Sincerely yours
D.H. Benjamin

THE LAUNDERER.

A PRACTICAL TREATISE

— ON —

THE MANAGEMENT AND THE OPERATION OF A STEAM LAUNDRY

— BY —

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PREFACE.

IT HAS often been stated that there is no technical work published on the laundry industry, and as a need of such work has often been suggested to the writer, and being convinced that it would be appreciated by the general laundry public he has attempted to meet the requirements of the trade and herewith offers the following work, hoping that it will be received and awarded such merits as a true criticism will give. There has been an attempt to set forth a practical, common-sense standard which can be generally followed, and a like technical information which will aid the novice and professional to overcome many of the perplexing difficulties which arise in the laundry business. The reader may not agree with everything in this book, as the writer is fully aware of the diversity of opinions in the methods and operation of a laundry, and while the points herein set forth are in every way practical, no doubt there are many which can be improved. The writer makes no claim to superior knowledge, but only sets forth his experience and observation in the practical workings of the laundry business in its various departments. It is quite impossible in a work of this kind to make it broad enough to cover every condition that may arise. The reader may find it necessary to depart here and there from the text of this work to meet the requirements of different conditions which exist in different localities, and he should study the work and adjust it to his conditions, and not try to adjust his conditions to the work. The greater diversity between men's opinions and the opinions here given will be in the plans of the laundry, the arrangement of the machinery and the application of the machines more than the methods of operation. As this work is the result of one man's experience, of course there are many existing conditions which have never come under his observation, and which may be found to be omitted.

It is impossible, without extending the number of pages beyond reasonable limits, to illustrate every laundry machine. For this reason only a few of the prevailing types have been shown in any one case. The selection of any one machine must not be understood to indicate that the author is partial to the particular machine illustrated. The purchaser should fully consider the varying conditions which are to be met, and select the machine best suited to them.

The prospective purchaser should not be guided in his selection of machinery by reported failures on the part of any one machine in a laundry. It is an undisputed fact that a failure upon the part of one laundryman to successfully operate a machine has been completely offset by the complete success of another laundryman with the identical make of machine.

D. H. Benjamin.

Ionia, Michigan, October, 1900.

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THE LAUNDERER.

CHAPTER 1.

INTRODUCTORY.

The laundry industry is divided, naturally, into two distinct classes of work, laundering and relaundering. When the garment is new, it is laundered. After it has become soiled, it must be relaundered, and, while the character of the work is similar to first laundering, the method employed is somewhat different. In the present work, the subject of laundering new work will be taken up first, and that of relaundering afterwards.

The laundering of new shirts, collars and cuffs, must be done perfectly, and, in the present state of competition, manufacturers have brought the laundering of their goods to the highest degree of excellence. Anyone making a good garment, and poorly laundering it, has but little chance in the sale of his goods, when competing with the manufacturer who may make a poorer class of goods, but who launders them well, and who therefore finds a ready market for his output.

The laundering of new goods has become an art, and the volume of business done is regulated by the character of the laundry work, much more than by the manner in which the goods are made. A poorly made garment, nicely washed, starched and ironed will make a far better appearance than a well-made garment poorly washed, starched or ironed, and it will be observed in all manufacturing that greater talent, skill and energy are put into this department than anywhere else. If you should inquire where the turning point in the business is, you would surely get as the answer, "The laundry." Therefore, anyone starting out to launder new work must be prepared to strive for perfection in every detail.

CHAPTER 2.

EQUIPMENT OF A NEW-SHIRT PLANT.

Washroom. Capacity, 40 dozen shirts per day.

One four-pocket dash wheel; one thirty-inch extractor; one hot-water tank in rear of dash weel; one bluing- and starch-tank in rear of and connected with dash wheel; stationary tubs; soap tanks; crocks for water heater, etc.

DESCRIPTION.

A dash wheel is a washing machine having an inside cylinder about eight feet in diameter and three feet wide, with four partitions through its periphery, forming a cross at the center and dividing the space into four three-cornered compartments or pockets. This cylinder is perforated and it revolves in a water-tight case. It has no reverse motion, but runs continuously in one direction. Each compartment has a door, and ten dozen shirts may be placed in every one. The outer case has also an opening, which is closed by a water-tight door. Shirts are tied around the body, with the arms secured so that they can not become entangled while revolving in the machine. An illustration of a dash wheel is shown in Fig. 1.

The action of the machine is as follows: the same number of shirts, say ten dozen, is placed in each one of the four pockets; the machine is made to revolve and the goods are dipped down into the washing solution, whatever it may be, and are then carried up over the center and dashed from one corner of the pocket to the other. Goods change positions in a dash wheel four times in each revolution, this making a dash wheel much more effectual than the common cylinder washer, because of the greater action in each revolution.

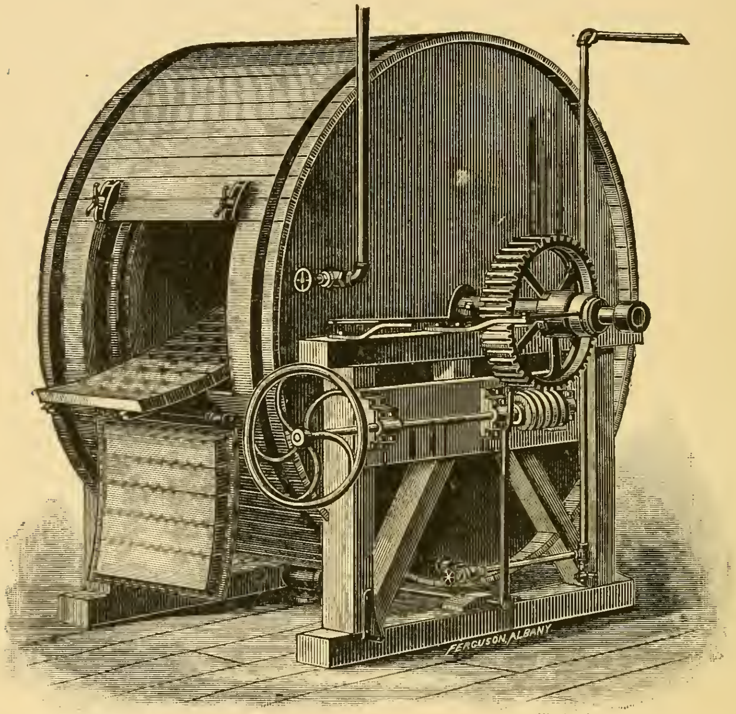


Fig. 1. DASH WHEEL.
(Troy Laundry Machinery Co.)

If new work is to be undertaken, the author would strongly advise the use of a dash wheel. It is more economical in material, and is more effectual in pounding the sizing and color from the fibre. New goods come from the bleacheries filled with sizing, and have a very tenacious green shade all of which has to be removed before a fine color can be established, and nothing is so effectual in accomplishing this as a dash wheel. Light shirts may be washed satisfactorily in a small machine, but heavy muslins, like Wamsutta and New York Mills never should be washed in a cylinder machine; otherwise the seams will be yellow, and the bosoms more or less streaked in spite of anything that can be done. Examine the binding of a bosom, for instance, where several thicknesses are tightly stitched down; it is impossible to thoroughly bleach and destroy this color in the goods in the cylinder machine, consequently, when the bluing is applied, it will not "take" in these seams, and, when the shirt is ironed the seams will be yellow. Such shirts must be washed in a dash wheel, where they will receive heavy "pounding," in order to thoroughly saturate all parts of the shirt with the washing solution.

CONNECTIONS OF A DASH WHEEL.

Dash wheels should be connected with hot and cold water, and steam, using large water pipes in order that the machine may be filled quickly. It should have large sewer connections, so that it may be emptied promptly. A water glass to indicate the depth of water in the machine is also a valuable adjunct. Makers of dash wheels seldom put on water glasses, unless specially requested to do so. But a machine without a water glass can be operated only by having holes bored in the side of the machine, so that the water may run out when it has reached the level of the holes, thus indicating the amount of water in the machine. This is a very uncertain operation, and to insure uniformity of results it is necessary to have a water glass.

There should be erected on an elevated platform a stationary tank, and this tank should be connected with the machine. There should be an open steam pipe leading into the tank, for cooking the dipping starch, and heating the bluing and souring solutions. The tank should be made large enough to hold all the water, or solution of any kind, that the dash wheel may require at one time. There should be steps leading to this platform, and everything about this tank equipment should be made as convenient as possible, for the whole operation of the washing is done by the means of this elevated tank. In this tank all solutions are mixed and properly prepared before being run into the machine. To the rear of the machine there is usually attached an aluminum soap tank, for putting the soap or any other solution into the machine.

The ordinary dash wheels are belted directly, without gearing, from a countershaft, which is furnished with the machine. The speed of the dash wheel should not be over twenty-eight turns per minute, if it runs much faster than this, the goods are swung completely around by centrifugal force and receive no action whatever. It is necessary to use the very best double belt to run a dash wheel, as it must run quite slowly, and the belt has to be very taut.

In case one desires to use a cylinder washer, for the purpose of washing new shirts, the author wishes to state that it is necessary to erect an elevated tank in connection with the machine in the same manner as that described in connection with the dash wheel, and for the same purpose. A cylinder machine, in its essential details, will be described later.

It is absolutely necessary, in any washroom, whether it be for new work or old, to have some sort of hot-water system. Having hot water, not only facilitates and shortens the process of washing, but enables one to get better results than from heating cold water by steam. Every change of water should be of the same temperature, as the water preceding it, and this condition can only be brought about by having a supply of hot water always ready for use.

There are several different methods of obtaining hot water, the most approved plan being the utilization of exhaust steam from the engine. Of course, if an engine is not used, then live steam must be let into the water tank directly, but in almost all steam laundries today, a steam engine is employed. A regular hot-water plant consists of a large elevated tank, used for storage, and the water passing into this tank, and then through an exhaust steam heater, becomes heated from exhaust steam.

There are many makes of hot-water heaters, but where there is a mineral deposit in the water, the author advises the use of that class of heater which not only heats the water, but also removes the greater percentage of mineral deposit. In this kind of heater the steam is exhausted at the bottom of a large steel tube; at the bottom of this tube is placed excelsior, and above the excelsior several sections of plates of iron. Water is admitted at the top, flows over these plates, and as it falls it passes through the steam, when the mineral deposit is precipitated, the water becomes heated, and is pumped into the elevated tank. This class of heater has an oil separator, which removes all oil that there may be in the exhaust steam, and prevents any of it from getting into the hot water. An example of this form of heater is shown in Fig. 2.

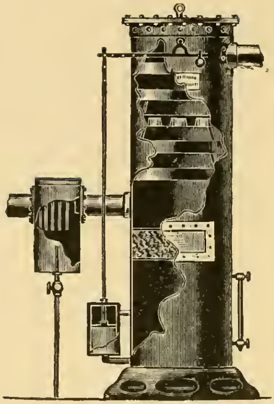


Fig. 2. MONITOR WATER PURIFIER.
(Monitor Water Purifier Co.)

Another form of heater, which is much used, consists of an arrangement similar to the one already described, except that the inside is filled with coils of copper pipe, through which the exhaust steam passes. This heater is filled with cold water, and receives the heat from the steam by radiation through the copper pipe, whence it flows by pressure into the tank. With this kind of heater no pump is required.

A very cheap method of heating water is as follows: Have an elevated tank, in the bottom of which has been placed a coil of steam pipe, through which the steam is to be exhausted from the engine so that the steam heat will radiate through the pipes into the water. The coil, in this case, should be sufficient to radiate all the heat in the steam, and should any steam escape when the tank is filled with cold water, it would indicate that more coil is required. With this arrangement, when the tank is first filled with cold water, no steam should exhaust into the open air. The coil must have an outlet, for when the water becomes hot, the steam will not condense in the coil, and it therefore must escape or produces a back pressure on the engine. I consider this arrangement very desirable, as it not only serves as a hot water heater, but produces a partial vacuum in the exhaust pipes by the steam becoming condensed, and thus increases the power of the engine. In other words, it serves the purpose, to a certain extent, of a steam-engine condenser.

This storage hot-water tank may be placed in any convenient position in, or outside the building. It should be elevated sufficiently to allow the water in the bottom of the tank to gravitate to the washing machines. There is very little danger of its freezing, the water always being hot. The only difficulty that might arise, would be with the water freezing in the pipes leading from the tank into the building. But no trouble should be experienced if these pipes are well protected. If necessary to have a tank outside, it is practical to so place it. The tank should be connected with the washing machines, to the elevated tank in rear of washing machines, and to the stationary tubs or other places where hot water is needed.

In the equipment of a washroom, a good extractor is a very important adjunct. There are many makes of extractors, but all embody the same principle, *i. e.,* the extraction of the moisture from the goods by centrifugal force. All the moisture is not removed by the extractor, however, and the machine that can run at the highest rate of speed with safety, is the most desirable machine to buy, because the greater the number of revolutions of the basket, the greater the amount of water that will be extracted.

The universal type of extractor is constructed as follows: A perforated steel cylinder or basket is mounted on an upright shaft, in yielding bearings, and driven by a pulley on the lower end of the shaft. The basket is enclosed in a water-tight casing which is open at the top. The yielding bearings are necessary to allow the machine to revolve on the center of the centrifugal force. It is impossible to place goods in an extractor perfectly in balance, and if the machine is made with rigid bearings, and operated at a high rate of speed, it will run with great vibration, on account of the load being out of balance. When, however, it is mounted in yielding bearings, and the shaft allowed to oscillate, the mass of weight will find its own center and revolve on the same principle as a top, without causing any vibration to the machine or the foundations. The principle point of merit in an extractor is that it is capable of being run at a high rate of speed with its load very greatly out of balance. The best extractor being that which can be run at the highest speed and the most out of balance. The yielding bearings are usually an arrangement of springs in the bearing directly underneath the basket, and the lower end of the shaft is mounted in a ball bearing. This allows the shaft to oscillate and swing about its lower extremity. See illustrations, Fig. 3, 4 and 5.

Another very good type of extractor, which, in the author's judgment, is built on the best scientific principles, is that in which the shaft extends above the basket, with the upper end secured in a ball bearing, while the lower end rests in a movable box. In this type of machine, gravity acts in place of springs. The objection to an arrangement of this kind, is that the machine driven from above, and to have the shaft extending above the machine, is not so convenient as when

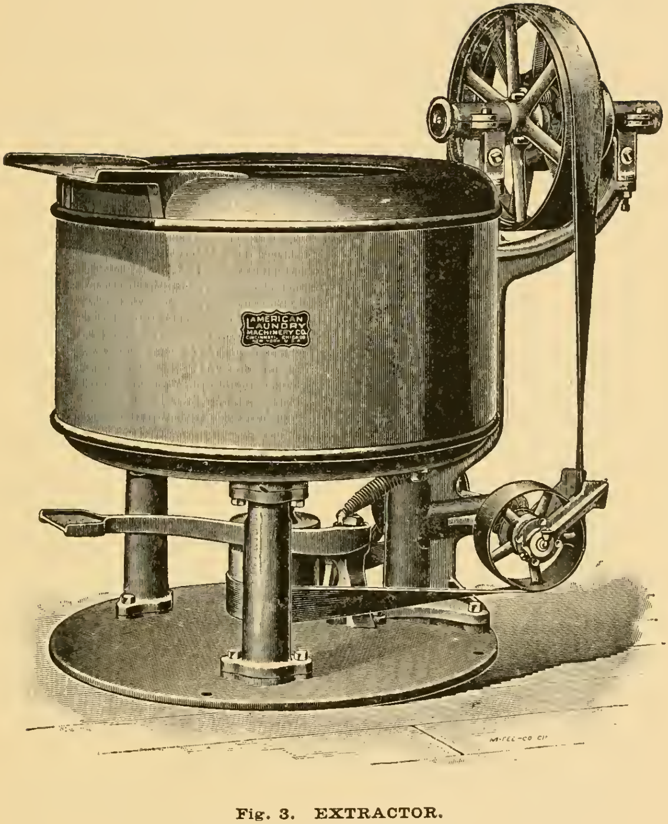


Fig. 3. EXTRACTOR.
(American Laundry Machinery Co.)

the machine is driven from below. Manufacturers of this type of machine, however, have brought it to the highest state of perfection, and its many advantages quite outweigh this objection. An example of this type is shown in Fig. 6.

Extractors are dangerous machines, at the best, and they should be handled with the utmost care. If they are run at too high a speed, there is danger of an explosion, and when an extractor explodes, the result is almost equal to that of a boiler explosion, and it may be very destructive to life and property. There is great danger, also, in running this machine too much out of balance. Many times the vibration causes the bending of the shaft or breaking of the spring, in which case the results are likely to be disastrous.

An extractor is driven by a countershaft, which is generally furnished with the machine. It is well to have a friction pulley on the countershaft, which drives the machines, to take the slip or lost motion when starting. It takes quite an amount of power to start an extractor, but after it has reached its speed very little power is required to keep it in motion. Therefore, it must be started slowly, and should there be no friction pulley, the belts will necessarily slip, in which case much damage is caused to the belt, as well as loss of power.

The larger the extractor the less its drying capacity. It is the quick travelling of goods around a small circle that causes the greatest centrifugal force; the larger the circle the less the centrifugal force at the same surface speed. A thirty-inch basket is the most practical machine for steam laundries.

The usual speeds of standard makes of extractors are as follows:

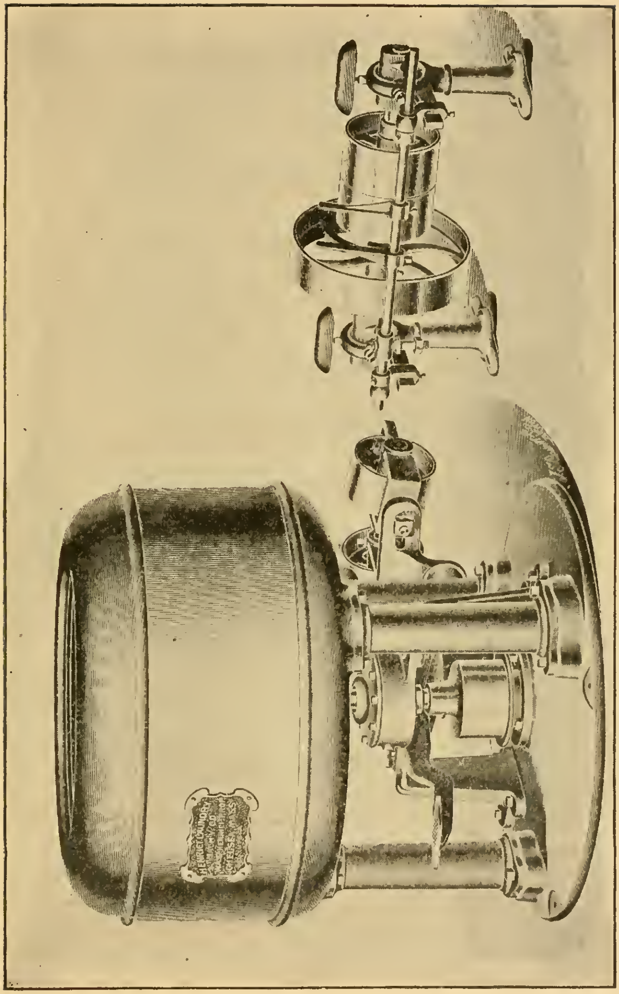


Fig. 4. EXTRACTOR.
(Henrici Laundry Machine Co.)

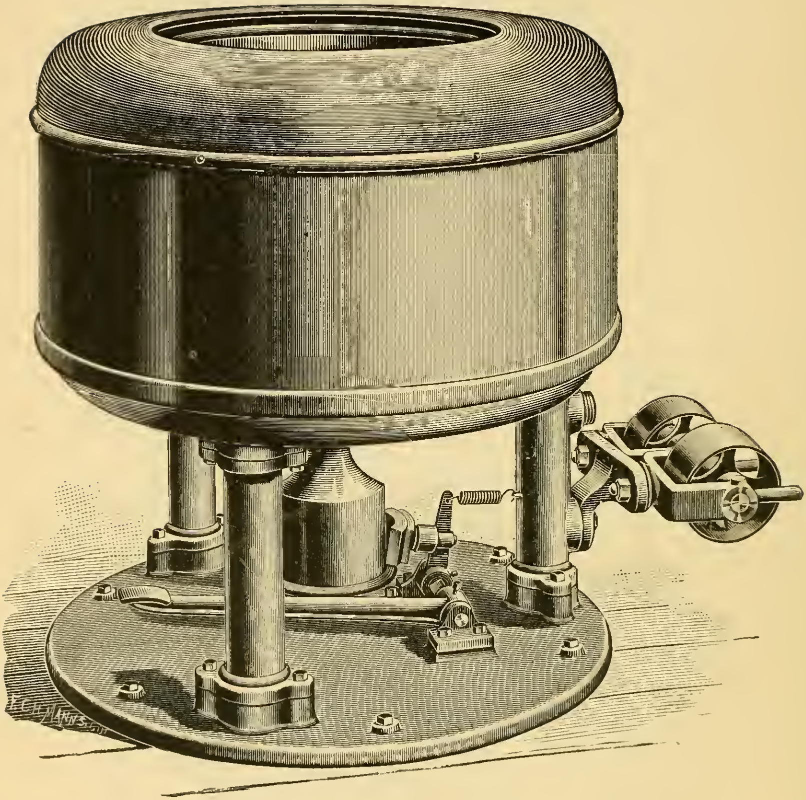


Fig. 5. EXTRACTOR.
(The F. M. Watkins Co.)

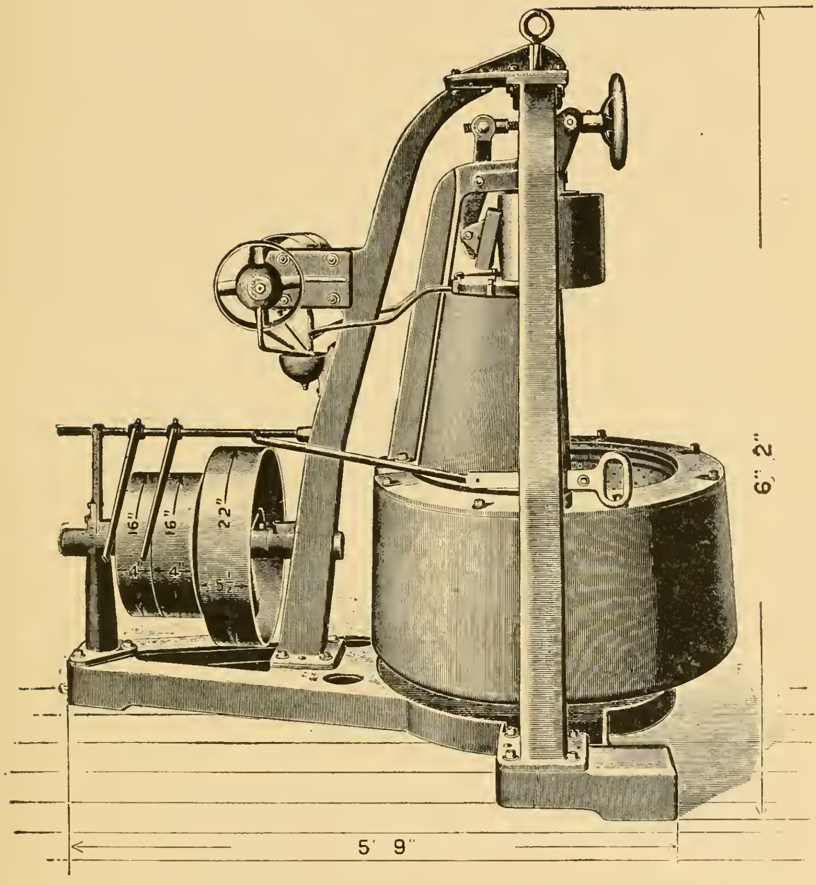


Fig. 6. EXTRACTOR.
(A. T. Hagen Co.)

20-inch basket, 1,400 revolutions per minute.
24-inch basket, 1,300 revolutions per minute.
26-inch basket, 1,200 revolutions per minute.
30-inch basket, 1,000 revolutions per minute.

Sizes larger than 30 inches are unusual, and anyone purchasing a machine of larger size should get advice regarding the speed from the manufacturer. Extractors are made as large as 60 inches, but such machines are not practical for laundry purposes, and are used more especially in woolen mills and textile manufactories.

It is doubtful if it is economy for a laundryman to manufacture his own soap. There are so many thoroughly reliable houses, and competition has brought the price of soap to such a low figure, that it does not pay to make it yourself. In either event, whether a laundryman makes his own soap or buys it, a metal soap tank is a necessary adjunct to every washroom. The usual commercial soap sold to laundries is put up in barrels in chips, and to use this soap economically it should be boiled up into a liquid soap.. A metal tank is necessary for this purpose, as the alkali destroys wood fibre, and a wooden tank becomes worthless in a very short time.

The soap tank is preferably made of galvanized iron, and, for ordinary washrooms its dimensions should be as follows: Diameter, 36 inches; depth, 30 inches; made of No. 22 galvanized iron. In the bottom should be a circular steam coil, with small holes about one-eighth inch diameter, drilled about one inch apart. The end of the pipe should be capped, to compel the steam to escape through the holes, and thus produce small steam jets all over the bottom of the tank. Water should also be run to this tank.

A tank of this size will cook up about a half barrel of chipped soap. To use it, proceed as follows: Fill the tank about half full of hot water, empty in about half a barrel of chip soap, turn on the steam, and boil until the entire mass is a saponified liquid. If any "building up" is necessary, add it to the soap when boiling. The author considers it a good plan to buy neutral soap, and to strengthen it with caustic soda or potash. In this way one knows exactly what he is using, and if he is acquainted with the amount of caustic the stock will saponify, he is never in danger of getting free alkali in his soap.

Many manufacturers make what they term a "strong" soap. The author has found this soap to contain quite an excess of alkali, and alkali in a free state in goods is most ruinous in its effects. It destroys fibre nearly as quickly as sulphuric acid, and therefore laundrymen must be very careful to determine that their soap is not "overloaded." The author does not consider it safe to add over 5% of caustic soda to pure neutral soap, and if the soap is in any way strong, the adding of caustic soda must be undertaken very cautiously. However, as the present discussion is on the subject of new work, the matter of the strength of the soap is not of so great consequence as in the case of old work. New goods are very little soiled and only need a sudsing to soften the fibre, and make them in better condition to receive the other chemicals. In case colored goods are being washed, an entirely neutral soap is required.

The necessary equipment for doing new work having been described, the process of doing the work will now be explained.

CHAPTER 3.

PROCESS OF WASHING.

The foundation of good work, be it new or old, is in good washing; and when I say washing, I do not mean what the word technically implies, but the manner of cleansing the goods, the body starching and the coloring. Color, especially in new work, is of the highest importance, and it is a matter in which every manufacturer endeavors to reach perfection. New work requires to be decidedly blue in tint, in order that it will appear white after it has remained in boxes and until it reaches the purchaser. If goods do not have this blue tint when they are first laundered, they will shortly become yellow and unsightly. It is also necessary to have the blue tint well "set" in the goods so that it will not easily fade. New goods are rarely sold to the consumer in less than six months after they are manufactured, and they should therefore have a color that will stand that length of time. It is the proper manipulation in the washroom that gives such a color. The author thinks he can safely say that every manufacturer of importance in this country uses aniline colors. This dye is easy to handle and rarely spots or streaks, as does ultramarine, and, when properly used, produces a pure and beautiful shade. However, aniline is a very fading color, and must be handled with the utmost care or it will escape and leave the goods in a yellow condition. The author understands that ultramarine is used quite extensively in Europe, but personal experience with the two colors makes him favor the aniline, and he believes that any one acquainted with the method of handling it would use no other. Indigo blue and the bluing bag are so far behind the times that it is scarcely necessary to refer to them at all.

Under the head of washing new work, white shirts will be considered first. Washing white shirts requires greater care, and the process is more complicated than when handling any other work, excepting white collars and cuffs. Shirts that are to be washed in a dash wheel must be tied in such a manner that they may not become entangled, for, in case they should, they will not receive the proper treatment, as the liquid can not penetrate the mass of the goods, and the center of the mass will not receive the same color as the goods on the outside. Moreover, when the goods are in an entangled condition they are more likely to be torn, and will become so matted together that they can not move except as they may slide from side to side in the pocket. It very frequently happens that they are worn out completely where they come in contact with the wood in the machine.

Tying shirts for the dash wheel consists in binding a string around the shirt, securing the arms to the side of the shirt and fastening it just below the bosom. When a shirt is tied around the bosom the color will not take in that part of the bosom with which the string is in contact, resulting in a yellow shade on the shirt at or near the bottom of the bosom. Shirts should always be tied with a white string, as any sort of colored string will stain the goods.

The ordinary dash wheel will wash forty dozen light shirts, or thirty-six dozen heavy shirts, which, when equally divided, will be ten dozen light shirts or nine dozen heavy shirts to the package. It is never advisable to overload the washing machine, as there should be space enough to allow of free action of the goods and liquids, in order to produce the desired results. If the machine is too full the goods will not move as they should.

Warm water must be admitted into the machine while it is in motion, and it should rise to a level of about eight inches from the bottom of the machine, as indicated in the water glass.

Soap should then be added, in a quantity sufficient to produce a free suds. The goods should be run in this suds about thirty minutes. Washing in suds is not for the purpose of removing the dirt so much as to soften up the fibre and remove all sizing contained in the goods. New work is usually very little soiled, and consequently it does not require a very strong soap. The object to be attained is to free the goods of all foreign matter, and leave them in a condition which will allow a free action of the process which is to follow. After "sudsing," the goods should be thoroughly rinsed in warm water the same temperature as the suds, and it should be noted here, that in no case should any water enter the machine at a lower temperature than the water preceding it. In other words, never allow the goods to be cooled below the temperature which they have been given already. It is recommended that they be rinsed after the suds, twice in warm water, and about five minutes each time.

Next in order comes the bleaching, which is of the highest importance in new work. All muslins that are made into shirts are already bleached, and have received a tenacious green shade from the process in the bleachery. This shade must be entirely removed before good color can be produced by the laundryman; therefore it is necessary to bleach the goods in order to get rid of this green color, but not for the purpose of making them any whiter than they really are. Goods, when properly bleached in the washing machine, should have no color whatever, but they should have a natural, pure whiteness, which condition makes it possible to treat them successfully by the laundering process. Some muslins require more bleach to bring about this result than others, and the laundryman must be the one to judge to what extent bleaching must be carried. He may possibly, after running the goods in a certain strength of bleaching solution for some little time, find that the color has not been entirely removed, and he must then add more bleach to the solution, and in this way, feeling his way, ascertain the amount necessary to produce the desired result. After the goods have been rinsed, run in water of the same temperature and as much as for washing add to this solution a quantity of chlorine liquid, the amount being regulated by the strength of the liquid. If chloronate fluid or chlorozone be used then the author would recommend as a starter for a lot of forty dozen shirts, about eighteen liquid ounces. If this is not sufficient increase the quantity until the result desired is obtained. If chlorine liquid, made from chloride of lime, be used, and which has the strength of 15 degrees Beaume hydrometer test, the author would recommend adding 55 fluid ounces and operating the same as with manufactured bleach. In either case, be it manufactured bleach or a solution made from chloride of lime, the elements used in this process are the same. There are a great many adherents to the manufactured bleach liquid, while many others stick to the old process of making chlorinated fluid from chloride of lime. See formula on page 350. Either solution is practical, and it matters little which is used, although the author believes that the manufactured article is most convenient and quite as economical. Manufacturers of chlorinated fluids of this nature claim that their process produces more chlorine than can be obtained from chloride of lime. They produce a chloriate from its natural affinity and charge into a solution the caustic soda liquid, while chloride of lime absorbs gas, and gives it off again when dissolved in the liquid. Of course, anyone can understand that the chlorine being incorporated in the lime, will escape to a certain degree, and the element mainly desired would thus be lost, taking this fact into consideration, the chlorinated fluid is, perhaps, the most economical.

It is generally supposed that chlorine does the bleaching. This is not the truth of the matter, however, It is the oxygen which destroys the color. The chemical action is, that the chlorine unites with hydrogen in the water, producing hydrochloric acid, and leaving the oxygen in the solution, which does the bleaching. After the laundryman has ascertained what strength of chlorine is necessary to use, it is advisable to run the machine in this bleach solution for about thirty minutes. After this, the goods should be most thoroughly rinsed in water at a temperature of not less than one hundred and eighty degrees. Rinse three or four times, from eight to ten minutes each time, having an abundant amount of water in the machine. It is absolutely necessary to remove every trace of chlorine in the goods, or else it will be impossible to produce any sort of color. Aniline blue can not act where there is any chlorine present, and, in order to thoroughly neutralize any chlorine which may remain after rinsing, it is recommended that the goods be treated to a solution of water and acetic acid, which is commonly called "souring." This will put the goods in a condition to easily take the color, and to retain a permanent shade.

Next in order comes the matter of coloring, which is the fine art in the laundering of new work. It is a fact that no two grades of muslin will take a color alike, and it is also true that the same process applied to a certain brand of muslin at different times, will not produce like results in color. The conditions vary in the treatment of muslins in the bleacheries, and variations in the water in some localities affect these conditions. Especially, is this true, when using mineral water. Water at times seems to contain more mineral than at others, and the object to be attained in new work, is uniformity in color. In order to obtain uniformity one must meet all conditions. It is not true that a formula can be given for the production of a uniform color under all conditions, and the man who would produce a uniform color must use a great amount of ingenuity in handling of solutions.

What is desired in new work is a true blue, a blue that will compare in shade to the sky. It should not be green, nor purple, nor violet, but blue. In order to get a true blue, one must use the three colors mentioned, green, purple and violet. The operator is advised to have a mixture of each shade, and, if in making up the color, it is found that the green predominates, add the violet, or, if the the violet predominates, add the green, using the purple for the foundation. If goods are too green they will look very nice and bright when first washed, but they will soon turn yellow, as yellow is the next color to green. If, on the other hand, they are too violet they will have a dark steel-gray appearance.

In order to insure permanency to the color, and brightness in effect, the use of oxalic acid is recommended, and the author states in this connection that if oxalic acid is properly used, nothing harmful will result. Oxalic acid has no injurious effect on goods when they are in a wet state, but if it is allowed to remain in the goods, and the goods are dried, then a chemical change takes place, and the oxalic acid is very destructive. But, if, after using the acid, it is thoroughly rinsed from the goods, there is no danger. The use of oxalic acid is recommended also, because it has the most natural affinity for aniline color, and for this reason it will render those colors most tenacious.

The author's plan of color with oxalic acid is as follows: Draw into the elevated tank, already described, about sixty-five gallons of hot water; add to this hot water, for forty dozen shirts, eighteen ounces of oxalic acid; thoroughly dissolve the acid in boiling water before pouring into the tub, otherwise the crystals might remain in the bottom of the tub, and not dissolve. Heat the water to a temperature of not less than two hundred degrees, and to this add the color. The natural effect of oxalic acid on aniline is to produce a green shade, and in order to offset this it is necessary to use a blue having a strong violet or purple shade. One has to feel his way in this matter, and the author would suggest not putting as much blue as the operator might at first think necessary into this oxalic acid solution, but only enough to give the indicated shade, as more can be added afterward in case it is found that the goods are not blue enough, or have not the right shade. The author usually immerses the shirt by hand in this bluing solution, and when he finds that it appears too green, he adds a deeper shade of violet, or, if they appear too violet, he adds a deeper shade of green, and in this way any desired shade of blue may be produced. After having "tried" the color in this way, and finding that it is the right shade, the solution is allowed to run into the machine.

The laundryman will usually find that the goods in the machine will not be as blue as the shirt outside in the tank, and therefore, when making up the blue solution, it is usually necessary to have it several degrees bluer than desired, because, from some cause or other, when it enters the machine it will not blue the goods in the machine as much, and after several trials one can judge quite accurately the shade of the bluing necessary to produce the desired shade in the tank.

Should the goods not be blue enough, more bluing must be added to the machine. This may be done through the box at the back. Care must be used to pour it in slowly, or else the goods will not receive a uniform shade of blue. When the goods become too blue the remedy is more troublesome to apply. In this case it is usually necessary to bleach all the color out of them and to begin again, as the oxalic acid renders the aniline an almost indelible dye. No amount of rinsing will remove it; nothing but bleach. Therefore when the goods are too blue it is about useless to try and rinse the color down. Begin again, remembering to be more conservative in the amount of colors next time.

It is necessary to run the goods in this solution not less than thirty minutes, and longer if the shirts are heavy, in order that the bluing may take well in all the thick seams and bands. After the goods have remained a sufficient length of time in this water-color they should be well rinsed three or four times in warm water having in it about eight ounces of acetic acid. The author usually prepares the rinse-water in the tank before letting it into the machine. This is done in order to prevent any water coming in contact with the goods before it has received the acetic acid. It is necessary to use this acid rinse-water to preserve the brightness of tone in the color and prevent fading. Pure acetic acid is entirely harmless and will not injure the most delicate fabric and, by its use in this way, the clothes may be thoroughly rid of the oxalic acid, still retain the color, and also any injurious effects from the oxalic acid will be prevented. After this rinsing the goods are ready for "dipping."

Dipping consists in starching the shirts with a small amount of starch cooked in a large quantity of water. Nearly all new work requires dipping to make it finish smoothly and firmly, and to produce a sizing in the goods. In the cheaper grades of shirts it is also necessary to produce stiffness in the body. The lighter and cheaper the muslins, the heavier should be the dipping, and as the quality improves the quantity of dipping is lessened until, reaching the finest grade of muslin, which requires but a very little body starching, only enough starching is necessary to prevent the bodies from having a "sloppy" appearance when ironed. Dipping also thoroughly fixes the color. It should be the object of the laundryman to have the goods the same shade after they are dipped as they were after being water-colored, and, in order to produce this result, a thin shade of bluing is necessary in the dipping.

As pointed out before, oxalic acid has a tendency to turn aniline blue to green, and in order to counteract this it is necessary to use a violet. It is found that the dipping has a tendency to turn aniline blue to a purple, consequently it is necessary to add green to produce the same shade in the goods as with the water-color. Should the same combination of bluing be used in the dipping as in the water-color the goods would turn to a deep violet or purple, and should the same combination be used in the water-color as in the dipping the goods would have a green appearance. Consequently in the water-color more of the violet shade and less of the green must be used, and in the dipping more of the green shade and less of the violet. By experience one is enabled to so nicely mix his colors that the shade of the goods after they are dipped will be exactly the same shade as after they are water-colored, while yet an entirely different combination of bluing is used in the dipping.

It is very difficult, and perhaps impossible, to set any formula which can be applied in the matter of color. It must all be regulated according to the conditions and the quality of the goods being treated, and the only thing left for the laundryman to do is to have his different shades of color and then to study the combinations and effects. It should be stated here that the dipping should never be bluer than the goods after the water-color; if anything, it should be a trifle less blue. Should the dipping be bluer it will settle in the heavy parts of the shirt, such as the bosoms and bands, and cause a mottled appearance when ironed. On very light, cheap shirts it is necessary to extract the water before the goods are dipped in order that they may take more starch and have a heavier feeling when finished. Many buyers of this class of goods are very particular about the "weight." In some instances I have known buyers to weigh a half dozen shirts, and if they did not come up to a certain standard, they would be returned, with the statement that the muslin (?) used was not of the proper weight. Yet it was not the muslin which was at fault, but the goods were dipped too lightly.

For a cheap, light shirt the author advises using 28 pounds of starch and 60 gallons of water for forty dozen shirts; for a medium grade of shirts it is advisable to use 20 pounds of starch and 60 gallons of water, and for the best grades of shirts, 10 pounds of starch and 60 gallons of water. One can use a fair grade of corn starch that may be purchased in the market at present for about 2½ cents a pound. Nearly all dealers keep this grade of cornstarch, and it will answer the purpose as well as a higher priced quality. The starch dipping should be boiled in a tank for five or ten minutes, and to this solution be added about twelve ounces of acetic acid and the required amount of bluing. It is also necessary to test the dipping and the shade of blue in the same manner as when testing the water-color; viz., by dipping a shirt into the solution, and in order to ascertain the correct shade it would be well to examine a shirt after extracting. This will enable the operator to correctly judge the depth of color, whereas, if one looks at a shirt thoroughly saturated with the bluing it appears bluer than it is when the starch is extracted and the goods are in a true state of color. Goods, when they have the proper color, should appear, particularly when held towards the light, quite blue, and light coming through the goods should be the same tint as the goods. If this is not the case and the goods reflect a dull, greenish tint, then the color is "off," and should they be laundered in this condition they will have a very dark appearance. After the shade of the dipping starch is considered correct, let it run onto the goods for about twenty minutes. After this they should be removed from the machine and thoroughly extracted.

It is advisable to run the goods in the extractor twenty minutes, in a machine that is run at twelve hundred turns a minute. It is necessary to extract all water possible from the goods before they are sent to the starchroom, for any amount of water left in them will weaken the starch just so much, and they will be proportionately soft.

The method of washing white shirts is, in brief, as follows: Run shirts ten minutes in lukewarm water. Rinse well in lukewarm water three times, five minutes each time. Bleach: 16 fluid ounces of chlorinated fluid, 60 gallons of water. Run thirty minutes. Rinse three times in acetic acid solution, ten minutes to each rinse. Dip made of 60 gallons of water, 28 pounds of starch, acetic acid and blue. Run thirty minutes; take out and extract. White collars and cuffs are treated in a similar manner to white shirts, and the formula is practically the same.

The washing of colored bosoms and white bodies is an entirely different process from the washing of white shirts. Many of the colors in print goods are very fading, and in no case can any bleach or oxalic acid be used, and but very little acetic acid may be employed. In some colors no soap can be used without danger of fading the goods. The manufacturers of print goods use two kinds of dye; one has an alkali basis and the other has an acid basis. The alkali color will stand any amount of soap and not fade, while if too much acid should be used, it will cause the color to fade. But with the acid-colored goods soap will fade them and acid brighten them. As it is not practical to determine the nature of every color with which one has to deal, it is necessary to make the solutions so nearly neutral that they will not affect either color. On the cheap grades of colored bosom shirts it is advisable to use no soap. Usually the goods are not soiled, and the action of the machine, together with the different solutions, will cleanse the goods of all dirt or soil they may have received when being made.

It is necessary, also, to warn laundrymen never to use a hot solution on colored goods. Many goods are faded by using too hot starch, and laundrymen are prone to attribute it to other causes than this one. Colored bosom shirts which have cuffs to match should have the cuffs washed with the shirts in order that if there be any fading or changing of shade, the cuffs will receive the same action as the shirts and will match them when laundered. Otherwise the bosoms and the cuffs may be of different shades when finished.

The best method of handling colored bosom work is as follows: Rinse goods about fifteen minutes in lukewarm water. The coloring of the bodies of this class of goods is better done in the dipping starch. This starch should be made in about half the quantity of water which is required for the dipping, and after the starch is cooked, draw into the solution as much cold water as is necessary to dip the goods, and as will bring this solution to a temperature which will not fade the colors. The dipping should never be any hotter than can be borne by the hand. To this solution of dip add six ounces of acetic acid, and the required shade of blue. The bluing of white bodied shirts should be a deeper shade than for white shirts, as the color can not be so thoroughly fixed in the goods, and therefore it will fade to a considerable extent while being dried and dampened. After the color is found to be correct, run the dipping into the machine in the same manner as for white shirts. Run not less than thirty minutes, and extract.

In any laundry there will be a certain amount of goods which have to be done over, or relaundered, from some cause or other, and the treatment of these "wash-overs," as they are commonly called, is somewhat different from the process employed when they were originally washed. They usually come back to the wash-room more or less soiled, and require greater care in the washing, that is, they necessarily have to be washed in a strong solution of soap and water in order to remove the soil or dirt they may have on them. Consequently, more attention must be given to this part of the process. They should first have the starch and sizing rinsed out of them with lukewarm water, and then be washed for about thirty minutes in a good strong soap suds, after which they should have a second suds, and run from fifteen to twenty minutes longer. Then the water should be brought to a temperature of not less than two hundred and ten degrees, after which they should be thoroughly rinsed in hot water. After rinsing they should have a slight bleaching, and then be finished in the same manner as when originally washed. Care should be taken in the amount of bleach used on the goods the second time. If they are bleached as strongly as they were originally, it might cause them to be tender, and it is not necessary to do so, as there is no color in them to be removed, except stains, which may incidentally happen. The wash-overs of colored bosom shirts require washing in the neutral soap, and in order that the cuffs may match the bosoms, should they have any, the cuffs should be matched up and washed with the shirts, even though the cuffs do not require it, for, if the shirt that has cuffs should be washed at any time without the cuffs, the two may not match. After these goods have been washed in a lukewarm neutral soap, they should be rinsed and then dipped, as when originally treated. It is customary, and convenient, to have a small washing machine especially for wash-over work. Then this class of work will not interfere with the regular routine of the wash-room.

CHAPTER 4.

THE STARCHROOM.

In about every well regulated "new-work" laundry, the wash-room is in the basement; this seems to be the most natural and convenient place for it, and as the goods are generally under cover, there is very little trouble from dirt falling on them. It is customary to have the starchroom and the ironing-room on the top floor, for the reason that the goods while there are generally exposed, and dirt and dust is likely to fall from the ceiling, particularly if there is an occupied room above them. There is never trouble from this source where these rooms have no others above them. Moreover, a better light is to be had in the upper story of a building, and good light is necessary to good work.

The starchroom is preferably supplied with a cement floor, which should be graded to an open sewer connection. This floor may be so constructed that it will be very durable, and absolutely water tight. It is injudicious to try to conduct a starchroom in an upper story without having some sort of a water-tight floor. In fact, any form of metal floor will soon rust out, and cause leaking, and any kind of wood soon rots away. Therefore cement would appear to be the most practicable, and although it may be a little more expensive, the first cost is a minor consideration when everything else is taken into account.

A cement floor may be constructed as follows: Remove the ordinary floor and insert a false floor between the joists, about four inches below the top of the joists. Into the space above the false floor pack a certain amount of good Portland cement and gravel. After this has hardened, finish the top in the ordinary way, having an average thickness, in every part, of about five inches. After this floor has hardened it will be very durable and serviceable. It would be necessary to have a templet for the bolts to secure each machine in its position so that when the machines are in position it will not be necessary to disturb the cement.

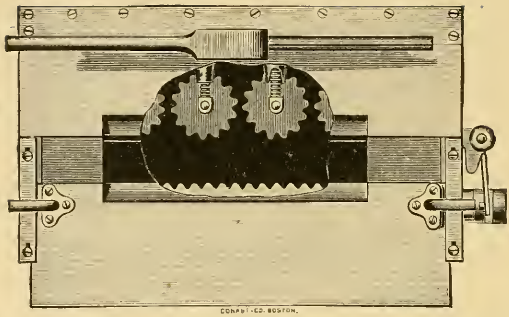
The following formula for a cement floor is that used by the author: The total depth of gravel and cement should be about five inches. The first four inches should be made up of coarse gravel and Portland cement, in the proportion of two to one mixed in a trough of water. After being placed in position, it should be levelled off and pounded down with a heavy maul or a tool such as pavers use. On top of this a coat of cement is laid, made up of gravel which has been sifted through a sieve having a mesh of one-eighth of an inch. This gravel is mixed with Portland cement in the proportion of two to one. It is also mixed in a trough with water, and spread over the gravel and cement bottom immediately after it is wet up.

The method of putting down cement floor is in squares, or blocks. The cement is outlined by a straight edge set edgeways, and the cement is filled in flush to the straight edge, and then stroked off level with the top. After it has set, the straight edge is removed, and a fresh piece of cement put in. It is necessary to have a good foundation for a cement floor. If it is made on the ground floor, the cement bottom should be made on the dirt. If made on an upper floor the floor should be shored up underneath with posts to prevent any spring in the floor, as in the case of the floor springing the cement would become cracked and would leak. In buildings where an ordinary floor has been laid, it will be necessary to remove the old floor and make a false floor about three inches below the top edge of the joists. This is done by nailing cleats securely to the side of the joists and filling in between with short boards well fitted together. On this base floor the gravel and cement is placed and the cement floor built up in the same manner as already described. The cement floor will finish higher than the original floor, which is necessary in order to cover the joists and make a secure job.

The shafting and power transmission devices for the starchroom machinery may be placed overhead. It need not be very heavy shafting as the power required in the starchroom is very light. Modern starching machinery requires very little power. The movement of the machines is rather slow, consequently there is very little dust arising from the movement of the belts and shafting. It is necessary to have a supply of cold water and steam in the starchroom, hence the piping for these must be put in place.

The machinery necessary for the modernly equipped starchroom are, shirt starching machines, collar starching machines, power roll wringers and band starching machines.

A practical machine for starching the general run of new work is the Benjamin machine. This machine forces the starch into the shirt by pressure and not by friction, the pressure being sufficient to drive the starch through the many thicknesses in a shirt bosom,



TOP VIEW OF NEW UNIVERSAL SHIRT STARCHER.

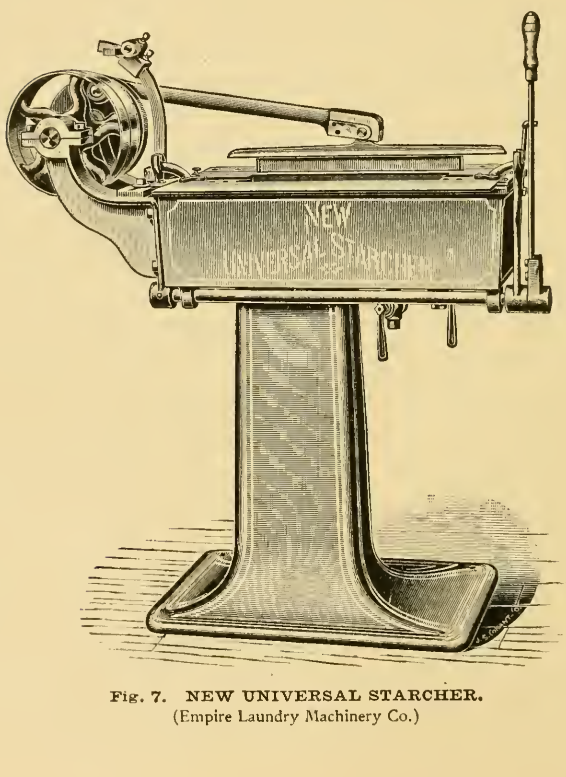


Fig. 7. NEW UNIVERSAL STARCHER.
(Empire Laundry Machinery Co.)

and especially is this recommended where heavy work is to be done. This machine has also rubber stripping rolls which remove the starch from the surface of the shirt, leaving it free to wipe and finish.

A general starching machine for stock work is the New Universal, shown in Fig. 7. In this machine the shirt is kept in a straight position and not tangled into a bunch, as is sometimes the case.

Another important machine in the starchroom is the collar starcher. While there may be doubt as to the real economy of labor in using a collar starcher in a custom laundry, it may be said that this machine is almost indispensable in any laundry doing new work, especially colored collars and cuffs. The old process of starching collars and cuffs is generally known as the dipping process, that is, the goods are put into a sort of tumbler together with hot starch and churned around for a certain length of time. This process pounds the starch into them, and while it produces stiff work at a very low cost, it will not do at all for new work and particularly for colored goods. In the first place the hot starch and the action of the machine is very destructive to colors and causes a great many wrinkles which it is almost impossible to remove. The shape of new collars and cuffs should always be considered, and where they are starched in a dip-wheel it is about impossible to get them true in regard to shape. Of course, on the better grades of collars and cuffs it is possible that they may be handled in a dip-wheel, but it is preferable that they be starched on some good collar starcher. The majority of the colored work at the present time is starched dry, that is to say, it is not washed at all, but simply run through the machine and starched. Much of this goods is manufactured and made into collars and cuffs which go with either negligee or stiff-bosom shirts, and are of the same pattern as the collars and cuffs. Negligee shirts are not starched at all excepting neck and wristbands, and the collars and cuffs must necessarily match

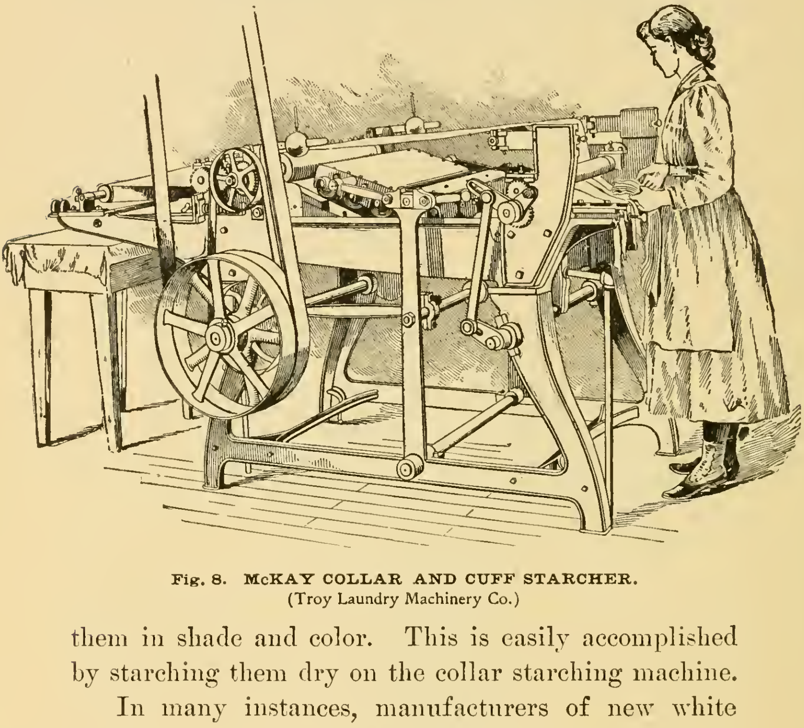


Fig. 8. McKAY COLLAR AND CUFF STARCHER.
(Troy Laundry Machinery Co.)

them in shade and color. This is easily accomplished by starching them dry on the collar starching machine.

In many instances, manufacturers of new white collars and cuffs are using collar and cuff starching machines. I believe it to be of advantage on this class of work, as the cost of starching new goods is much greater than starching old work, and therefore it is economy to have a collar starching machine. The McKay Collar and Cuff Starcher, shown in Fig. 8,

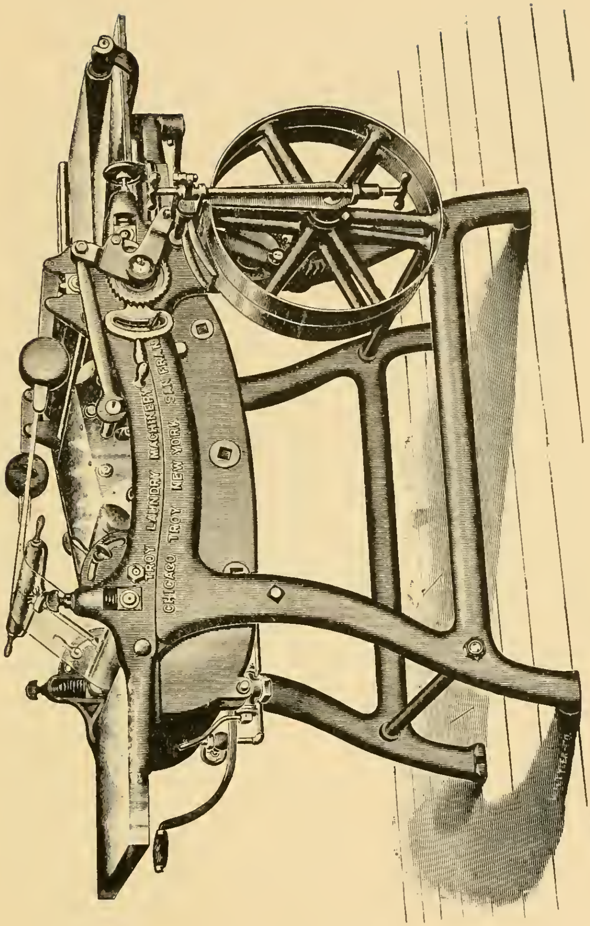


Fig. 8-A. No. 3. COLLAR AND CUFF STARCHER.
(Troy Laundry Machinery Co.)

is an example of this type of machine. This machine is the invention of Mr. Joseph McKay. The principle on which it operates is as follows: The goods are fed into the machine between two endless aprons. The lower apron consists of a heavy canvas belt, the upper apron of a thinner material. The goods are carried between these aprons below the starch line and while they are being passed through the starch they receive a rolling and rubbing motion from the top which forces the starch through the goods in a manner similar to the action of the hand. They then pass out of the starch and between the rollers, which remove nearly all the surplus starch. It is claimed for this machine that this action removes the wrinkles in the goods. As the goods are fed into the machine they are passed between two rolls which revolve at a slower speed than the speed of the apron and as the goods are being held between the rolls the aprons catch hold of the goods, and as they are running faster than the goods the tendency is to stretch the material and to draw the wrinkles out.

Another good type of Collar Starcher is the Hagen, shown in Fig. 9. The principle of feeding the goods through this machine is the same as the McKay, but instead of the rolling, reciprocating motion of the McKay, there is a system of stationary rolls covered with rubber, having numerous small cells or cavities which carry the starch. The goods pass between these rolls and by pressure on them the rubber yields and the starch in these small cells is forced through the goods.

Still another machine is the Weldon, shown in Fig. 10. This machine does away entirely with the fibre

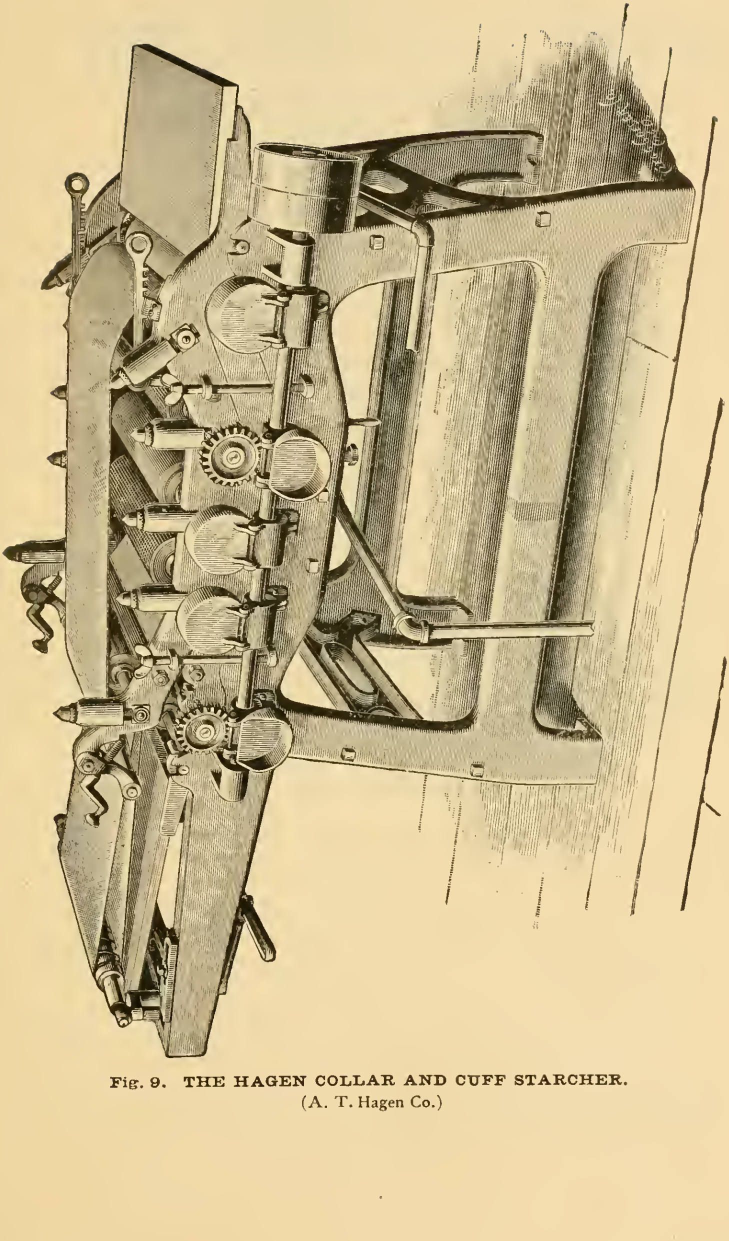


Fig. 9. THE HAGEN COLLAR AND CUFF STARCHER.
(A. T. Hagen Co.)

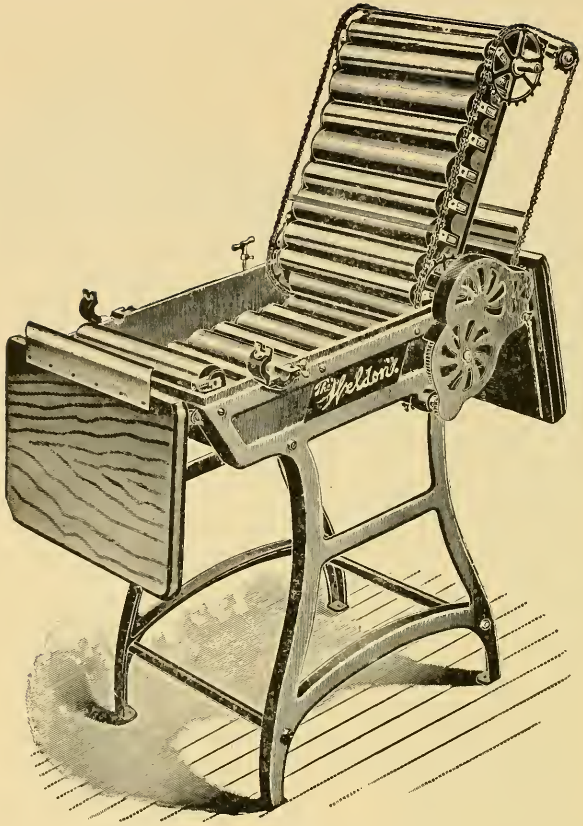


Fig. 10. **WELDON STARCHER.**
(Love Mfg. Co.)

aprons. It has a metal carrying arrangement which carries the goods between the rolls of metallic rollers. The carrying device is arranged and adapted to a link-chain mechanism which runs on sprockets. This gives a positive motion and reduces the liability to get out of order. The Bishop, the Ewing, the Eureka and the Economic are other well-known starchers and are shown

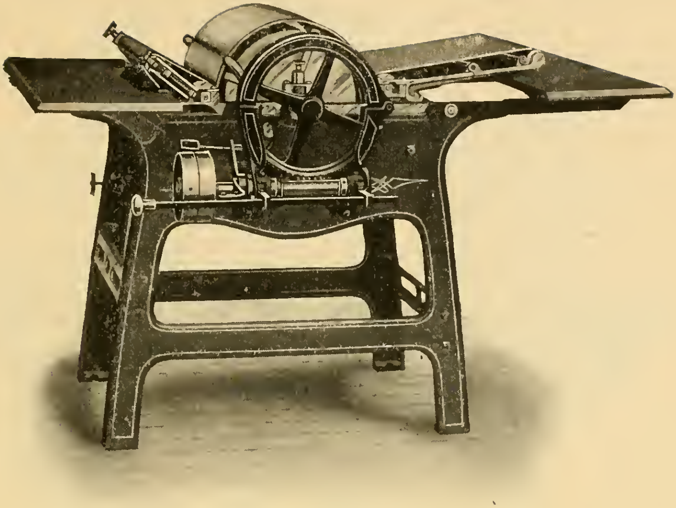


Fig. 11. THE BISHOP COLLAR AND CUFF STARCHER.
(G. H. Bishop.)

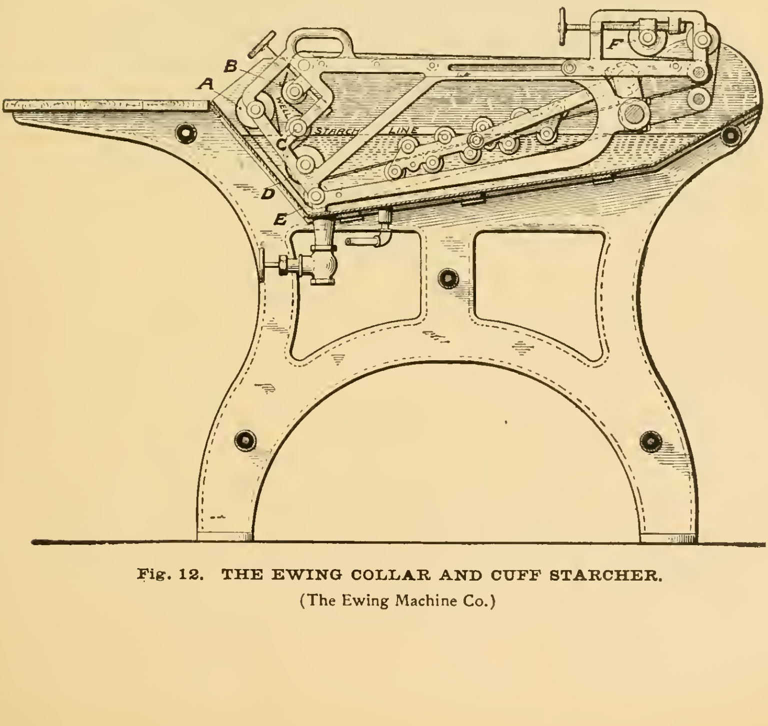


Fig. 12. THE EWING COLLAR AND CUFF STARCHER.
(The Ewing Machine Co.)

Fig. 13. THE EUREKA COLLAR AND CUFF STARCHER.
(F. W. Mateer & Co.)

in Figs. 11, 12, 13 and 14. They all employ the same principle of putting the starch into the goods, viz., by passing the goods between rollers while submerged in the starch.

Another machine which is very useful for the starch-room doing new work is a band starching machine. Laundrymen handling this class of goods usually have

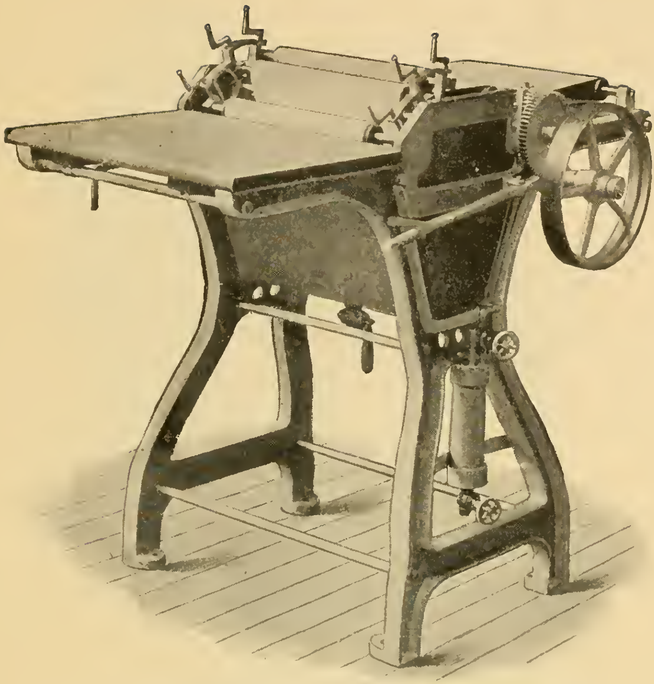


Fig. 14. THE ECONOMIC COLLAR AND CUFF STARCHER.
(The Economic Mfg. Co.)

many shirts or shirt waists having attached collars and cuffs and for this kind of work a band starcher is very useful. The machine shown in Fig. 15 is the invention of Mr. C. H. Brace, of Pittsburg, and is usually known as the Brace Band Starcher. The principle of this machine is that the starch is carried in rolls or rubber cells and pressed into the goods by pressure from auxiliary rolls. The starch is carried from the tank to the rubber roll which has these cells, by a carrier roll which revolves in the starch and against the surface of the rubber roll. The bands, cuffs or collars are passed between the rubber roll and the pressure roll and are

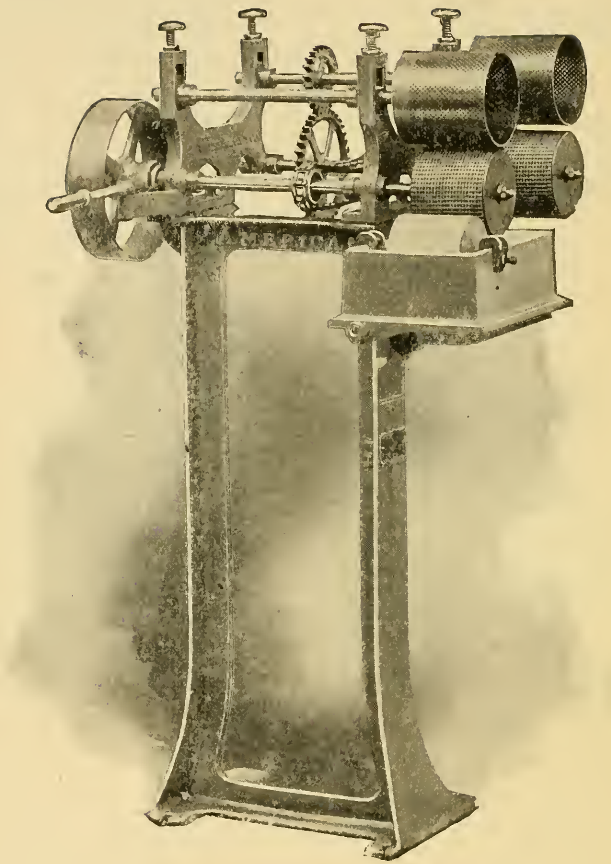


Fig. 15. "BRACE" WRISTBAND STARCHER.
(American Laundry Machinery Co.)

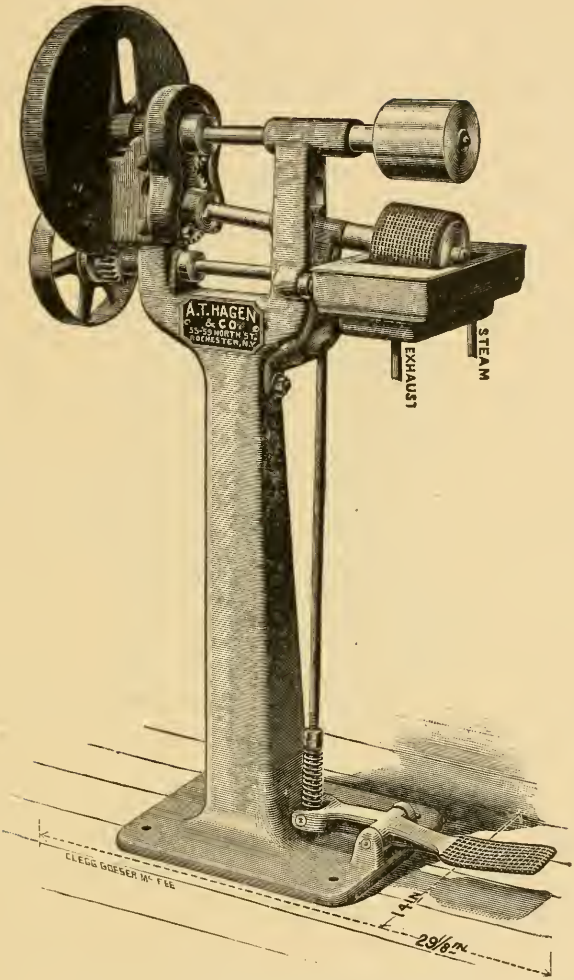


Fig. 16. HAGEN WRISTBAND STARCHER.
(A. T. Hagen Co.)

thus starched without causing any wrinkles in the goods. After this they may be run through the wiping device which is attached to this machine. The Hagen machine, shown in Fig. 16 has no wiper.

The power roll wringer is a very important adjunct to a well equipped starchroom. This wringer should be attached to a stationary tub having water and steam connections. This tub is usually for the purpose of washing the cloths used in wiping the shirts when finishing. The cloths can be thoroughly washed and rinsed in this tub, and wrung out with the wringer, when they are again ready for use.

Another important matter which will receive the consideration of every laundryman, who desires to be up to date in modern laundry methods, is the manner of starch cooking. Recently there have been invented heat-retaining starch-cookers which are commended highly. In the first place they have the correct theory of starch cooking, besides being so constructed that they retain the heat for a long time in the starch after it is cooked, making it possible to cook starch at night, and to use it the next day.

An illustration of the Bishop Cooker is shown in Fig. 17. These cookers have a separator which removes all the water from the steam before it enters the cooker, thus leaving the steam in a dry condition, and making it impossible for any moisture to get into the solution after it has reached the boiling point. The author has continually boiled starch in one of these cookers for six hours without increasing the quantity in any degree.

To those who desire a cheaper arrangement for cooking, the author recommends the use of a wooden tank arranged at a suitable height from the floor to allow the starch to run out through the large faucet into a tub or pail. Into this tank should be introduced steam pipes and the outlet should be at the bottom. Connect the steam into a cross having four openings,

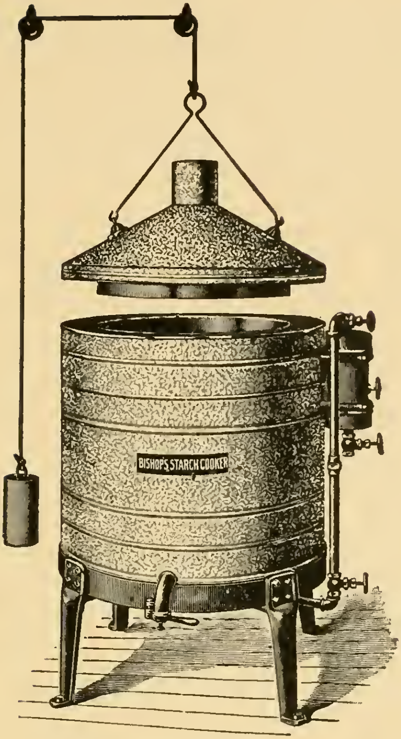


Fig. 17. BISHOP COOKER.
(G. H. Bishop.)

and into these openings connect curved pipes, each pipe curving in the same direction and opening in the same direction, similar to a revolving lawn sprinkler. As the the steam is discharged from these pipes it causes the starch solution to revolve very rapidly and in this way thoroughly mixes the whole mass. Just outside this tank place a water-trap to prevent any water getting into the starch. This trap may be constructed as follows: Take a two-inch pipe about eighteen inches long and put a cap on each end; insert the inlet steam pipe through the side of this two-inch pipe at about one-third the distance from the bottom. From the top of this two-inch pipe connect the steam outlet, and into the starch-cooker at the lower end of the pipe have an outlet, controlled by a valve to allow the escape of the condensed water.

As the steam enters this large two-inch pipe the water gravitates to the bottom end and the steam rises to the upper end, thus completely separating any water there may be in the steam, preventing it from coming into the starch and weakening the starch solution. This form of starch-cooker will cook the starch fully as well as the more expensive kind but it has not the heat retaining qualities. However, one can cook quite nicely with this arrangement and he need not be concerned as to the results.

All machinery in the starchroom should be arranged close together in one portion of the room, leaving the balance of the space in the room free for finishing the work and conducting the general business of the room. There should be erected, near the machines, stationary tables having board projections for the purpose of finishing and wiping the goods. All tables in the starchroom should be covered with zinc. It affords a very clean surface, is easily kept clean and will cause no stains as is the case many times where wet goods are placed directly in contact with wooden surfaces. The boards on which the shirt is rubbed and wiped off are arranged to project clear of the table about twenty-eight inches. They should be about twelve inches wide and rounded on the projecting end. It is not feasible to cover this board with zinc as the zinc will cause the starch to come out of the goods when the goods are removed from the boards. It forms a partial vacuum under the surface of the goods and when the goods are lifted up from the board the starch remains on the zinc surface, causing the shirts to be soft when finished.

There also should be arranged above this table, hooks on which to hang short bars containing twelve small brass hooks and on these bars the shirts should be hung as soon as they are finished. This bar is taken with the shirts and hung in the dry room, thus avoiding any danger of getting the shirts soiled or starchy, as is the case where they are starched, finished and then laid on the table before hanging in the dry room. It is not a wise plan ever to hang white shirts by the yoke, as it invariably causes a stain in the yoke from the wood or wire from which they are hung, or else they will be soiled from handling in removing the hanger from the shirt. The yoke of the shirt is the part which shows very prominently when the shirt is ironed, and therefore the yokes should be very pure and clean when the shirts are finished.

If anyone will practice a while with the ordinary stick which shirts are hung on, they will find that they can hang the shirts by the skirt as conveniently as they can by the yoke. After the shirt is finished and ready to hang, lay it across the starch-board, bosom up. Take the stick in the right hand, place one end under the right side of the shirt, having the projecting end of the stick to the right, turn the stick under the skirt to the left side of the shirt and with the left hand fold the left side of the shirt over the end of the stick, always having the stick far enough up on the shirt so that when it is folded on the stick it will remain in place. This forms a very secure way of hanging shirts and it prevents any possibility of soiling the yokes.

With colored work this plan of hanging is not required. The only objection to hanging the shirts by the skirt is they will not dry as quickly as when hung by the yoke, but this is not a consideration when one wishes to be assured of perfect results after the goods are ironed. If the dry room is so arranged that these bars, carrying a dozen shirts, may be transferred from the starch table directly to the dry room, it avoids a great amount of handling, because when the shirts are starched and hung on these bars they are practically hung in the dry room.

To ensure perfect results in starching great care must be given to the proper preparation of the starch, the quality of the article, and the manner in which it is cooked. The author advises for the best results, in new work, to use one-half wheat and one-half corn, in the proportion of one and one-half pounds of starch to a gallon of water. He would recommend the use of fairly thin cooking starch, but not too thin. Starch must have a certain amount of body in order that it may remain in the fabric. If it is too thin, especially on very light work, the starch seems to escape from the goods, and leave them in a soft condition.

The proper method of cooking starch is as follows: Draw into the cooker as many gallons of water as the amount of starch solution requires. From this quantity of measured water draw off into a tub about one-third of the quantity. Into this water add the required number of pounds of starch, and thoroughly dissolve it before putting it into the cooker. Heat the water in the cooker to the boiling point, and then stir this dissolved starch solution into the boiling water in the cooker, after which boil the solution as hard as it is practicable, for fully thirty minutes.

For example, for a tub of starch of twenty gallons have twenty gallons of water in the cooker. Draw out seven gallons; to this seven gallons add twenty-five pounds of starch, half wheat and half corn; heat the water to boiling point; pour dissolved solution into cooker and cook thirty minutes. If the starch solution is for white work, add four ounces of acetic acid and a small amount of aniline blue. The starch need not be too blue, but just enough to remove the yellow cast in the starch. If the goods are just blue enough and if there is acid present in the starch, the blue will remain clear in the goods; but should the starch be blued too heavily, it will show blue spots wherever there is any surplus starch left on the goods, and it is also liable to produce a mottled appearance.

For the starching of colored work it is advisable to use very little acid, as acetic acid in many cases fades print goods. In this solution it is recommended to add about six ounces of Japan wax to prevent the goods sticking to the iron when they are being finished. It is possible to iron goods without any wax in the starch, but the ironing is not so easy. The starch sticks to the rolls, and is liable to cause the goods to "rumple up" unless there is wax present. Especially is this true in collars and cuffs.

In many instances it is possible and practical to use less expensive solutions of starch, and less wheat or less corn may be used, but the proportions already given are about the usual ones. To what extent this may be carried may easily be ascertained by any laundryman. The formula laid down is one that will ensure absolute certainty. No one formula can be offered as regards the quality of the work. Each amount may be cheapened, and to what extent, the laundryman must determine. It is the same with starch as with everything else; you can not get something for nothing, and if you want the highest results you have to pay for them. It is the author's policy with reference to supplies to always use about the best that is procurable.

The methods of starching will now be taken up, and the starching of new white shirts will be considered first. After the goods are washed and extracted they should be placed in clean zinc-lined trucks, covered with a cloth, and sent to the starchroom. They are then taken from this box, and folded ready for starching. They should be folded through the center of the bosom, having the wristbands laid on the side of the bosom. They may be arranged in this way in several thicknesses, thus occupying very little space on the table, and then transferred to the starching machine in large bunches. The operator removes the shirt as it lies in this bunch, and places it in the machine. If it be a "New Universal" machine or a "Benjamin" it is placed in the machine just as it is folded. The machine is then closed, and the starch worked into the shirt. If it is of the "Bishop" type, then the shirt has to be bunched in the same manner as though it were to be dipped in a pail of water, placed in the machine, and the machine closed, and by an automatic arrangement it is starched, the starch being forced into the goods.

In ordinary medium-heavy work a starching machine will starch at the rate of one hundred and fifty shirts an hour. For heavy work more time is required, and the time must be determined by the grade of the work. When the shirt is well starched, remove it from the machine, open it up, and if the starch has thoroughly worked through the bosom into the inside that is all that can be expected, and it is then ready to be finished and wiped. Some machines have stripping devices which remove the surplus starch, but in the general type of machine the surplus starch must be removed by hand.

After the shirt comes from the machine, it should be thrown on a clean table, and taken from there by the one who is to finish it. It should then be drawn on the board, neckband first. The operator should thoroughly rub the bosom with the palm of his hand, remove all wrinkles, and press the plies of the bosom thoroughly together. A shirt bosom, when it is well rubbed down, will be somewhat transparent, enough so that the wood in the board can be seen through the bosom. If the bosom has been rubbed first, the wristband should be brought up, and laid on the bosom, and also rubbed. After thoroughly rubbing out all wrinkles it should be carefully wiped with a clean piece of cheesecloth, or a sponge, cheesecloth being preferable for shirts.

All the surplus starch must be wiped from the bosom, or any other part of the shirt. First wipe the wristbands, then the bosom, then the yokes, then the inside of the yokes. After this has been done remove the shirt carefully from the board, being careful to see that the plies remain stuck together. Next hang the shirt on the stick, as already described, and then hang it in the dry room. Shirts starched in this manner are half ironed. They will come out of the dry room smooth and firm, without any wrinkles. Great care must be given to this part of the work, as it is the turning point of good work in the shirt department.

Wiping cloths should not be used for too long a time, as they soon become starchy and thus lose their efficiency. A large number should always be at hand, and when they become starchy they should be washed immediately. They are then ready for use again. If there is any starch left on any part of the shirt it will show when ironed, and the most unsightly thing that can appear on a shirt is surplus starch.

If shirts are to be ironed by hand, it is possible to leave wrinkles in the bosom when they are being ironed, as hand-iron work is damped far more than machine-ironed work. If, however, shirts that are to be ironed by machine have any wrinkles in them, the wrinkles will invariably be there when the ironing is finished. So it is of the highest importance to have absolute perfection in the starching of shirts which are to be ironed by machines, and it is an advisable feature in shirts to be ironed by any process.

Open-front shirts are finished the same as open backs, except that it is necessary to raise the upper lap of the shirt, and thoroughly wipe the under lap where the upper lap covers it. The two halves of the bosom should then be pressed together again, and the shirt hung in the dry room in this condition. Some laundrymen consider it of such importance to have the bosoms remain stuck together as to go to the trouble of fastening the neckbands of open-front shirts, where they join, with a clasp, in order to insure the open fronts remaining in their proper position when drying. The author scarcely considers that this is required, but it is well, if possible, to have open fronts remain stuck together until they are dried. It causes them to retain their shape better, and it makes it easier, if they are ironed by machines, to produce the proper shape in the bosom when it is finished. Great care must also be exercised in the wiping of the inside yokes. This part of the shirt shows when it is folded, and therefore it should receive its proper attention when being starched.

The method of starching colored shirts is the same as white shirts, excepting that there should be but very little acid used in the starch, and the goods may be hung by the yoke. There should always be a sufficient amount of starch in the machine to ensure perfect work. for, if the starch gets too low the goods will not be well starched. The cloths used for wiping shirts are usually made of cheesecloth, each piece of which should contain about one yard and a half, and there should be a sufficient number of them in order that they may be washed frequently, and that the wipers may have a plentiful supply. One cloth should not be used to wipe more than a dozen shirts before it is washed.

For the ordinary washing it is only required to be washed in the stationary tank, in warm water, but they should be thoroughly cleansed once a week by washing them and bleaching them in the regular washing machine, and they should receive this process before first using them, in order to get them in a condition to become a good absorbent. Some laundrymen use sponges, but the author's experience leads him to believe that cloths are better for shirt work. Sponges will answer, however, for collars and cuffs that require a very light wiping.

In starching white collars and cuffs, the use of a collar starcher is recommended, although they can be starched successfully in a dip wheel. But the author is inclined to believe that the shape of the collar is better maintained when starched in the machine. The dip wheel seems to shrink them somewhat and destroy the outline of the pattern.

The chief quality wanted for new work is a thick finish. That is, the goods should feel heavy and the edges should have a thick appearance and it is never advisable for new work to have the appearance of having been ironed too hard. It is the author's opinion that collars starched on a good machine are less liable to have a thin edge. They have to be finished with great care or else they will be flattened and the starch ooze out, causing them to have that thin appearance which is common in old work. It is quite difficult to explain this quality, but if a new collar of a certain brand is compared with an old collar of the same brand after it has been relaundered in the custom laundry, the difference and quality referred to will be very apparent. This quality is obtained almost entirely in the starching.

The goods come from the wash-room in the same condition as do the shirts. They then should be straightened out and piled in bunches in dozens. The operator feeds them into the machine as rapidly as the machine can receive them. On the opposite end another operator receives the goods from the machine and lays them in dozens. From there they are taken to the finishing table, all the wrinkles taken out and wiped very carefully and hung on bars ready for the dry room. The starch for white collars and cuffs may be the same as for white shirts, only in the case the goods are very light the starch should be made somewhat heavier. Much care must be given to the finishing and wiping. The collar or cuff must be pulled into shape, corners and curves put in their proper position and the edges made straight. In fact the original cut of the collar must be preserved, and special care must be given to this matter throughout.

Absolute perfection in the laundering of white work must be attained in order to compete with others, and to do this the starching must be absolutely correct. Nothing should be slighted in the process of starching collars and cuffs. A little imperfection might pass on a shirt, while it will not do at all on collars. The trade demands perfection, and they are very nearly getting it; and anyone who expects to be able to compete in this class of work must recognize this fact. Everything about the process of starching collars and cuffs must be correct. The starch must be absolutely right; the machine must be in perfect condition, and everything must be immaculately clean; the operators themselves should be clean; the tables and cloths and racks and everything about the room must be absolutely clean.

The hanging of collars and cuffs is another important matter and should receive careful attention. If they are hung over an ordinary bar, they are liable to be soft and stain where they come in contact with the bar. If they are hung by the button hole, they are more or less drawn out of shape and are liable to be stained with verdigris where they come in contact with the hook.

The most practical manner in which to hang a collar is over a bar, providing the bar is made to overcome the objections stated. This bar should be about an inch and a half wide and an inch thick and the dry room racks fitted to receive it. The upper edge of this bar should be grooved in the center allowing two ridges at the outer edge of the bar so that when the collar is hung over the bar it will have only two bearing points. The sides of the bar should be tapered so that as the collar hangs down it will not come in contact with the bar. This form will allow the collar to be hung in the center and will preserve its shape. It will not come in contact with any surface except where it rests on the edges of the bar, and this will prevent it from becoming soft, as is the case where the entire surface touches the bar; therefore it is a very simple and practical manner of hanging.

The whole bar should be covered with a cloth to prevent any stains from the wood. The cloths should be renewed frequently, as they become charred and torn by continual use and if they are not removed frequently they will cause trouble by staining the goods. It is a simple matter to cover them. All that is required is a straight piece of bleached muslin which should be starched and pasted over the bar. These bars should have a rack placed to receive them at or near the starch finishing table, and as the goods are starched they should be hung on the bar immediately. When the bar is full it should be placed in the dry room in a manner similar to the method of hanging shirts. During the entire process of starching, the collars and cuffs should be kept in their original dozens and dried in the same manner, and when they are taken from the dry room they should be tied again the same as when received for starching.

The method of starching colored collars and cuffs is very different to that of white ones. In the first place it does not require nearly such an amount of mechanical action to saturate the goods with starch. The material used is generally of a coarser and looser nature, and absorbs starch more readily. It requires less attention to wiping and in every way is an easier article to handle than white work. It is usually brought to the starchroom directly from the manufacturer and is starched without being washed. The goods are fed into the machine and handled similarly to white work, but inasmuch as it is not washed the shade remains the same as it was when manufactured. It is much easier to finish them, as there are very few wrinkles, and very little attention need be paid to shaping in finishing.

Unless exclusive machines can be used for this class of work any of the standard makes of machines will answer the purpose. Of course, it is more difficult to handle colored work that has been washed and in that case the same attention to details must be given as in white work, although the mechanical action of starching is no greater and the same type of machine that will starch dry laundered work will also starch colored work that has to be washed.

Starch used for colored collars and cuffs should be a trifle heavier than that used for starching shirts and should have no acid or bluing in it. Care must be used not to have the starch too hot for colored work. Very hot starch causes many colors to fade. The hanging of colored work is done in the same manner as with white work, and what has been said in regard to keeping bundles of white work together should be applied to colored work. It is best to sort the work immediately after it is finished, and it requires but little attention to keep the original number of pieces in the bundles throughout the whole laundry process.

Another matter in connection with the laundering industry which the author has neglected to mention, and which in many laundries it will be found necessary to understand, is the laundering of neckbands. Many manufacturers make their shirts with a laundered neckband but launder no other part of the shirt. Especially is this true in colored negligee work or in puff or silk-bosom soft shirts. If the neckbands are white, they should be washed in the same manner as white shirts and in fact they may be washed with a load of white shirts provided the neckbands are placed in a net. After being washed they can be run through the collar starcher and treated the same as white collars and cuffs. If they are colored bands then they should be run directly through the collar and cuff starcher without washing, in the same way as with colored collars and cuffs.

The starch in any machine, whether it be for shirts or collars and cuffs, should never be allowed to get below the temperature of 160 degrees and in order to maintain this temperature it is necessary to have the starch heated by steam. Many makes of starching machines have a steam jacket and the starch is kept hot by radiation, while in other makes the steam comes directly into the starch, and in this case the water-traps should be put on the steam pipes to separate the water from the steam as has been described in the case of the starch-cooker. If the water is allowed to get into the machine from condensed steam it will reduce the consistency of the starch and will cause the shirts to be soft, and this is many times the cause of soft work.

It takes so very little water to destroy the efficiency of starch, and, quite frequently, starch is thus destroyed without the operator noticing that there is any difference in its consistency. The results will show only when the goods are ironed. Therefore it is necessary to use great care in regard to this matter.

CHAPTER 5.

THE DRY ROOM.

There are a great many theories advanced in regard to drying out the moisture that is contained in fibre, and while they may sound very well in theory, I find they do not amount to much in practice. The matter of circulation and condensation have received exhaustive experimenting, both in lumber drying and in laundry drying. Some make great claims for the plan of extracting the hot moist air from the dry room, condensing the moisture in it, and return the same air again "in a dried state," into the dry room.

This impresses the average laundryman as an excellent idea. But when put to practice, there is nothing in this plan. It is true that the air becomes saturated with moisture, and should the dry room have no ventilation whatever, it would be only a short time before the goods would not dry at all. Consequently, this moist air must be gotten rid of, and it is just as well to let it escape into the open air by some good form of ventilation. This plan is better than to try to condense the moisture in this air, and to return the dry air to the dry room.

The only way to condense moisture in the atmosphere, is by reducing the temperature to what is known as the "dew point." When this is done the water falls from the air precisely in the same manner as the dew is discharged from the atmosphere. As the "dew point" is usually at a lower temperature than the outside air surrounding the dry room, the air which passes through the condenser comes out colder than the outside air. Should this cold air be discharged again into the dry room it would retard the drying process just in proportion to the difference in temperature between the air condensed, and the air surrounding the dry room, so it can be seen that it is much better to let the moist air escape and replace it with fresh air from the outside. Of course, it is understood that the temperature of the air must be raised before any amount of drying can be accomplished, and the higher the temperature of the air, when it enters the dry room, the less number of heat units are required.

Therefore, everything being considered, the author believes that the condensing plan is a detriment. He does believe, however, that it is a good plan to cause an enforced circulation. The drying process is caused by the air being expanded by heat, absorbing the moisture from the fibre by what is known as capillary attraction. The strata of air directly in contact with the fibre first receives the moisture and when this is loaded, it gives off its moisture to the next particle of air to it, and so the process continues until the air takes up all the moisture. If it can be so arranged that when the particles of air next to the fibre are loaded with moisture, they are moved, and fresh, dry particles take their places, it can be readily understood that the drying will be accomplished much more speedily.

This theory the author has fully demonstrated, and the adoption of the following plan is advised: At the top of the dry room have an inverted funnel-shaped hood, and if the dry room is large, have several of these hoods at different points in the ceiling of the dry room. To these hoods connect galvanized iron pipe about four inches in diameter, and have the pipes from each hood joined to one larger pipe. Have this larger pipe connected to the inlet of an ordinary fan blower; from the outlet of this blower extend the same sized pipes to the bottom of the dry room, and connect it by several branches into the base of the dry room, under the steam coil. By operating this fan a current of air through the dry room is obtained.

In the matter of ventilation it may be said that any plan whereby a certain portion of the air may escape and be replaced by fresh air, is practicable. The theory that moist air falls to the bottom, and that the ventilation should be at the bottom, the author believes to be incorrect. He considers the best way to ventilate a dry room is to allow the cold air to come in at the bottom, and as it is heated and expanded, allow it to escape at the top, in the natural order of things. The ventilator pipes should be regulated with a damper or otherwise too much heat will be lost. The dry room is continually being opened and closed, and in that way much change of air is accomplished. Hence the ventilation is not of so much importance as it would be in case the dry room were a ceiled air-tight compartment. Therefore the most practical plan is a small provision for ventilation, as already described, together with the plan of circulation.

It is not necessary to run the blower at a very high rate of speed, but at just sufficient speed to produce a gentle circulation of the air in the dry room. After all has been said, the most essential thing about a dry room is heat. A dry room must be hot, and the hotter the better. A dry room, to produce the highest result, should have not less than one square foot of heating

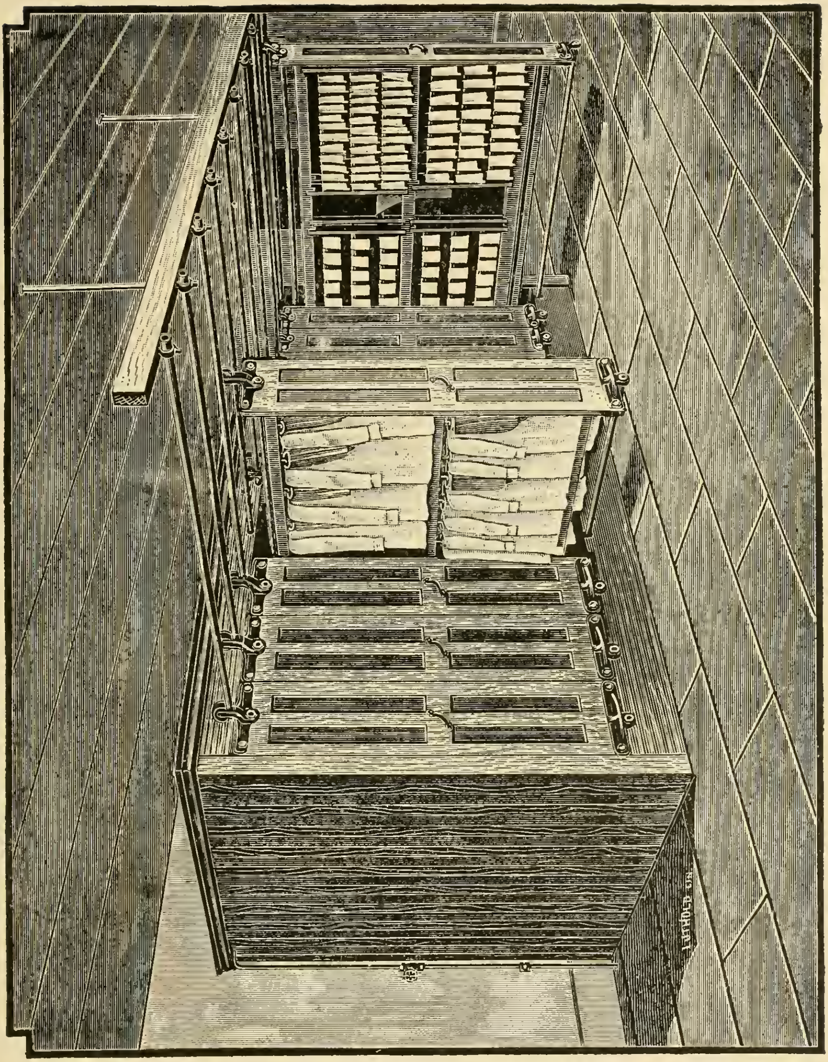


Fig. 18. STANDARD DRY ROOM.
(The F. M. Watkins Co.)

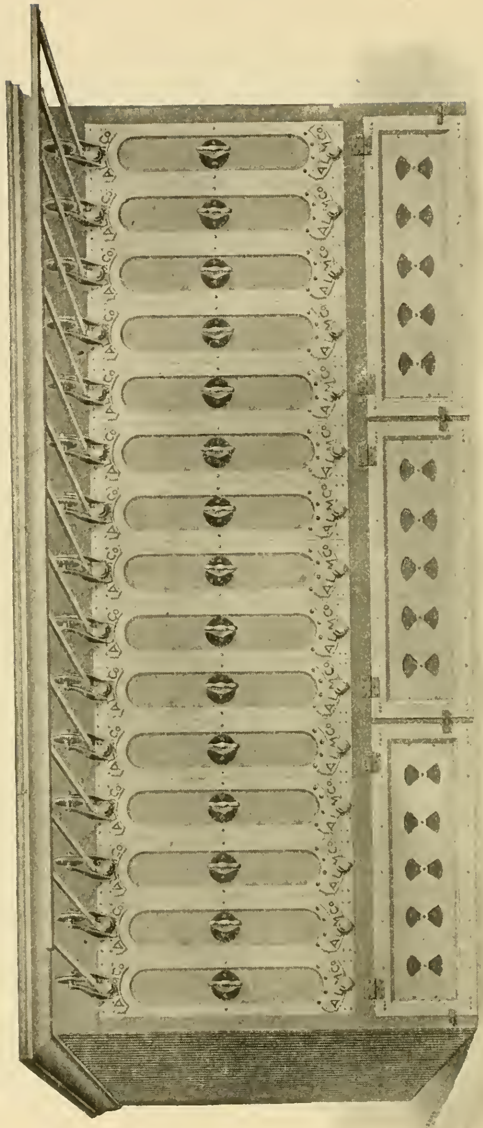


Fig. 19. METALLIC DRY ROOM.
(American Laundry Machinery Co.)

surface to every seventy-five cubic feet in the dry room. With this amount of heating surface in a dry room it will not fail to give good results. Of course, ventilation is necessary, to a certain extent, and circulation is a good thing, but one can get along without the latter, and with very little of the former.

The standard type of dry room is illustrated in Fig. 18 and is made as follows: The floor is usually covered with galvanized iron, made water tight, and graded to a sewer connection, so that the room may be easily washed out when it becomes dusty. Covering nearly all of the surface of the floor is a coil of steam pipe. This coil is two or three tiers thick. At one end there is an elevated header, into which the ends of all the pipes of the upper tier are connected. The middle tier, if any, is connected to the pipes of the upper tier by return bends; that tier is again connected to the lower tier in the same manner, and the ends of the lower tier of pipe are connected into the header. Each tier of pipe is graded in such a way that the water will gravitate out of the coils.

The usual casing of a dry room is of wood, lined with tin, and the space over the coil is filled with racks. The forward ends of the racks form the front side of the dry room. The racks are hung on runways, usually made of iron pipe, and are made to move easily by being supported on rollers. These racks are drawn out to their full extent, and the goods hung on them, and then run back into the dry room. There are several kinds of metallic dry rooms, which from a point of durability and convenience have much to recommend them.

Standard forms of Metal Dry Room are shown in

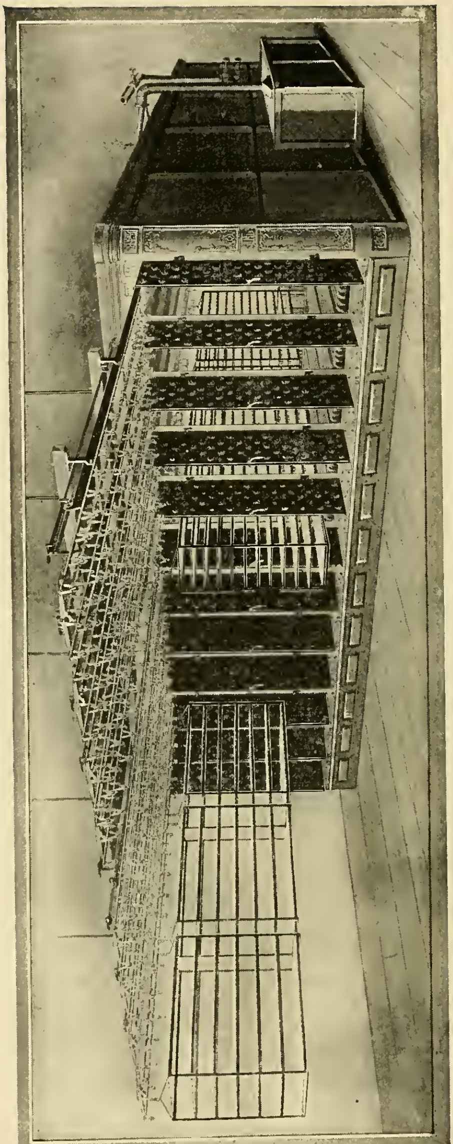


Fig. 20. THE HENRICI METALLIC DRY ROOM.
(Henrici Laundry Machinery Co.)

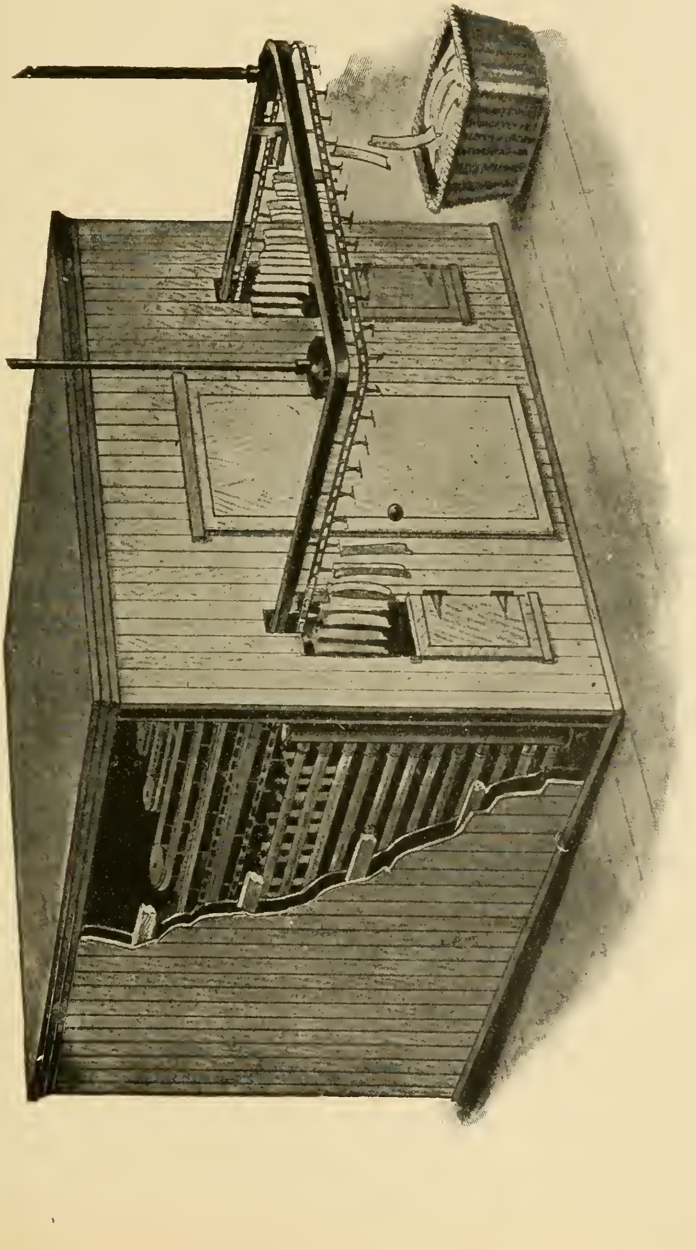


Fig. 21. AUTOMATIC CONVEYER DRY ROOM.
(Barnes & Erb Co.)

Figs. 19 and 20. An automatic conveyer dry room is shown in Fig. 21. The material employed is usually galvanized iron. No matter what may be claimed for a dry room, the first and chief thing that should be considered by the purchaser is the question of the amount of heat furnished.

It is of the highest importance, that when the goods are dry they should be removed from the heat, and especially is this true of white work. If the latter class of goods hangs a short while in the dry room after it is dry, the heat will cause the goods to lose their blue tint, and they will turn yellow. It is also essential to have abundant drying capacity, and that the goods should be dried quickly, in order to get the best results from the starching. If goods are too long in drying, it invariably effects the stiffness. Much of what the author calls "punky" work, that is, work which resembles in feeling a piece of blotting paper when finished, is caused by goods being too long in the dry room.

CHAPTER 6.

THE DAMPENING ROOM.

The dampening room should be in, or near, the same room as that containing the dry room in order that the goods may not have to be transferred too far away when they are in a dry and bulky state. The dampening room should be arranged with commodious racks in which to pile the shirts after they come from the dry room. The goods shou!d be protected from dust by having the racks covered on top with boards, and the sides protected with a muslin curtain arranged to be drawn back when shirts are being put in. The goods as they are taken from the dry room should be assorted into the lots in which they are to go and counted and checked in order to ascertain when the lot is complete.

All tables and racks in the dampening room should be kept absolutely clean .and free from dust. A shirt occupies more space in a rough dried condition than in any other and consequently it is more liable to become soiled for the reason that it presents a greater surface to catch the dirt. Any dust that may accumulate would hardly be noticed until the goods are dampened and ironed and then it shows up very conspicuously. Care also should be taken not to allow goods to fall on the floor. Much soiled work is due to carelessness in this respect. Many times a shirt is dropped on the floor, picked up and put into the racks without being properly examined and, when the shirt is ironed, it is discovered that it is soiled and one is at a loss to account for the cause.

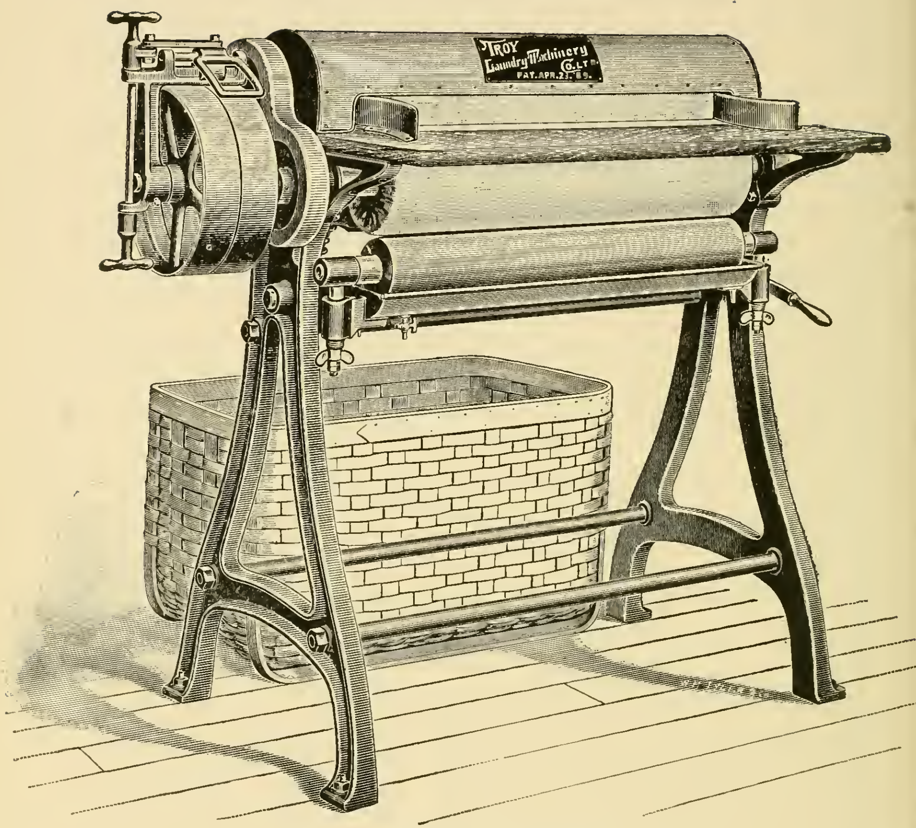


Fig 22. SHIRT DAMPENER.
(Troy Laundry Machinery Co.)

A convenient arrangement of racks in the dampening room is as follows: The floor of the rack should be raised from the main floor about six inches and should be made of slats to allow the dust to fall through. The space beneath will permit of easily cleaning the bottom of racks. Partitions for the racks should also be made of slats placed about eighteen inches apart. The racks should be about three feet wide and seven or eight feet high, boarded up the sides with matched boards for about three feet. The space on top should be covered with matched boards and the sides protected by curtains. There should be long tables in the dampening room on which to place the shirts as they come fıcm the dry room. The sticks are removed from the shirts as they are laid on the tables and the shirts assorted from these tables and placed in the racks.

The only machine required in the dampening room is the dampening machine, and where large quantities of collars, cuffs and shirts are to be dampened, it is wise to have a machine for each class of goods, because the degree of dampness suitable for a collar will not do for a shirt, and it is quite difficult to adjust a machine, which has been already adjusted for shirts, to dampen collars properly and then readjust it to properly dampen shirts. A machine, when it is once adjusted for dampening, should not be changed as frequent changes will affect the uniformity of the work.

It is essential for the best results, either in collars or shirts, that the dampening be done uniformly, and to get uniform dampness is a source of great anxiety to the average laundryman. Of course, the ideal damp-

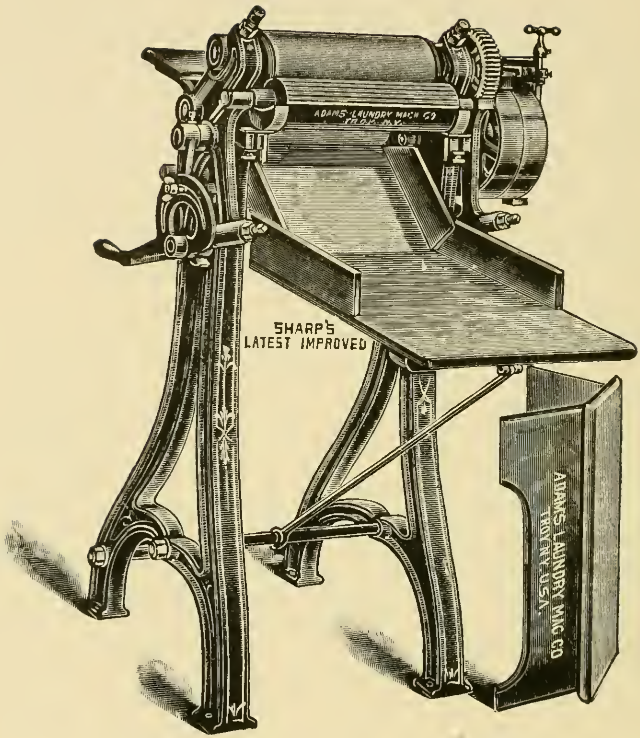


Fig. 23. COLLAR AND CUFF DAMPENER.
(Adams Laundry Machinery Co.)

ening is with sheets, but in laundries doing a large amount of work, this method is impracticable on account of its being too slow. A machine must therefore be employed which will have the desired capacity.

The universal type of dampening machine is one which dampens goods on the blotter principle. The goods are passed between two cloth-covered rolls, the cloth on the rolls being saturated with water. The water is carried to the covered rolls by means of a metal roll revolving in a trough of water, which tranfers the water from the trough to the cloth-covered rolls. The machines are made with an adjustment which will allow any amount of pressure required between the metal roll and the cloth roll, and the greater the pressure the less is the amount of water. The two cloth-covered rolls in a well-adjusted machine do not touch each other. As the goods pass between the rolls they press on the goods and force the moisture into the fibre. Should they run in contact with each other they would form a pool of water between them and as the goods are fed through the machine the first which came in contact with the rolls receive the greatest amount of water, and this would cause uneven dampness.

The cloth-covered rolls of the dampening machine should not revolve to exceed twenty-four revolutions, or less than twenty revolutions per minute. If the rolls revolve too rapidly, too great an amount of water will be transmitted, and if they revolve too slowly, too little an amount of water will be transmitted. It is therefore very essential that the speed of a dampening machine should not vary from between the limits stated.

It has been usual to have the dampening-room on the same floor as the starchroom, as it is essential to

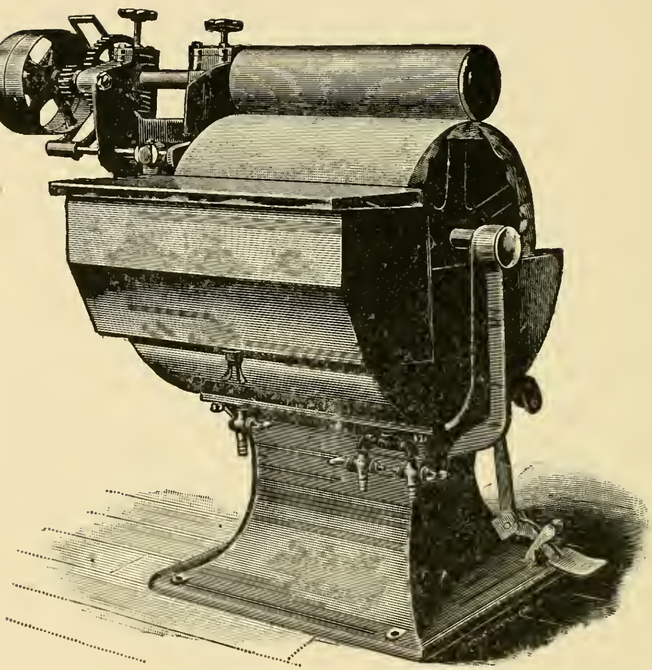


Fig. 24. SHIRT SKIRT DAMPENER.
(S. H. Sinclair Co.)

have the dampening machine operated on a water-tight floor with the proper arrangements for drainage, because there is certain to be more or less water dripping from the dampening machine, and many times the troughs overflow. Unless this arrangement is made much damage by water may ensue.

It is very important to have the dampening machine always in perfect order. The style of machine shown in Fig. 22 requires very little dressing, as the dampening-rolls are covered with rubber, and thus afford a cushioned surface. The dampening machine on which cloth in the place of rubber on the rolls is used acts in the same manner as the one using rubber, but it requires somewhat more attention in the dressing. The author usually prefers the use of unbleached muslin, and to wind about ten yards on each roll, and to renew frequently. A machine of this type is shown in Fig. 23. When the machine is first covered it will dampen more freely than after it has run awhile, so it is important to use care in the matter of adjustment of rolls when the machine is first covered. There are other forms of dampening machines, but the general type of machine in use is one already described.

The machine shown in Fig. 24 dampens the skirt of the shirt only, after which the skirt is laid over the bosom of the shirt, thus, in a measure, dampening on the same principle as by the use of sheets. This is a very good plan of dampening, and it is very successful.

In any form of a dampening machine perfect dampness is not at first obtained, as only certain portions of the garment receive the moisture, while the others remain dry. If the goods were dampened sufficiently at first to moisten the whole surface, they would be too

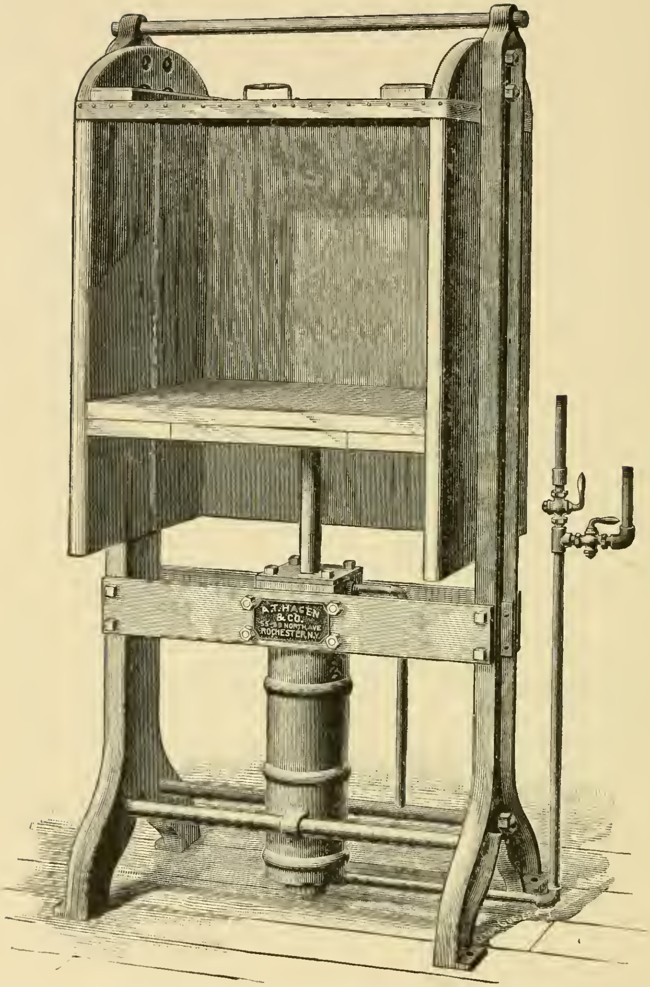


Fig. 25. HYDRAULIC OR STEAM SHIRT PRESS.
(A. T. Hagen Co.)

damp to iron. To avoid this trouble they are only partially dampened and are then allowed to remain in this condition long enough to allow the moisture to penetrate from the moistened portions into those that are not moistened. In time all the moisture in the garment will be thoroughly distributed in every fibre. To aid this process the dampening press is a necessary adjunct. When the goods are placed in this machine and firmly pressed together, it brings the fibre in closer contact, and uniformity in the dampness is brought about much more quickly than when the goods are not subject to pressure.

There are many forms of shirt presses on the market, but the most practical plan for large quantities of new work is to press the work in a damping-box and allow it to remain in these boxes until it is ready for ironing. New work never should be ironed the same day it is dampened, as it requires from ten to twelve hours for goods to be thoroughly and fully saturated with moisture. Several good forms of dampening press are shown in Figs. 25, 26, 27 and 28.

The author would recommend the use of a large dampening truck that will hold about 40 dozen shirts. This truck should be zinc-lined and mounted on rollers or castors. Shirts, when damp, should be folded, the skirt over the bosom, and packed closely in this zinc-lined truck, and they should finally be covered with a clean moistened cloth. Over this cloth there should be a cover that will fit in the truck-box. There should also be some sort of an arrangement into which the truck may be run and the goods pressed and allowed to remain until ready to iron. A press of this nature is shown in Fig. 29. An arrangement by which a

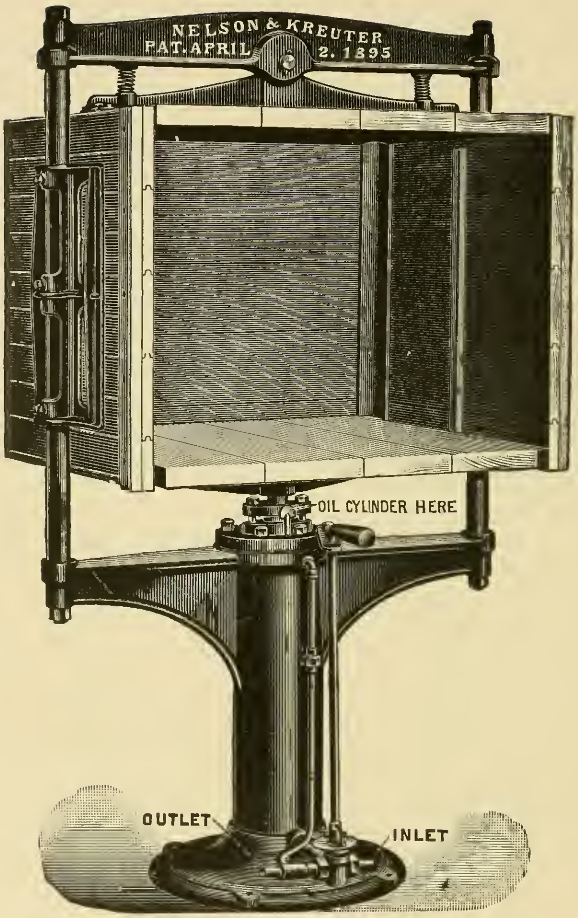


Fig. 26. STEAM SHIRT PRESS.
(Nelson & Kreuter.)

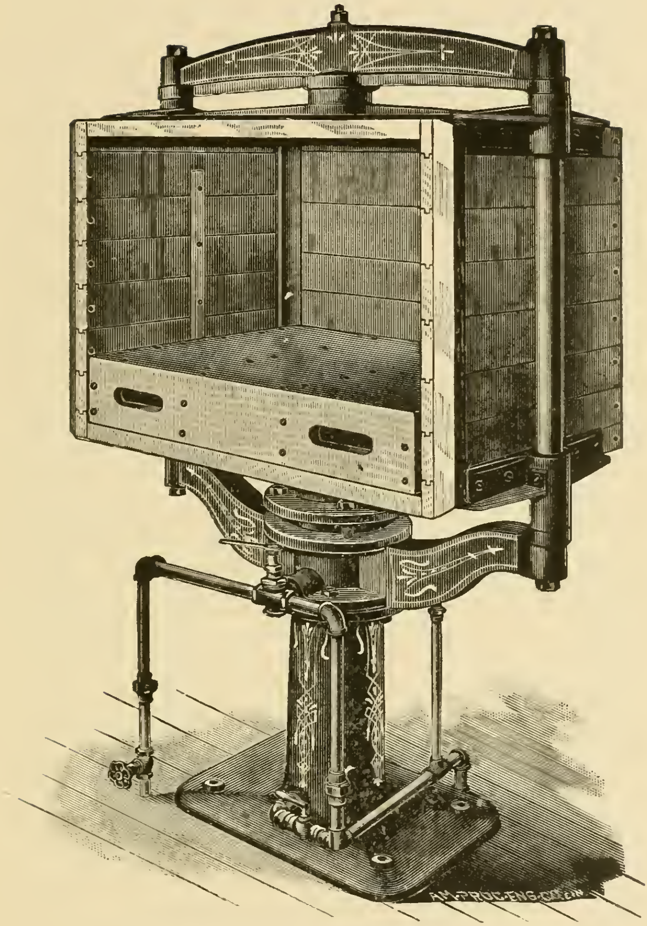


Fig. 27. HYDRAULIC OR STEAM PRESS.
(F. M. Watkins Co.)

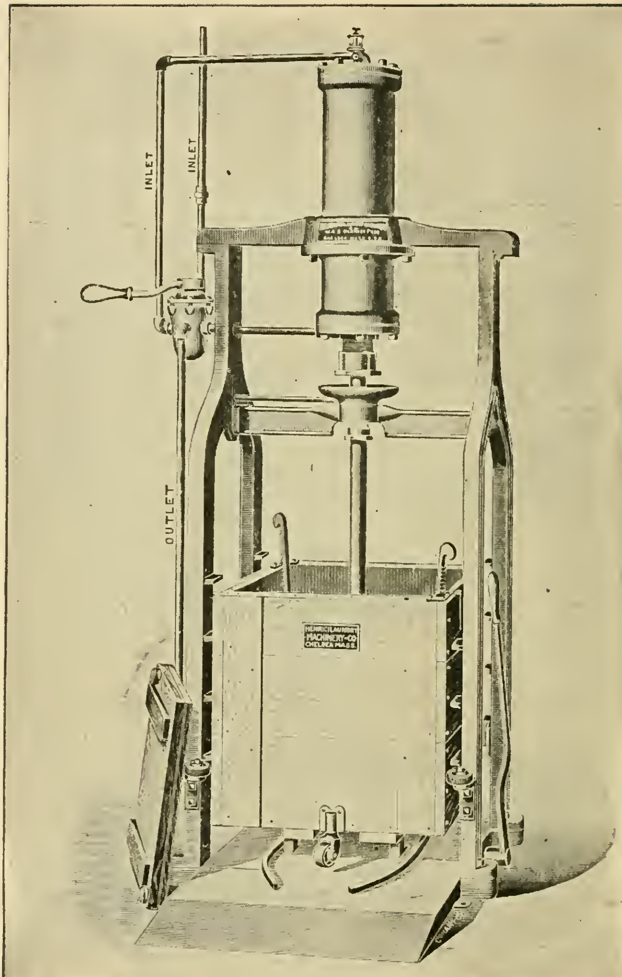


Fig. 28. SHIRT PRESS.
(Henrici Laundry Machinery Co.)

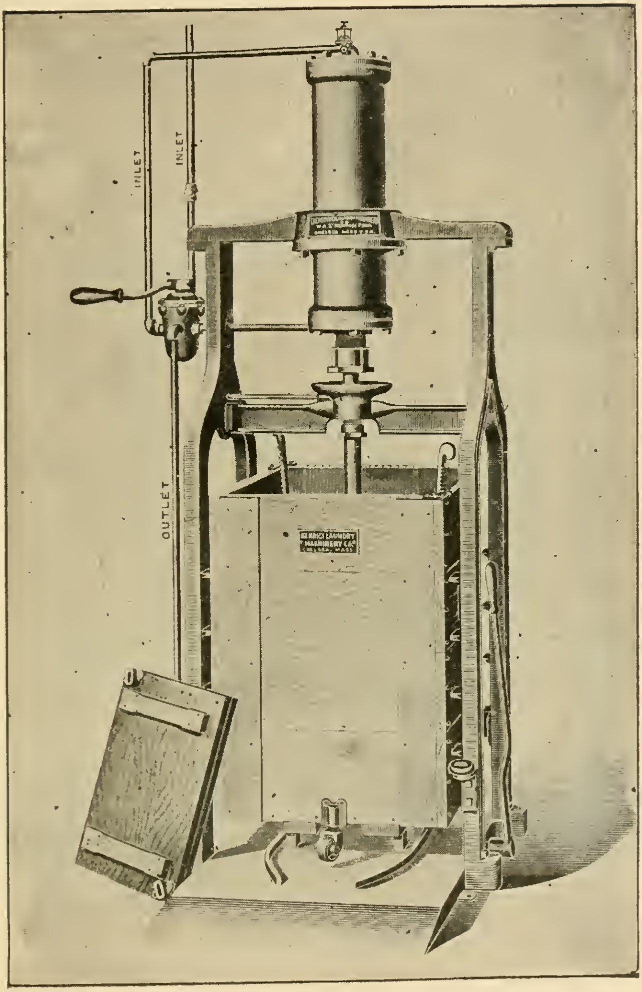


Fig. 28a. SHIRT PRESS.
(Henrici Laundry Machinery Co.)

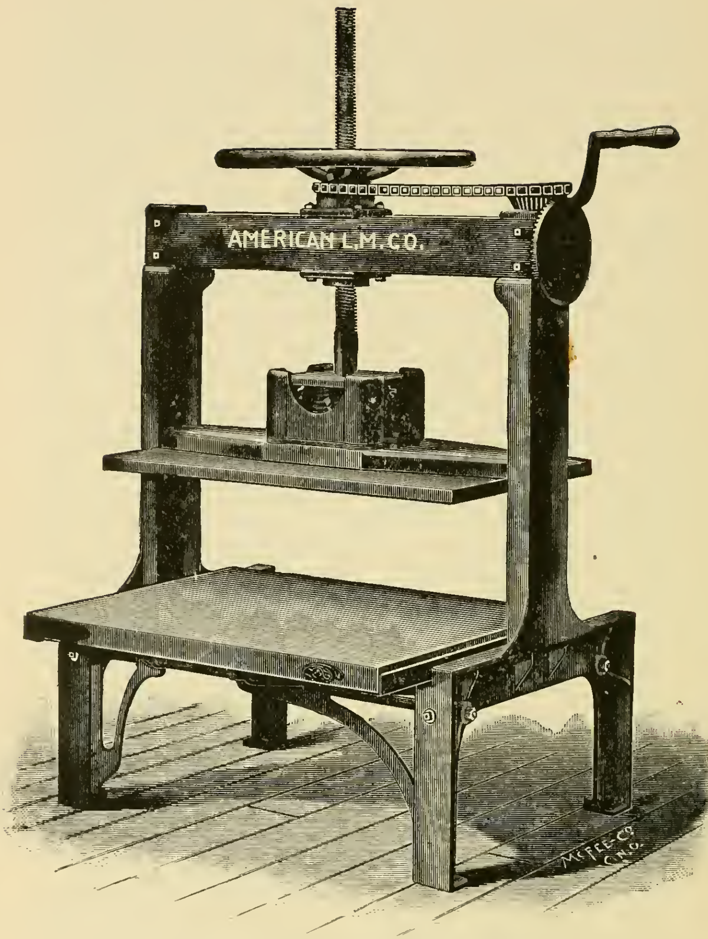


Fig. 29. COMBINATION SHIRT PRESS.
(American Laundry Machinery Co.)

common jackscrew may be used affords a very cheap and satisfactory press.

Some factories are equipped with a power screw arrangement which is very convenient, but as this device is not practical in every locality, the details of its construction will not be given. Anything that will press the goods together after they are placed in the box is all that is needed. After the goods are pressed the truck can be run into the ironing-room and allowed to remain there until the goods are ready to iron.

The dampening so far described is for goods which are to be ironed by machines. The dampening of shirts to be ironed by hand is usually done by the person who irons them, as each individual is particular to have his work dampened to suit himself. The degrees of dampness vary according to the ideas of the ironer. Some ironers iron goods considerably damper than others, so the matter of dampening for hand ironers need not be treated here. What has been said above applies equally as well to the dampening of shirts, collars and cuffs.

CHAPTER 7.

THE IRONING-ROOM.

Among the first questions one has to consider in the equipment of the ironing-room is that of gas. So far science has not furnished us with any practical means of heating ironing machinery sufficiently excepting with gas. There are, however, a few machines that may be used which are heated with steam, and as these are the exception, they will be taken up later.

There has been considerable experimenting with electricity for the purpose of heating ironing machinery, but, so far, it has not been successful. No substance seems to have been found that will sufficiently stand the high temperature necessary and at the same time have sufficient resistance. Therefore, gas seems to be the only source of heat entirely practicable for ironing machinery.

There are three kinds of gas which may be used. One is natural gas, another is ordinary illuminating gas, and the other is a gas manufactured from gasoline, either from a general plant or by a special burner at the ironer. Experiments are also being made at the present time with water-gas, but no practical application of this gas to laundry work seems to have been made. In localities where natural gas is to be obtained, it is generally used in laundry machines, as it is considerably cheaper than manufactured gas, produces greater heat, requires less oxygen, and in every way is very suitable for laundry purposes.

The majority of laundries in the United States are using illuminating gas, which is furnished in the majority of towns having a population of over 3,000. This gas is well adapted for laundry purposes, as it burns very uniformly, the combustion is quite complete, and as far as its doing the work is concerned, it is generally satisfactory. Of course, the quality will vary in different localities, according as the gas plants may vary in their equipments. However, the author's experience has been that illuminating gas furnished by the public gas plants in the different towns that he has visited has run very uniformly in quality. The chief objection to this kind of gas is its cost. Gas plants are usually owned by corporations, which control the supply and prices of the article. Consequently laundrymen have to accept their terms or go without gas.

Gas manufactured from gasoline affords a great saving when compared with illuminating gas, and produces an intense heat. The objection to this gas is, however, that it has a very strong odor, and is harder to regulate in the burners than natural gas or the regular illuminating gas. Gasoline gas requires very little oxygen mixed with it. It produces a blue flame, and is not a success for lighting purposes in the ordinary gas burner. However, should it be desired to use this kind of gas for illuminating purposes, excellent results may be obtained by using a Welsbach burner. There are other forms of burners made to be used with gasoline gas, but in the author's experience they have not proven satisfactory.

The author has had considerable experience with gasoline gas, and he considers it very satisfactory for laundry purposes. It is usually produced at a cost which is about one-half that of city gas, and if a modern gas plant be used the objections to this gas, already stated, are reduced to a minimum.

The Springfield Gas Machine is frequently used. This machine consists of a large iron tank having sections and reservoirs in which the gasoline is placed and through which air is circulated. This tank is buried several feet underground, and quite a distance from the laundry. In the pans containing the gasoline are inserted a fibrous substance which extends above the level of the liquid, and becomes saturated with it. The air is circulated through this material and becomes impregnated with the gas from the gasoline. In cold weather, the air that is forced into the machine is heated in order to produce better evaporation, as gasoline requires a temperature of not less than 75 degrees in order to vaporize it. The tanks are buried in the ground and away from the buildings, in order to lessen the danger from explosion and reduce the insurance rates. The modern gas plant has every equipment known in the way of safety appliances, and it is quite unusual to hear of any damage arising from the use of gasoline in this sort of a plant.

The plant which has just been described is quite an extensive one, and is designed to meet the needs of a large establishment. One would not be justified in adopting it who is doing a small business. In Fig. 30 is shown the Vernon Gas Machine, adapted for both small and large laundries.

There is also an ironing machine burner on the market which is designed to generate gas directly from the gasoline, but the author's experience with this device leads him to believe that it is an undesirable one,

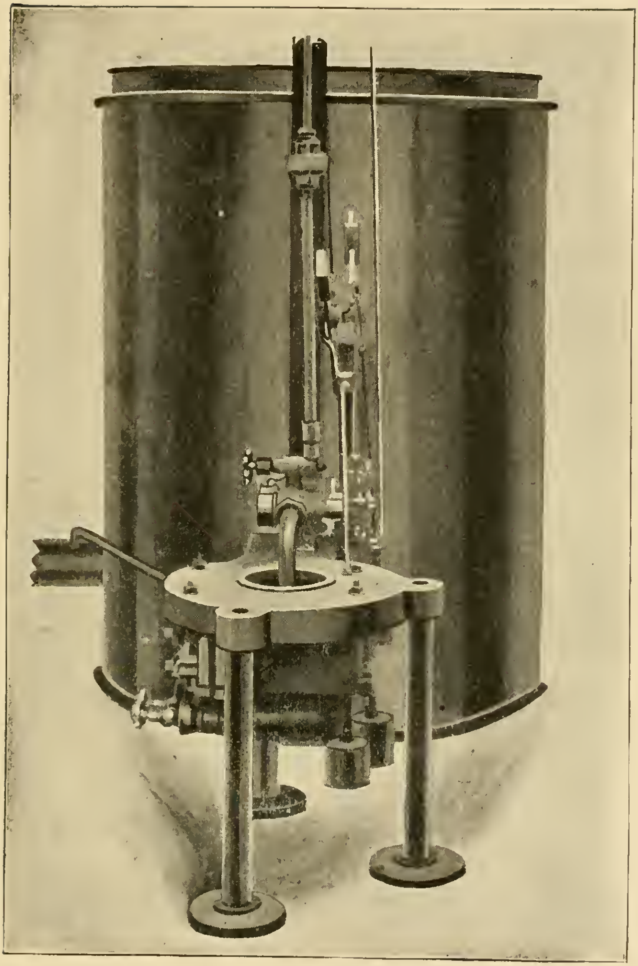


Fig. 30. GAS MACHINE.
(W. W. Vernon.)

and that it should not be resorted to unless the laundry is so located that no other gas can be obtained. These burners work very well when new and clean, but they soon become clogged, and cause no end of annoyance.

The supply of gas to the laundry should be suffcient to heat all the machines and stoves when everything is running. There must be an abundant supply of gas, or the full capacity of the machines which use it can not be obtained. There is nothing so discouraging to an operator as to have insufficient heat in his machine. To those who can not obtain a large supply of gas, the author recommends the use of a fan connected in the main gas supply. This fan should be connected in such a way that it becomes part of the gas passage. The inlet-pipe should be connected to the inlet of the fan, and the outlet-pipe connected to the outlet of the fan. All joints should be made tight to prevent the escape of gas. The shaft that carries the fan should be provided with stuffing-boxes, to prevent any escape of gas through the journals. When this fan is revolved it produces a partial vacuum, which causes the gas to flow forward more rapidly, and the motion of the fan carries the gas outward, producing greater pressure in the pipes leading to the machines.

Wherever possible, all pipes should be conducted under the floor on which the machines set, and they should be connected through the floor to each individual machine. The iron pipe should be run to within a few inches of the burner, and should be closed by a valve. Connection should be made from the pipe to the burner by means of rubber tubing.

The nature of the work done on ironing machinery requires the heating of small rolls and irons, of which there can be no natural ventilation, and as there can be no combustion without oxygen, it is necessary to provide a forced supply of air directly to the point at which the combustion is desired. This is accomplished by means of a fan or an air-pump, forcing air through pipes, and conducting it to the point where the combustion is required. This problem has given inventors a great amount of thought and experiment.

The modern burner embodies all the true principles of perfect combustion. In the ordinary burner designed to burn illuminating gas for the purpose of producing light, *i. e.,* the ordinary fishtail burner, the combustion of the gas is incomplete. It is this incomplete combustion that produces light, for the reason that the temperature is not sufficient to consume every particle of the fuel and a portion of it becomes incandescent. The incandescent state is necessary, as it is from the incandescent particles that the light is given off. It is therefore necessary in a heating burner to mix air with the gas just before it reaches the burner, in order to insure complete combustion, and the derivation of the maximum possible amount of heat from the fuel. This is not so necessary when gasoline gas is used, as there is already a considerable amount of air mixed with it when it reaches the burner. When gas is burned with free access of air, it is only necessary to so arrange the burner that air may enter and mix with the gas before it reaches the point of combustion —the flame. When the gas is burned without free access of air, as is the case in the roll of an ironer, it is necessary to supply air to mix with the gas before reaching the flame, and also to surround the burner by an air-pipe, through which the air is supplied under pressure.

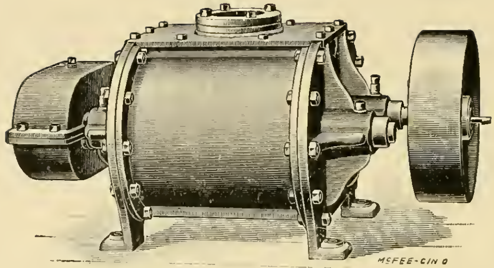


Fig. 31. **ROOT BLOWER.**
(P. H. & F. M. Root Co.)

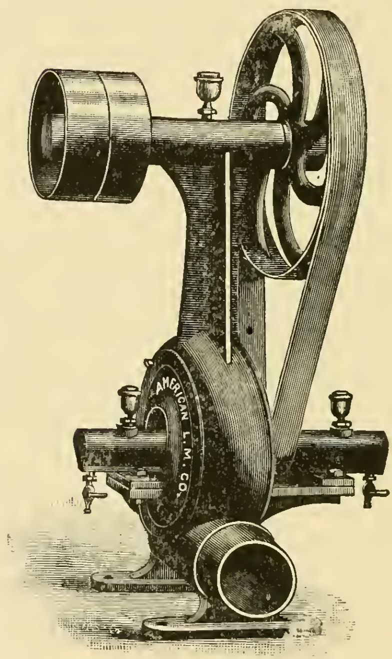


Fig. 32. **AIR FAN.**
(American Laundry Machinery Co.)

Such burners as are used in ironing rolls consist of a small pipe enclosed in a larger one. The gas is admitted into the smaller pipe, and it is allowed to escape from a number of fine holes at the point where combustion is desired. There is also a small air-pipe which is connected to the gas pipe at a point somewhat in advance of the point of combustion, and this furnishes sufficient air to insure complete combustion while air is allowed to pass around the gas through the larger air-pipe. If the smaller air-pipe were not present, the combustion would be incomplete, and the result would be a yellow flame which would soon coat the inner surface of the roll with soot. Soot is a non-conductor, and it destroys the heating properties of the roll.

The usual method of supplying air to ironing machines is with a fan, although many laundries of late have adopted the Root blower, shown in Fig. 31, or an air-pump. A fan simply creates a current of air, but will not produce any great pressure. If there is an outlet in the pipe, the air flows through, but when passages are all closed no greater pressure is accumulated. Therefore, in large plants having many feet of air-pipe, a blower or a pump, giving positive pressure, is preferable, as long surfaces which afford friction, retard the velocity of air, and lessen the efficiency of the fan, the machines nearest the fan getting more air than those farthest from it. However, a good fan-blower, twelve inches in diameter, and running at the rate of 3,500 turns a minute, will furnish sufficient air to operate quite an extensive plant. The chief objection, other than stated, to a fan, is the high rate of speed to which it must be run. This usually affords laundrymen considerable annoyance in the way of breaking belts and heating journals. The author's advice to the laundryman who must use a fan is, to get the best. Use self-oiling bearings and countershaft; use best grade leather belting, cemented together, and arrange both the fan and the countershaft so they may be adjusted to tighten the belt. Then make the belts endless, and never resort to lacing. The Sturtevant fan shown in Fig. 32 is a good example of this type.

The air-pipes leading from the fan should be large, in order that there may be as little friction to the air as possible. The elbows and bends in the air-pipe should be round. Any square turns in the air-pipe afford great resistance to the air and retard its velocity. Any branches from the main pipe should be joined with a "Y" and not with a "T". Good heavy tin is an excellent material to use in making this air pipe.

The "Root" blower is made with an arrangement of irregular shaped cylinders which are revolved inside of an air-tight casing. As these cylinders rotate they take in the air and pocket it, producing an atmospheric pressure in the discharge pipe. With this machine it is not safe to use tin pipe, as the pressure is liable to be so great that it will burst it. Iron pipe is preferable to use in connection with a "Root" blower. A smaller pipe can be used than with a fan as the pressure overcomes the friction of the pipe walls.

In many modern equipped laundries will be found the air pump. This pump is of a design similar to the regular plunger water pump. It is especially built for pumping air. The air is pumped into a large iron reservoir, which equalizes the pressure and from the reservoir is connected the air supply pipe. The reservoir should be large enough to contain a sufficient amount of air to cause a steady flow and pressure in the air pipe. If this reservoir is too small, the throbbing of the pump will be noticeable in the air pipes, and an uneven flow of air will result. This device is quite expensive, but it affords a very satisfactory arrangement for producing an abundant supply of air to a large number of machines. The connection from the reservoir to the machines should be made with iron pipe.

CHAPTER 8.

IRONING-ROOM METHODS.

There are three methods of ironing new work. One method is to iron the shirt entirely by hand with a hand iron; another is to iron part of the shirt by hand and part by machine, and the other is to iron the shirt entirely by machine. The latter method is coming into general use. Competition has brought it about. Prices for laundering shirts have been very much reduced owing to the introduction of ironing machinery, and it enables the laundryman to handle large volumes of work with comparatively inexperienced help, as the machines are so constructed that they will perform perfect work when run by an operator having ordinary intelligence. Hand ironing is a trade, and can not be acquired except by long apprenticeship, and good work can be obtained only by continuous practice of the workman.

To iron a shirt entirely by hand requires a great amount of intelligence, judgment, and skill. The same shirt can be ironed nearly as well by machines with operators having very little experience and who do not need to possess a technical knowledge of ironing. Consequently it is much easier to establish a machine ironing business than to establish a hand ironing business. However, in many factories there are found to be no machines, the work being ironed entirely by hand. But this is only done in factories having a well established retail business and a reputation which places them in a position to sell their goods at a price which warrants their paying to have the work ironed by hand. The average laundry, handling the average class of goods, will find it ruinous if hand ironing is the plan on which the goods are laundered. The argument against machine work is that it can not equal handwork. But this argument can not hold true, as there are laundries in the United States that are known to be doing as fine work by machines as it is possible to have done by hand, and in many cases the work ironed on machines finds a quicker sale than work ironed by hand.

One great recommendation for machine work is its uniformity. In a well regulated laundry, ironing shirts by machines will produce uniform results. Every shirt will be of the same character and appearance, while the shirts ironed by hand will have as many different grades as there are different ironers working. One operator will iron a shirt stiff, while another will iron it soft. There will be a difference in the general character of the work; so much so that one can hardly recognize the shirts after they are ironed, there being so much difference in the work of one operator and another.

The plan of ironing shirts partially by machines and partially by hand is, in many cases, quite practical. By this plan the starched portions of the shirt are usually ironed by machines and the balance by hand. The inside of the yoke is ironed by hand; the neckband, the wristbands and the bosom are ironed by machine, and then the body and the sleeves are ironed by hand, making a combination which, in results, resembles the character of hand ironing very closely. It is, however, still more expensive than all machine work, and requires skilled mechanics after the machine work is done to put it into shape.

The following machines and devices are necessary in a machine ironing plant: A bosom ironer; a back ironer; a neck ironer; a wristband ironer; a bosom fixing table; a yoke setter; a sleeve ironer; a body ironer and a folding table. They should be arranged in line in the order given. The machinery should, if possible, be driven from shafting below the floor, as this will avoid a great amount of dust from moving belts and oil from the shafting, as when it is placed overhead. With the above arrangement of machines the shirt passes from one machine to another in its regular course. Each part is ironed on a separate machine, and as it passes along the line it gradually develops into a laundered shirt.

The author's plan is usually to iron the inside yokes of the shirt first and generally by hand. Although he has used very successfully the same kind of a machine that is used for ironing wristbands, he considers hand ironing for inside yokes the best. The inside of the yoke of a shirt is very conspicuous after the shirt is folded, and it should be ironed very neatly and well. The objection to ironing by machine is that it crushes the plaits and gathers, and produces a gloss finish which looks very cheap. If the inside yoke is ironed by hand, and the balance of the shirt is ironed well by machine, it will have, when finished, the character of a hand ironed shirt. There are a great many varieties of bosom ironers, all of which possess a certain amount of merit, but there are very few machines made that are well adapted to new work.

New work can not be successfully ironed on the ordinary bosom ironer which is found in use in custom laundries. It must be a machine having clamps and devices to hold the shirt in its proper position, so that the shirt may be ironed absolutely correct. It is necessary to pay a great amount of attention to the manner in which the bosom is ironed. It is impossible to get a shirt well laundered if there is no attention paid to the way the shirt is ironed on the bosom ironer. It takes very little deviation to cause the shirt to be out of shape when it is folded. A shirt is built on close lines, and if these lines are distorted in any way it will cause the shirt to be warped and cramped and to have an unsightly appearance. Consequently, a machine not having devices for stretching and holding a shirt in shape is not a practical machine with which to iron new work.

Mr. Watson first recognized this point, and was the first man to successfully construct a machine that would properly iron a new shirt. His machine, shown in Fig. 33, is now in general use in many of the largest manufactories. It has all the attachments necessary to hold the shirt in the proper shape, and is also of great capacity.

The Watson machine is constructed on the plan of a reciprocating table which carries the shirt under a roll. It is in contact with the rolls only in its forward motion, then it drops away from the heated roll and returns to its former position, thus ironing in one direction only, that is, from the neckband towards the bottom of the bosom, which causes all fullness to advance in the same direction. As the bosom is being ironed the slack, or fullness, can be taken up by the

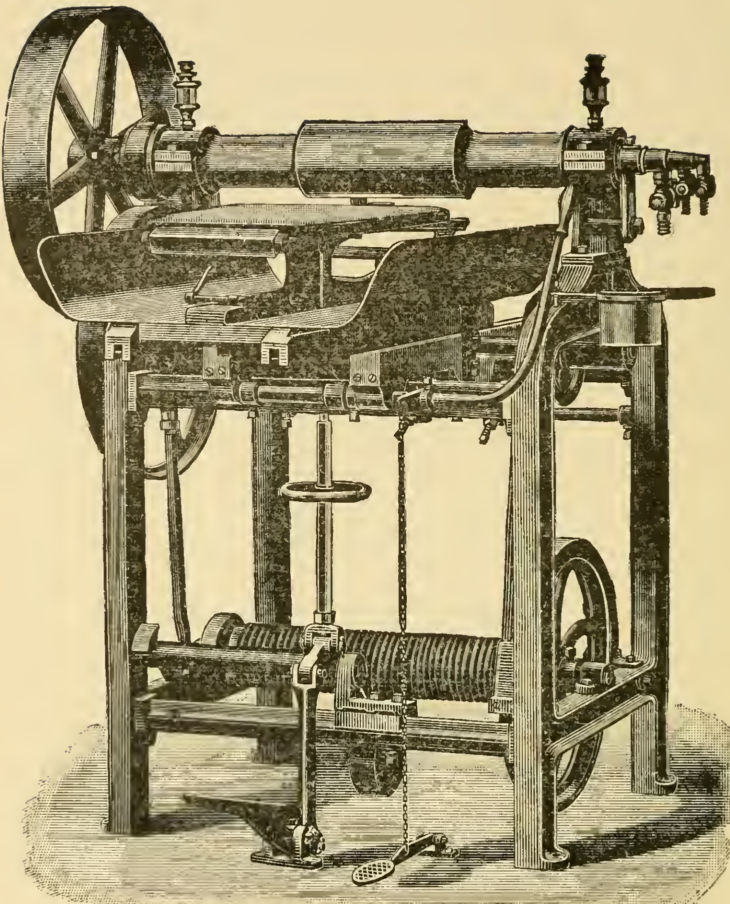


Fig. 33. WATSON IRONER.
(Nelson & Kreuter.)

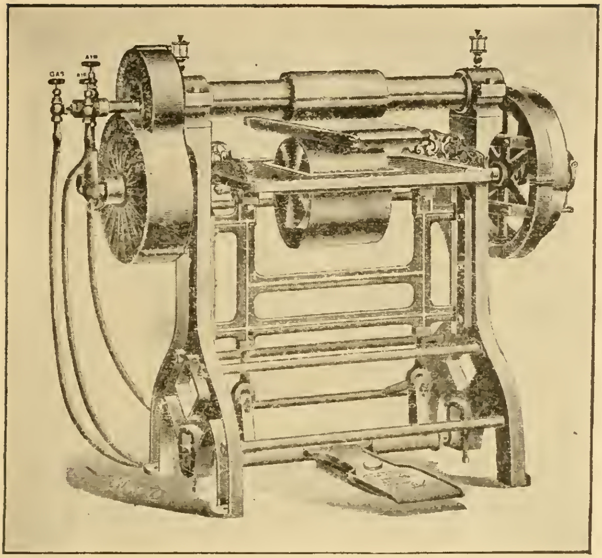


Fig. 34. HENRICI BOSOM IRONER.
(Henrici Laundry Machinery Co.)

stretching device which is on the machine. There is a clamp which covers the neckband and presses it into a space below the level of the surface of the bosom board. This clamp holds the neckband in position and protects it from being dried out while the bosom is being ironed. This leaves the neckband in a moistened condition so that it may be easily ironed on a neckband machine. It also has clamps to hold the shirt in position by attaching the shirt to the board at the point where the yoke is in contact with the end of the board. Thus it is that the shirt is held firmly in position while the bosom is ironed, and renders it possible to get a correct shape on the shirt when it is finished.

The Henrici, a bosom ironer shown in Fig. 34, is of a different type from the Watson machine. This machine has removable boards, the sizes ranging to correspond to the different sizes of the shirts. One board will iron two different sizes, making it necessary to have but three boards for all sizes of shirts, except the board for boy's sizes. The shirt bosom is drawn over this board. There is a round opening at one end into which the neckband of the shirt is placed, and then into this opening there is inserted a round ring and the shirt drawn up to the shoulders, causing it to lie in its proper position, with only the neckband reversed. The machine is constructed with a revolving heated roll and a revolving drum arranged to be raised or lowered at the will of the operator. The shirt, as it is on the board, is run between the revolving drum and the revolving heated roll. Pressure is applied and the shirt moves forward by the action of the drum, and the fullness is stretched out as the shirt is drawn, practically as it is on the Watson machine. The shirt passes forward, the drum is lowered and the shirt is pulled back to its original position.

The chief merit claimed for this machine is that the different sizes are ironed on the proper size board, making it easier to iron correctly all the different sizes of shirts, while on other machines the operator is obliged to judge at what depth the neckband should be drawn in order that it will correspond in size to the shirt, and in many instances the operator's judgment is at fault and causes ill-shaped shirts. If, for instance, the operator, in ironing a small shirt, does not pull the neckband in under the clamp far enough, it will cause bulging up of the bosom when the neckband is buttoned together. However, operators soon learn to judge the position of the shirt, and it is practical to iron all sizes of shirts on one size board, provided the operator has good judgment.

There is not so much difference in the sizes of the shirts in the circle of the bosom as one would naturally suppose. The difference in the various sizes is in the size of the circle in the yoke, and not so much in the bosom. This makes it possible for a small shirt to be ironed on the same bosom board as a large shirt, except, of course, the larger shirt must be let out more in the neckband than the smaller. The difference is not so great, however, but that it is practical to iron it on the same board. Another advantage claimed for the Henrici machine is that while one operator is placing shirts on one board, another operator is ironing on another board, thus increasing the capacity.

The curved board shirt ironers are rapidly becoming popular, and they present advantages in handling the work. A very good example of this type is found in the Stone Racer.

The author has obtained more satisfactory results in operating an ironing machine with a slow motion than a fast one. It requires a certain time to dry out a garment and, if a machine is running slowly, the heated iron is in contact with the goods longer than in running fast. To get the same amount of contact requires more motions or a faster movement of the iron over the goods, and especially is this theory true in the operation of a bosom ironer. If the machine is speeded too high, a greater number of passes of the shirt under the roll is required, and, as the bed moves so rapidly, the operator has not sufficient time to properly manipulate the machine and stretch the shirt while it is being ironed.

CHAPTER 9.

THE BACK IRONER.

The next thing to do on a shirt, after the bosom is ironed, is to iron the back. This is usually done on a machine that is known as the body ironer. It is necessary to iron the back and remove all the moisture there may be in it, or else, when it is folded, the moisture in the back will be absorbed by the bosom, causing the bosom to have an uneven appearance. The rolls on this machine should not be less than thirty inches long, and the cloth roll should travel at the speed of thirty revolutions per minute. Any make of machine of this type will answer the purpose. The preference of the author is for machines having revolving heated rolls, rather than for those having a stationary shoe. And this preference is extended to any machine of this type, no matter to what purpose it is put.

When goods are of a proper dampness, a machine having a stationary iron will give fairly good results, but it is impossible to maintain even dampness, and if the goods are a little dry, better results, in the author's opinion, may be obtained with revolving heated rolls. With a roll, the whole pressure is concentrated to a line, whereas, with a stationary iron the pressure is distributed all over the surface of the iron, and to iron well goods that are not properly dampened, or goods that have dried out to a certain degree, the roll is much

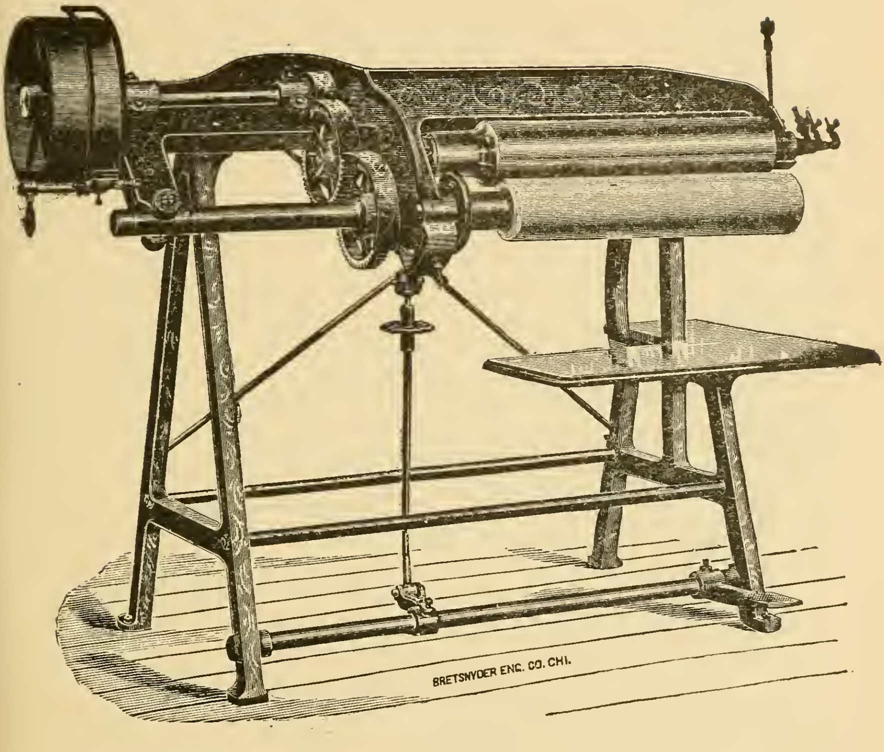


Fig. 35. ROLL BODY IRONER.
(Nelson & Kreuter.)

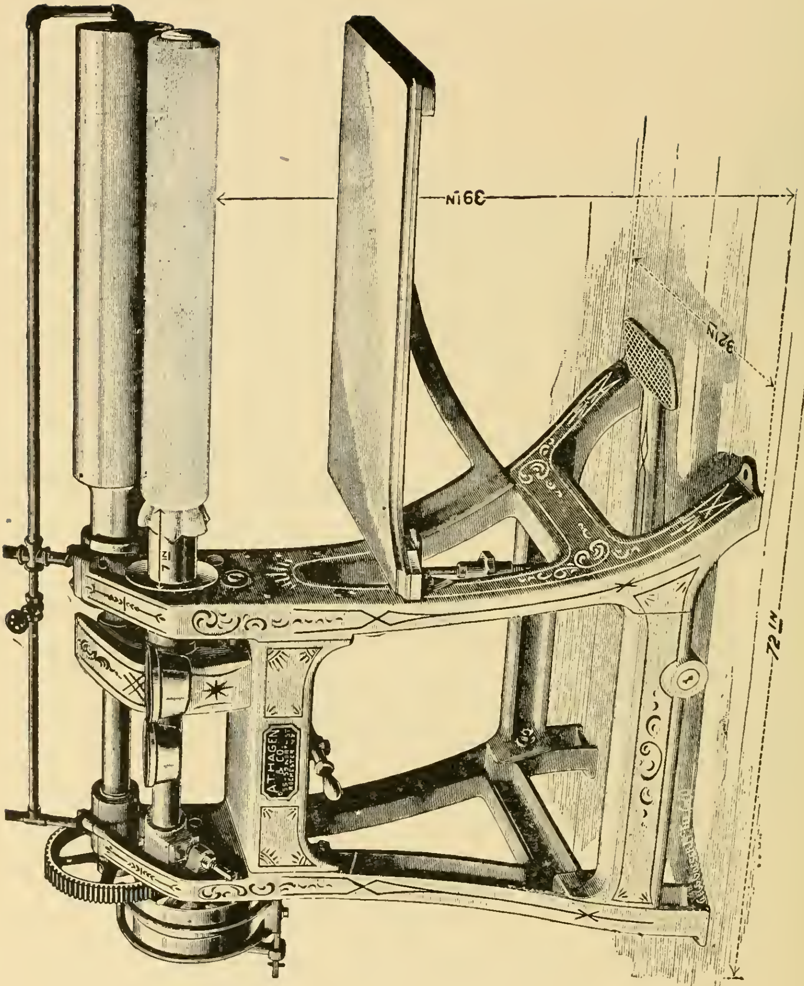


Fig. 36. HAGEN BODY IRONER.
(A. T. Hagen Co.)

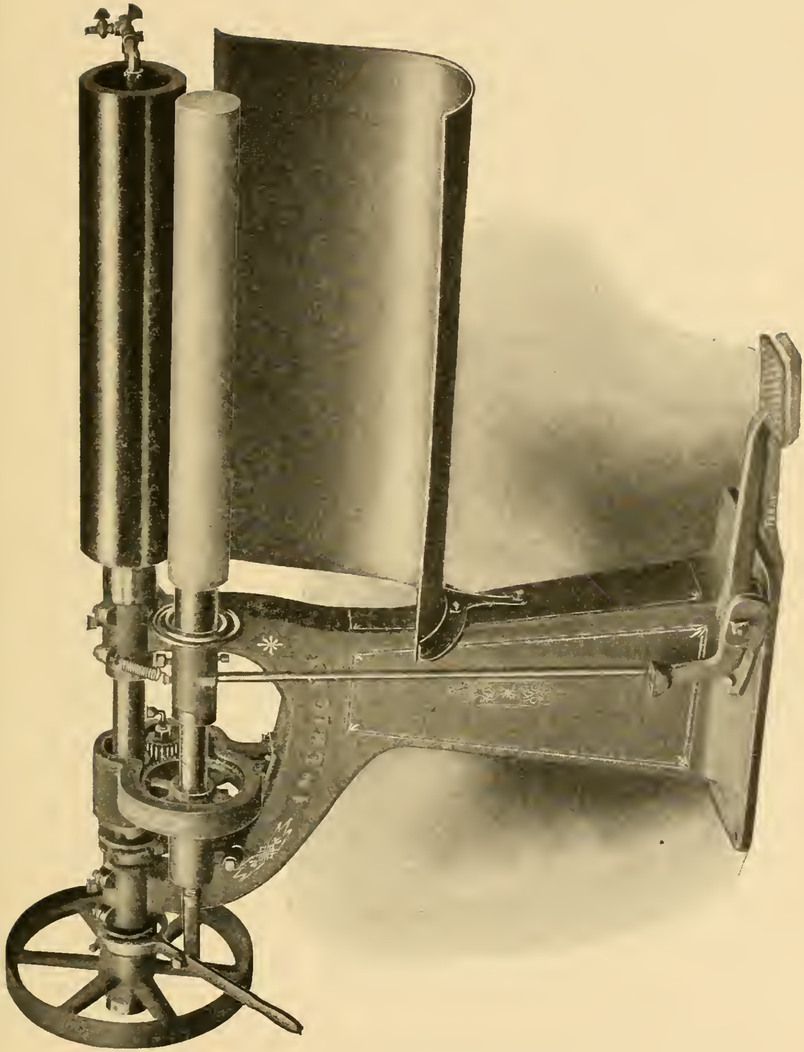


Fig. 37. AMERICAN BODY IRONER.
(American Laundry Machinery Co.)

better, for the reason already stated, that the iron presses the goods in a line of contact. A large supply of gas and air is required to operate this machine, as it is a long roll, and the nature of the work which it performs absorbs a large amount of heat, a large proportion of which is also given off by radiation. Several examples of modern body ironers are shown in Figs. 35, 36 and 37.

In certain makes of this machine the rolls project beyond their bearings, there being no bearings at the extreme end of the rolls, while in other makes the heated roll has a bearing at its extreme end, making it more rigid and more durable. The objection to this class of machine is the liability of oil dropping on the work from the upper bearings, although this has been successfully guarded against by most manufacturers. The lower roll, of course, has no bearing, because it would render it impracticable in placing the work on the machine. This machine is constructed usually in such a way that when the lower roll is brought in contact with the upper roll it begins to revolve, and when it drops away its motion stops. However, in some makes of machines, the lower roll revolves continuously, which arrangement is open to several objections. It affords great danger in operation, as the operator is liable to get an arm caught in the machine, and if the rolls revolve continuously, they may cause a serious accident to the operator.

CHAPTER 10.

NECKBAND AND WRISTBAND IRONERS.

Next in order in this line of machinery is the neckband ironer. This is one of the most simple machines in the laundry, and yet it is of the greatest importance and the most difficult to operate. The usual type of neckband ironer is constructed with a revolving covered roll running in contact with a stationary heated iron. The pressure is applied by means of a pedal connected to the heated iron by a perpendicular rod. Pressure is applied by the foot when the work is fed through. The roll does not run in contact with the iron when it is performing no work.

There is another type of neckband ironer which is constructed with two revolving rolls, one roll being heated and the other covered, and its operation is similar to the one already described. The author prefers the former machine, for the reason that it is easier to operate, is not so liable to damage the work, and it irons stiffer neckbands. The Troy machine, shown in Fig. 38, and the Hoyt Improved, shown in Fig. 39, are good representatives of the type of machines first described.

What has been said in regard to slow motion in ironing will be emphasized in describing the manner of neckband ironing. If a neckband ironing machine runs too fast, it is impossible to guide the work properly, and it is also impossible to iron a stiff neckband.

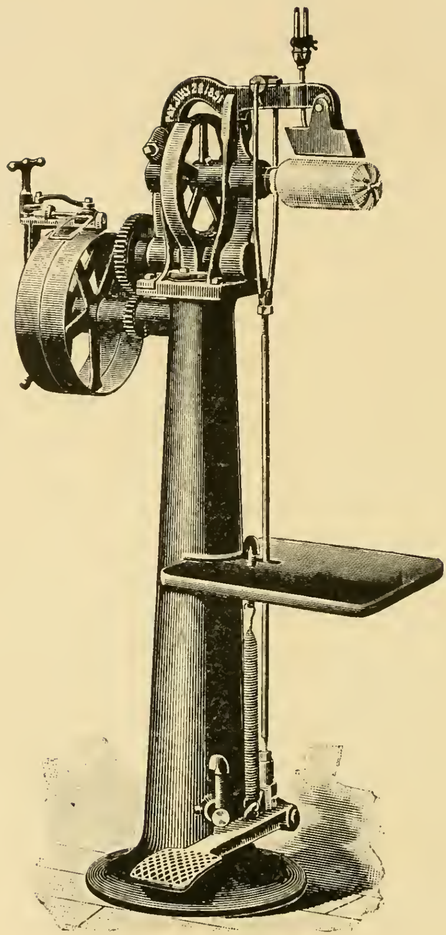


Fig. 38. TROY NECKBAND IRONER.
(Troy Laundry Machinery Co.)

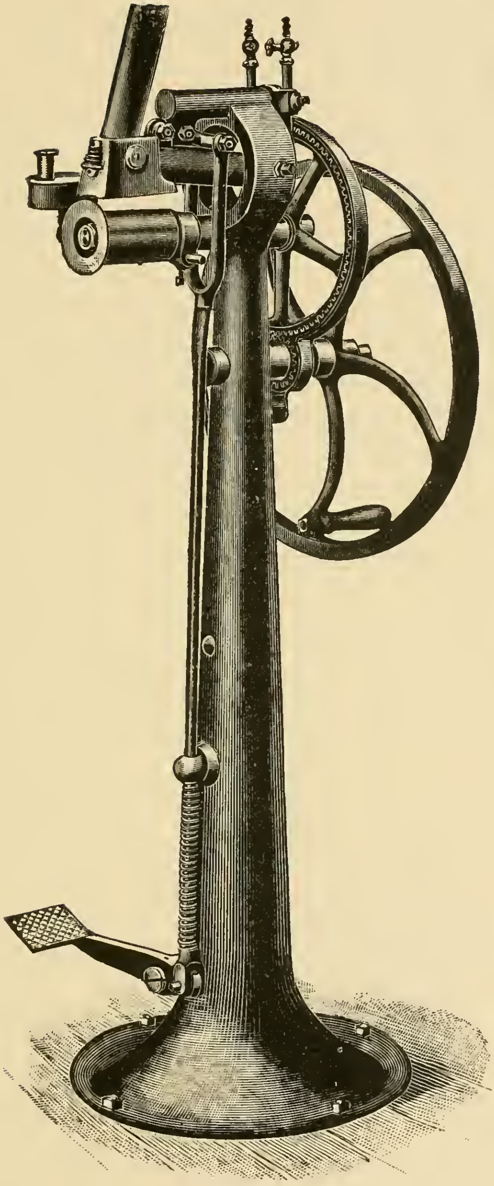


Fig. 39. HOYT IMPROVED BAND IRONER.
(Hoyt Mfg. Co`

The revolving roll of a neckband machine should not run faster than twenty-five turns per minute.

The wristband ironing machine, which comes next in order after the neckband ironer, is not so important a machine as the latter, neither is it so difficult to operate. In this class of machine there are also two types; one with a stationary heated iron, shown in Fig. 40, and one with a revolving heated roll, shown in Fig. 41. The author has no particular choice in either of these machines.

A wristband ironer should have a roll not less than six inches long, in order that a portion of the sleeve as far as the binding may be ironed at the same time as the wristband. In either type of machine described above the rolls are brought in contact with the ironing surface by means of foot pressure, and an operator, having learned to manage one machine, can easily operate the other. As far as quality and quantity of work is concerned the author has been able to detect no difference between them. The covered roll on this machine should not run faster than thirty turns per minute.

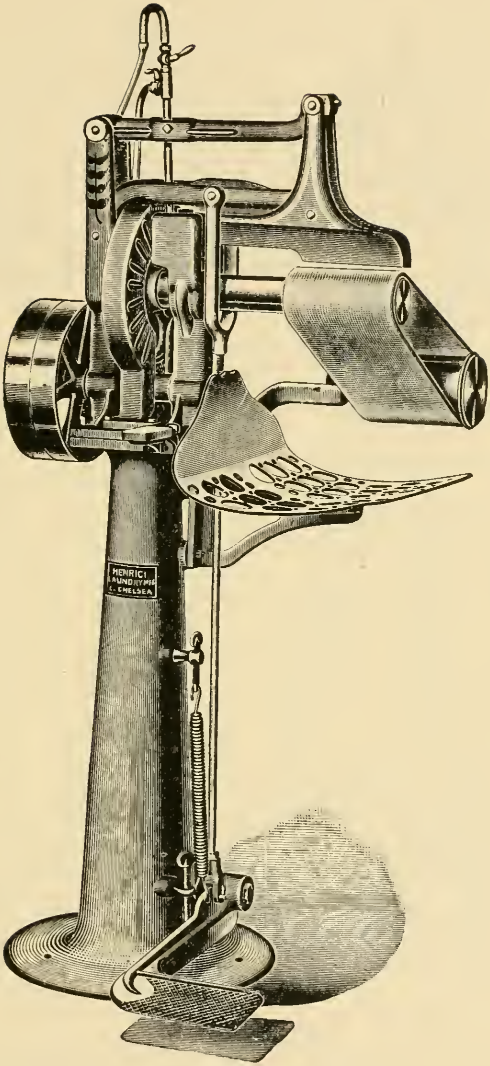


Fig. 40. HENRICI WRISTBAND IRONER.
Stationary Iron.
(Henrici Laundry Machinery Co.)

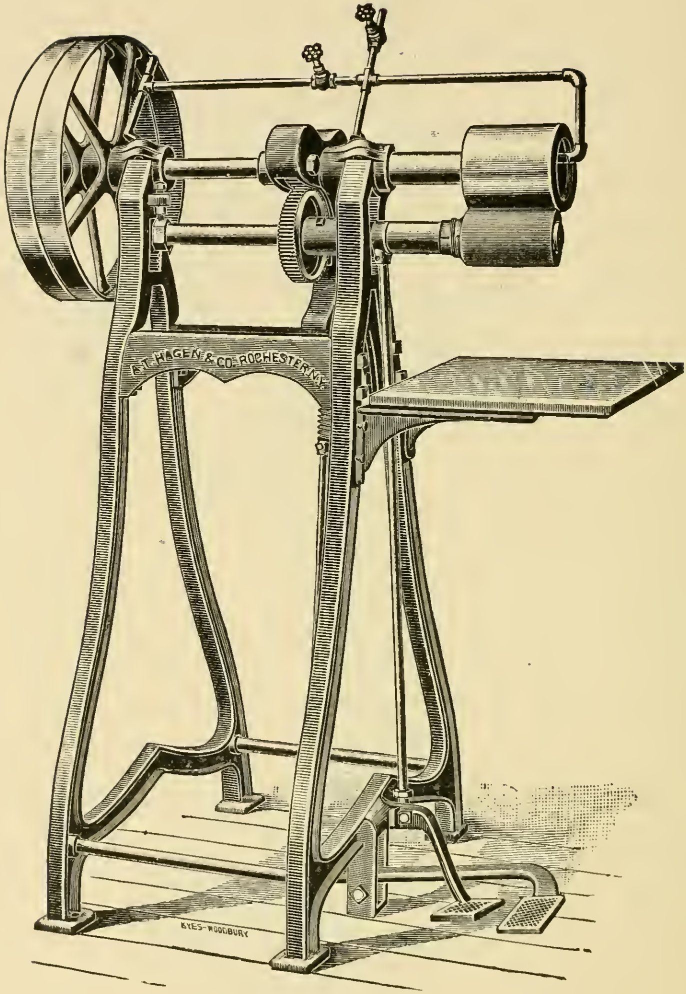


Fig. 41. **HAGEN WRISTBAND IRONER.**
Revolving Roll.
(A. T. Hagen Co.)

CHAPTER 11.

THE BOSOM-FIXING TABLE AND THE YOKE-SETTING MACHINE.

After the wristband-ironer comes a very important operation. This shirt has now had its yoke, bosom, back, neck and wristband ironed, and as it has become more or less rumpled up in the previous operations, it now needs an operation to put it into shirt shape and commence to give it the appearance of a well laundered shirt. This operation is performed on the bosom-fixing table. This table is a sort of a home made device which can be built by almost any carpenter, and consists of a regular table such as used by hand ironers.

If one does not care to manufacture this table they can buy them of a well known laundry machinery company. A table of this kind must have a projecting board having shoulder clamps and a stretching device for holding the shirt in proper shape. It is also necessary to have a gas stove attached to the table for heating flatirons. The table should be made very strong and securely fastened to the floor.

The yoke-setting machine, an example of which is shown in Fig. 43, will now be considered. This is a sort of a hand and foot operated device which requires no mechanical power to operate it. It consists of a stationary table having a universal swinging arm which carries a gas heated iron. This arm is raised and lowered by means of foot pressure and is moved to any position on the board at the will of the operator.

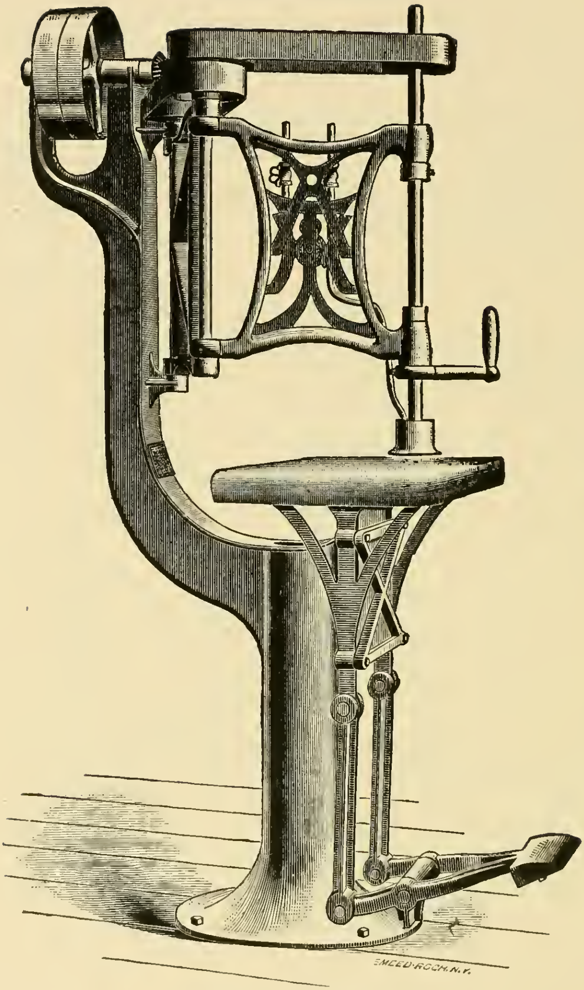


Fig. 42. YOKE SETTER.
(A. T. Hagen Co.)

The iron has a handle by which the operator may move the iron to any position desired. There is also a spring attachment, which produces a certain amount of pressure on the iron. The iron is square in shape, having a beveled side and rounded edges on three sides, while

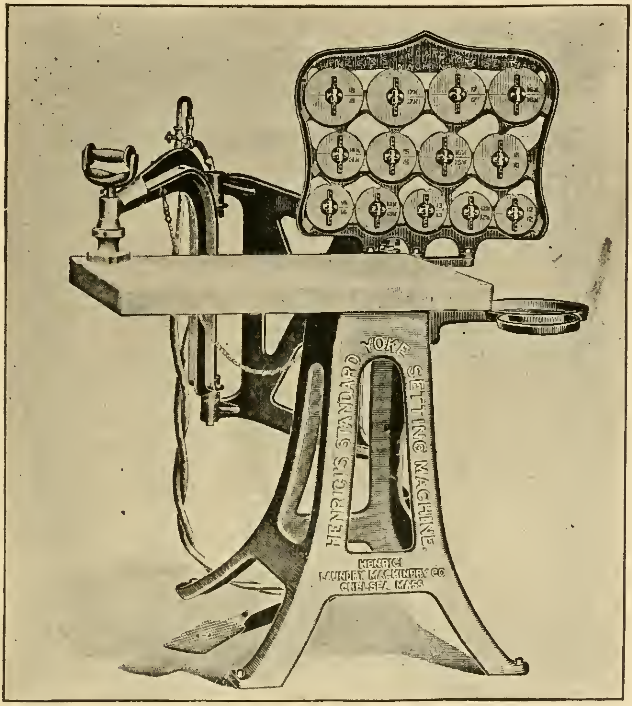


Fig. 43. YOKE SETTER.
(Henrici Laundry Machinery Co.)

on one side the edge is square-cornered. The iron may be turned into any position. The yoke-setting machine is used to set the yokes of shirts after they come from the bosom-fixing table. It irons the yoke smoothly and sticks it firmly together so that it will hold the shirt in proper shape when folded.

CHAPTER 12.

SLEEVE AND BODY-IRONERS.

The next machine in order, after the yoke-setter, is the sleeve-ironing machine, an example of which is illustrated in Fig. 44. This machine is of the same type as the one already described for ironing backs, the difference consisting only in its having shorter rolls. The rolls for this machine should be about twenty inches long. Some laundrymen iron sleeves on a lighter machine with a shorter roll, but in order to iron a sleeve well, and to preserve the shape of the shirt, the shirt should be ironed on the side as far down as the bottom of the bosom. Starting from the side line of the bosom, the ironing should be from that line towards the side of the shirt, and continued on to the sleeve until the cuff is reached. In order to iron the shirt on the side and the sleeve in this manner, the rolls must be longer and the machine heavier than is required to iron the sleeve only.

The ironing of bodies has long been a perplexing question, and a great many plans have been introduced for ironing this part of the shirt, but all plans seem to have failed, except one, and that is, ironing the shirt flat, as it would naturally lie when it is to be folded. If the body of a shirt is ironed on a roll machine similar to the one already described for ironing the backs, it is sure to put the fullness of the skirt in the wrong place, and render it difficult to fold neatly. Thus, it is necessary to lay the shirt flat, with the bosom up, stretch all the fullness, and lay neces-

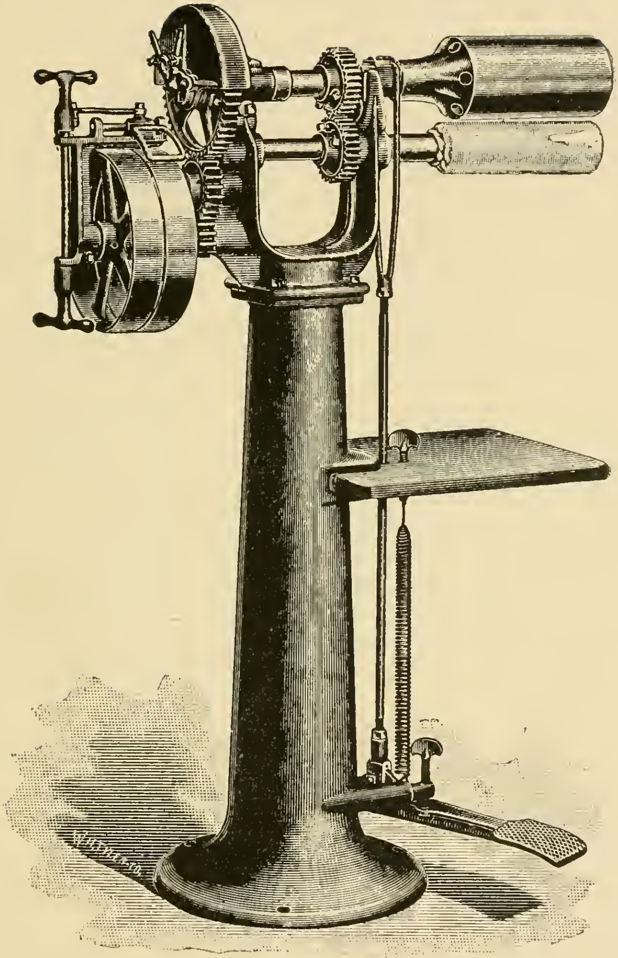


Fig. 44. TROY SLEEVE IRONER.

(Troy Laundry Machinery Co.)

sary wrinkles to the side of the skirt, having the front skirt, where it shows when folded, lie smooth and flat. Then, if the shirt is ironed in this position, an easy and natural fold can be obtained.

The Watson Body Ironer is shown in Fig. 45. It is the invention of Mr. L. H. Watson. This machine consists of a stationary bed, large enough to admit a shirt being laid on it at full length. It has a device for clamping the yoke in position, and a stretcher for removing the wrinkles from the skirt. Above the table is suspended a heated roll, which is brought into contact with the shirt at the lower end of the bosom. It is then caused to move from the bosom towards the bottom of the skirt, and as the roll moves forward the stretching device takes up all the fullness, allowing the roller to produce an even, flat finish to the whole front of the shirt. After the roll has moved over the surface of the table it is automatically raised and carried back to its original position, where it remains at rest until it is again employed by the operator. This machine is quite elaborate in construction, and too complicated to admit of a detailed description here. It may be said however, that its complications are no detriment to the machine, as any machine built on this plan, and doing the work which this is designed to do, must necessarily be complicated.

The Henrici machine, shown in Fig. 46, differs from the Watson machine in every particular as regards construction and plan of operation, while the result obtained is the same as in the Watson machine. The Henrici machine consists of a revolving drum over which is passed a canvas apron. This apron is carried on rolls, which are mounted in line with the upper

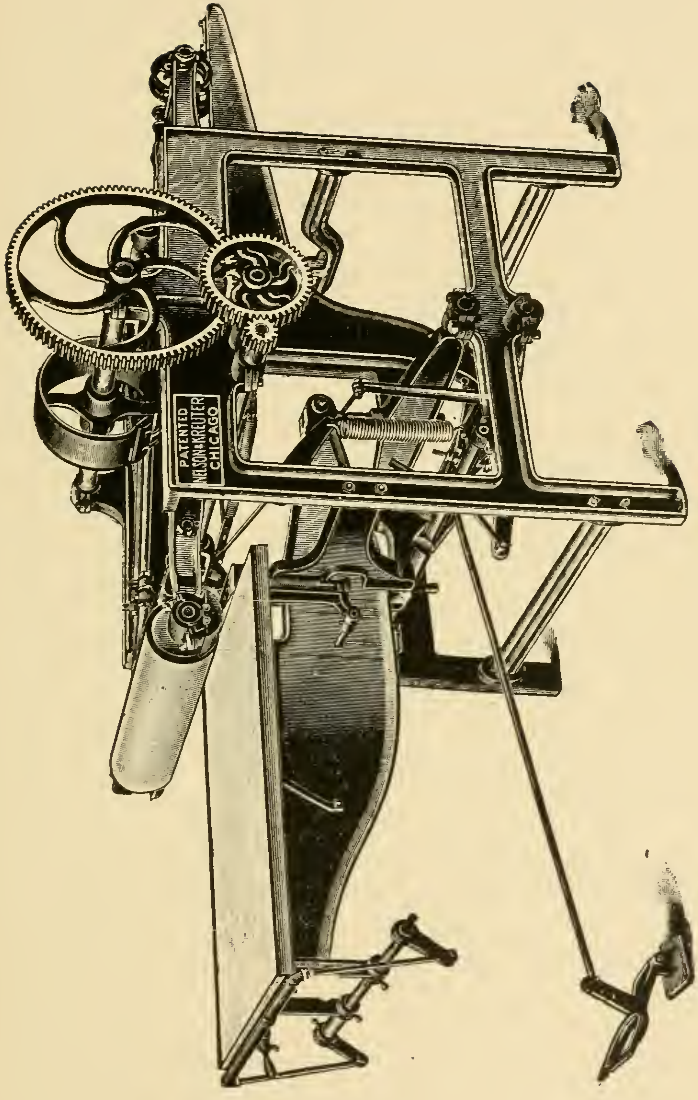


Fig. 45. WATSON BODY IRONER.
(Nelson & Kreuter.)

edge of the drum. The drum being equally distant between the carrying rolls, it affords a continuous movement of a flat surface. Above this apron is a revolving heated roll. The apron, the drum and the carrier rolls are mounted on a frame which is made to raise and lower by means of a foot lever, thus carrying the whole equally. The natural position of this drum and apron, when the machine is not in use, is at its lowest point, and when it is in this position the apron is at rest, as it moves only when the drum is raised and pressed against the revolving heated roll.

The shirt is laid flat on the apron, and passed under the revolving roll, and when the shirt is in the right position with the end of the bosom directly under the heated roll, the drum is brought up, pressure is applied to the apron, which moves forward, carrying the shirt with it, thus ironing from the bottom of the bosom to the lower end of the skirt, producing the same result as is produced by the Watson machine, the difference being that in the Henrici machine the shirt moves forward, and the roll remains in one position, while in the Watson machine the shirt remains stationary and the roll moves forward. There is no stretching device on the Henrici machine. The operator does the stretching with his hands while the shirt moves forward. If the shirt is not sufficiently ironed by one passage it can be returned and ironed again simply by pulling the apron back by hand.

Objections have been made to this plan of ironing because it is claimed it sticks the skirts together, and makes too stiff a body. These objections are easily overcome. In the case of sticking together the skirts can be pulled apart after it being ironed over once and finished. Then, when the folder gets it, he can again

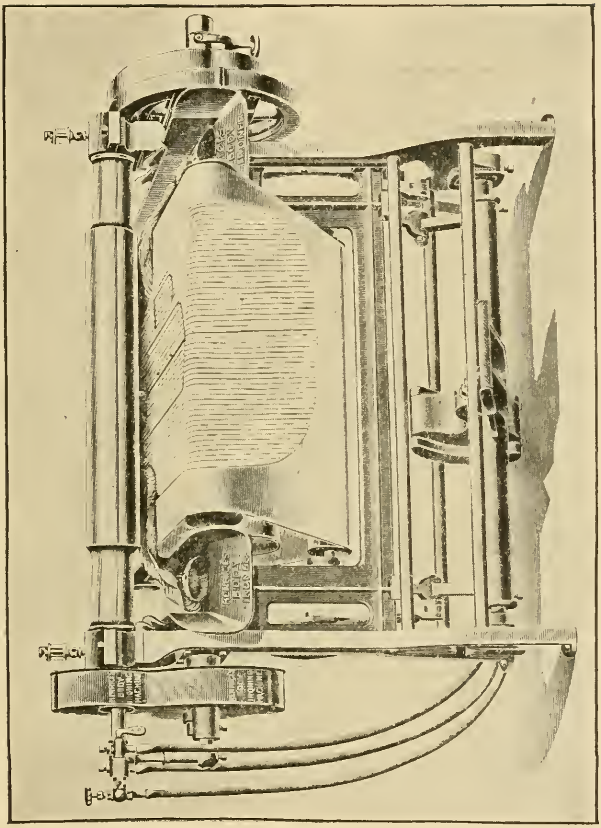


Fig. 46. HENRICI BODY IRONER.
(Henrici Laundry Machinery Co.)

pull it apart, and if there are any little creases or breaks he can smooth it out with a flat iron. If the body is too stiff it is usually due to its having too much dipping-starch or by having the work too damp. A cheap grade of shirt, as has been said before, should be very stiff in the body. There are very few buyers who will accept a cheap shirt unless it is well starched, and when it comes to be ironed on the body ironer it is well to fold it up in the condition in which the machine leaves it, and not attempt to pull the skirt apart. Fastidious laundrymen will say that this is not good work, but the author's experience has been that the trade desire a cheap shirt starched and ironed all over as stiffly as possible, and the laundryman must give the trade what it wants.

After the shirt has passed this machine it has been completely ironed, and is ready to be folded. There is no machine on the market for the purpose of folding shirts. There are one or two large factories, however, that operate machines to aid in the folding, but which do not fold the shirt completely. This is something that, to the author's knowledge, has never been done, and there is afforded an excellent opportunity for a useful invention in this direction.

Shirts are folded by hand, the only accessories required being suitable tables and flatirons. These tables should be arranged near the body-ironer, and the shirts folded immediately after they come from the latter machine.

It is customary to have a gas stove on each table, for heating the irons used by the folder. The shirts must be creased with a hot iron, and any place that has not been properly ironed should be touched up by the folder.

After the shirt is folded it should be placed carefully in a box made for the purpose. This box should hold about two dozen shirts. It is a convenient plan to have rollers attached to the box, so that it can be moved around the room easily. When the folder has filled one of these boxes, it should be taken away, and removed to the examination table. From there the shirts should be taken and examined. As the examining department is usually a part of the boxing department it will be considered in connection with the boxing operation.

As the work passes from one machine to another it is necessary to have something on which to place it while it is waiting for the next operation, and as a convenient means for this purpose the use of light portable racks is recommended, which will allow the hanging of a shirt by the arms, having the body between the supporting rails of the rack.

Each operator should be supplied with clean sponge cloths and there should be basins of clean water arranged at convenient points along the line of the machines, as there is always sure to be more or less sponging to do in each operation, in order to get clean work and produce the right dampness. The bosom-ironers and bosom-fixing tables should be supplied with plait raisers.

If there are more than one line of machines in operation, the back-yoke ironers should be supplied with rubber stamps, and stamp their work. Each stamp will apply to the whole line, so that if there is any bad work done it can easily be traced.

Having fully described the equipment of the ironing room, for ironing new shirts, the method of doing the work will now be considered.

CHAPTER 13.

PROCESS OF IRONING BY MACHINES.

The first part to iron on the shirt, is the inside yoke. This, as has already been stated, it is preferable to iron by hand, for the reasons given in Chapter 8. The table on which this part of the work is to be ironed should be covered with a soft wool felt, as it is impossible to produce a nicely ironed yoke on a hard table. Of the irons used to do this part of the work the rough face polishing iron is to be preferred. This is a small thick iron and is suitable in every way for this class of work.

The shirt is laid on the table with the right side of the yoke next to the table and the bosom away from the operator. The operator first irons the double portion of the yoke of the shirt next to the neckband, covering a space extending about three inches from the outer end of the yoke. He then irons the strap, or binding, which extends down the back. Last of all, he irons that portion of the back which naturally shows when the shirt is folded. This part of the back is usually joined to the yoke in gathers and to iron these gathers nicely requires considerable skill, which can only be obtained by practice. The shirt should not lay flat when this part is being ironed. The iron should start low enough on the back of the shirt to be free from the gathers. It is then moved upward with one hand while with the other hand the yoke is raised and as the iron moves forward it presses out the gathers instead of ironing them in wrinkles, as would be the case if a shirt was ironed without being raised as described.

Some manufacturers do not have the shirt gathered at this point and this makes it much more convenient to iron. But the prevailing style at the present time, is to have the shirt gathered at this point so it will show a fullness in the back of the yoke when the shirt is finished. Unless this part is ironed nicely the shirt will present an unsightly appearance, no matter how well the balance of the shirt may be ironed.

The inside yoke is the first thing usually observed as it has the size mark and the label on it. Any imperfection there will be observed more quickly than anywhere else. As first impressions are lasting it is best to use great care on this part of the garment.

The knack of ironing of an inside yoke well is not very easily acquired. It requires greater practice than any other part of the process. It is necessary to have on this table a basin of clear water and a paddle shaped stick which is to be used for cooling the irons. The irons should be quite hot, almost to the scorching point, in order to iron inside yokes well. To maintain this heat the irons require frequent changing. As is usually the case, they will become overheated and, unless the operator is provided with means to cool them, it is quite certain that more or less of the work will be scorched. It is also necessary to provide this table with a small piece of Japan wax, and when the iron is taken from the heater it should first be touched lightly on the wax and then rubbed on a clean piece of muslin before it is put on the shirt. Unless this is done the iron will stick to the shirt and is quite certain to scorch it.

A considerable amount of pressure must be applied to the iron, and the yoke must be damp enough to allow the rough dry to be ironed easily. It is impossible to get a nicely ironed yoke if it is too dry. Because of this fact it is necessary to iron this part of the shirt first before it becomes dry during the other operations. It is also very necessary that all the moisture should be dried out during the process of ironing; if not, the shirt will have a mussed appearance when finished.

A good operator, on a well-equipped table, can easily iron fifty dozen inside yokes a day, unless they be unusually heavy and with reinforced backs. So it will be necessary to have only one inside-yoke ironer to one line of machines, as the capacity of a single line, as already described, is fifty dozen open-back shirts or thirty-five dozen open-front shirts a day.

The ironing of inside yokes by machine is done on a machine similar to the wristband-ironer. The yoke is drawn out straight and ironed from below the gathers towards the neckband, and then reversed and ironed on the other side. This can be done either before or after the bosom is ironed. With the Henrici bosom-ironer it is necessary to iron the inside yoke after the bosom is ironed, as the back of the shirt comes in contact with the cylinder which carries the bosom-board while the bosom is being ironed, and if the yoke is ironed first it will crush it out of shape. This is not the case with the Watson machine, as nothing comes in contact with the yoke while the bosom is being ironed. The only objection to ironing the yoke first is that it is liable to become mussed when the operator puts it on the bosom-machine, but if the operator uses proper care this will not happen.

CHAPTER 14.

BOSOM IRONING.

The foundation of a well-ironed shirt is in the bosom ironing, and as this is the main feature of the shirt the utmost care and skill must necessarily be given to this operation. It was for a long time advocated that shirts could not be successfully ironed by machinery because the machines iron them out of shape. This was, to a certain extent true, until shirt manufacturers made a deep study of the problem, and made shirts which could be ironed by machinery. There are today, however, some shirts that can not be ironed by machines, as the manner in which they are cut will not permit the correct shape to be obtained on a machine, while the same shirt may be ironed correctly by hand, as the hand-ironer can stretch it, and make it conform to the shape desired.

In ironing bosoms on a machine, one is handicapped by the bosom being ironed first. If the shirt is ironed by hand the neckband is ironed first; a ring is put in the neckband, or a block, as the case may be, and the bosom is stretched and conformed to the shape of the ring or block, thus making certain of obtaining the proper shape. When the bosom is ironed by machinery the judgment of the operator must be relied on to iron the bosom in such a way that it will be properly shaped. This shape must be such that when the neckband is afterwards ironed, a ring or block may be placed in it, and the bosom made to lie naturally without a buckle or a break.

The greatest difficulty with the latter method is that the operator is liable to neglect to pull the bosom in narrow enough at the point where it is "sloped." That is, the bosom will be wider at the neckband than at the bottom. The side lines of the bosom, instead of running parallel, will form a slightly oblique line to each other. This throws the line of yoke at an outward angle, and will not admit of the neckband closing at the back. A shirt ironed in this way will, when the neckband is buttoned, raise up in front, making it impossible to correctly set the yoke, or to fold the shirt properly.

A shirt, when it is correctly ironed, will allow the neckband to come together when the shirt is laid flat. A safe guide to go by to accomplish this result is to have the lines of the edge of the bosom parallel. In order to gain this end it is necessary to stretch the shirt at the bindings or edges of the bosom, which allows the yokes to be brought up square, and thus bring the upper part of the bosom into its right position.

The seam which joins the yoke to the front of the shirt should run at right angles to the bosom board. If a shirt is placed on the bosom board in this position, clamped and ironed, it is reasonably certain that there will be no trouble in having a proper shape as the result. There is not so much importance to be attached to the size of the shirt as there is in getting the line to the shirt correctly adjusted to the neckband and yoke clamp. If the bosom lines are parallel, and the yoke seams are at right angles, this will regulate the distance in or out from under the neckband clamp of any sized shirt. Of course a small shirt naturally will project farther under the neckband clamp than a large one, but the difference is not so great as one might expect, and for this reason it is possible to iron all sizes of shirts on one board.

What has been said in this connection applies to open back shirts as well. The general feature is the same in ironing open front shirts, the only difference being that there are two pieces to consider instead of one. The theory of getting the shape remains the same. The lines and angles must be preserved in ironing open fronts, just as in ironing open backs. The main difficulty in ironing open fronts, as compared with ironing open backs, is the tendency of the upper lap of the bosom to come out longer than the lower lap, and to bulge up when the shirt is folded. Another difficulty is to avoid the showing of a crease in the upper lap where it lies over the under lap. The first difficulty is overcome by having the upper lap caught lower down by the neckband clamp than the under lap. This will allow the shirt to lie flat, as the under lap will be longer than the upper lap. This is necessary in order to have the neckband stand up properly, as the neckband, when ironed, should stand at right angles with the bosom, hence the under lap has to be longer to allow the upper lap to lie naturally, and to give the two pieces of the neckband their relative positions.

To avoid the crease use a thin piece of felt of the same thickness as the shirt bosom, placed on the right-hand side of the bosom board, and coming to a line where the edge of the under lap would naturally meet it. Thus, when the upper lap is laid on, it will have the same level, which is caused by the thickness of the felt joining the edge of the under lap, so that when it is ironed there will be no impression made on the under lap, because it is ironed on an even surface.

The two sides of the bosom are ironed at one time, which, of course, leaves an unironed surface on the lower lap, where it comes under the upper lap. To iron this, loosen the clamps, pull back the upper lap, readjust the clamps, and then iron over the under lap again. This will iron the exposed surface which was under the upper lap.

Open-front shirts, having a one-piece neckband, are more difficult to iron than those having two-piece neckbands, and of course it is impossible to separate the laps and iron the portion under the upper lap in the manner just described. This kind of shirt needs to be finished under the lap on the bosom-fixing table, otherwise the bosom is ironed the same as an open-back shirt.

Pique bosoms are usually ironed on the wrong side, in order to bring out the embossed figures. Great care should be taken to thoroughly iron this class of work, as any dampness left in will destroy the appearance of the bosom.

Plaited bosoms are comparatively easy to iron, providing they are well starched and dampened. It is well to raise the plaits after the bosom has been ironed over twice, then to finish the bosom, and raise the plaits again. Do not run over the bosom after the plaits have finally been raised.

In ironing white work, the matter of sponging is quite an important matter. Even if there is no occasion to use the sponge cloth to remove the dirt, it is still necessary to use it in order that the bosom may take on a better finish. It is quite a knack to sponge a shirt properly. The sponge cloth should be very soft and absolutely clean, being large enough to make a good handful when it is dampened and crushed together. The cloth should be saturated with pure, clean water, and wrung out as dry as possible, when it is ready for use. After running over the bosom once or twice, sponge the surface with this cloth, by rubbing the cloth up and down, using as much pressure as possible. Do this immediately after the shirt has passed under the hot roll, as the heat remaining in the bosom aids in giving the surface that peculiar dampness which is necessary to produce the highest result in the finish of white work. It imparts that satin-like finish which is so desired by the trade and assiduously sought after by the laundryman.

All the moisture in the bosom must be thoroughly dried out before the shirt leaves the bosom-ironer. If there is any moisture left it will cause the shirt to have a warped and buckled appearance, and it will not be so stiff as it would be if it were thoroughly dried out.

What has been written thus far in regard to bosom ironing applies to the Watson type of machine. There is an essential difference in the operation of a "Henrici" machine, because of the fact that the shirt is ironed on a portable board. The shirt is put on this board independently of the machine, and then the board is passed under the hot roll, ironing the surface of the bosom on practically the same principle as on the Watson machine, but the handling of the board requires greater skill on the part of the operator than is required to cause the board on the Watson machine to move under the roll. However, with a "Henrici" machine many tricks can be accomplished, like ironing any one portion and not another, or jumping from one end of the bosom to the other, and various other necessary movements which can not be accomplished on machines of the Watson type.

It is the usual plan with the Henrici machine to have one operator put the shirts on the board, and another operator run them under the roll. The one ironing the shirt removes it from the board when finished, while the other operator puts another shirt on another board, adjusts the neckband clamp and rings, stretches the bosom, and gets it ready for the machine. This plan of handling the work renders it possible for the machine to be kept in operation almost continuously, thus making it feasible to greatly increase its capacity.

One of the principal advantages claimed by the manufacturers of this machine is that it will produce a correct shape on any size or style of shirt. As the shirt is ironed with its bosom, yoke and neckband in their proper positions relative to each other. As sizes change they are ironed on different sized boards, thus theoretically ironing every shirt correctly to a certainty, if the operator is careful to adjust the shirt properly on the board.

The shirt bosom is first drawn over the board, the board being inside of the shirt, and the neckband is then adjusted to the round cavity in the upper end of the board. Into this cavity is placed a brass ring which is made to expand outwardly firmly, pressing the neckband against the wall of the cavity, and thus holding the neckband in its proper position. This clamps the yoke in its natural position. The skirt is then stretched and the bosom ironed.

Open fronts are ironed in practically the same manner as has already been described in connection with the Watson type of machine. It is not practical, however, to iron under the upper lap on the Henrici machine, but this part of the shirt may be finished on the same machine that irons the wristbands.

The makers of the Henrici machine advocate the use of a split felt for ironing open fronts, but the author's experience with it has not been entirely satisfactory. However, for the benefit of the reader, the method of using the split felt will be described.

A felt of medium thickness is placed over the regular covering of the board. This felt is split or divided at the line of the edge of the upper half of the open front bosom, and it extends downward to the point where the bosom is joined together. It is also cut at right angles at the point where the neckband joins the bosom, and also at the bottom where the bosom is joined together, and it extends to the edge of the under lap. This will allow the projecting of the under lap under the felt, which leaves an all-felt surface on which to iron the upper lap, making it possible to iron the upper lap and not show a crease. The objection found to this plan is that, when the shirt is buttoned, that portion of the shirt which is under the felt will not be finished like the balance of the bosom, and the lap in the neckband will vary, and many times cause that portion which is not ironed like the rest to show when the shirt is finished.

CHAPTER 15.

IRONING BACKS, NECKBANDS AND WRISTBANDS.

The ironing of the backs of shirts is a comparatively simple operation. As little attention may be given to this part of the shirt as to any other. The main object in ironing the back is to absorb the moisture there may be in it, and to prevent the bosom becoming moistened, as would be the case if the shirt were folded with a damp back lying against it.

The shirt should be drawn on to the covered roll, having the bottom of the skirt to the left. The full length of the back should then be ironed from the seam where it is joined to the front to the opposite seam. Care should be given to the manner of keeping the facings straight. This is easily done by holding the neckband together with the right hand, and pulling the shirt taut with the left hand when the roll is passing over the facings.

Backs should be ironed sufficiently to evaporate all the moisture, as it is the same with backs as with every other part, that dryness must be the result. Otherwise there will be failure in attaining the best results.

Neckband ironing is the most difficult and particular operation in the whole process of ironing. It requires greater skill and longer practice than anything else, and it is the most difficult operation to describe. The only way one can succeed in learning this opertion is to take what few suggestions may be offered, which may serve as a guide in starting, and then persistently practice until the knack of ironing the neckband properly is acquired.

There are two things absolutely essential in ironing neckbands. One is to iron a stiff neckband, and the other is to make it stand up at its proper angle. Unless a neckband has the proper dampness, and is ironed with a great amount of pressure, it will be soft. If the bosom is stiff and the neckband soft after it is ironed, it is certain that the neckband has not been ironed properly. I have known many laundrymen having this trouble who thought the cause of it was in the starching, while all the time the trouble was in the manner in which the neckband was ironed.

Neckbands must necessarily be ironed inside and outside. The inside of the neckband must be smooth, in order that the shirt may be worn with comfort, and the outside must be ironed to show the proper finish. So it is doubly difficult to iron the neckband. The neckband should be ironed first on the inside, which is somewhat easier than ironing the outside. Once ironing over is usually sufficient.

In ironing the inside, commence at the left end of the neckband, as the shirt is held up, bosom towards the operator. Grasp the neckband firmly with the left hand near the end of the neckband, with the right hand holding the yoke. Put the end of the neckband under the hot iron and apply the pressure. When the shirt starts immediately grasp the lower end of the bosom, holding the left hand in the same position as at first, the thumb and forefinger acting as a guide to direct the course of the neckband, with the forefinger as close to the revolving roll as possible. With the right hand carry the shirt in such a position as will allow the neckband to travel under the iron without running out from under it or the bosom running under, and while the neckband is passing through, hold it taut with the thumb and finger and apply all the pressure possible. Once over is usually sufficient to iron the inside. In case the neckband runs out start it in again at the beginning and try it over. After the neckband is ironed inside it will be partially turned in, and before it is ready to be ironed on the outside the neckband should be reversed into its proper position.

To iron the outside commence at the right end of the neckband, or the end opposite to the one first ironed when the inside was ironed. Grasp the neckband and yoke with the hands in the same manner as when starting to iron the inside. Immediately after the shirt starts, seize hold of the lower end of the bosom and, as the shirt moves forward, let the right hand follow the sweep of the bosom, keeping it in its right position continuously relative to the neckband, and holding the shirt bosom at right angles with the roll.

When the band first starts in, the right hand will be low down near the knees of the operator, and as the band is ironed the right hand will travel upward and in a circle agreeing with the motion of the neckband, always holding the shirt in such a position that the bosom will not become broken up. As the last half of the neckband is ironed the hand reaches out and passes downward in a circle, and when the hand has reached to about the level of the neckband ironer it can let go of the shirt and allow it to fall down to a perpendicular position. Thus it will be seen that the shirt bosom has described a complete circle, the face of the bosom being at all times at right angles with the roll, causing the neckband to stand up at its proper angle to the bosom. The left hand should be held as close to the roll as possible. The curvature of the neckband must be maintained, and therefore it will not do to allow the hand to remain too far away from the roll or to guide the neckband into the machine on a horizontal line. This would break up the bosom and would render it impossible to properly guide the work.

The difficulty is, of course, that the neckband will run out from under the iron or the bosom run under the iron. Neckbands are quite narrow, and must be ironed to an exact line. The bosom has been perfectly ironed right up to the seam of the neckband, and if the neckband is properly ironed, there will be no unfinished portion at the point where the neckband joins the bosom, neither will the bosom be broken up in any way.

For the benefit of those who have not mastered this part of the ironing the author would advise persistent practice on work which is not intended to go to the trade. It is usually the author's plan to teach new operators on work that has to be washed over, for, unless the neckband is well ironed, it is not in condition to send out, and one can not afford to allow a novice to practice on work which has to go to the customer. If a neckband is poorly ironed it can not be fixed without washing it over.

Open-front shirts are harder to iron than open backs, although about the same motions have to be gone through with. The main difficulty comes, however, in ironing the last half of the open front neckband, as the operator has to commence at the centre of the bosoms, and usually, as this is quite narrow where it joins the bosom, starting it in is much more difficult. Always have the iron almost scorching hot.

It is not a difficult matter to iron a wristband well. The person operating this machine need only possess moderate ability. About the only thing to do is to place the work under the iron, give the machine sufficient pressure, and guide it through. First iron the inside of the wristband, and then the outside. Then iron the facings, and, last of all, iron the portion of the sleeve where it joins the wristband by having the wristband and sleeve drawn well on to the roll. This will allow ironing a certain distance on the sleeve, making a smooth finish. The covered roll should not be over four inches in diameter when fully covered. If it is larger than this, it will be difficult to get the sleeve over it.

Wristbands should be well ironed, as they are usually folded up and in sight, and consequently should have a good appearance. Laundrymen will discover that it is more difficult for an operator to iron all the wristbands of the shirts that go over one line of machines than to iron any other one portion of the shirt, with, perhaps, the exception of the sleeve ironers, although, if the operator gets accustomed to the work, it can all be done on one machine.

CHAPTER 16.

BOSOM-FIXING.

Now comes that part of the process which rights the shirt into shape, and gives it its character. The shirt has received rough handling up to this time, the bosom is broken in many places, caused from having been handled, when having the back, neckbands and wristbands ironed. The shirt is now put into its proper shape, and kept so until finished. No operation after the bosom-fixing need in any way break up the bosom or damage the appearance of the shirt. If there is any moisture left in the bosom it is taken out here; if there are any imperfections in the ironing they are corrected here, and if the shirt has become slightly soiled there is now an opportunity of cleaning it, or to do anything else which is needed in correcting or fixing up the general appearance of the shirt.

If the shirt is ironed slightly out of shape on the bosom-ironer, it may be corrected here, and the operator's first object is to overcome any imperfection in shape and endeavor to make the shirt lie flat. The shirt is first buttoned, and then drawn on to the bosom-fixing board. There is a ring or block placed in the neck, which expands the neckband to its full size. If the shirt then bulges in the centre, the yoke above the bosom should be dampened, the neckband and ring well drawn down on the board, and the yoke-clamp applied. The bosom should then be stretched by pulling the skirt downward evenly in the line of the bosom, and while in this position, the clamp that holds the skirt should be brought down to secure the shirt in this position. This will cause a tension on the bosom and the yoke. The whole surface of the bosom should next be moistened very slightly.

The operator should now, take a smooth-faced sharp-cornered flat-iron and go over the whole bosom slowly, commencing at the centre of the bosom at the bottom and moving towards the neckband. After the neckband is reached the iron should move outward, following the curve of the neckband, and as the iron is passing round the neckband, the operator should stretch the shirt sideways, carrying all the fulness ahead of the iron. When the edge of the bosom has been reached, reverse the motion of the iron, and pass around to the other side of the neckband, stretching the shirt ahead of the iron, as before.

If the shirt is properly moistened, the iron of the right temperature, and if the iron is moved over the surface very slowly, it will level all unevenness, and shrink out all fulness. For instance, if after the shirt is stretched, as has been described, there should be a fulness in the centre of the bosom near the neckband, by slightly dampening this fulness, passing the iron over it slowly, and stretching the shirt sideways at the same time, the fulness will all disappear and the shirt lie flat. Unless any such fulness is removed it will be impossible to set a good yoke well or get the shirt to lay flat when folded. A good operator on a bosom-fixing machine can correct quite extreme errors of this description. After the bosom has been made to lie flat, raise the plaits, and iron under them. Then the shirt is ready to pass on to the yoke-setter.

In fixing the bosoms of open-front shirts the operator has many times to correct the fault of the upper lap being longer than the lower lap. Of course, when this is the case, the upper lap will rise up in the form of an arch when the shirt is pulled on the bosom-fixing board. This extra length in the upper lap must be removed before it will lie flat, and to accomplish this result requires considerable skill. The goods in the upper lap have simply to be shrunk, and this is accomplished by moistening the upper lap to quite an extent, especially where it laps over the under lap. Care must be taken, however, not to get it too wet, or it will spoil the appearance of the bosom.

Take the flat-iron in the right hand, and commence at the bottom of the bosom, on the edge of the upper lap. With the left hand press the bosom down, and with the fingers and thumb extended, distribute the unevenness into equal parts, holding it in that position while the iron is raised slightly at the point, moved forward, and the uneven surface under the iron pressed down. Then, holding the other uneven surfaces in their proper position with the fingers, gradually work up the bosom, covering each uneven surface, and pressing it down, until the neckband has been reached. It will then be found that all the fullness in the bosom has been shrunken out.

One can not start with the iron and push it over the surface. If he does, the iron will simply press the fulness ahead of it and by the time the neckband is reached there will be so much fulness, that if it is then ironed down, it will produce a large wrinkle. Each forward motion of the iron should be accompanied by a slight raise of the forward edge, keeping the heel of the iron well pressed down on the bosom, and with the hand ahead of the iron holding the bosom so it can not slip. The bosom being slightly moist when the iron is brought down, the material will shrink together, and thus the fulness will be taken up.

Open-front shirts that are caught in the neckband will have to be finished under the lap on the bosom-fixing table. This is done with the flat-iron before the shirt is drawn down on the board. It is a simple matter to do this. The shirt is placed on the board, the upper lap raised up, the point of the iron inserted between the laps, and the unironed portion of the surface of the under lap is then easily ironed. After this proceed as described before.

To do good work in bosom-fixing, the iron should be very hot and just below the scorching point. It is impossible to do this work as described, with a cold iron. It is usually the author's plan to have a gas stove for a single iron on the bosom-fixing table, located on the opposite side of the table from the operator, and convenient to the work. The author uses one iron only, and has it over the flame during the time the operator is changing the work. He has the blaze just high enough to keep the iron at the right temperature all the while. Each time, before the iron is placed on the shirt, it should be rubbed over a cloth having a little wax on it, in order to prevent it from sticking to the bosom. A beveled edge iron is of no use for this kind of work. It requires a sharp edge in order that the angle, where the neckband joins the bosom, may be ironed.

CHAPTER 17.

YOKE-SETTING.

The yoke-setting machine is an ungainly thing to work with. It is a difficult matter for a beginner to control the motion of the iron and the pressure. This machine is not operated by power, but is merely a sort of tool for ironing the yokes. It has sufficient pressure to thoroughly set the plies of cloth together, so that when the yokes are finished they adhere to each other and form a solid piece of goods which does not break nor blister when the shirt is folded.

After the bosom has been properly shaped on the bosom-fixing table it is laid flat on its back on the yoke-setting machine. A ring is put in the neck and the yokes folded to the line, which the shape of the shirt naturally indicates. The operator then takes hold of the handle of the heated iron having the sharp edge of the iron pointed in the direction of the wrist, and with the left foot on the treadle raises the iron. The iron is then swung to the point on the shirt where the bosom joins the yoke, having the sharp edge of the iron close against the neckband. Then the iron is moved slowly towards the top of the shirt, following the curve of the neckband.

After the iron has been passed to the top of the yoke it is pushed from the neckband towards the shoulder seam, ironing the front of the yoke and sticking it to the back. After this is done the iron is passed up and down on the side of the shirt next to the bosom, firmly sticking the front and back together.

The operation just described is usually done first on the left side of the shirt. After it is finished the iron is swung around to the right side and placed at the line where the bosom joins the yoke. It is next moved upward and around the neckband, as has been previously described, the motions, however, being reversed. Pressure is applied to the iron by allowing the foot to rise and thus let the weight of the machine down on the iron. The degree of pressure is regulated by the foot and is worked in unison with the motion of the hand. The successful setting of a yoke depends on the nicety of the pressure and the proper movement of the iron. At no time should the iron be moved rapidly. In fact, the slower it is moved the better will be the work done.

The work must be properly sponged and dampened; it must not be too wet, yet it must have moisture enough so that when the iron is passed over slowly and with sufficient pressure the yoke will become thoroughly stuck together. Unless the yoke is so stuck together, a perfect fold can not be obtained, as it will break up and become soft and the slightest amount of handling will cause it to be mussed. There must, of course, be sufficient starch in the yoke to make this possible; otherwise one might iron it as carefully as can be and yet not get a stiff yoke or one that is stuck together.

It is desirable, in order to get a good fold, to stick the sides of the shirt together at the edges of the bosom. This will make a firm substance through which to form the side creases when folding, and it enables one to fold a shirt compactly, making it into a firm and flat package. The iron of a yoke setter must be quite hot, nearly to the scorching point, and it should never be allowed to remain on the shirt without being in motion. The iron may be hot enough to scorch should it be at rest, yet will not scorch if it is slightly in motion. The bosom fixing and yoke setting has now given shape and character to the shirt. The proper appearance of the shirt depends largely on the correct operation of the bosom fixing and yoke setting. After the shirt leaves the yoke setting machine its character has been fixed, and it now remains only to iron the sleeves and body, which operations do not particularly add to or detract from the general appearance of the shirt, although of course they should be done well in order to produce a high class product of laundry work.

CHAPTER 18.

SLEEVE AND BODY IRONING.

In ironing sleeves and bodies, care should be taken in handling the work in order that the bosom or the yoke may not in any way be broken up, as this would destroy the good work of the bosom fixing and yoke setting operations. After the yoke has been set the shirt should carefully be placed on a rack in the proper position in order to allow the shirt to remain in the same shape as it was when it came from the yoke setter. The sleeve ironing operator now takes the shirt carefully with the left hand holding the left yoke and the right hand holding the edge of the body near the bottom of the bosom. In this position the body of the shirt is held edgeways with the bosom opposite the operator. In this position it is carried between the covered roll and the revolving heated roll of the sleeve ironer. The yoke end of the shirt is at the left and nearest to the body of the machine.

Pressure is then applied which brings the shirt in contact with the revolving heated roll near the edge of the bosom and parallel with it. The ironing movement is from this line towards the edge of the shirt and in the direction of the sleeve. That portion of the shirt at the side of the bosom and extending to the edge, should be thoroughly ironed as far as the bottom of the bosom before the sleeve is ironed.

After this is done, the ironing motion continues down the sleeve to the wristband, and while the sleeve is being ironed, the left hand should be inserted within the sleeve and the fingers extended, in order that the sleeve may be ironed as wide as possible. At the same time press with the right hand outside the sleeve and against the left hand which is inside the sleeve, thus holding it taut as it passes under the revolving roll. After thoroughly ironing this side of the sleeve let it pass between the rolls, releasing the pressure when it comes to the wristband, in order to avoid crushing the wristband. Then on the opposite side of the same sleeve start to iron at the wristband, ironing up the sleeve to the body of the shirt.

To iron the other sleeve, withdraw the shirt from between the rolls, in order to avoid crushing the neckband, and then bring it back between the rolls without changing the position of the shirt. Have it pass only far enough along so that the neckband and the bosom are at the other side of the rolls. Then commence to iron the sleeve at the point where it joins the back of the shirt, extending downward towards the wristband, at the same time holding the sleeve, as has already been described.

After the sleeve has been ironed as far as the wristband commence to iron the other side of the sleeve, beginning at the wristband and passing towards the body of the shirt. In this way you iron up the sleeve as far as the body of the shirt, passing on to the body and ending the operation on the front of the shirt near the edge of the bosom, on the side opposite to where the ironing of this part was started. These movements iron both sides of the sleeves and the part of the shirt in the front at the side of the bosom, down as far as the bosom extends.

The shirt is now completely ironed excepting the front of the skirt extending from the bottom of the bosom downward. The ironing of this portion of the shirt is a comparatively simple operation. The shirt is placed on the body ironer with the back on the apron, pressure is applied, and the shirt is brought in contact with the heated roll at the bottom of the bosom. As the shirt moves forward the operator holds it taut and carefully adjusts the folds of the skirt so that there may be no wrinkles in front of the shirt in a space as wide as the bosom. If this is done no wrinkles appear in the skirt when the shirt is folded. All the fulness, if any, should be brought to the edges and ironed down where it will not be seen. If the shirt has a tab, the second time the iron passes over the skirt the tab should be raised and that portion under the tab ironed. The shirt has now been entirely ironed, and nothing remains but to fold it. This will be the next operation described.

CHAPTER 19.

FOLDING SHIRTS.

The general appearance of a shirt largely depends on the manner in which it is folded. This may seem to be a very unimportant operation, but it is one equally as important as any other, and great care should be used in performing this part of the work.

The folder should be provided with a hot iron and a clean sponge cloth, as it will be found necessary many times to remove slightly soiled spots and reiron any little portions which may not have been completely ironed by the machines.

The folder should be provided with a small pad of felt which may be slipped into the shirt to form a surface on which to press the bosom, should it be necessary to reiron any portion of it. The iron should have a smooth face and square edges, the polishing iron usually being employed.

There should be a small, round block attached to the edge of the table and projecting about an inch beyond the edge, and this block should be covered with felt and cloth. The block is used, when necessary, to reiron the neckband. The shirt is held in such a position that the block is within the neckband, and then it is easy to iron the outer surface by passing the iron around the block in contact with the neckband.

After every imperfection has been corrected, the shirt is laid flat, bosom up, and a crease is formed along the bosom, continuing down the full length of the shirt on the left side by taking hold of the shirt at the left yoke with the left hand, and the bottom of the skirt with the right hand. Then raise the shirt up, and swing the sleeve and the side back under the bosom. Next, lay the shirt again on the table, crease the yoke in the line of the bosom and hold the shirt in position with the left hand. With the right hand press down the bosom and form the crease close to the edge of the bosom. Next, pass the hand the full length of the shirt.

After this has been done, run a hot iron the full length of the crease. Then, with the left hand, take hold of the right yoke and with the right hand take hold of the lower end of the skirt. Again raise the shirt and form the crease on the right side of the bosom, and, throwing the sleeve and side back under the bosom, pass the iron over the crease as before. Care should be taken to run these creases in straight lines close to the edge of the bosom and nearly parallel, the full length of the shirt. The lines, however, extending down the skirt of the shirt should incline slightly towards each other. This will prevent the back of the shirt when folded from being any wider than the bosom.

After these two lines have been formed, the shirt is turned over and laid on the table with the bosom downward. The sleeves are next laid parallel to the line extending down the shirt. The crease of the sleeve should be formed at the yoke, commencing at a point about two inches from the line of the bosom. This will throw a crease diagonally across the sleeve at about an angle of forty-five degrees, and this crease should be ironed down with a hot iron. Then the sleeve should be folded with the wristbands laid about three inches from the top of the shirt, making a crease in the slevee about midway between the shoulder and the wristband. One wristband should be folded a little higher than the other in order that they may not form too great a bunch in the shirt.

All the creases having now been formed the shirt is ready to fold. The next operation is to turn in the outer edges of the shirt and fold over the whole side of the shirt next to the operator, keeping the sleeve in its relative position. When this is done fold over the opposite side. The shirt is now folded, forming a package the full length of the shirt and as wide as the bosom. The bottom of the skirt is next turned in and creased with an iron, folding it upward and over the back of the shirt, making a crease at the bottom of the bosom. Now pin the skirt to the back of the shirt, and the operation of folding is finished. If this operation is carried out faithfully, it will produce a flat, compact package having straight lines and regular angles.

The main point in folding a shirt is to have it snug and compact, and this is done by making the creases in the proper places and using an iron to make the creases permanent. Much care must be given to these details or the effects of good ironing will be lost in the bad appearance of folding.

After the shirt is folded it should be laid on its back and carefully pressed all over with an iron, when it is ready for the examining room.

CHAPTER 20.

THE EXAMINING ROOM.

Shirts are taken from the folders to the examining room and inspected, and those that are perfect are passed on to the boxing room, while those that are not right are either fixed or washed over. Many times the examiner is able to clean some portion of the shirt and make it passable, and there are other shirts that may be made all right by having them retouched or cleaned by someone who is trained to do this class of work. In every well-regulated laundry it is customary to have some one person who is an adept at this class of business. He is usually known as the "cleaner," and one who is an expert at fixing up a doubtful shirt is a valuable person to have in a laundry, as he will save his wages many times over in the amount of goods saved from relaundering. An operator of this sort requires quite an extensive paraphernalia. He should have an ironing-table, sponge cloths, flat-irons, a bar of soap, a bottle of bleach, a bottle of acid, and the various liquids necessary to the cleaner's art.

Of course there will be many shirts that are so soiled or poorly ironed that they will have to be washed over. These shirts should be sent directly to the wash-room, and should be washed before everything else, and relaundered in preference to any other work, as a lot of shirts can not be shipped until the washovers come through.

Great care should be given to washovers in order that they may not have to be washed over a second time, for any small number of shirts in a lot that have to be returned to the washroom will delay the shipment of the entire lot. Therefore it is necessary to make a special effort to organize a quick system in relaundering washovers.

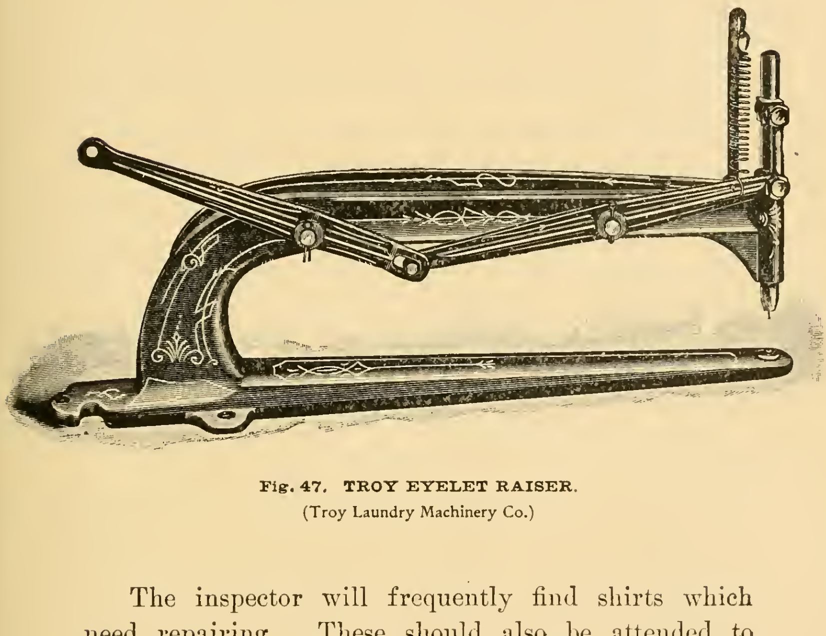


Fig. 47. TROY EYELET RAISER.
(Troy Laundry Machinery Co.)

The inspector will frequently find shirts which need repairing. These should also be attended to promptly in order that they may get through in time and not delay the lot. Usually a shirt which has to be repaired must be relaundered, and it should be repaired in time to be relaundered with the washovers.

The examining table should be provided with an eyelet raiser, and the shirts that are passed should have the eyelets raised and then passed on to the assorting racks.

There are several makes of eyelet raisers, but the kind recommended for large quantities of new work are those which are attached to the table and operated with a lever. A machine of this kind is the Troy eyelet raiser, shown in Fig. 47.

CHAPTER 21.

BOXING.

After the shirts are examined they are ready for boxing. There are various methods of handling the work in this department, but the most modern and approved plan is to have pigeonholes arranged on a table. These pigeonholes are open at both ends to allow the shirts to be put in from the examining table at one side and taken out by the one who boxes the shirts at the other side. They should be arranged three tiers high, running from sizes twelve to eighteen. If white shirts are coming through, only two tiers are required, one tier for box plait and the other tier for French plaits; but if colored shirts are arranged for, then three tiers are required, as colored shirts usually run in three colors of the same pattern.

In sorting white shirts, each size is put in the pigeonhole by itself, the box plait in one tier and the French plait in the other. The boxer on the other side of the rack pulls the shirts out of the pigeonholes and boxes them, usually putting three French plaits and three box plaits in a box, then stamps the box to show what it contains. If he is boxing colored shirts, two shirts of the same color are put in a box. In the boxing of open-front white shirts no distinction is made except in sizes.

If collars and cuffs are packed with the colored shirts, it is necessary to open the boxes and insert the proper size collars to match the shirts. The collars are usually tied to the neckbands of the shirts to which they belong, and the cuffs are slipped into the bosom through the neck-opening.

The process of laundering new shirts has now been described from the time they start from the washroom until they are boxed, and the method described in ironing is that in which machines are used, this being the most popular and economical method. For those who would desire to use them, other methods will be described in the following chapters.

CHAPTER 22.

IRONING SHIRTS PARTLY BY MACHINERY AND FINISHING BY HAND.

This plan of ironing shirts is to use the machinery in the same manner as when ironing entirely by machinery, until the shirt reaches the bosom-fixing table. The inside yoke, the bosom, the neckband, and the wristbands are ironed by machinery, and the balance of the shirt is finished by hand with the flat-iron.

The finishing is done on a table having a projecting bosom-board clamp and stretcher similar to the bosom-fixing table; in fact, the bosom should receive the same treatment on this table as it receives on the bosom-fixing table. The back of the shirt is ironed with the flat-iron, by folding it down the center of the back, and ironing each side of the fold. Afterwards the sleeves are ironed, then the yoke is set; next, the front skirt is ironed, and the shirt is ready for folding.

This plan of ironing is well adapted for a fine grade of shirt, and it is considerably more economical than ironing the shirt entirely by hand. It produces a fine, soft finish on the body of the shirt, and makes the garment very comfortable to wear. It is not as firm and compact as when ironed entirely by machinery, and it will not stand handling and preserve its appearance as well as a machine-ironed shirt. One of the advantages of this plan is that so much money need not be invested in machinery, and one starting a new business in this way is not compelled to go to the expense of a fully equipped plant. It possesses the advantage of producing the work at a comparatively low cost, without too great an outlay.

It is quite important to finish the shirt as soon as possible after it has been ironed by the machines. In order to do good hand ironing, the goods must be thoroughly dampened, and if shirts are allowed to remain too long in the air, they will dry to such an extent that it will be impossible to iron the bodies well by hand.

To sponge a dry piece of goods and then attempt to iron it usually results unsatisfactorily, and therefore it is necessary to iron the bodies and finish the shirt immediately after it has come from the machines. The folding in this process is the same as has already been described.

CHAPTER 23.

HAND IRONING.

It is a difficult matter to explain how to iron a shirt by hand. It is a knack which can only be acquired by practice, and an operator can become skilled only by long practice. One who irons a shirt by hand may put his own individuality into his work, as no one has anything to do with the ironing of the shirt but the operator himself. He dampens his own work, and finishes it complete. He is responsible for ironing every part of the garment.

It requires a great amount of intelligence, good judgment, and long practice to become a skilled hand ironer. One can not acquire it in a short time, or pick it up by seeing someone else do it. It is a trade complete in itself, and reflects as much credit on the workman who does it well as does any other trade with which the author is familiar. Therefore no more can be done than to merely state the manner in which the shirt is ironed, and the process through which it goes, step by step, until finished.

The ironer usually takes as many shirts as he thinks he can iron in one day and dampens them to suit himself. Some ironers require work damper than others; no ironer would be satisfied with another's dampening.

Work that is to be ironed by hand requires to be damper than when it is to be ironed by machine. In fact, it must be so damp that it will be soft, and the plies of the goods must be in a pliable condition, so that they may be easily separated and the wrinkles easily removed.

Hand-ironers usually dampen their work by sprinkling it. They then roll each shirt into a tight, compact package and closely pack them all together in the small dampening boxes, which are a usual adjunct to an ironing table. It is common to have a cover which fits inside of this box, and after the shirts are dampened and packed away, a cloth is laid over them, the cover placed on top of the cloth and pressed firmly down. The cover is held in position by any sort of a weight. It is a common thing in a factory, where work is ironed by hand, to see heavy stones lying around, which the ironers use for weights in pressing down these covers, while the shirts are being dampened. The goods are allowed to lie in this condition over night, when in the morning they are ready for the ironer's artistic work.

A hand ironer is equipped with an ironing table—such as has already been described in Chapter 11—a polishing iron, a flat iron, a basin of water, a sponge cloth, and a plait-raiser. With these, a small piece of wax, and a means for heating his iron he is ready for business. Hence it may be seen that it does not cost much to fit up for hand ironing. The first thing to be ironed on a shirt is the neckband. This is ironed with a polishing iron. It is drawn out and laid flat on the table, the body of the shirt being placed on the back of the table, with the neck band near the front edge and nearest the operator.

The inside is ironed first, and then it is turned over and finished on the outside. When finishing the outside a great amount of pressure is required in order to get a stiff neckband. The operator must put his whole weight on his iron, and use a great amount of "elbow grease." The neckband is usually ironed first because it requires a very hot iron, and should one attempt to iron any other portion of the shirt and then try to iron the neckband, the neckband would be soft, owing to insufficient heat in the iron.

A hand ironer must study to keep his irons at the right temperature, and yet work fast, and this is done by ironing those parts first which require the hottest iron, and those parts last which require less heat. He must also plan to have one iron heating while the other is being used, and as he has only two irons—the polishing-iron and the flat-iron—he must have them always ready, and not wait for them to heat.

When he starts in, he heats his polishing iron first, and while using that allows his flat-iron to become heated and, as already stated, he irons the neckband first. Next he irons the inside yoke with the same polishing-iron.

After the neckband and inside yoke are ironed, the neckband is buttoned, and the shirt drawn over the bosom-board. A ring is placed in the neckband, and the shirt drawn down in a manner similar to the way in which it is handled on the bosom-fixing table. It is, however, stretched sufficiently to remove any wrinkles, which may be done by stretching it lengthways. It is then clamped in position. The operator now, by means of a plait-raiser, and by stretching the bosom sideways, removes all the wrinkles in the bosom, leaving it in a perfect condition to be ironed. During the time it has taken to effect this operation the flat-iron has become heated sufficiently to do its work. If it has become overheated it must be cooled in a basin of water before it may be used.

After the flat-iron has been removed from the fire the polishing-iron is placed on the fire to be reheated. The operator now irons over the bosom carefully with the flat-iron, using sufficient pressure to press the plies together, and to dry the bosom out. During this operation the iron is moved very slowly and carefully. This process simply dries the shirt, producing very little finish. After the shirt has been sufficiently dried it is then gone over very thoroughly with the polishing-iron. When the bosom has been dried out with the flat-iron it should be slightly redampened with a sponge cloth and ironed again with a polishing-iron. When the polishing-iron is being used the operator should employ a great deal of pressure and go over the surface very rapidly. This will give the finish required, and the proper amount of polish is obtained by ironing the bosom on a hard surface with the polishing-iron. Hand ironers usually have a soft felt which they slip under the bosom when using the flat-iron, and after the bosom is set and dried the felt is removed, leaving a harder surface on which to polish the bosom.

Open-front shirts are placed on the bosom board with neckband buttoned and the shirt stretched and clamped in its natural position, the upper half of the bosom lapping over the lower half. When the upper half is ironed a felt is usually slipped under it in order that one-half of the bosom may be ironed without a crease. The shirt is then unbuttoned at the neck and the under lap is ironed. After this the shirt is again buttoned and the bosom polished in the same manner as has already been described, with this exception, that a piece of metal covered with cloth is slipped under the upper half of the bosom, affording a hard surface on which to iron and polish the upper half without showing the impression of the lower half.

The stiffness of a bosom depends on the way in which it is ironed. If the first operation—that is, drying the bosom out—is not done properly, the bosom will be soft. The iron must be very hot, almost at scorching heat, and should be moved over the bosom slowly with all the pressure that can be applied. Soft and blistered work usually results from the use of a cold iron, and it should be understood always that an iron should never be moved rapidly when drying a bosom. The conditions change when it is being polished. Then friction is required to produce the desired result, and, as the bosom has already been dried, there will be no bad results from moving the polishing-iron rapidly, although this iron must be very hot, as well as the other. After the bosom has been ironed the shirt is then finished, as has been described in Chapter 22.

In a great many well-regulated laundries are found hand ironers employed in machine operating plants. The reason for this generally is that the proprietor has peculiar makes of shirts which can not be ironed by a machine. Many times hand ironers are employed to iron samples, and all work which can not be ironed practically by machinery, such as shirts with collars attached, embroidered fronts or any other styles which require special attention.

CHAPTER 24.

LAUNDERING NEGLIGEE WORK.

The methods of laundering stiff-bosom shirts have been described already, but as yet nothing has been said regarding the laundering of negligee shirts, and the term negligee, in this instance, will be applied to all such shirts as do not have a stiff bosom; for example, Madras and percale made into the common negligee shirts, the puff bosom, and the shirt having a soft bosom made either of silk or Madras. During the past few seasons there have been a large number of the last-mentioned shirts manufactured, and as this shirt promises to remain in fashion for a considerable time, the method of laundering it should be described.

This shirt is usually made with a laundered neckband; that is, the neckband is laundered before it is sewed to the shirt. In better grades of this make of shirt the wristband is also laundered. It has a white body and a colored, fancy bosom, usually made of some silk material. There is no washing required on this shirt. It is necessary only to iron it. Therefore it need not go into the starchroom or be hung in the dryroom. The parts that are to be ironed are slightly moistened, preferably with raw rice starch-water. The neckband should be slightly dampened and run through a neckband ironer, as the neckbands become more or less bent and "broken up" during the process of manufacturing the shirt. The neckband ironer will freshen them up and also close the stitching, which shows quite plainly on a laundered neckband.

It is not practical to launder this neckband on the shirt, but as it is unnecessary to wash the body or the bosom, it would not be possible to have a good-looking neckband if it were not washed. If the neckband is colored, then it is a comparatively easy matter to launder it on the shirt.

After the neckband has been ironed the yoke should be slightly moistened on each side and ironed with a polishing-iron, then the bosom and neckband are buttoned, a ring placed in the neckband and the shirt laid flat on the table on which it is to be ironed.

The table for ironing negligee shirts is not of the same construction as the one required to iron stiff bosoms. It requires no bosom board, for the reason that the shirt is ironed flat, having nothing inside of it. The plan recommended for such a table is one which has a clamp arranged on one end for securely holding the yokes in position to allow of stretching the shirt. This clamp extends across the entire end of the table and is curved in the centre in conformity with the shape of the top of the shirt. The clamp may be arranged to operate by means of a lever which, when pressed down, holds the yoke firmly to the table. There should be a small hook on the inner edge of the clamp which engages the neckband ring and holds the neckband in position when the clamp is pressed down.

When the shirt is laid on the table it should be dampened slightly with starch-water on the yokes and the front. Then it should be placed in position and the clamp pressed down. The operator stretches the shirt and takes all fulness out of the front, holding it in this position by pressing the left forearm down on the shirt, the arm extending at right angles with the shirt. While the shirt is being held in this position the operator irons the front, covering the bosom and the sides, and during the whole operation of ironing the front, he should not remove his arm from the shirt. A clamp arrangement to hold a shirt taut is a good thing, but it takes considerable time to operate it, and therefore the plan to do without it by using the arm is recommended. After the operator has become accustomed to holding a shirt in this manner it will be found comparatively easy and rapid. After the front of the shirt has been ironed the clamp is raised and the yokes set; then the bottom of the skirts are finished, and the shirt is ready to be folded.

The method of folding soft shirts is essentially different from that employed for stiff bosoms. As there is no bosom to hold the shirt in shape, some rigid substance must be supplied upon which to form it. A thin board beveled at the edges made of the size and length which the shirt is required to be when folded is generally used. It is a good plan to arrange folding tables independent of the ironing-table and to have the board upon which the shirt is folded hinged to the table.

A table should be cut out at the extreme end directly central with the folding board. This cutout in the table admits the neckband when the shirt is laid on the table with the front down. The neckband is placed in this opening and held in its proper position for folding by bringing the hinged folding board on the back of the shirt; the shirt is then folded over the board in similar lines to the folding of stiff bosoms, which has been already described.

The pinning of the shirt is the same as the pinning of a stiff bosom, except that an extra pin is placed in the back of the shirt to hold the yokes in position. Care must be taken to have the shirt folded centrally, and it is necessary, before removing the shirt from the board, to see that it is central. After the shirt has been folded and pinned, the board is raised and the shirt drawn off of it. It is unnecessary to iron the sleeves or the back of the shirt on any of this negligee work which is not required to be washed.

There is another kind of shirt which is made in a similar manner to the one already described, with the exception that it has what is commonly called a puff bosom. This bosom is gathered at the top and at the bottom, leaving a large amount of fulness in the front. Many of the better grades of these shirts being made of white material, they require washing, and should be washed just as any white shirt. When they are washed it is necessary to fully launder them; that is, send them through the entire process.

The neckbands and wristbands must be carefully starched to prevent any starch getting on the bosom. The shirt is then dried and dampened and afterwards ironed throughout. The bosom may be nicely ironed on what is known as the ladies' sleeve ironer. This is usually an egg-shaped iron heated by steam or gas. The bosom is drawn over this heated surface and, as it is made of a very thin material, it is dried and ironed very rapidly. The inside yoke is ironed by hand, the neck and wristbands ironed by machines, the sleeves usually ironed by machines, and then the shirt is ironed on a flat table having a yoke clamp, as already described. The folding is the same as with other negligee shirts.

The cheaper grade of puff bosoms and those that are made of white material having laundered neckbands are not washed. This shirt is handled in practically the same manner as the one first described, except that the bosom is slightly moistened and ironed on the puff ironer.

Madras and percale negligee shirts are usually made with an unlaundered neckband. These shirts are not washed, but it is necessary to starch the neckband and wristbands. It is a delicate matter to starch a neckband on a shirt and not get starch on the front of the shirt. In fact, it is almost impossible to starch the neckband and keep the front clear of starch, without having some device to keep the starch from getting on the front. Some sort of arrangement has been suggested on which there is a protector which will prevent starch getting beyond a certain line. The author has a crude arrangement which fills the bill. It has the appearance of a miniature guillotine. The "knife" has a straight edge which is brought in contact with the goods by means of a foot lever connected to it. The shirt is laid at the back of this contrivance and the knife is brought down and forms the dividing line between the neckband and the front of the shirt. Under the shirt is a piece of felt which allows the knife to press the goods into its soft surface, thus preventing the possibility of starch getting back of the knife on the front. While the neckband is in this position it may easily be starched by hand. As Madras and percale absorb the starch very easily, the wristbands are starched at the same time and the shirt dried.

This grade of goods requires no dampening previous to ironing, for it is possible to iron the neckbands and wristbands well by simply dampening them with a sponge cloth at the time of ironing. The goods are so soft and loosely woven that the moisture quickly penetrates them and puts them in a condition to be ironed at once. After the ironing has been done the shirt is finished according to the method described in a previous chapter.

CHAPTER 25.

COLLAR AND CUFF IRONING.

There are a great many machines manufactured for ironing collars and cuffs, and about all of them contain the same principle of ironing; that is, a revolving heated roll, running in contact with a revolving padded roll, the essential difference between the various machines of this character being only in the application of the principle. Some manufacturers use springs, while others use weights for pressure. Machines of smaller capacity are quite simple in construction, while those of greater capacity are more complex.

The better grades of machines are constructed in such a manner that the heated roll may be made to travel at several rates of speed, thus producing different grades of finish. Domestic finish, medium gloss and high gloss may usually be produced on the modern collar ironer by simply shifting gears. The faster the hot roll revolves—the padded roll revolves at the same rate of speed at all times—the greater will be the gloss produced. Machines of the largest capacity are so constructed that they will iron the goods, when properly dampened, in one passage through the machine. They usually iron the collar or cuff once on the wrong side and twice on the right side by a single passage through.

This class of machines has generally three heated

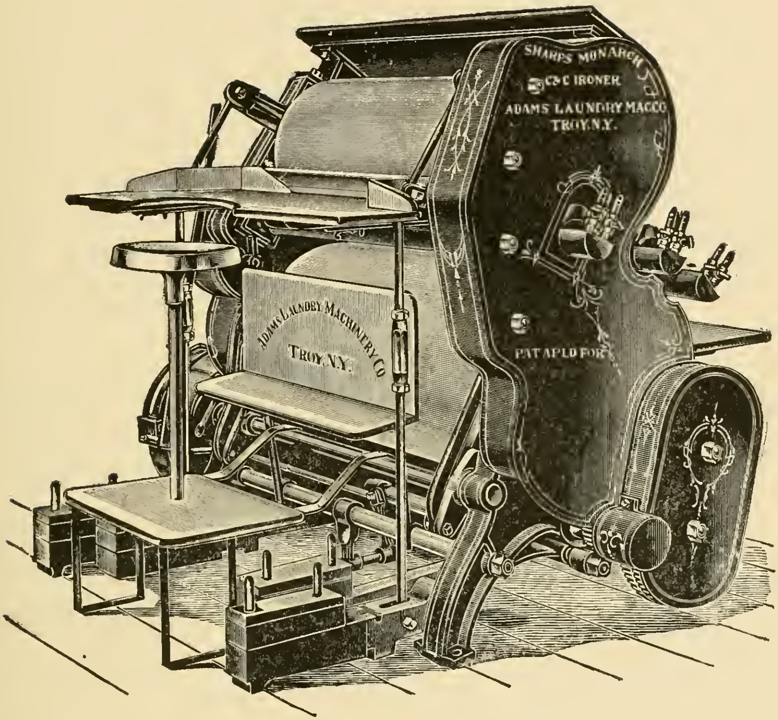


Fig. 48. MONARCH COLLAR AND CUFF IRONER.
(Adams Laundry Machinery Co.)

rolls and two padded rolls. In the first set of rolls one hot roll runs in contact with one padded roll, the padded roll being on top, or above, the heated roll. The goods are then carried from these to the other rolls. The second set of rolls consists of one padded roll and two heated rolls running in contact with it, the heated rolls being above the padded roll. Thus it will be seen that as the goods pass through the machine they receive the ironing action once on one side and twice on the other.

This type of machine is represented in the Adams Laundry Machinery Co.'s Sharp's Monarch, Fig. 48, the Troy Laundry Machinery Co.'s No. 5, Fig. 49, and the American Laundry Machinery Co.'s Mammoth is shown in Fig. 50. These machines differ only in construction.

It is claimed by the manufacturers of these machines that they will iron two thousand dozen collars or cuffs in ten hours. These machines have elaborate chain gears by which almost any finish desired may be obtained. The pressure is applied by weights and may readily be increased or decreased simply by adding weights to, or taking weights away from, the pressure levers. They are also constructed so as to be quickly thrown out of gear in case of accident, or the pressure quickly removed.

Another style of collar-ironer is represented in the Adams II, Fig. 51, or the Columbia, Fig. 52, and the Troy No. 6, Fig. 53. This type has a revolving heated roll between two revolving padded rolls and in contact with them. The goods are fed between the upper revolving padded roll and the heated roll, and return between the lower revolving padded roll and the

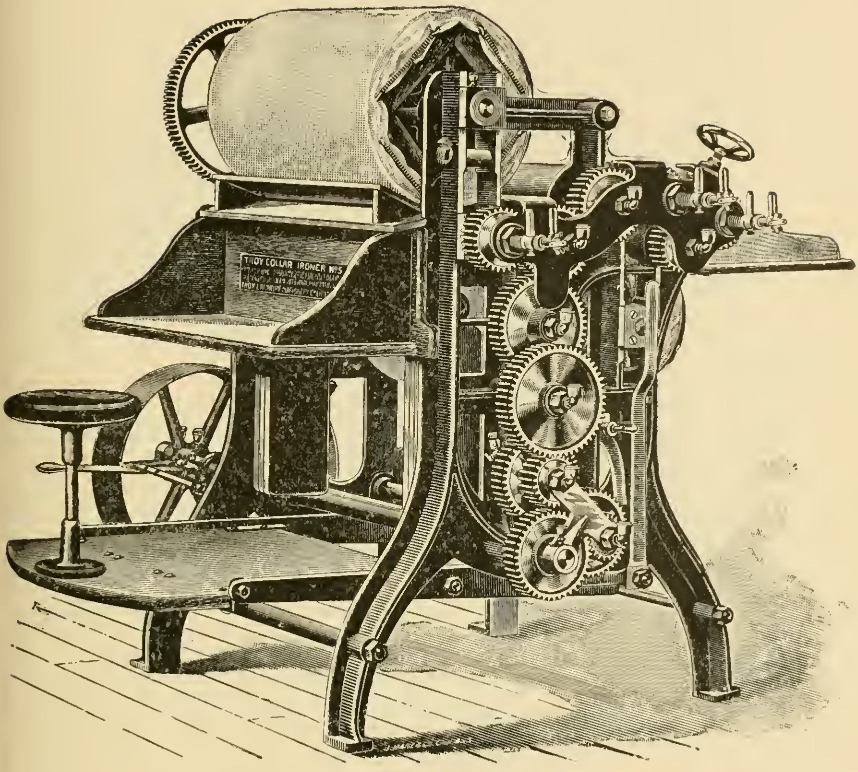


Fig. 49. TROY No. 5 COLLAR AND CUFF IRONER.
(Troy Laundry Machinery Co.)

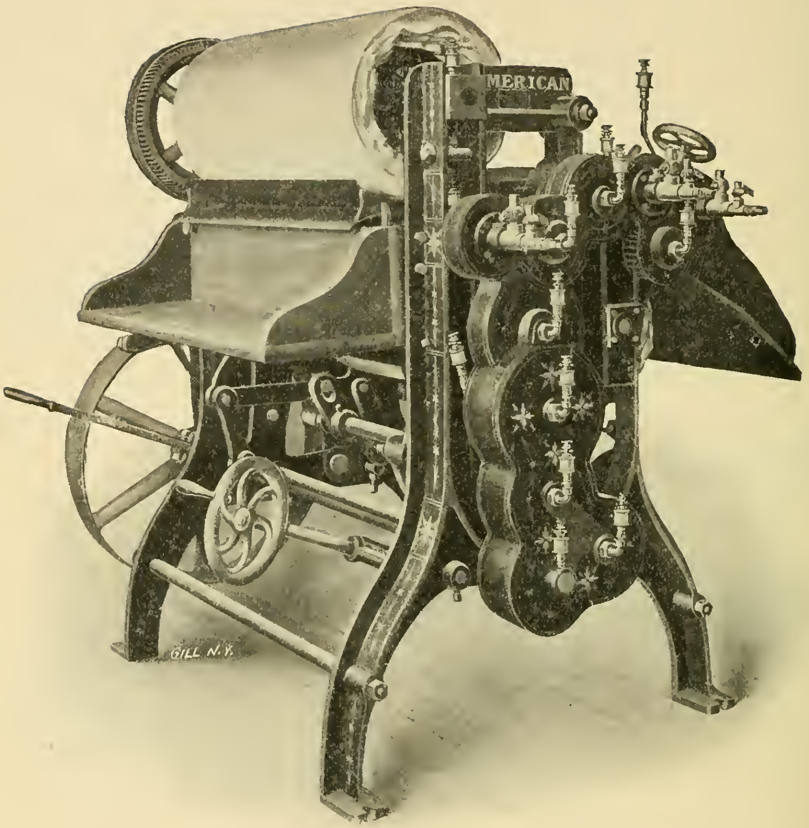


Fig. 50. MAMMOTH COLLAR AND CUFF IRONER.
(American Laundry Machinery Co.)

heated roll, thus making one heated roll do all the ironing. Seven hundred dozen pieces per day is about the capacity of these machines, and they do very nice work. In these machines the pressure is also applied by weights, and they are so geared that several different finishes may be produced.

Collar-ironing machines of lesser capacity than those already described, are those having one heated roll and one padded roll. This type of machine is represented by the Nelson & Kreuter regular collar-ironer, Fig. 54. This machine has a padded roll above the heated roll, and a return apron, which carries the work back to the operator after it has been passed through. It is an excellent machine of medium capacity, and is used extensively in the custom laundries. The pressure in this style of machine is usually applied by springs or screws. It is built for the purpose of producing high gloss, and while domestic finish may be obtained, machine is designed for gloss work. The fact alone that the work has to be passed through the rolls several times before it is finished, naturally tends to this end, and that is why this class of machine has had such a large sale, for many of the customers of medium capacity laundries require gloss finish on their collars and cuffs.

The next machine in point of capacity is one having its revolving heated roll above the padded roll, and is represented in the "Watkins" machine, known as the No. 7, and shown in Fig. 55. Many laundry machinery concerns manufacture this machine on the same lines, there being no patent upon the device. This machine is found in small custom laundries; it produces a very high gloss, and has a capacity of about one hundred and fifty dozen pieces a day.

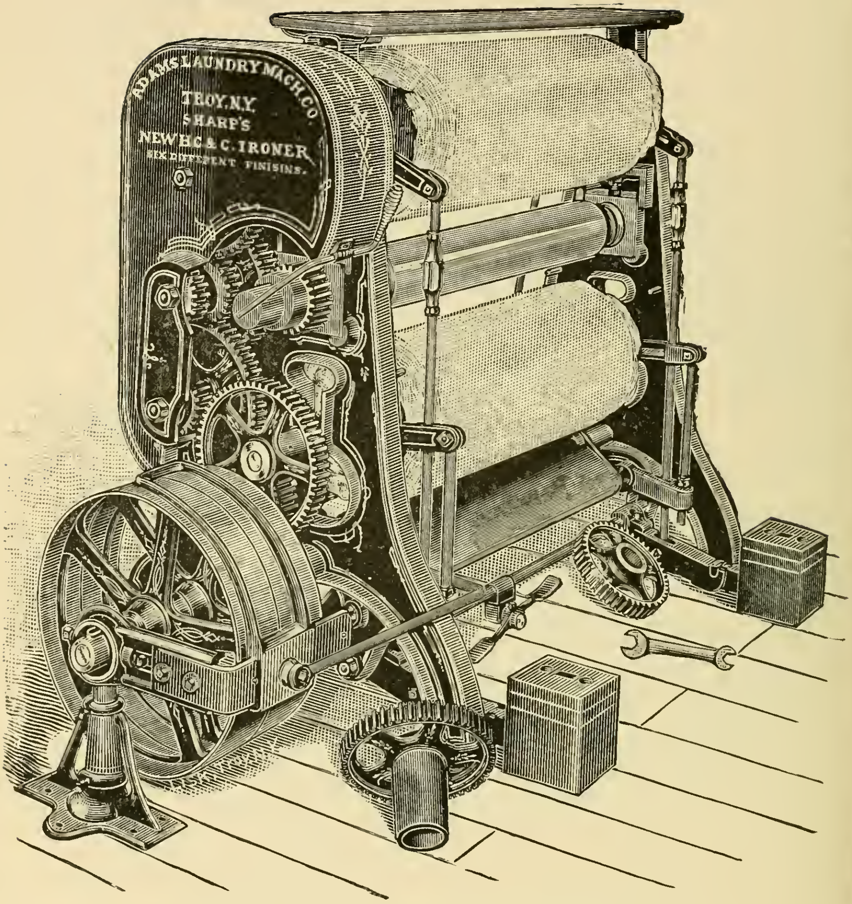


Fig. 51. "H" COLLAR AND CUFF IRONER.
(Adams Laundry Machinery Co.)

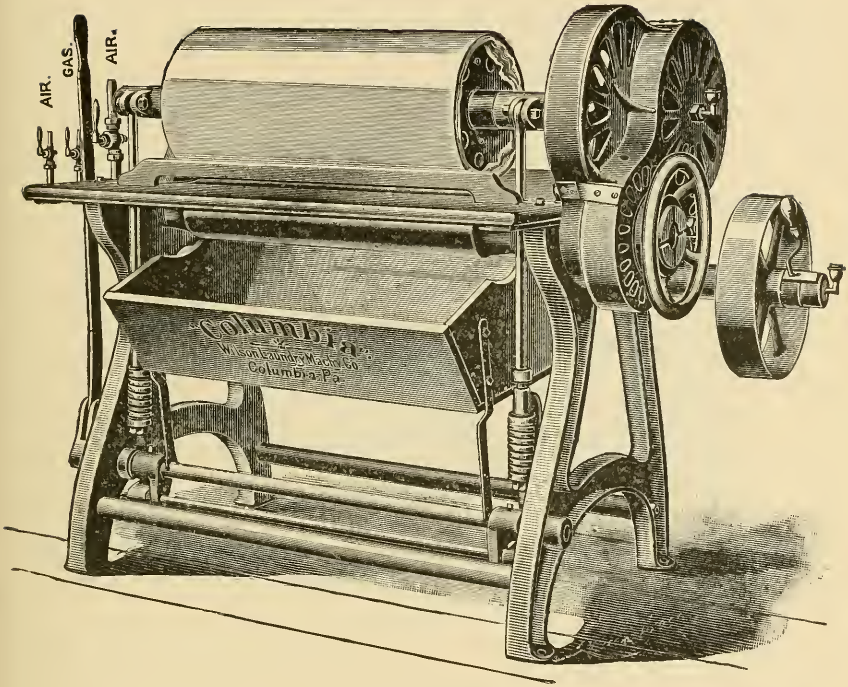


Fig. 52. COLUMBIA COLLAR AND CUFF IRONER.
(Wilson Laundry Machinery Co.)

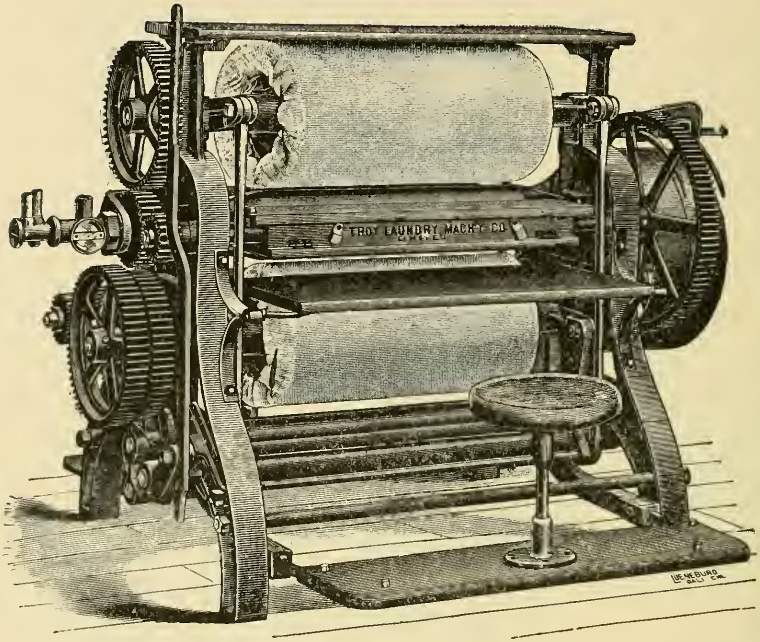


Fig. 53. TROY No. 6 COLLAR AND CUFF IRONER.
(Troy Laundry Machinery Co.)

There is yet another type of machine for ironing collars and cuffs, which has a reciprocating padded surface, running in contact with a revolving heated roll, see Fig. 56. This machine resembles the Sinclair type of bosom-ironer. In fact, the Sinclair firm and other manufacturers, make a machine that is known as "The Combination," it being adapted to either iron shirt-bosoms or collars and cuffs. It produces a very high gloss, which is well adapted to the requirements of laundries whose trade demand that finish.

There is another reciprocating collar-ironer which is known as the "Gardner." This machine differs from the one just described in the fact that the roll is reciprocated instead of the padded surface. It is so constructed that the roll will revolve one way and slide the other, or revolve both ways, or slide both ways; thus it will be seen that it has either a great amount of friction or no friction. This machine has been used for many years in some of the Troy collar shops, and is still quite a favorite on certain grades of work.

There is a small machine which is a necessary adjunct to the laundry of large capacity. This machine is known as the "Troy Collar Tipper," and is used to iron the tips of winged point collars after they have been ironed on the large machine. As the collars are ironed only once on the inside it leaves an undesirable appearance on the part of a standup collar which is folded over, and consequently the collar tipper helps the laundryman out of this difficulty. This machine is simply a power press, having a felt surface pressed against a heated surface; the point of the collar is slightly moistened, placed under this hot plate, and pressed; this gives the desired finish to the collar which

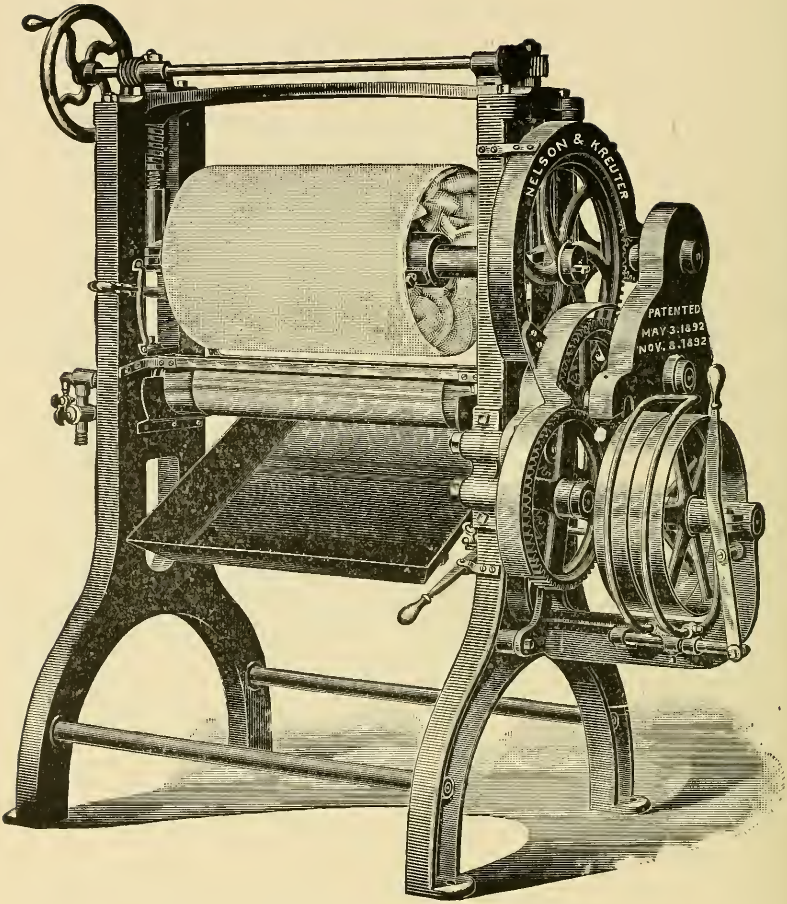


Fig. 54. "N. & K." COLLAR AND CUFF IRONER.
(Nelson & Kreuter.)

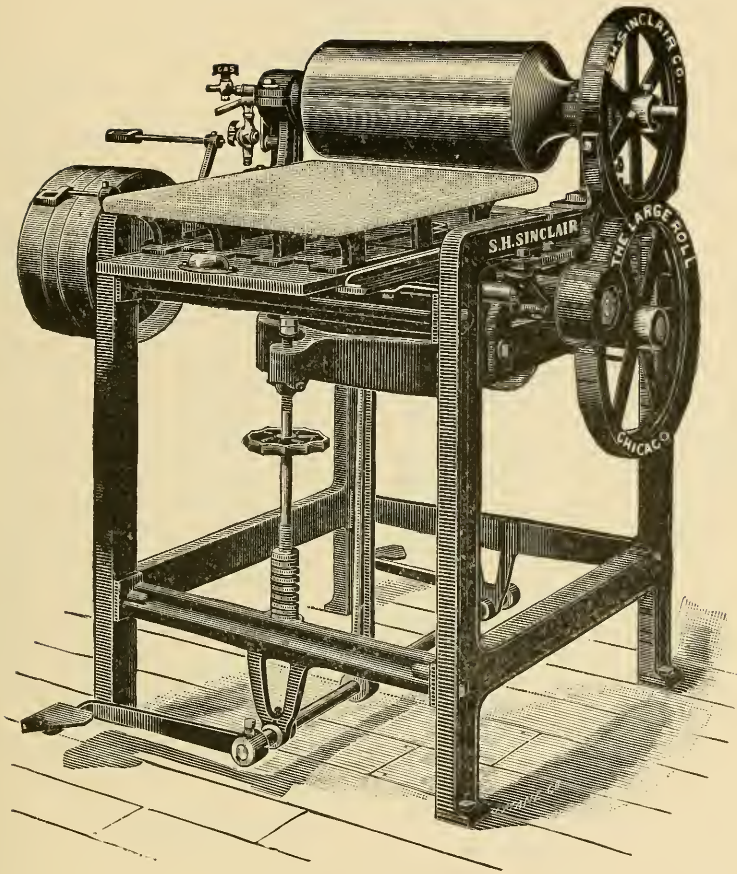


Fig. 56. COMBINATION COLLAR AND CUFF IRONER.
(S. H. Sinclair Co.)

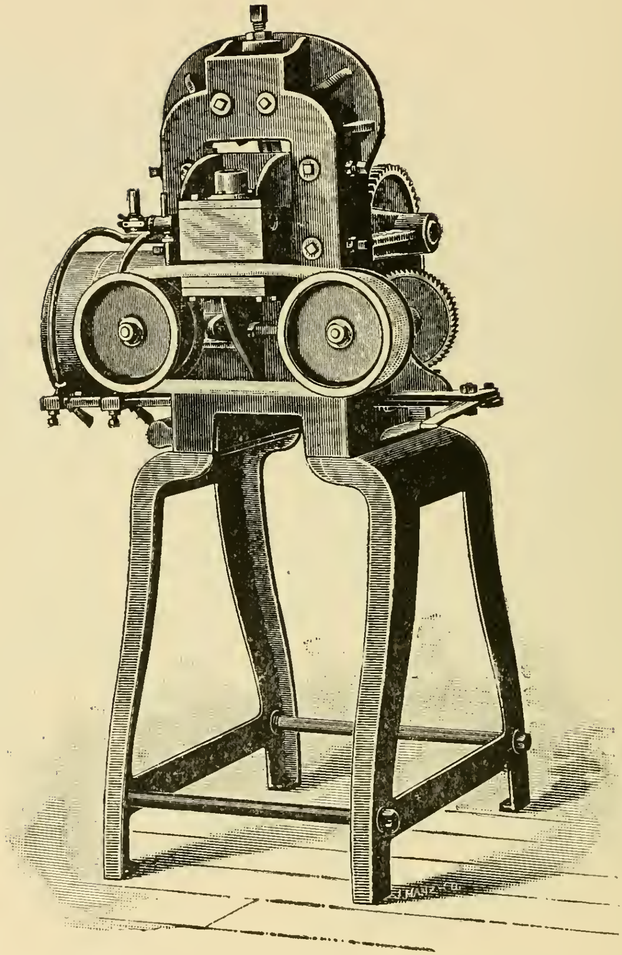


Fig. 57. OOLLAR TIPPER.
(Troy Laundry Machinery Co.)

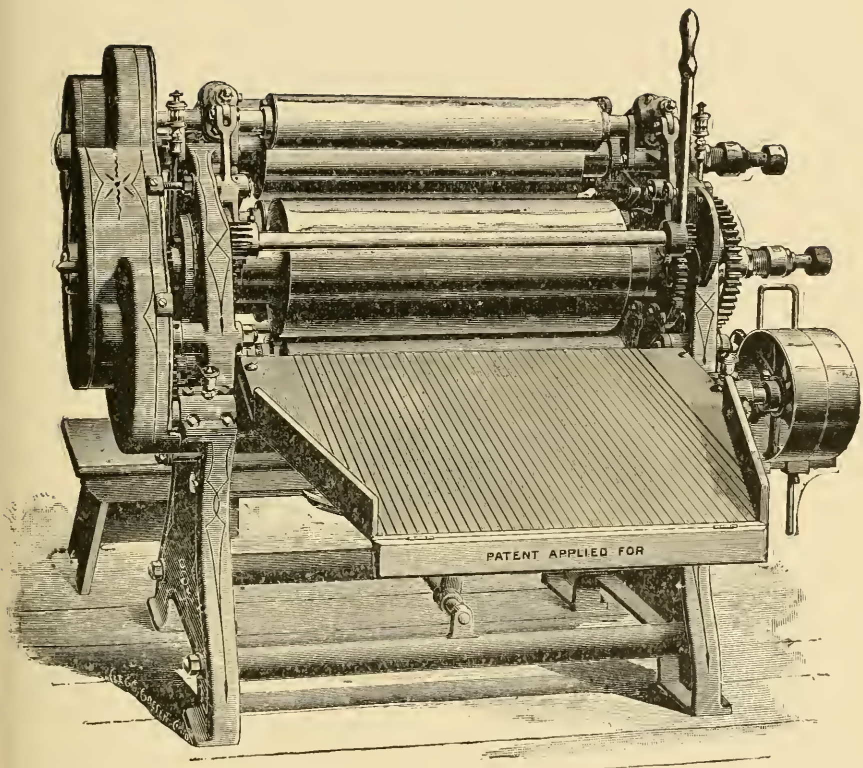


Fig. 58. HAGEN STEAM COLLAR AND CUFF IRONER
(A. T. Hagen Co.)

has already received a nearly complete ironing by having been passed through the collar-ironer. The Troy tipper is shown in Fig. 57.

The machines which have thus far been described are all heated by gas. There is, however, a machine maunfactured to iron collars and cuffs which is heated by steam. This machine is of Hagen manufacture, and is illustrated in Fig. 58. It is claimed for this machine that it possesses the advantage of being free from the danger of ever scorching the work, and that it produces a pearly white appearance, which is not always the case in goods ironed by machines heated with gas. This machine is said to be especially adapted for custom work because it renders the goods tough and pliable and pleasing to wear, and while it may not stand the rough handling usually given to new work it is said to be strong enough to hold up and remain in shape until it is worn.

The idea of this machine is taken from the old steam mangle and it consists in having a large steam cylinder running in contact with several small padded rolls. In this machine the goods are in contact with the heated surface during all the time they are passing through the machine. In other classes of machines the goods are in contact with the heated roll only when the small roll is in contact with them, and then the heated surface is only at the point of contact. In the steam machines, however, the whole of the heated surface is in contact with the whole of the surface of the goods, thereby making it possible to iron the work at a low temperature.

The ironing of standup collars is a comparatively easy matter, as they are not folded, but simply curled, which is done by running them through a machine known as the "Collar Shaper." But the ironing of

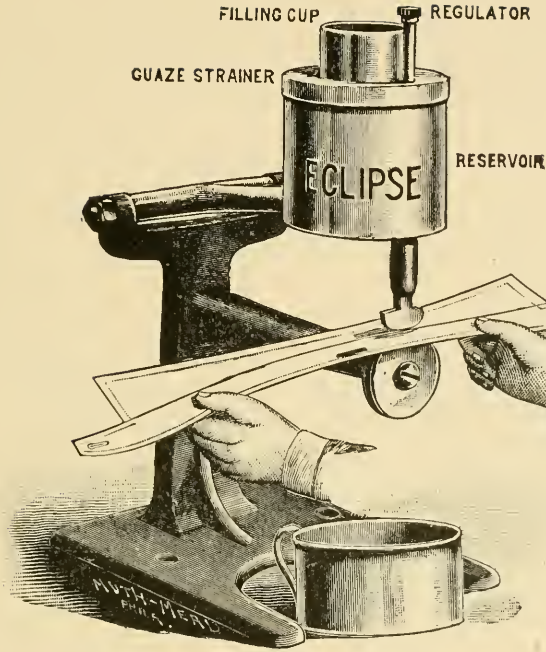


Fig. 59. ECLIPSE SEAM DAMPENER.
(Barnes-Erb Co.)

turndown collars is quite difficult, as they have to be turned and shaped after they have been ironed on the collar ironer. It is necessary to dampen the line where the collar turns to prevent the cracking of the goods, and in order to do this neatly the use of a dampening device is necessary to dampen evenly that portion of the collar where it turns over, and not spread the line too wide, as this would cause the collar to be soft around the edge of the fold.

This dampening device is generally called the seam dampener, and it usually consists of some sort of a roll arrangement having felt, or fibre, edges to which the water is applied, and as this roll passes over the goods it causes a streak of water to remain where the roll has passed. There are various makes of seam-dampeners, some of which are automatic, and feed the water continuously when in use. Others are made with a felt washer held in place between two metal flanges; this felt being kept usually in water when not in use. There is a more elaborate seam-dampener manufactured by the Barnes & Erb Co., and shown in Fig. 59, which it is claimed possesses greater merit than the wheel dampener. Any arrangement which will evenly distribute a narrow line of water, where the collar is to be folded, is all that is absolutely necessary.

The water for seam-dampening should be warm, so that it will penetrate the goods more quickly. It is also recommended that about five percent of pure glycerine be added to the water, rendering it capable of being more quickly absorbed.

After the collars have been dampened they should be allowed to stand a few minutes before turning, to allow the water to thoroughly saturate the fibre. If they are turned too soon after being dampened, they are liable to crack. After they have been sufficiently dampened they should be folded and shaped. The process of folding a collar is quite an art, and it should be done with great care in order to give the collar its proper shape, and not crack the linen. The collar should be partially turned by hand, and then run through the collar-shaper.

To run the turndown collar through the shaper and preserve its shape is quite a difficult matter, and requires considerable practice before one is able to prevent the collar from becoming jammed up in the shaper.

The shaper creases down the fold, and also curves the collar to conform to the neck, and, as the outside of the collar is longer than the inside, it must come from the shaper at the right curve, or else the inside band will double over and form a crease.

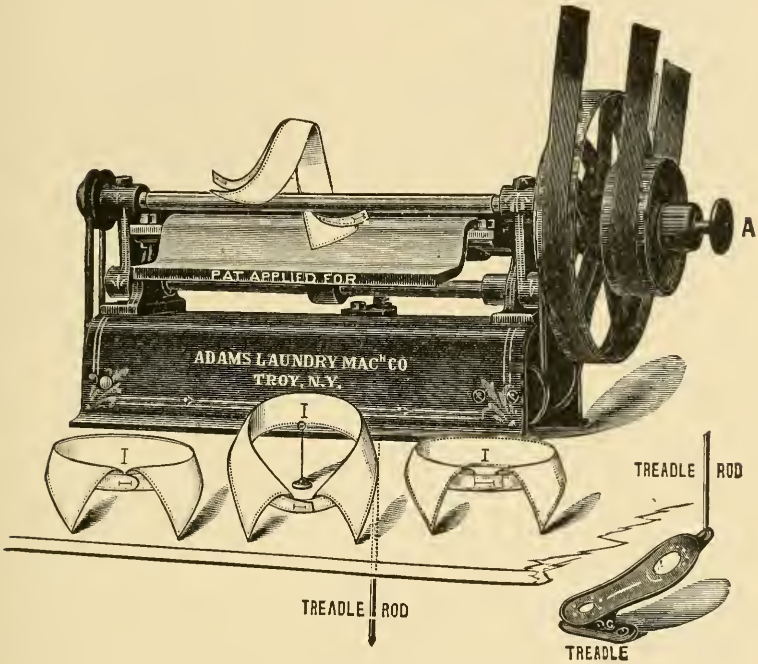


Fig. 60. COLLAR SHAPER.
(Adams Laundry Machinery Co.)

A collar-shaper consists usually of a rubber roll running in contact with a small metal roll. In some instances the metal roll is heated, in which case the rubber roll is generally dispensed with, and a roll covered with cloth substituted. There is also a sort of shelf arrangement in close contact with the rubber roll, and near the small roll. It is placed in such a position that it bends the collar when it passes through the machine. The Adams Laundry Machinery Co. manufacture a collar-shaper, and have so constructed it that the operator can release the pressure and contact of the roll at will, thereby making it possible to have the machine act on any portion of the collar desired. An illustration of this collar-shaper is shown in Fig. 60. The principle upon which this machine operates makes it practical to shape rolled turned down collars, and not break the roll of the collar on the end, as the collar can be placed in the machine, and the shaper applied at any point on the collar, and left off at any point. This machine is also made to run at a fast or a slow speed, which is very convenient, for when shaping standup collars or cuffs, the machine may be run rapidly, and when shaping turndown collars it may be run at a slow speed as is desirable.

After the collars have been run through the shaper they will be found to be more or less roughened and bent at the edge where the fold is made, and in order to do a first-class job this unevenness should be ironed out. This is done on what is known as an "edge" ironer. This is a little machine having a curved, raised flange, which is brought to an edge. The collar is placed on this curved flange, having the edge of the flange extending inside of the collar, and snug up into the fold; a grooved hot iron is then passed around on the edge of the fold, smoothing the edge and finishing the job. There have been various machines manufactured lately, commonly known as the "saw edge" machine, examples of which are shown in Figs. 61 to 64. There used to be a general complaint from people wearing standup collars, about the edges being so rough, and

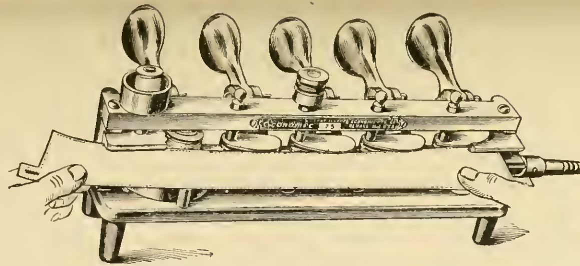


Fig. 61. (Economic Mfg. Co.)

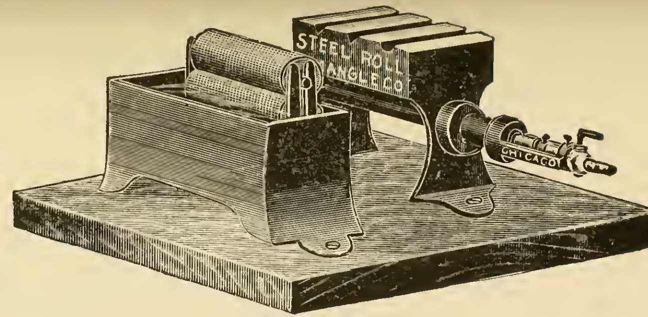


Fig. 63. (Steel Roll Mangle Co.)

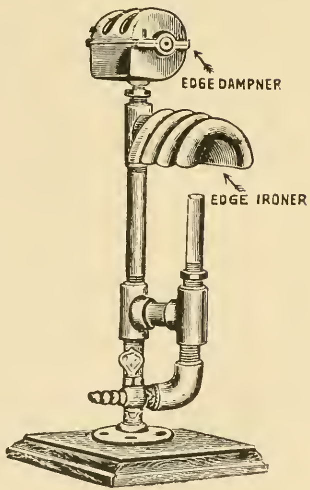


Fig. 62. (Electric Laundry Machinery Co.)

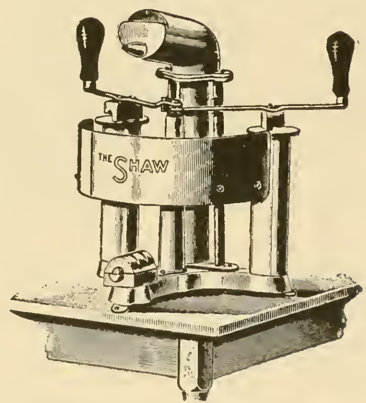


Fig. 64. (Reed Mfg. Co.)

EDGE IRONERS.

for this reason the saw edge machine was invented. It is almost impossible to launder a standup collar without its having rough edges, and to overcome this, the edge is slightly moistened and ironed. Some accomplish it by passing it through a groove in a hot iron, others

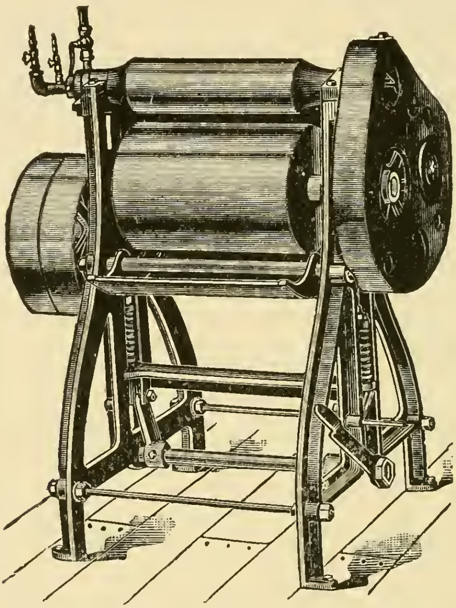


Fig. 55. No. 7 COLLAR AND CUFF IRONER.
(F. M. Watkins Co.)

by having a system of rolls having grooves in them. Either device is practicable. There is no invention in the laundry line that has been so much appreciated by the public as this little saw edge machine, and every laundryman who would be up to date in his equipment should not overlook this simple device.

PART SECOND.

CHAPTER 1.

CUSTOM OR OLD WORK LAUNDERING.

This branch of the industry has grown to be a large commercial factor in the business world. While the fundamental principle of laundering remains the same in old work as in new, the conditions vary to a considerable degree, and many of the methods are different owing to the fact that not so thorough a treatment or such extensive and complicated methods are required in laundering old work. While it is necessary to relaunder goods nicely, it is not necessary or even practicable to go to the same extent in laundering them as though the goods were to be sold or were to remain a long time in stock. A customer is not particular as to the general character and shape of goods which are relaundered so long as they look well when worn. The dealer, however, requires that his goods present a fine appearance when he places them on sale, and therefore the laundryman who launders new work must give attention to everything which adds to the appearance and the character of this work.

While the chief requisite of the laundryman who launders old work is to get it clean and starch and iron it well, the prevailing price for relaundering goods does not permit of expending so much labor upon them as was done at the time they were first laundered.

New work, as a general rule, is better to look at than to wear, owing to the fact that, in order to have the goods appear well when on sale and stand handling, they are starched very stiff, and when a man first wears them he is very uncomfortable. Take shirts for example. Usually the bodies are starched, the bosoms are very stiff, and the yokes are stuck together. One wearing some of the new work which has been laundered in some one of the stockwork factories, feels as though he were wearing a coat of mail, but when the same shirt is relaundered it comes back quite a different article. Then the body and the yoke are soft, the bosom is pliable, and one wearing it the second time would hardly believe it was the same shirt.

It is much easier to relaunder goods than to first launder them, and the more times they are laundered the easier they can be laundered. The fibre seems to soften, the goods wash and starch easier, and they become capable of receiving a more pliable finish. Nice custom laundry work consists in having the goods tough and pliable, not harsh and stiff. Take a collar, for instance, that is laundered right, it will have a sort of elastic finish, that is, it will be soft without being weak. It may be buttoned on to a shirt without any effort or damage to the buttonholes. Shirt bosoms will not be like boards, but springy and yielding, and yet they will not break or blister by wearing.

Nice laundry work is clean work; it should be immaculate. If it is white, it is a pure white; if colored, it is clean and bright. It is well ironed, has no rough dries or scorches, it is well starched and wiped, and no blotches of starch are seen upon it. Nice laundry work does not have starch on the body of the shirt or half way up the sleeve.

The standard of good laundry work was well expressed by a friend of the author, who said that certain work "looked good enough to eat." This I considered a very fitting expression, for work that looks good enough to eat, must be very good looking work, unless one is not particular about what he eats.

CHAPTER 2.

WASH ROOM.

The foundation of good laundry work, for old work, is the same as for new, and that is the wash room. It is here that the work is prepared for the other departments. The work must be washed well, or no good results can be obtained, no matter how well the work may be done after it leaves the wash room. If it is not clean, no amount of scrubbing with the sponge cloth in the ironing room will make it look right, and to get good work in the wash room, much depends upon the plan of handling the goods and the general arrangements for doing so.

In the first place the wash room must be so constructed that it may be kept absolutely clean. It should be a place where one would not be afraid to spill a little water, or allow a little steam to escape. It should be arranged in such a manner that the floors may be easily flushed with water, and the machines kept clean on their exteriors by the use of the hose.

The floors should be made of Portland cement concrete, with a decided grade leading to a sewer connection. It is an excellent plan to have a gutter extending under the machines and connecting with the sewer, and to have the floor graded so that any water on the floor may drain into the gutter and pass into the sewer. The washing machines should open into this gutter, so that, in case any garment is dropped between the cylinder and the machine, it will pass out into the open gutter. Thus it will not be lost, as would be the case were the outlet of the washing machines connected directly with the sewer.

There should be an abundant supply of hot and cold water. It is quite an easy matter to obtain an abundant supply of cold water, providing the water works are of sufficient capacity, but it is not such an easy matter to have an abundant supply of hot water and there are many varied devices and means resorted to to obtain hot water. This subject has been quite fully covered and discussed in describing the treatment of new work.

To get the greatest capacity out of washing machines it is necessary to have large water connections. Especially should the hot water supply pipe be large, not less than two inches, as the pressure of hot water is usually not very great.

To those who can not obtain a storage of hot water the author would recommend an arrangement of pipes by means of which water may be heated as it passes into the machine. One will not be able to fill the machines as rapidly by this means as one could do with a supply of hot water, as the water must be admitted slowly in order to heat it sufficiently as it passes in. An instantaneous heater may be made simply by inserting a steam jet into the water pipe, and discharging the steam into the water as it passes through the pipe.

If the water pipe is connected at the end of the washing machine, instead of having an elbow where it turns to go into the machine have a "T." Supposing the pipe to be one and one-half inches in diameter, the "T" should have two openings an inch and a half in diameter, one placed on the side and the other on one end. To these openings the water pipe should be connected. The opposite end should be reduced to three quarters of an inch, which is the usual steam connection. Through this three-quarter opening should be run a straight thread, that is, one not having the usual taper which is given the regulation pipe fittings. This thread should be equal in size through the opening of the "T" so that a pipe may be screwed in and through this opening from the inside. A six-inch nipple three quarters of an inch in diameter, having a thread on one end about two inches long should be screwed into the "T" from the inside, and extend through far enough to admit a connection to this nipple to be made on the outside of the "T."

The steam pipe is connected to the projecting end of the nipple, and the joints made tight by lock nuts, which screw against the steam connection, and also against the "T." If these lock nuts are not used it will be difficult to make a steam tight joint, as there is no taper to the thread. The nipple extends beyond the side opening of the "T" where the water is admitted, and when steam is admitted through the pipe it is discharged into the water pipe in the direction of the flow of water, acting on the injector principle, and causing no back pressure on the water pipe. The temperature of the water which passes into the machine may be regulated by the amount of water admitted, and by the pressure of steam.

Hot water is one of the most essential things in the wash room, in fact, it is quite impossible to do good work without it, and as this arrangement is so simple, anyone may avail themselves of the use of hot water. While this method may not be as convenient as the storage tank arrangement, it will practically answer the same purpose. So, when discussing the methods of washing, there will be no attempt to furnish a formula by means of which one may obtain good work without the use of hot water.

The power for a wash room is usually transmitted by shafting which is run overhead. The modern washing machine requires no counter shafts, and it is usually the rule to extend the line shafting nearly perpendicularly over the washing machines. The extractors and any other machinery in the wash room are usually run by countershafts.

The best double leather belt should be used on washing machines, as the work is very hard for belts. They are subject to great strains, and when the machines are in operation the belts are constantly being shifted from one pulley to the other to produce the reverse motion of the cylinder. The best quality of belting is recommended for the reason that the wash room is usually a damp place, in which a poor belt is very short lived.

CHAPTER 3.

WASHING MACHINES.

It is said that more patents have been granted for washing machines than for any other class of machinery. The greater number of these patents have been granted on inventions for domestic use. The energy expended in washing soiled garments is something inventors have for many years been studying to lessen, but without any apparent success. Any machine which has to be operated by hand, usually requires as much energy as is equivalent to that used in washing the goods in the ordinary way.

Most of the inventions are not those of practical men, but are the outcome of the efforts of someone who has tried to get something for nothing. While the inventions along this line in power machinery have been very successful, and the state of the art in the mechanism of power washing machinery is considered by the author to be as well advanced as that of any other machine, the modern washing machine is an evolution. The prinsiple on which it operates is two-fold, mechanical and hydraulic. The mechanical part consists in dashing the goods from one side of the cylinder to the other, and the hydraulic principle consists in forcing the water through the goods by the centrifugal action of the cylinder. These two principles combined are found in almost all washing machines today.

Machines differ in construction, but the principle is always the same. At one time there were different constructions of machines, and machines having different principles, but as many of these machines are now nearly obsolete, it will hardly be necessary to describe them in this work. The modern laundry washer is so far ahead of them, that if a laundryman should have one of the other kind, the author would advise him to throw it away, and catch up with the procession.

A power washer, such as is used today in all the modern laundries in this country is constructed with a water-tight, cylindrical-shaped tank, having a perforated cylinder within it. This inner cylinder, by a reverse mechanism, is caused to revolve several times in one direction, and to reverse and revolve several times in the opposite direction, the reversing mechanism being automatic, changing the motion of the cylinder at regular intervals. This reverse motion is necessary to prevent the clothing from becoming entangled in the machine. A continuous motion will tangle the goods to such an extent that it is almost impossible to separate them.

The above description applies to the washing machine pure and simple. While there are a great many manufacturers who make washing machines, and claim different advantages for them, none claim that their machine possesses any advantages in washing over any other machine, their claims being based usually on the construction of the cylinders, or that of the mechanical movement. No special make of washing machines could be recommended because they would wash any better than any other. Machines might be recommended that because they were built on better mechanical principles than others, or because they possessed greater durability, but when it comes down to washing,

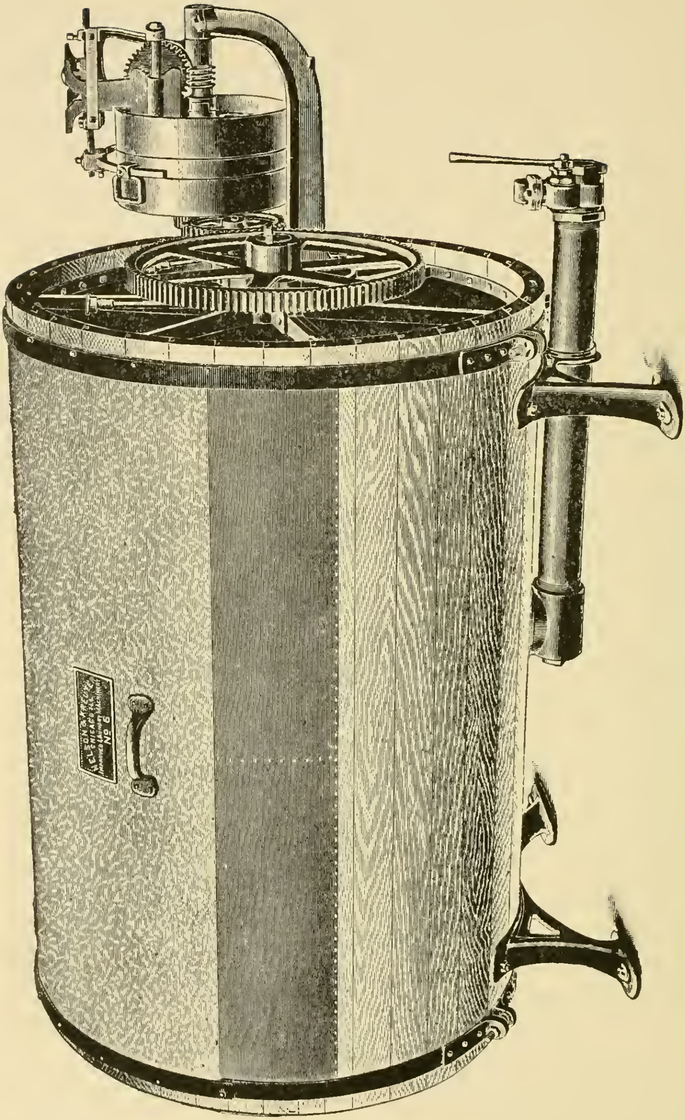


Fig. 65. IRONHEAD WASHER.
(Nelson & Kreuter.)

one will wash as good as another, providing it is of the same size and capacity.

In the purchase of a washing machine it is the advice of the author to buy the best. A washing machine is subjected to very severe treatment, owing to the nature of the work it has to do, and at its best is very short lived, as compared to any other class of laundry machinery. The regulation washer is built usually for cheapness. It has a pine outside cylinder, and a hardwood inside cylinder, with the reverse motion bolted on to the wood of the outer cylinder. This machine is very short lived, as the wood soon becomes softened by the action of the hot water and the steam, the bolts which hold the motion to the head become loosened, the reverse mechanism gets out of line, and as a result the machine soon goes to pieces.

Several manufacturers of laundry machinery build washers having a cast-iron head, to which the motion is attached. This is quite a practical machine, and far more durable than a machine having heads of wood. It might seem to some who have had no experience with this class of machine that the iron head would rust and cause trouble. Such does not seem to be the case, as the iron soon becomes coated with a deposit from the water, the soap and the other ingredients which are used in the machine, and this deposit prevents the iron from rusting. As the movement is bolted to this iron head, there is no possible chance for the gearing to separate, as is the case with wooden heads. The N. & K. Ironhead Washer, shown in Fig. 65, is a good example of this type.

A machine having a frame work of iron, into which the wooden cylinder is fitted is also another good style

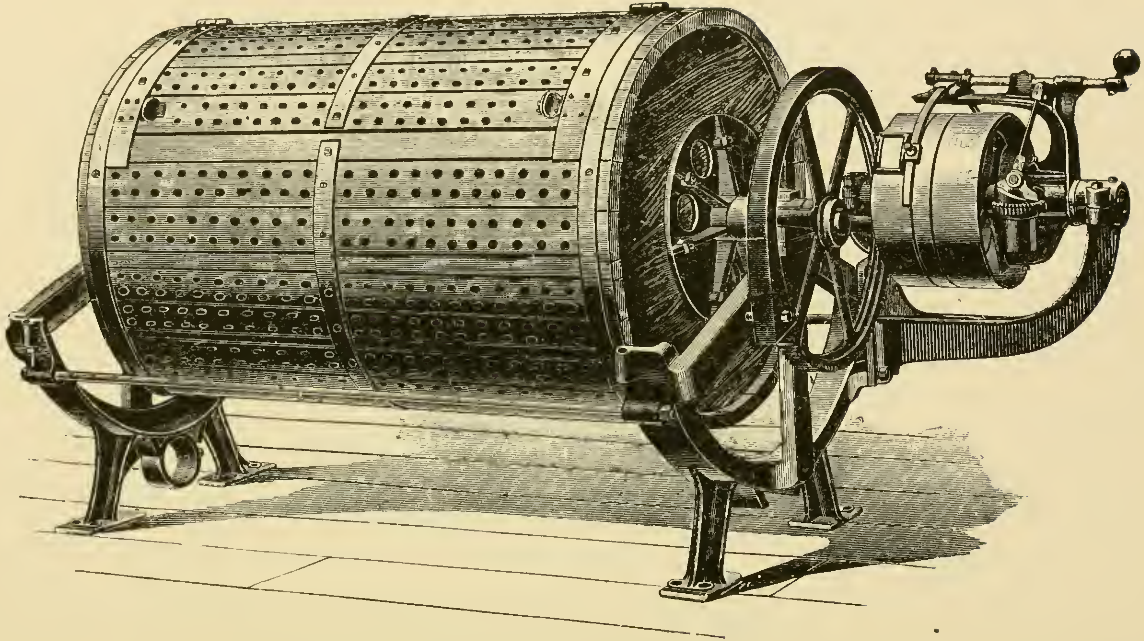


Fig. 66. STYLE "A" WASHER.
Outside tub removed, without taking belts off header
(F. M. Watkins Co.)

of which the Watkins machine, shown in Fig. 66, is an example. The iron frame is self contained, and the movement is bolted to the frame. All the bearings are attached to this frame. The wooden part of the machine may be removed and renewed without disturbing the belts which operate it. This plan of construction makes a very strong and durable washer, and one that will run for a great many years with a very little cost for repairs. The perishable part of it being wood is easily renewed, making the machine practically as good as new.

There are combinations of various kinds in washing machines. One which is quite common is a machine having a wood outside cylinder, and a brass inside inside cylinder, as shown in Fig. 67. This machine is quite expensive, but its durability justifies the first cost. A brass cylinder in an iron frame machine is about as practical a washing machine as one can buy. It possesses all the advantages of any washing machine, besides having the great merit of durability. The wearing parts are practically indestructible. The outside cylinder, of course, requires to be renewed in time. This can be easily done on this style of machine without even removing the inside cylinder, or changing the belt. This brass cylinder machine is constructed also with an outer cylinder having an iron head, making a very durable machine.

The acme of washing machines is the all-metal machine, Fig. 68. The washing machine having a wooden outside cylinder possesses the merit over the all-metal machine of being nonradiating. A metal machine requires more steam, as every time the metal is cooled off it has to be heated again from the heat that

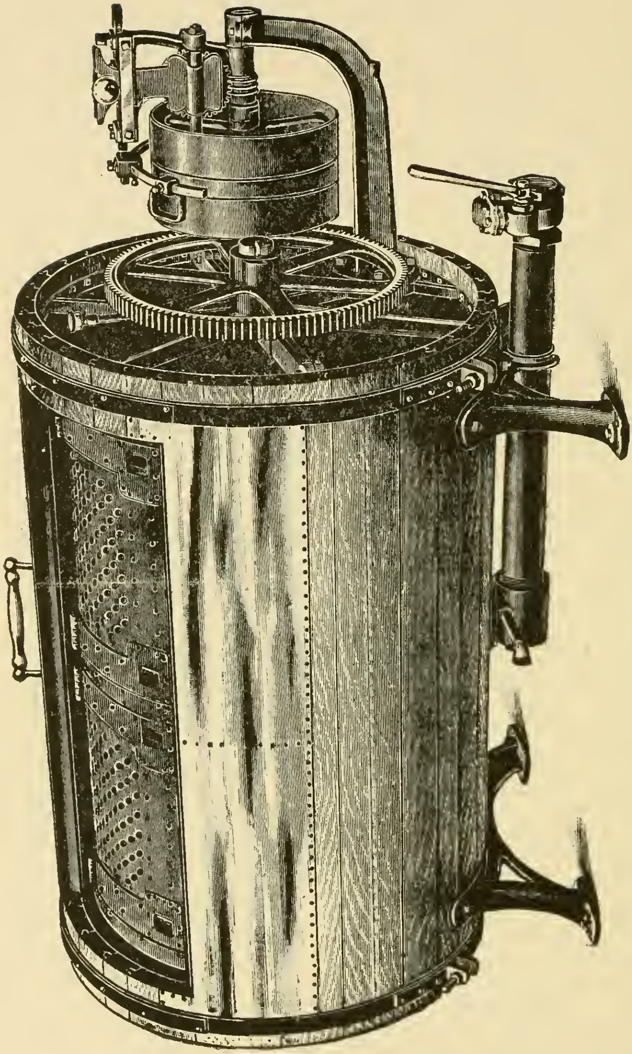


Fig. 67. BRASS CYLINDER WASHER
(Nelson & Kreuter.)

is in the water. As this heat has to be supplied by steam, it requires more steam to operate a washing machine which is made of metal than one which is made of wood. This is the only objection to a metal washer, but it is quite an objection where one is operating a large plant of washing machines, and therefore it is greater economy from every point of view to use a machine having a wooden outside cylinder, and a brass inside cylinder, for reasons already stated.

A machine which has a capacity over one hundred shirts should be geared at both ends. Machines are being manufactured which have a large drive gear attached to the journal of the inside cylinder at each end of the machine as illustrated in Fig. 69. These gears are connected and run in contact with pinion gears which are attached to a shaft running longitudinally with the machine at the back. To this shaft is attached the reverse mechanism which drives the cylinder. Thus the power is distributed equally to each end of the machine, producing no torsional strain on the inner cylinder.

Some manufacturers build washing machines having a galvanized iron outside cylinder. This machine is quite generally used in the hospitals and public institutions. It is considered by physicians and superintendents of public institutions to be the best machine for that class of work, owing to its sanitary qualities. This construction of machine is popular also on account of its comparative cheapness, as an all-brass washer is a very expensive luxury.

There is another machine which it might be well to speak about in connection with the subject of institution work, and that is the machine called a "Disin-

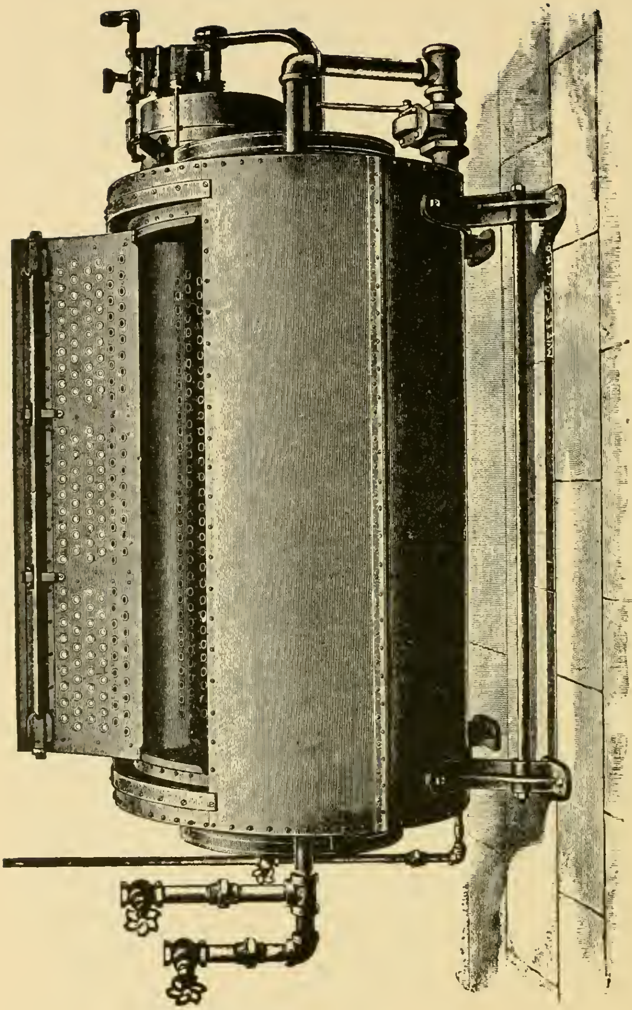


Fig. 68. ALL METAL WASHER.
(American Laundry Machinery Co.)

fecting Machine." It resembles a washer in construction, and is practically a washer which has the outer cylinder constructed strong enough to withstand the steam pressure employed. The openings are arranged in such a manner that they are easily made steam tight.

The article of clothing which is to be disinfected is placed in this machine, the outer cylinder sealed up, and a pressure of steam admitted. The action of the machine agitates the goods and allows the steam to thoroughly penetrate every fibre, which effectually destroys all disease germs that there may be in the goods, and renders the clothing free from the danger of spreading contagious diseases. After the goods have been subjected to a steam bath the washing process is continued in the ordinary way. See Fig. 70.

The steam chamber is constructed of an inner and outer steel shell, forming a steam jacket, with cast-iron ends, frames and doors fitted with steam-tight copper gaskets. The jacket gives perfect circulation, prevents too rapid condensation and dries thoroughly the goods exposed. This jacket is filled with steam during the entire operation, making the chamber a drying oven, so that the articles to be sterilized and disinfected are brought to temperature before the admission of steam to the inner chamber, and thoroughly dried after the steam has been exhausted. To prevent a possibility of life to the germ by an admixture of steam and air during exposure, an air pump is applied whereby a vacuum of fifteen to twenty inches is produced previous to the admission of steam to the inner chamber.

Many institutions, which have very filthy goods to be washed, have a system of ventilation applied to

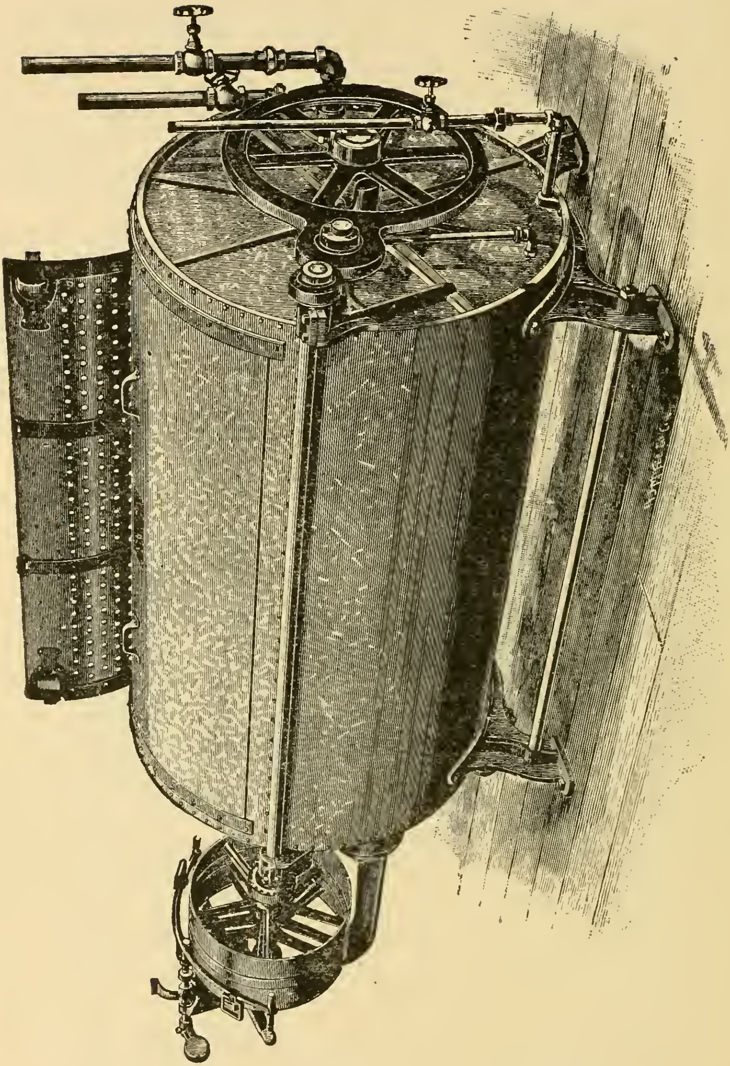


Fig. 69. DOUBLE GEAR WASHER.
(American Laundry Machinery Co.)

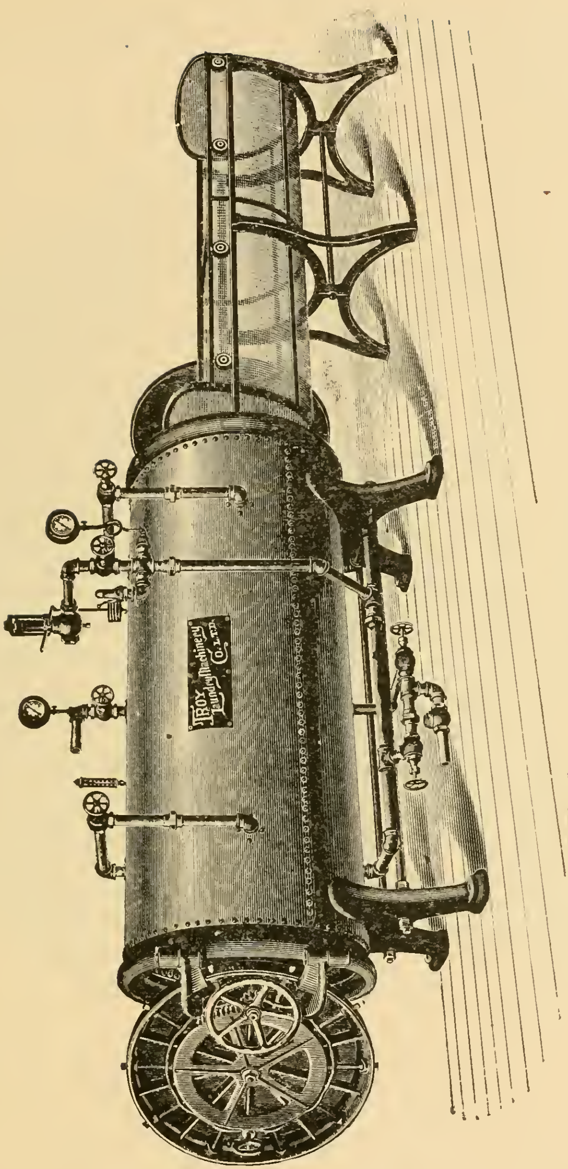


Fig. 70. STERILIZER.
(Troy Laundry Machinery Co.)

the washing machines which is excellent, and would not be amiss in any laundry. The plan of ventilation is as follows:

Into each end of the cylinder of the washing machine is connected an air pipe about five inches in diameter. This air pipe leads to an exhaust fan, and from there to the open air. The exhaust fan is continually running, and any odor or steam from the goods in the machine is removed and discharged through the exhaust pipe, thus preventing the sickening odor which is present in many institution laundries, as well as in some custom laundries.

There is a novelty in the way of washing machines, which is manufactured with a woven wire cylinder, and it is claimed that it has a greater washing efficiency than the ordinary machine, owing to the fact that it has more openings through which the water can pass and consequently produces a greater hydraulic action. Undoubtedly this machine has considerable merit. Fig. 71 is a cut of Woven Wire Washer.

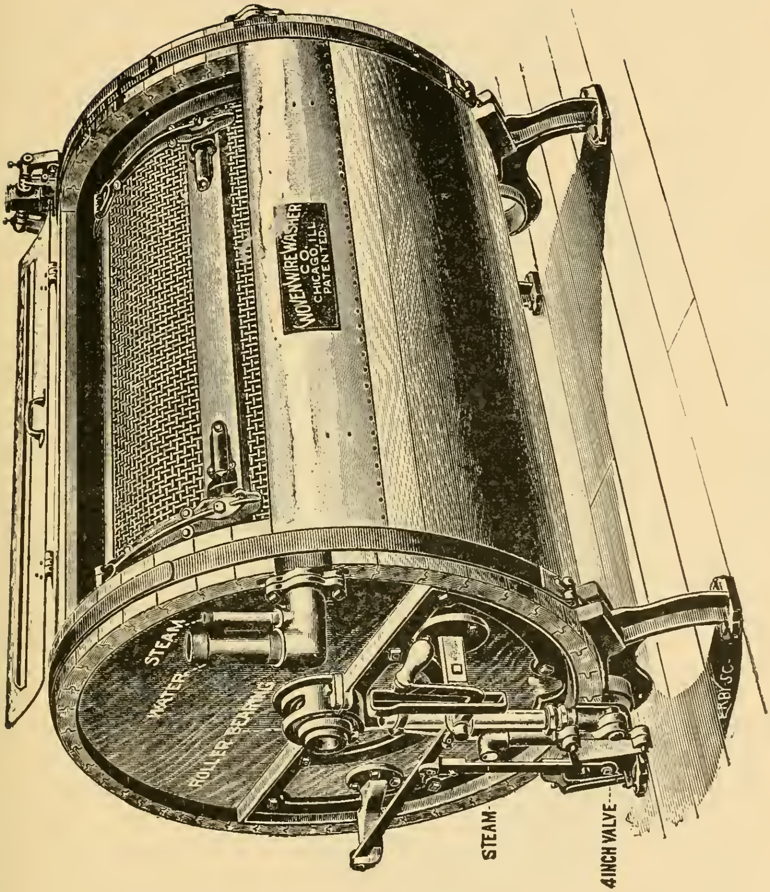


Fig. 71. WOVEN WIRE WASHER.
(Woven Wire Washer Co.)

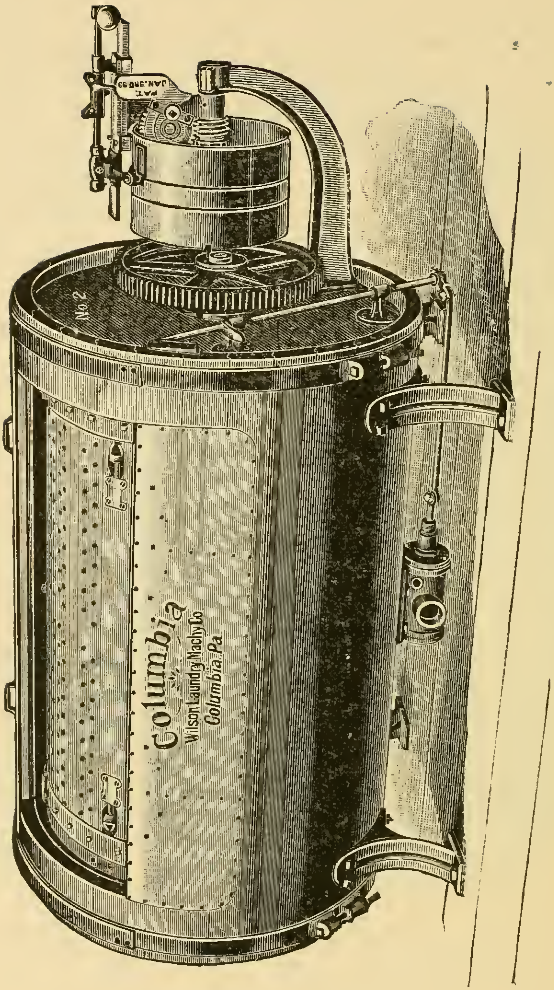


Fig. 71a. **COLUMBIA WASHER.**
(Wilson Laundry Machinery Co.)

CHAPTER 4.

FILTERS.

The question of filters in our modern laundries is a momentous question, especially in localities where the water is supplied from rivers or streams which are subject to freshets, or have a natural discoloration. It is not necessary to filter water for laundry purposes except to free it from any foreign substance held in solution. The question of bacteria or foreign substances which might affect its qualities as a drinking water need not be considered when the water is to be used for laundry purposes. All that is there required is to have a water that is clear, which will not stain or discolor the goods that are washed in it.

The greatest need of filters is in laundries depending on the Ohio and Mississippi Rivers for their supply. Rarely ever is the water from these rivers clear. There is usually present what is known as red clay or aluminiferous earth. This substance is very readily taken up by water and puts it in that condition which is commonly called rily. To use this water successfully this substance must be gotten rid of, and the only plan by which this may be accomplished is by filtering.

The principle of filtering consists in passing the water which is charged with foreign substance through a material which has sharp angles or corners that will catch and hold the foreign substances, allowing the water to pass through and come out clear and free from dirt. The usual plan in filtering consists in having a bed of finely ground quartz or sand through which the water passes. This will relieve the water of all particles down to a very minute size. But as this foreign substance is not of a uniform size there are certain small particles which will escape through this

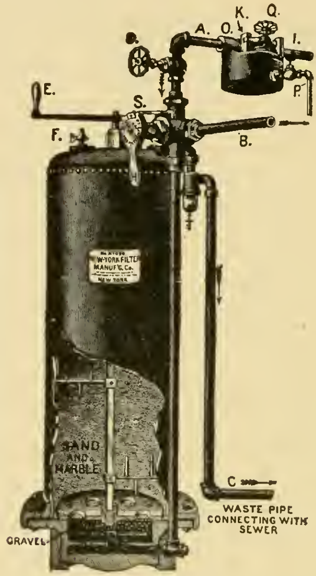


Fig. 72. NEW YORK FILTER.
(New York Continental Jewel Filtration Co.)

filtering bed, and pass out with the water, leaving the water still impure. In order to thoroughly eradicate this trouble a coagulant is required.

A coagulant is a substance which binds together the numerous finer particles of the foreign substances, making a body sufficiently large to be caught by the jagged edges of the filtering quartz. It curdles the matter in the water and the quartz catches the curdled particles, leaving the water pass through clear. The usual coagulant is alum. This acts on the impurities in the water in the same manner as the white of an egg does on coffee.

The amount of alum required is usually about one-half a grain to a gallon of water. Almost all of our modern filters are provided with means of automatically feeding alum solution into the water while it is being filtered.

There is no objection to the use of alum as a coagulant, as none of the alum escapes with the water. It unites with the impurities of the water and is retained by the filtering substance. It is then carried away when the filter is washed. The analyses of purified water where alum has been used show no trace whatever of alum.

In localities where freshets are common the water becomes very bad at these times and the use of alum alone as a coagulant is not sufficient. At such times it is generally used in combination with lime. The water is first treated with alum and subsequently with lime. The effect is an instantaneous action between the two whereby all the foreign substance is precipitated. Most of our modern filters are provided with apparatus for using alum and lime in combination.

There are various makes of filters for laundry purposes, of which the pressure type of filters is that usually adopted. This type of filter permits the connection of the water supply to it, and the supply of filtered water passes directly from it, filtering the water under full pressure as needed. The principle employed in all of these filters is the same. It consists in passing the water through a filtering substanee, usually of pulverized quartz. They usually have means for feeding

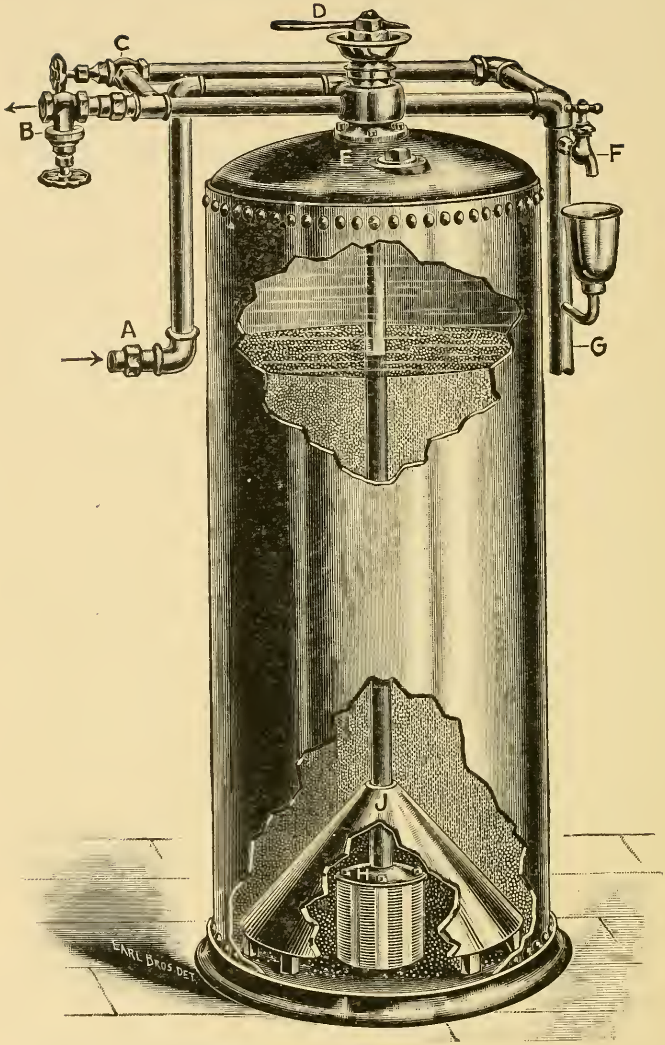


Fig. 73. BOWDEN FILTER.
(Hygeia Filter Co.)

coaguiants into the water, drop by drop, in such quantities as may be needed.

The principal merit in any filter is a thorough means of washing the filtering substance. This substance becomes charged with the impurities which it collects from the water, and the impurities must be washed out, or the filter would soon become useless. Many makes of filters are provided with a means of washing by reversing the current of water and breaking up the filtering bed by forcing the water from the bottom up through the top. As the water is introduced into the bottom of the filter it disturbs the particles of sand and carries off the impurities, leaving the sand clean. The New York Filter Co. makes a filter of this kind, which is shown in Fig. 72. The Bowden filter, shown in Fig. 73, is another.

There are other makes of filters which have a mechanical action as well as an hydraulic action for the purpose of breaking up the sand or filtering bed and washing it. In localities where water is very bad this type of filter is of good service, as it thoroughly disturbs the sand by mechanical action, and allows the water to wash every part of the filtering bed. This type is exemplified in the Jewell Filter, illustrated in Fig. 74.

The average size filter for a laundry doing $500.00 worth of work a week, and using Ohio or Mississippi water, should be about 60 inches in diameter. This filter should be fitted with a 2½-inch supply pipe, and it will filter 2,500 gallons of water per hour. In localities where the water is not so bad, for a business of the same dimensions a filter 36 inches in diameter is sufficient.

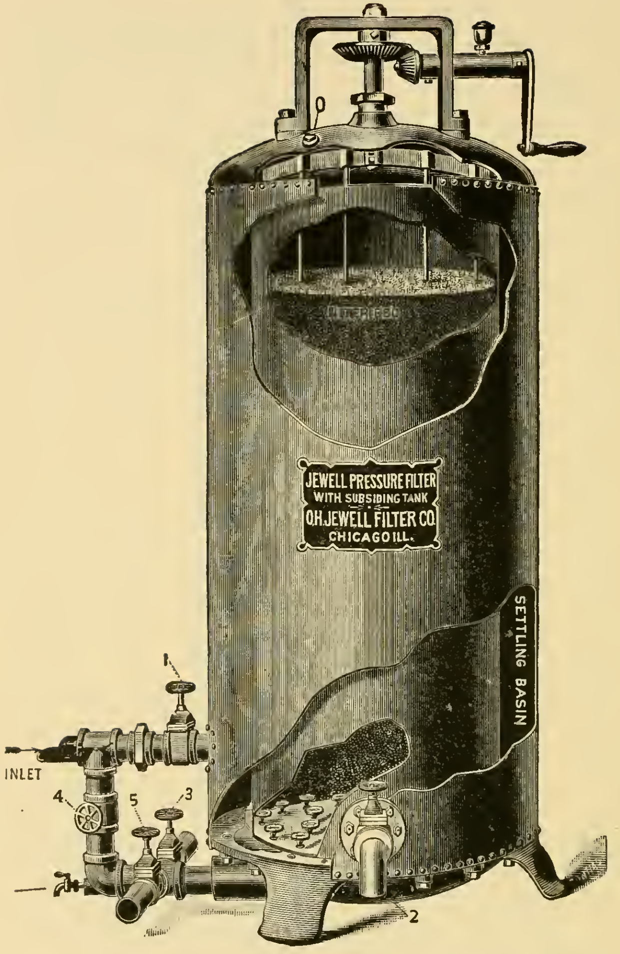


Fig. 74. JEWEL FILTER.
(New York Continental Jewel Filtration Co.)

The best kind of alum to use as a coagulant is what is known as the commercial sulphate of alumina. This is especially recommended on account of its soluble qualities, as it goes directly into solution when placed in water.

Ordinarily a filter should be washed once in twenty-four hours. With some waters it will require washing more frequently, and there are localities in which the filter need not be washed so often. It depends entirely on the condition of the water, and judgment must be used regarding the frequency of the washing.

CHAPTER 5.

ODDS AND ENDS.

In every well-regulated washroom for handling custom work there are required various minor machines, tanks, tubs, and utensils, which will be classed under the head of "Odds and Ends." The first of these which is to be considered is the machine known as the tumbler. This consists of a single revolving cylinder, and is used for shaking out flat work or family work after it has been extracted, putting it into a condition to be handled easily. This class of work is usually soft, and becomes so thoroughly pressed together by the centrifugal force of the extractor that it makes it a very slow process to separate the pieces by hand. The tumbler, however, shakes them up, and leaves them in a nice, light condition to be ironed or mangled. Most all of the laundry machinery manufacturers make a tumbler. It is a simple machine. Some of them are made to reverse, and some revolve continuously. The cylinder is usually slatted to allow the lint from the goods to pass through.

Laundries which do not use a collar and cuff starcher generally use the dipwheel for this purpose, and this device is found usually in the washroom. There are various shapes and makes of the dipwheel. Some are box-shaped, and others coffin-shaped, while still others are round. The goods are put into them together with the starch, and the machine is made to revolve so that it pounds the starch into the goods. There is no question but that the dipwheel puts lots of starch into the goods, and it puts lots of wrinkles into them as well.

Extractors are necessary in a washroom doing custom work, as well as in those doing new work, and, as they have been fully discussed in a former chapter, no further description will be necessary. An extractor having a 26-inch basket is usually the most practical size, and is that best adapted for custom work.

It is also necessary to have stationary tubs with power roll wringers attached, for washing anything that may be too delicate to be washed in the machines. They may be used also for starching skirts, or for starching any other garment requiring it. The stationary tubs should have connected to them hot and cold water and steam-pipes. Porcelain is the best material to have in a stationary tub, as it is more durable and is cleaner than any other material.

To get a practically uniform color in all grades of white material it is necessary to blue the goods by hand in stationary tubs. It is impossible to mix all kinds of goods together in a washing machine to blue them, and have them all take the same degree of color.

Some goods take blue more quickly than others, and, therefore, for uniformity in color, the goods that take the blue more quickly or more easily should be blued in a separate tank, in which the water is not so blue as would be necessary to blue these goods which require stronger blue to the same shade.

Two bluing-tanks are usually all that are required to give a practically uniform color. These tanks should contain bluing-water which in one of them is several degrees bluer than that in the other. The tanks should be located conveniently in the washroom and should have an extractor between them in order that the goods can be removed without inconvenience from the tanks to the extractor.

The operation in connection with these tanks will be further described when the methods of the washroom are treated. They should be connected with cold water pipes, steam and hot water not being required unless one prefers to blue in warm water. Of course this tank should necessarily be connected with the sewer.

If any starching is to be done in the washroom it will be necessary to have starch cookers placed therein. For a description of starch cookers the reader is referred to a former chapter.

It is also necessary to have tanks for making soap and tanks for bleaching solution, as has been described under the head of new work.

It is an excellent plan to have, in the washroom of a custom laundry, stationary tanks in which extremely soiled clothing may be soaked before washing. There are many goods which come to the custom laundry so badly soiled that it is quite impossible to get them clean in the ordinary process of washing. As the laundries are supposed to turn out every piece immaculate, it is necessary to make provision for thoroughly washing everything which may be sent to the laundry. Therefore, soaking-tanks are necessary adjuncts. These tanks should be connected with hot and cold water and steam-pipes, and they should also have a proper sewer connection. They should be made of porcelain, or, if of wood, they should be zinc-lined to prevent wood stains.

There should also be scales, graduating glasses and measures. Nothing ever should be done by guess in a washroom.

CHAPTER 6.

METHODS IN THE WASHROOM—WASHING WHITE SHIRTS.

Shirts that are very much soiled should be separated from the others, and, when time will permit, they should be soaked two or three hours in a solution of lukewarm water and soap. After they are soaked they may be washed together with the shirts which are not so badly soiled, and will come out looking equally as well after going through the washing process, because the soaking thoroughly loosens the fiber and partly dissolves the foreign substances which have been in the fiber of the material, rendering them easier to remove in the regular washing operation.

It is not advisable to overload a washing-machine, and it is usually a safe plan to wash one-fourth less than the number of shirts in a washing-machine than it is claimed by the manufacturers the machine will handle. Manufacturers are prone to overrate the capacity of washing machines, and it is better to wash seventy-five shirts in a machine that the manufacturer claims to be a hundred-shirt washer. If the machine is too full it destroys the action, there not being freedom enough to admit of the free passage of water through the goods, and the washing process is incomplete. It is necessary to have room enough for the goods to move about freely, as this aids in the washing and allows the soap and other ingredients to thoroughly penetrate every fiber.

It is well to first run the shirts in lukewarm water to remove the starch and any other loose foreign substance which the goods may contain. After this has been done the goods are ready to be soaped. There should be a sufficient amount of water in the machine to thoroughly saturate the goods, and to have a free amount within the inner cylinder.

There should not, however, be enough water to float the goods or to raise them from contact with the surface of the inner cylinder. If the goods are allowed to float, the cylinder simply revolves around them without materially disturbing their position. But if the goods rest against the surface of the cylinder they are carried up by centrifugal force and the friction of the surface of the cylinder, and dashed against the opposite side. They are thus continually being dashed from side to side. As they pass around at the lowest point in the cylinder they pass into the water, and the continual action of falling and dipping carries on the washing operation.

The second water should be charged sufficiently with soap to produce a free suds. The soap should contain as much caustic potash as it is safe to use, as goods of this nature are usually badly soiled, and require a very strong soap. The suds should be about lukewarm, say, at a temperature of 110 degrees. The suds should never be allowed to get any hotter or colder. They should never be allowed to "go down." If suds go down, the soap invariably curdles in the goods and produces soap spots or "black specks." Cold water should never be admitted to suds, as it will cause the suds to go down, producing the results just described. If there is not soap enough in the suds the suds will wear out after awhile, and this causes it to go down. In either event, soap spots are the usual result.

In the event of soap curdling and producing a soft, greasy substance in spots on the goods and between the linings, it is necessary, in order to remove it, to thoroughly rinse the goods in hot water, and then to add about two quarts of kerosene oil with sufficient water to each seventy-five shirts. Bring this solution to a boiling point and keep it there at least an hour. This will thoroughly dissolve this greasy substance, rendering it easy to rinse it from the goods. After the soap spots have been removed, the washing process must be started again.

The goods should be run in this first suds about one-half hour. After they have been run awhile it is well to add more soap to insure the suds from not going down. After running one-half hour in the first suds, rinse twice in water at the same temperature as the suds, always making it a point never to let water on the goods which is at a temperature lower than the water preceding it. Should goods be hot and cold water admitted, it closes the fiber of the goods, and an action takes place which is commonly called "setting the dirt." The heat relaxes the fiber, leaving the threads loose and in a condition for the dirt to be easily removed. If cold water be admitted before the goods are cleaned, the fiber seems to contract and locks the dirt within it. This is the true theory of setting the dirt.

After the goods have been rinsed twice, they are ready for the second suds, and if manufactured bleach is used, the goods may be bleached in the second suds.

Goods that are dried indoors, as is necessary in a custom laundry, require a slight bleaching to preserve their whiteness, and therefore the matter of bleaching with manufactured bleach, which is a very popular method, will be treated here.

Manufactured bleach, or chlorinated fluid, is a chemical compound of chlorine, an alkali and water. The chlorine is usually generated directly from chloride of sodium, or common salt, and charged into the alkaline solution which retains the chlorine gas. This makes a very convenient bleaching agent, besides being a time-saver as well. It may be used together with the suds, bleaching and washing in one operation, whereas, if chloride of lime is used, it hardens the water, making it impractical to use soap.

The chlorine fluid should be added with the soap in the second suds. Eight fluid ounces of the manufactured bleach should be used in a washing of seventy-five shirts. The goods should be run in this suds and bleach about three-quarters of an hour. A small amount of steam should be admitted and the solution gradually heated to not over 200 degrees. Never, in any event, allow it to come to a boil, or to 212 degrees.

Goods should not be scalded until after they are clean. Soap of sufficient quantity should be used, in order that there may be a free suds during the whole time. The same trouble will be experienced if the second suds go down as when the first suds go down. It is not necessary to use an excessive amount of soap, as this will cause too much suds, which will run out of the machine, causing an excessive waste of material, besides retarding the action of the machine. The suds act as a cushion to the fall of the goods. Proper sudsing consists in having a lather which will come up near to the opening of the machine. In this condition the goods have ample opportunity to fall and receive the action of the machine, and at the same time they are in no danger of receiving soap spots.

If the bleaching is not done in the second suds it is necessary to run the goods fully three-quarters of an hour more in order to get them clean. At the end of this time, if the very soiled goods have been soaked, all the goods will be thoroughly clean and ready for rinsing. The first rinse after the suds should be let on very hot, if possible at two hundred degrees, and it is well to admit steam and boil this water for a few minutes. Three hot rinses of six or eight minutes each after the suds is usually sufficient. The machine should be well flooded with water when rinsing to thoroughly loosen up the goods and to allow the soap to be freely rinsed away.

Aniline blue is now being generally used. This is preferred on account of its having a beautiful tone of color and being so easily soluble. It is a very sensitive dye, and will not take hold in the presence of alkali or chlorine. It requires an acid to develop the color and render it permanent, so it is necessary to treat the goods to an acid bath to neutralize any soap or chlorine which may remain in them after they are rinsed. As there are two methods of souring which are safe and practical, both will be given.

The first method to be discussed will be souring with oxalic acid. There is much prejudice against oxalic acid as being an acid which will affect the fiber of the goods. This prejudice is largely due to ignorance of the nature of the acid. Oxalic acid is not injurious to fiber except when in a dry state. It does not injure the goods except when drying. Heat produces a chemical change in the acid, resulting in a substance which is highly corrosive. Therefore, if oxalic acid is well rinsed from the goods it will cause no injury. The chief thing to recommend oxalic acid for souring is that it does away with the yellow edges in collars and cuffs and the neck and the wristbands of shirts, and with various other stains which are common to custom laundry work.

The action of the material is that of a whitener, and it has a strong affinity for aniline colors. Being more active, it neutralizes soap and chlorine much more quickly than does acetic acid. Oxalic acid should be used hot after the third rinse. Eight ounces of crystal acid should be dissolved in a pail of hot water and gradually poured into the machine while it is running, the machine having previously been filled with hot water. The goods should be run 20 minutes in this solution, after which they should be rinsed twice in cold water. They are then ready for bluing.

To sour with acetic acid, it is necessary, after the first hot rinse which follows the second suds, to rinse twice in cold water. As the souring is done in cold water, and as it is not well to put a cold sour on hot goods, the goods should be cooled off each time. It is an easy matter to sour with acetic acid, and of course the chief thing to recommend it is the fact that it is entirely harmless. The goods may be rinsed in the clear acid, providing it is pure, and the acid need not be rinsed out, as no injury will be done by leaving it in the goods.

There is a cheap commercial acid which is sold as acetic acid. It is not acetic acid proper, however, and is very injurious to the goods. It is fully as unsafe to use as sulphuric acid, and it is well to test every purchase of acetic acid to determine if it will injure the goods. An easy test is to take a piece of cloth saturated in the acid and hang it in the dry-room. If, after it is dried, it proves to be tender, the acid is unfit for laundry purposes.

Use about four ounces of acetic acid to a lot of 75 shirts. If the bluing process is to be done in the machine then add the required amount of blue to the acid water, and do not rinse afterward. If the bluing is to be done in a tub the goods will be ready for it after they have run in the acid water 15 minutes. If the bluing is to be done in the machine in connection with the use of oxalic acid it should be done after the second rinse following the acid. About three ounces of acetic acid should be used to permanently fix the color, even though the goods have been previously soured with the oxalic acid.

It must be remembered that the oxalic acid has been rinsed away, leaving the goods in a pure white, neutral condition, and if they should be blued without a little acetic acid they would be liable to fade out in drying.

Goods for custom work do not require to be blued as much as new work, only a sufficient amount being required to give them a slight blue tint, which will prevent them from looking yellow when ironed.

It has already been stated that it is impossible to produce a uniform color in a load of promiscuous material, and the laundryman who desires to approach nearest to this result must blue by hand in the tubs. These tubs should contain water blued to two different degrees of color. One should have the shade of color which will give the correct shade to the goods which take the bluing the easiest. All the goods from the machine are placed in the weaker solution, and those pieces which do not take a sufficient amount of blue are sorted out and placed in the second bluing tub, which has the greater degree of blue color. This method will give a practically uniform color to all grades of goods.

The goods should remain in this water fifteen to twenty minutes, after which they are taken out and extracted. The water should be made slightly acid by the use of acetic acid for the same reason as has been already stated when speaking of bluing in the machine. The bluing solution should be changed for every load.

White collars and cuffs are washed by the same process as shirts. They never should be washed with shirts in the same machine unless there is a partition in the machine.

If one desires to bleach with a bleaching solution made from chloride of lime, according to the formula given under "New Work," it is necessary to do so after the second suds. The goods should be rinsed twice in lukewarm water before the bleach, and then the bleaching solution should be added to the lukewarm water, the quantity depending on the strength of the solution. Run the bleach twenty minutes, and afterwards rinse three times in hot water. The goods are then ready for the souring process, which is the same as already described.

CHAPTER 7.

WASHING WOOLENS.

See formula for a potash soap for washing woolens on page 350.

It is a difficult matter to successfully wash woolen goods without shrinking them. In fact, it is quite impossible to prevent shrinking to a certain degree, although they may be washed and not be shrunken to any appreciable extent. The principal cause of shrinking is too severe action on the goods when they are in a wet condition. The nature of wool is such that if it receives a pounding or falling action, as it does when in a washing-machine, the fiber contracts, owing to the fact that wool fiber has a bearded surface. As it is worked, rubbed or pounded together, the threads lessen in length as the fibers rub against each other, and, owing to the bearded nature, they clinch and hold together in the condition which has been produced by the pounding action. When the goods are dry, the fiber remains in this condition, causing the garment to be shrunken, therefore it is necessary to wash woolens with as little action as possible and no more than is required to get them clean.

Extreme temperatures in the wash-water also cause woolens to shrink. Flannels must be kept in lukewarm water at all times. Of course, the ideal way of washing flannels is to wash them by hand, then they may be washed in lukewarm suds, and the dirt gotten rid of by squeezing the goods in the hands, but it is not advisable to rub them on the board. In custom laundries, where a large quantity of this class of goods is handled, washing them by hand is a slow and expensive method. If care is used they may be safely washed in a machine, although when they are washed in a machine they should be rinsed by hand.

To wash flannels (see formula 350) in a machine use a very lively suds to prevent the goods from falling too heavily against the walls of the washer. Use pure, neutral potash soap, and add a small amount of ammonia to the suds. The suds should be lukewarm, and never allowed to get too hot or too cold. The goods should be taken from the suds without drawing the water from the machine, and then rinsed by hand in a tub containing lukewarm water. They should be rinsed in two or three waters, and then immediately extracted. Never allow flannels to lie in a wet condition, but as soon as they are rinsed, extract and dry them.

After flannels have been extracted they should be gently stretched in every direction before drying. As soon as they are dry, they should be removed from the heat, as too long a stay in the dryroom will cause them to have a harsh feeling. Usually fifteen minutes in the suds is a sufficient time to wash any flannel garment. Should there be any garment that would require a longer time it is the best plan to soak such a garment in lukewarm suds for an hour or so before washing.

With proper care and attention flannels may be washed by this method without any danger of seriously damaging them. If the suds should go down, and the goods are allowed to pound around in a washing-machine without the suds, in a very few minutes they will become so shrunken that they will be almost worthless; or, if the suds become too hot, the same result will follow. Therefore, when washing flannels, one must be certain of what he is about, as a little carelessness or negligence may cause a great amount of damage.

CHAPTER 8.

WASHING COLORED SHIRTS.

There are a great many shirts on the market made of colored goods, with the colors either printed or woven. While some of the materials have very permanent colors, others have colors which are exceedingly fugitive and delicate, and unless the laundryman is skilled in handling this class of goods, he will be called upon to settle many claims for damages on account of faded shirts. Therefore it is well to be conservative in the matter of handling colored goods, and all kinds should be treated by the same method as is necessary to successfully handle the most delicate goods.

There are two kinds of dyes used in making this colored stuff. One is an acid color, and the other an alkaline color. The acid colors are brightened by acid, and are faded by alkali, and the alkaline colors are brightned by alkali and faded by acid. As both kinds come into the laundry promiscuously, the only safe method is to subject the goods to a neutral process. That is, to use neutral soap and no acid. There should be no acid present in the starch, neither should the goods be soured in washing. Extremes of heat cause fading. Colored goods should be washed in neutral soap and lukewarm suds. The suds should be free and plentiful. Never allow over 150 degrees of heat, and rinse well in lukewarm water. It is necessary to run in suds one-half hour, rinse in warm water, and give the goods a second suds for another half hour. Then thoroughly rinse in lukewarm water and extract. This class of goods usually has collars and cuffs to match. The collars and cuffs should be washed with the shirts.

There is another class of shirts which are more difficult to handle than the all-over colored shirt. These are the shirts with a colored bosom and a white body. This is one of the most unsatisfactory shirts the laundryman has to contend with. To get a pure white body and preserve the color of the bosom is a problem which has never been solved. If you bleach the body you destroy the coloring in the bosom, and if you preserve the color of the bosom you get a yellow body. Of course the thing to do is to preserve the bosom and take chances on the color of the body, but such things are the "bugbear" of the laundryman. About all that can be done with this shirt is to wash it in neutral soap in the same manner as has been described for all-over colored shirts, and, after the goods have been thoroughly rinsed, it is well to blue them slightly with ultramarine blue. This color will work without an acid, but there are difficulties in handling it, as it is an insoluble blue and is easily precipitated. It spots and streaks more easily than aniline, but it is about the only blue that can be used in a neutral process. If too much of this color is used it will cause the goods to look dark and grimy. About all that can be done with this class of shirts is to wash them clean, and use a little tinge of ultramarine blue to counteract the disagreeable yellow effect in the body.

There is another class of shirts which is still more difficult to launder than any already referred to. These are fancy shirts having soft silk or cotton bosoms. Many of these shirts are extremely delicate in material and color, and they require the utmost care in laundering. They are originally laundered without washing, and when the laundryman gets them to relaunder he has a difficult task if he would in any way restore the original character and appearance of the shirt. This class of goods must receive extreme care in all the processes of laundering, and especially in the washroom.

The greatest proportion of this class of shirts is made in the medium and cheaper grades. Very few of the best grades are found on the market. The best grade consists of those in which the whole shirt is made of the same material as the bosom. This shirt is comparatively easy to launder, as the goods are of better quality in texture and color. The medium and cheaper grades have fancy bosoms with bodies printed to match or with bodies made of white material. It is the medium and cheaper grades that try the patience and the skill of the laundryman.

When these goods are first placed on sale from the manufacturer they look very nice, but when they have gone through the ordinary laundry they are scarcely recognizable, and the result is that the laundryman gets the blame. It is impossible for any laundry to wash and relaunder this shirt and have it look anything like it did when new. The laundryman may make a nice job of it if he is careful, but the shirt will never look the same after it has been washed as it did when new.

The washing of these shirts is about the same as the process for washing all-over colored shirts. They should be handled very gently and not run too long. Fancy bosoms having a white body should be washed the same as has been described for stiff colored bosoms with white bodies. There is nothing complicated about washing these goods. The only particular thing required is careful handling. They should be placed in the extractor in bunches to prevent any strain which would cause damage to the delicate material. The real skill in laundering these shirts is in the starching and ironing, which processes will be discussed in the departments allotted to them.

The common negligee shirt, either madras or percale, is a comparatively easy shirt to launder. It is washed in the same manner as the colored all-over shirt. If there are collars and cuffs to match, they should be washed with the shirts.

About the hardest thing to wash is a lady's white skirt. In many instances it is almost impossible to get this garment clean around the bottom. They usually become very much soiled from dust and mud-stains and the stain from the shoe leather. In order to thoroughly remove this discoloration and dirt something more has to be done than simply to wash it. It is advisable to soak this garment in lukewarm suds, having it charged to quite an extent with chlorine, and, after soaking it for several hours, rub those parts which are very much soiled on a washboard, using a good, strong rubbing soap. After this has been done the garment may be washed in the ordinary way, and it will usually come out clean and white.

In washing ladies' underwear it is advisable to use a certain amount of bleach in order to preserve the whiteness. Nothing pleases a lady more than to have her underwear white and clean. Therefore it is better to wash it in the same manner as a white shirt, with the exception of the skirt, which needs additional attention.

Dark-colored flannels and black stockings should never be washed with anything white, as the lint from the white goods destroys the appearance of the other garments, and the color from the black goods is liable to crock the white garments. Cotton stockings should not be washed with woolen stockings, but they should be washed separately, as they must receive a stronger washing action, and a stocking is something that must be washed well or it will not be clean, and will remain hard and stiff. Stockings usually become very much soiled by perspiration, and receive a peculiar odor owing to the nature of the garment and the portion of anatomy on which it is worn. It is necessary, when possible, to thoroughly scald them, but of course this is not practical in woolen stockings; therefore it is necessary to sort the cotton from the wool and to wash them separately. They should then be well extracted and dried quickly.

The matter of washing table-linen, sheets, pillow-cases, etc., will not be treated here, but it will come under the head of methods of the washroom in mangle work.

All miscellaneous goods, such as ladies' colored dresses, colored skirts, aprons and pieces of that kind, should be washed in the same manner as described for all-over colored shirts. Miscellaneous white work, ladies' waists, white vests and duck coats and pants should all be washed by the same method as described for white shirts.

Lace curtains may be washed in a machine provided that they are handled carefully. They should have free suds made of soap of ordinary strength, but before sudsing they should be rinsed in lukewarm water, which will practically remove all the dirt and dust, as they are of loose material, and any foreign substance is easily removed. It is well, however, to give them a short suds first, to remove the more permanent stains, after which rinse them well in lukewarm water. They should then receive a slight starching in the machine, or by hand in the tub, judgment being used as to the amount of starch to be used. Some people like them stiffer than others, and it depends entirely on the desire of the customer. After they are starched they should be well extracted and stretched on frames, like that in Fig. 75, to dry.

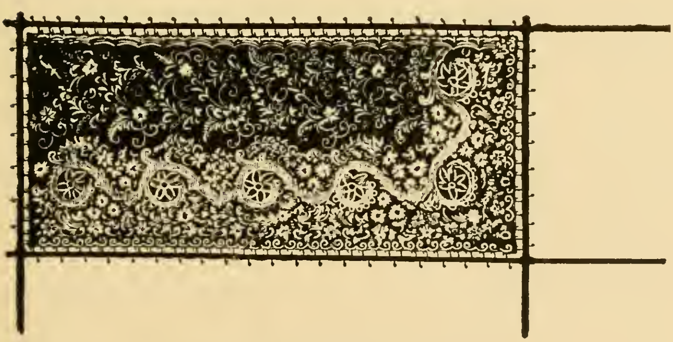


Fig. 75. LACE CURTAIN FRAMES.
(Camden & Philadelphia Soap Co.)

CHAPTER 9.

THE STARCHROOM.

The general plan for a starchroom for custom laundry work is practically the same as a starchroom for new work, which has already been described in Part I, Chapter 4. The machinery, however, may differ considerably, as it is not necessary to have as great mechanical force to starch old work as it is to starch new. Goods, after once being washed, take the starch more easily, and therefore it is advisable to have machines with which the action is less severe on the fiber; and another point is that old or custom work does not repuire to be starched as stiff as new work, as it is generally worn soon after being laundered, and retains its shape and stiffness long enough to meet the requirements of existing conditions. Again, a man does not want a garment as stiff to wear as it is necessary to have it in order to preserve its shape and stiffness when it is first laundered to sell. In view of all these facts, machines having a milder action are generally found in starchrooms equipped for starching custom work.

There are various machines made for starching shirts, all of which have been brought to the highest stage of perfection and are an evolution, and not a sudden invention. There are two principles involved in the various shirt starching machines; one is rubbing and the other is pressure. The latter is the easier on the garment and causes less wear, while it is true that the machine with the rubbing principle may be so adjusted that the wear is reduced to a minimum.

The first machines, which employed the principle of rubbing the starch into the goods were practically goods destroyers. About the first of this class of machines was one invented for starching new shirts before thin cooking starch was invented. It was designed for the purpose of rubbing the thick cold starch into the fiber. Before this machine was brought out the starching of shirts was done entirely by hand.

Its mechanism consisted in having two heavy corrugated wooden surfaces rubbing the face of each other and moving in opposite directions. These wooden surfaces were attached to arms, which were centered on a shaft and extended back to receive a crank or cam action. By means of foot power these wooden surfaces were brought in contact and pressure applied while in motion. The shirt was doubled together with the bosom bunched, and held in this condition by the hands. It was then dipped in the starch placed between these wooden surfaces, pressure applied and the starch rubbed in.

This principle is carried out in modern machines but it is so applied as to do very little injury to the goods. The rubbing is done while the bosom is immersed in the hot starch, requiring less pressure of the rubbing surfaces as the hot starch works into the goods easily. As the goods are in the liquid starch the starch naturally penetrates by its own pressure against the surface of the goods.

Another of the first inventions in shirt starching machinery consisted of a rubbing principle differently applied. The mechanical construction consisted in a

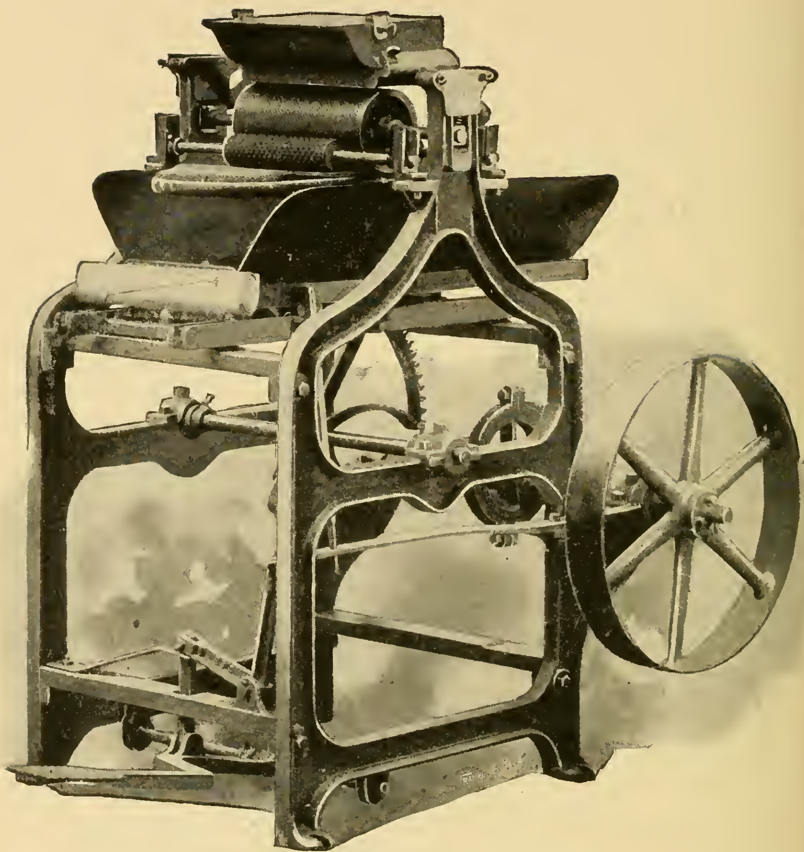


Fig. 76. BRACE BOSOM STARCHER.
(American Laundry Machinery Co.)

revolving irregular cylinder running in pressure contact with an endless belt or apron, the cylinder running faster than the apron and thus causing a rubbing action. The bosom was placed over the apron, starch applied, and the bosom run under the cylinder which rubbed the starch in. This machine was also designed to be used with thick-cooked starch and was very hard on the material. New work was strong enough to stand its action, but it was never a success on old work owing to the fact that old work could not stand its severe action. These two machines, together with a machine having corrugated wooden rolls running in contact, were the only machines used for starching shirt bosoms before thin cooking starch was invented.

After thin cooking starch was brought out, an innovation was made in shirt starching machinery, and in collar starching machines. The old principle of rubbing was still adhered to and embodied in the modern shirt starching machines.

About this time a machine was invented in which the principle of pressure for forcing the starch into the fibre instead of rubbing was used. The invention in this machine consisted in the use of a rubber pad having numerous minute cells. The starch was applied to the surface of this pad, which filled the cells. The article to be starched was placed on this pad, a perforated roller passed over the article, and pressure applied which drove the goods against the rubber cells, compressing their walls, and forcing the starch into the goods. This was an innovation in starching machinery, and has proven a success, especially with custom work. Its greatest recommendation is that it caused no injury to the goods. The Brace Starcher, shown in Fig. 76, employs this principle.

With other forms of starching machines the goods had to be taken from the machine and wiped, while on this machine a device was attached which wiped the shirt before it was removed from the machine, lessening handling of the goods.

The above principle was enlarged upon by other manufacturers, who brought out a machine with the arrangements somewhat reversed. In place of the rubber pad they used a rubber roll having the same rubber cells. This rubber roll was housed in a tank of starch, and when the machine was not in use the roll continued to revolve in the starch tank. The shirt bosom was pulled over a solid board having no cloth, but simply the plain surface of the metal board. When the shirt was in position the machine was thrown into gear, the rubber roll brought out from its tank of starch and rolled over the surface of the bosom, the starch adhering to the cells of the rubber. When pressure was applied the cell walls were compressed and the starch forced into the bosom.

This last-described machine is exemplified in the Hagen Shirt Starcher, Fig. 77, and is fast becoming a general favorite among a great many laundrymen. It is preferred on account of its cleanliness, ease of operation, because it produces no damage or wear on the goods, and a saving of starch. When the shirt leaves this machine it is starched and wiped ready for the dryroom. As the roll passes over the surface of the bosom the wrinkles nearly all disappear, making it a very rapid machine when one considers the fact that all other machines require wiping and wrinkles removed after the shirt has been starched.

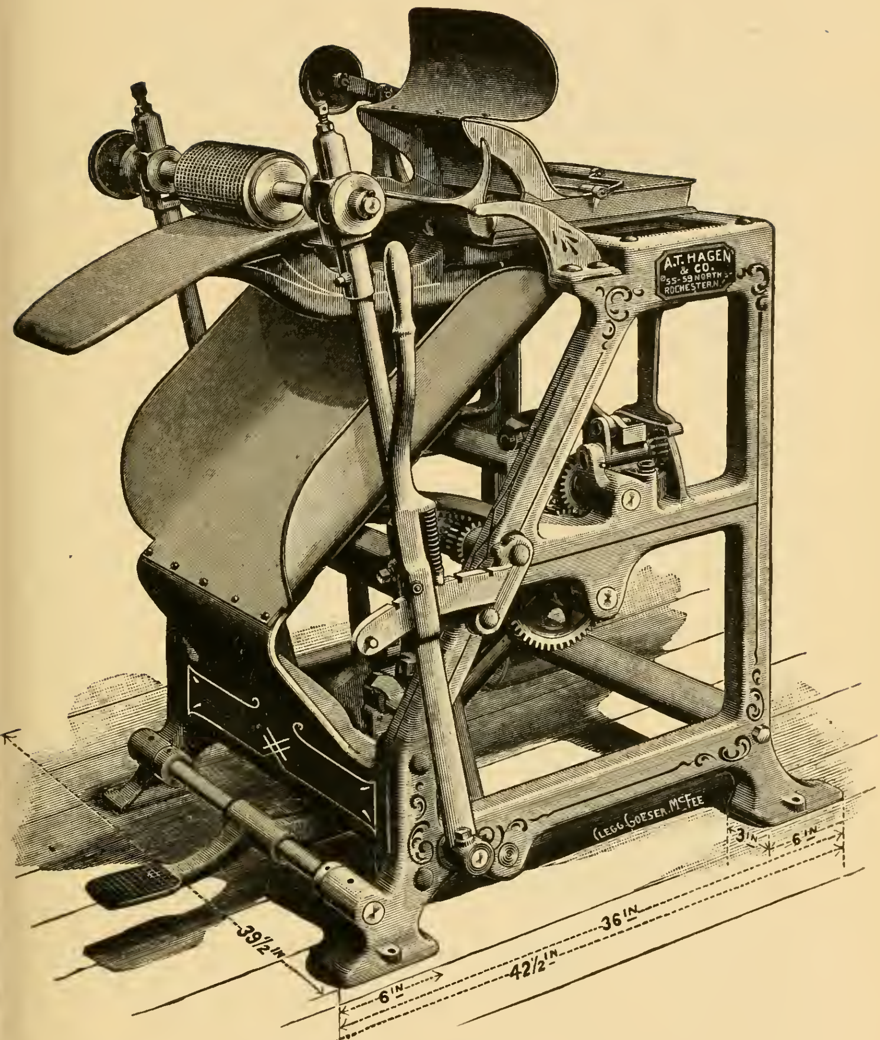


Fig. 77. HAGEN BOSOM STARCHER.
(A. T. Hagen Co.)

Makers of this class of machinery also make a band-starcher to starch the wristbands independently of the bosoms, and although they can be starched at the same time as the shirt, it is not convenient to do so. The band-starcher has the same princlple of rubber cells, and employs a rubber roller running in contact with band-starcher has the same principle of rubber cells, The cell walls are compressed, and starch forced in, in the same as in starching the bosoms.

In all rubbing starching machines now in use, the shirt bosom is doubled, placed between the rubbers, and receives a rubbing action while the bosom is immersed in the starch. Some of these machines have roll attachments which hold the shirts, and when the shirt is removed the rolls squeeze out the surplus starch. Most of them, however, have no rubber rolls, and the surplus starch has to be squeezed out by hand. When the machine is open to receive the shirt the machine is not in motion. When it is closed up and brought in contact with the shirts, the rubbing surfaces are set in motion, moving in opposite directions, rubbing a shirt bosom on each side. These surfaces are held in contact by light springs, which cause no undue pressure to injure the goods, and give a yielding pressure to accommodate the different thicknesses of the goods. The chief thing to recommend this machine is its extreme simplicity and cheapness, together with great durability. More machines of this class are used today than any other, it being the universal type for the custom laundry. The Bishop Starcher shown in Fig. 78 is of this class, as is also The Illini, Fig. 79.

Other types of shirt starching machines have already been described in Part I, Chapter 4. Machines for

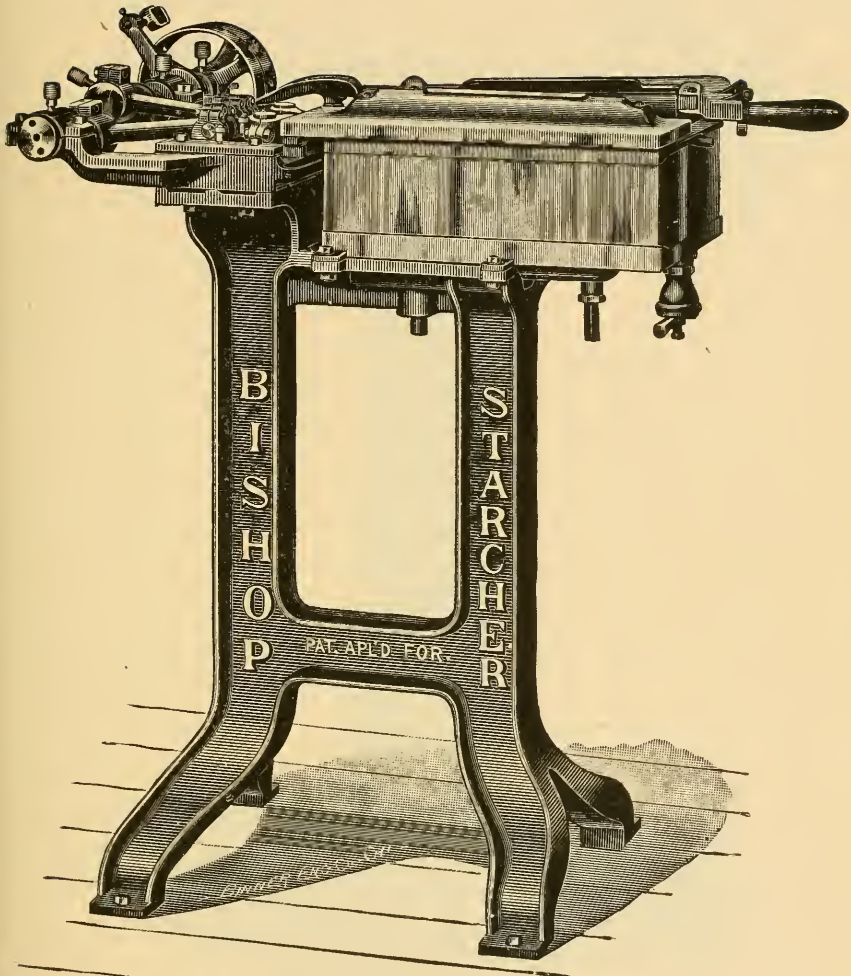


Fig. 78. BISHOP SHIRT STARCHER.
(G. H. Bishop.)

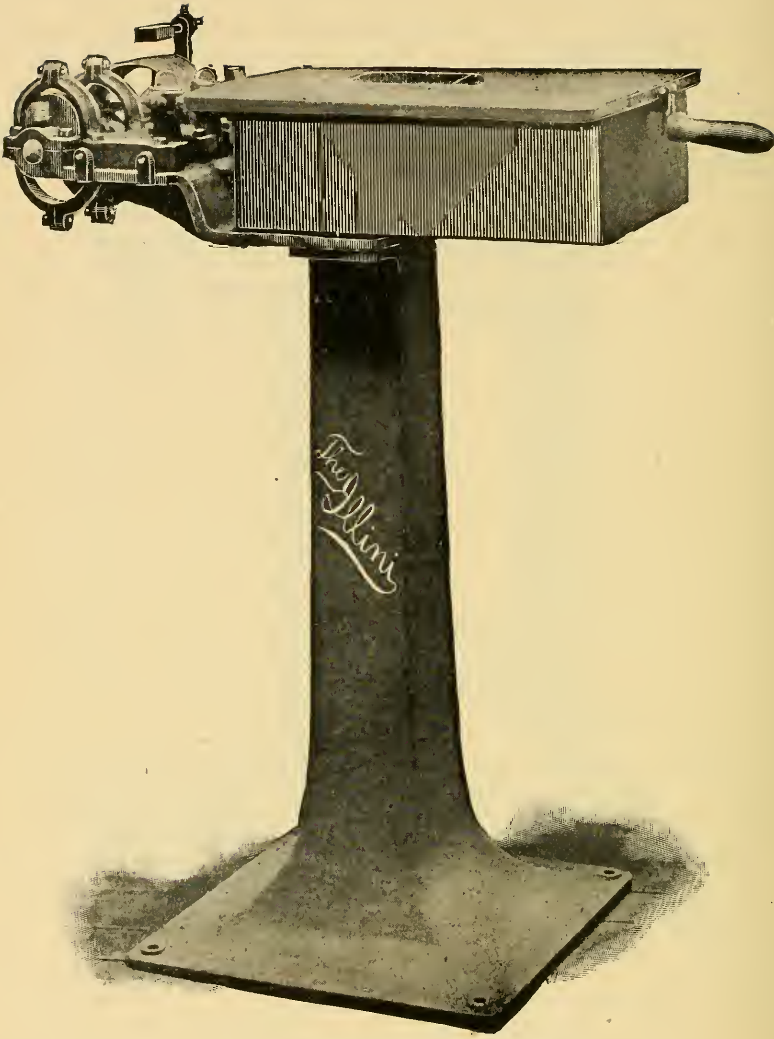


Fig. 79. ILLINI SHIRT STARCHER.
(T. L. Knudtson & Co.)

starching collars and cuffs have also been described. What has been said about them in regard to new work holds good in regard to old work, so it will not be necessary to further describe them here. The arrangement should be practically the same and the utensils the same, and what has been said in regard to starch cooking and cookers may also be applied here.

CHAPTER 10.

STARCHROOM METHODS.

It is not necessary to use as expensive a starch in the custom laundry as it is in new work. As has already been stated it does not require the stiffness that is necessary for new work. Neither is custom work affected by moisture the same as new work, as it does not lie as long before wearing, and consequently it remains in good condition until worn. Many of our leading laundries are using nothing but clear cornstarch, and are producing fine work. The invention of thin cooking cornstarch has enabled the laundrymen to get good results with corn alone. However, a little wheat may be added to impart toughness and flexibility, especially in starch for collars and cuffs. For general purposes the author would recommend the use of one-third wheat to two-thirds corn, at the rate of 12 ounces to the gallon for shirt and collar work. This combination produces a firm, flexible stiffness without blistering or breaking, and may be used with any starching machine, or easily worked by hand. It penetrates the goods quickly and is wiped easily, requiring no special effort to produce first-class results.

In the use of a clear cornstarch there is danger of unevenness in the work. It produces a stiff, hard finish which is liable to crack in turning or in folding. It absorbs moisture very rapidly, and the goods require greater care in dampening, as the natural tendency is to cause too great a dampness for proper ironing.

Good starch having a proportionate amount of wheat gives better satisfaction to the customers, as it holds its shape better when it is being worn, and does not absorb the moisture so readily from the body. Perspiration does not penetrate as quickly, and laundries using wheat starch in the ratio given above are not troubled as much with yellow stains in the seams of collars. This is true because collars starched with wheat starch do not absorb as much perspiration, and it is the perspiration which stains the seams of the collars. In reference to starch cooking see Part I, Chapter 4.

The operation of shirt-starching machines having the pressure principle which has already been described is as follows: In the case of a machine having the rubber bed on the bosom-plate the starch is applied to the cells of the rubber bed or pad by the use of a common brush which is dipped into the hot starch and brushed over the rubber pad. The bosom is then stretched on the rubber pad in a manner similar to stretching it on the bosom board of an ironing machine. The neckband is brought together and laid flat on the bosom board, and while the shirt is in this position it is run under a perforated brass roll which has a similar position in the starching machine to the heated iron roller in the bosom ironer. The pressure of the perforated brass rollers coming in contact with the shirt bosom forces the starch into the bosom by compressing the rubber cellwalls which are under the bosom, and which have been previously filled with starch. The bed of the machine carries the shirt bosom under the roller and automatically returns it to its first position, after which it is ready to be finished preparatory to drying.

This operation removes many of the wrinkles in the goods, pressing the plies firmly together, and making it a comparatively easy task to remove the remaining wrinkles in the bosom. When the return movement of the bed takes place a cloth-covered roll is automatically placed in contact with the shirt bosom, and wipes the greater portion of the surplus starch from it as the shirt is brought back to its original first position. Very little hand wiping is therefore required.

Generally, one passage forward and back is sufficient to starch a shirt bosom. Open-front shirts are starched in a similar manner, with the exception that the starch has to be applied to the surface of the bosom which comes under the upper lap. Otherwise a soft streak will occur in the upper lap directly over the line where it joins the under lap, or where it lies over the under lap.

In the other style of machine, where the rubber cells are on a rubber roller and caused to roll over the surface of the shirt bosom, the mode of applying the bosoms in the machine is similar, with the exception that no starch has to be applied with the brush. The shirt is brought on the bosom plate in practically the same way. Then the rubber roll with the cellular surface, which has previously been filled with starch by revolving in a starchpan, is brought out and made to roll over the shirt bosom. The principle of starching is the same, only in one machine the starch is pressed under the bosom, while in the other it is pressed on the outside of the bosom. As this rubber roll passes over the surface of the bosom, it thoroughly saturates the bosom with starch and practically removes all the wrinkles. Little or no wiping is required to finish the job. The starch for these machines must be used hot in order that it may thoroughly penetrate the fiber. If the starch is cold it is simply forced into the meshes of the goods, producing a soft, flabby bosom.

One of the principal points to recommend this machine is its cleanliness in starching, and its starching only the portion of the shirt desired to be starched. It leaves the yoke soft and the body free of surplus starch. In other words, it simply starches the neckband and bosoms, and only that portion of the yoke where it joins the bosom, leaving the body of the shirt soft and clean. This is the ideal way to starch a shirt which is to be worn immediately.

In the first-described machine it is usually customary to have a small copper jacket kettle connected with the steam supply placed adjacent to the machine. The starch is placed in this kettle and is kept hot by steam. In the other machine that part which contains the starch has a steam chamber under it, which keeps the starch hot all the time.

It is usually customary to starch the wristbands o. shirts, where these machines are used, before the bosom is starched, and on an independent machine, which has already been described. Afterwards the bosom is starched, and the shirt hung in the dryroom to dry.

The operation of the machines already described as having a rubbing action is as follows: The machine is filled nearly full of hot starch. The shirt bosom is bunched together by gathering the shirt in the hand at the side lines of the bosom, then the wristband of the shirt is placed against the bosom, and bosom and wristband submerged in the starch in the machine. The cover of the machine is then drawn together, and a circular opening in the edges of the cover where it joins allows the cover to come closely together and the same time hold the shirts in this bunched condition. The rubbing-plates and frames are automatically set in motion, rubbing the starch into the goods. These rubbing-plates are also partially submerged in the starch and operate directly under the cover of the machine.

While the machine is rubbing the starch into the shirt the operator has time to bunch another shirt ready for the machine. Hence, by the time the operator has bunched another shirt the shirt in the machine will have received sufficient starching and will be ready to be removed. The cover of the machine is then removed, the operation automatically stopping the motion, and the shirt is taken out, at the same time squeezing from it a portion of the surplus starch. This squeezing-out process is usually done by hand, but in some machines small rubber rolls perform this function as the operator pulls the shirt back through them.

Machines having rubber rolls are desirable, as it is quite impossible to wring out all the starch by hand. Especially is this true when the starch is too hot. Some operators use a stick to great advantage in case the starch is too hot for the hands. The stick is used by holding the shirt on the edge of the opening of the machine and stripping the starch by forcing the stick downward and gradually turning the shirt. Several such motions quite effectually remove the starch and do not burn the operator's hands. This method enables laundrymen to use hotter starch than otherwise with a machine having no rubber roll attachment.

The shirts have to be drawn on to a bosom board and finished in the same manner as has already been described in Part I, Chapter 4. The hanging and the handling of the shirts after they are starched may be the same as has already been described in Part I, Chapter 4.

The relative merits of the dipwheel and the collar and cuff starching machine for starching collars and cuffs have already been described. For old work the dipwheel method is very practical, and is used in a great many laundries even where the question of economy and of quality of the work has been fully considered.

There are various makes and shapes of dipwheels. They are all a sort of tumbling machine which simply pounds the starch into the goods by concussion. The concussion is produced by the falling of the mass of goods and the starch from one end of the machine to the other as it revolves. The cylinder, the oblong and the triangular forms of the dipwheel produce the same results by the same process. One thing is assured by proper use of the dipwheel. There will be no blistered or soft collars and cuffs. The tendency of this method is to produce a firm, solid and heavy collar or cuff, but its economy, as compared to the regular collar starching machine for custom work, has often been questioned. There are many who are of the opinion that the dipwheel method is as cheap as any, for the reason that the lots may be so arranged that while one lot is being finished another lot is being dipped. Hence, practically no time is lost in dipping and in the finishing after the dipwheel. If, however, the goods have been properly extracted, it does not require much more work or expenditure of time than finishing after the average collar and cuff starching machine.

Let no one think that the writer desires to depreciate the collar and cuff starching machines. They possess a great amount of merit, and have numerous advantages, especially in certain classes of work, and they are, generally speaking, savers of time. It may, however, be said to those who are partial to the dipwheel, and who desire to continue to use it, that they are not so far behind the times as they would be should they fail to adopt improved machines which have greater merit in regard to quality of work and cheapness of operation and in the quantity of work produced. The dipwheel method is not so much of a business way of doing work as is the collar-starching-machine method, and the method of starching cuffs and collars by the modern starcher appeals to the snug and thrifty business man. All other things being equal, this fact alone is destined to bring the collar starching machines into universal favor and to bring about the gradual disuse of the dipwheel.

Collars and cuffs which are to be starched with the dipwheel are ready for that machine directly after they are well extracted. They may be placed in the machine without any preparation. The dipwheel should be filled until two-thirds of the space within the machine is occupied with dry collars, and then starch should be added sufficiently to thoroughly saturate the goods and to leave a small surplus. If there is too much starch in the machine it will not starch well, as the starch cushions the fall of the goods and prevents the heavy pounding which is necessary to make them stiff. If there is too small an amount of starch, the goods will be blistered, as there will not be enough starch to fill the goods, the goods absorbing all the starch in the machine. It is well to run the machine a few minutes after it has been loaded and then to stop it and to look at the condition of the contents. When everything is right in the dipwheel, no surplus starch will be seen above the surface of the goods, but it will be a soft, yielding mass which can be moved around easily. If the goods are packed together in a hard mass it indicates that there is not enough starch, and more should be added.

Wheat and cornstarch in the proportion to one of the former to two of the latter, well cooked and made, 12 ounces to the gallon, is about the right thing for collar work.

A dipwheel should run not less than one half hour, and its speed should not be too fast, as there is considerable friction between the goods and the starch. If the machine is run too fast, the centrifugal force will carry the load completely around, and prevent falling of the goods. When a dipwheel is properly doing its work a heavy jar is felt on the floor or foundation each time the mass within falls from side to side. When the goods have become thoroughly starched they will have taken all or nearly all of the starch in the machine, leaving them thoroughly charged with starch.

To try to wipe them in this condition is too great a task on account of there being so much surplus starch, and therefore it is well to run the goods in a slow revolving extractor to remove the surplus. The extractor must not run too rapidly, or it will extract too much starch, and the goods will be in a soft condition after being ironed.

There are several manufacturers who are putting out an extractor made especially for extracting collars and cuffs after they have been taken from the dipwheel. These machines have a copper curb, making it possible to save the starch which is extracted and to use it over again for other purposes, whereas in an iron-curbed extractor the rust and dirt from the iron renders the starch useless. The starch which is extracted from collars may be used for starching shirts, aprons or any similar articles, but it should never be used for collars or cuffs, as its greatest strength has been removed in the first operation. This extractor is usually made 16 or 18 inches in diameter, and it should be run not faster than 500 revolutions per minute. There are connections made to the curb of the machine through which the surplus starch flows and from whence it is discharged into a pail or any convenient receptacle.

After the goods have been run for about ten minutes in the extractor, they are ready for finishing and wiping. There should be starch enough remaining in the goods to give them a good starchy feeling, so that when a piece is laid on the table, the plies pressed together, and the surface rubbed over with the hand, the surface will be slippery and offer no resistance. There should be starch enough present to make a lubricant which will allow the passage of the hand over the surface of the goods without friction or producing any wrinkles in the goods. If they feel dry and wrinkles rub in easily when being rubbed by the hand, it indicates that too much starch has been extracted.

If they are found to be properly starched and extracted, the load should be dumped on a finishing table. The operator then takes each piece and straightens it out, at the same time rubbing it lengthwise very firmly and carefully with the hand, pressing the plies together and forcing out any air that may be in the

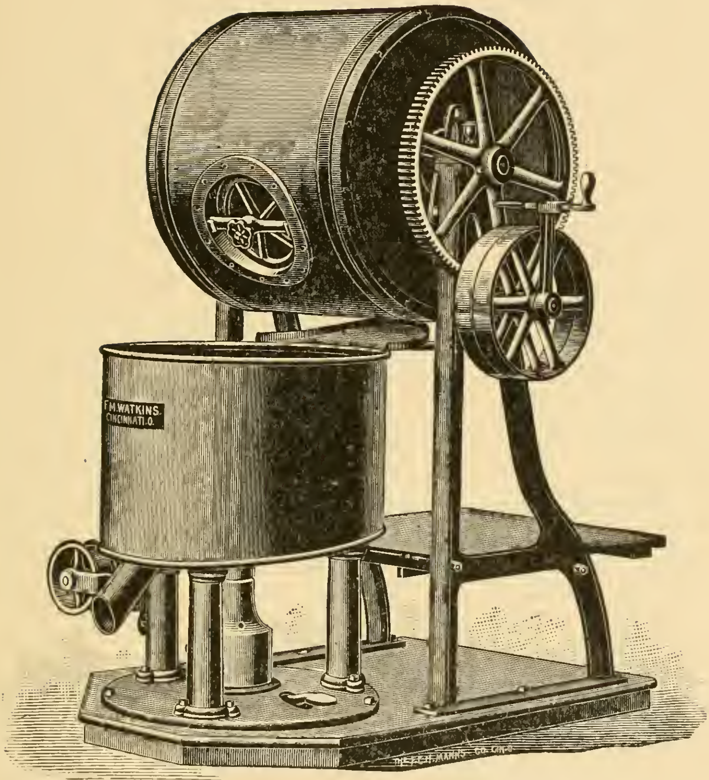


Fig 80. STARCH EXTRACTOR.
(F. M. Watkins Co.)

interlining. It will be observed, many times, that when passing the hand over the collar there will be a pocket of air between the linings, and the pocket will move from place to place as the hand passes over. In order to remove this air, the palm of the hand must press the entire width of the collar, and move gradually towards the end, forcing the air ahead of it until it is driven into one corner of the collar. Then slowly and carefully pressing against the air-pocket, force the air through the plies of the goods, and the interlinings will then come together.

When the air bubble has been cornered the operator must be very careful or it will escape him and get back into the body of the collar, and the whole operation will have to be gone over again. The air bubble behaves something like the mercury in the puzzle of the "spider and the fly." In very fine linen collars the bubbles are sometimes quite troublesome, because the meshes of the goods are so tightly woven, and when they are filled with starch they are practically airtight. But the air must be removed or the goods will be blistered when ironed.

After the air has been removed and the plies are stuck together, any wrinkles in the surface of the collar or the cuff must be distributed and the surface rubbed down. A little wrinkle may be easily removed by the finger nails, but if the wrinkles are troublesome, a little starch rubbed on the surface will often aid in distributing them. A good operator has a certain knack about rubbing a collar that makes the wrinkles disappear like magic.

It is not good laundry practice to carry all the fullness. to the end and allow it to wrinkle over and cover the stitching. A collar or cuff which is well starched should show the stitching all the way round. Any fullness in the surface which is the cause of wrinkles, should be worked toward the center of the collar, and not toward the end, and when it is in the center it should be distributed. There is a natural tendency in rubbing a collar to rub all the fullness toward the end; there is also a tendency with the average operator to leave it there.

Surface wrinkles are easily gotten rid of, but welts or wrinkles in the interlinings are more troublesome. It is sometimes quite impossible to remove the wrinkles in the interlining. An effectual method is to use a bone plait raiser, and scrape the welt to one side or one end. In moving it around it will usually disappear. The reason for a wrinkle being in the interlining is because the surface has shrunk more than the interlining, leaving the interlining full. Many times the wrinkle in the interlining may be removed by stretching the piece parallel to the wrinkles. That is to say, if the wrinkle runs endwise, stretch the collar crosswise, and *vice versa*.

After the collar has been well pressed together and the wrinkles all removed, wipe it very gently with a soft sponge or a fine sponge cloth and lay it on a clean portion of the table, with the inside of the collar down. Then, when the next piece is wiped, lay it on top of the first piece, with the inside of the collar up, bringing the face of the goods always together. Wiping collars and cuffs is a very particular process. If they are not wiped clean they will present a grimy appearance when ironed. If they are wiped too much the tendency is for them to be soft.

Starch that is to be used in a dip wheel should contain about one-fourth ounce of acetic acid to each gallon of starch, and a little bluing should be added. If this is not done, the hot starch will remove the color which has already been given to the goods. Of course it is not wise to use much acid for colored goods, and precautions should also be taken in starching colored goods in a dip wheel, for if the starch is too hot and the machine run long enough to starch them thoroughly, it is very certain that they will be faded. For colored work the starching machines are far superior, but as the average laundry gets very few colored collars and cuffs, they could be starched separately by hand. This class of goods is usually not so fine and takes the starch easily. If the goods are dipped and allowed to soak for half an hour or so in a good strong starch which is not too hot, they may be taken out, rubbed carefully by hand and wiped, assuring very satisfactory results.

As the subject of collar starching machines has been fully considered in Part I, Chapter 4, the methods only will be considered here.

Collars and cuffs that are to be run through a starching machine have to be first straightened out and laid in piles for the sake of convenience, and to ensure rapidity of feeding them to the machine. The starch is made the same as for the dip wheel, 12 or 14 ounces to the gallon, and it is kept at a high temperature in the machine. The operator who feeds the machine receives the goods from the operator who straightens them out and lays them on the carrier belts one at a time. Then, if the machine is to be worked to its fullest capacity, the carrier belts should be practically covered with goods. The goods now pass through the machine and are filled with starch. The tendency of the machine is to flatten the goods and to press the plies together, and to a certain extent to remove some of the wrinkles which the pressure would naturally do.

There is usually some sort of stripping device which removes the surplus starch from the goods as they come out of the machine, but in order to have stiff work it is necessary that the goods come out considerably charged with starch, apparently having too much starch left on them. If they are left too dry there will be a delay in finishing, as it requires a certain amount of starch to act as a lubricant, so that when rubbing them the hands pass over the goods without causing them to bunch up or wrinkle. Furthermore, as the goods are hot, and as they are finished directly after they come from the machine, the surplus starch is usually absorbed when the goods are rubbed in finishing. The operators who finish the goods stand near the delivery end of the machine, having the finishing take them off as they come from the machine. It requires usually about four finishes to take care of the product of the average collar and cuff starcher.

The same amount of care is required in finishing goods which come from a collar starcher as when they come from a dipwheel, although there are several manufacturers who claim their machine will do finishing as well as starching, but upon investigation of the merits of many such machines it is found that their claims are not borne out in practice. Perhaps satisfactory results may be obtained up to a certain standard, but to obtain the acme of collar starching requires that human intelligence be a part of the process.

It is the usual arrangement to have bars which fit the dryroom racks hung near the operators and finishers. Then, as the goods are finished, instead of laying them on the table, they are hung on a bar; and when a bar is filled, it is hung in the dryroom.

Some of the circumstances which make collar starchers a failure are, the starch has become too cold, the stripping device is too tight, the goods are not extracted enough, condensed steam gets into the starch, and the starch has been used too long without replenishing.

A difficulty with which every laundryman has to contend is the fading of colored goods, and the principal cause of this trouble is improper starching. Either the goods are starched with starch that is too hot or that contains acid. Many of the print goods which are made into shirts will fade in the presence of acid, even when the acid is used in very small quantities. The safest way to starch this class of goods is to sort them from the regular work, starch them with a neutral starch, to which no acid of any description has been added, and never to allow the starch to be hotter than one can bear his hand in.

Even with all possible precautions in washing and starching, colored goods will fade, and to fade them as little as possible is all that can be expected. When manufacturers claim that their goods will not fade they make a claim which is not justified by circumstances. The statement should not be accepted by the people, and they should not expect that their goods will be returned as bright as they were when first made. Laundries can handle colored work, and by proper treatment will not fade them so that the change will be noticed, unless the goods should be compared with the original piece of cloth. Constant relaundering, however, will cause colored garments to fade, but the change made each time is so small that it will cause no comment. What the laundryman has to guard against is the excessive fading of such goods in one laundering. This point has been fully covered in other portions of this work, and the discussion will not be continued further.

Shirts and collars and cuffs are about the only articles of importance to be handled in the starchroom. Of course, ladies' waists are quite an important factor, but as the styles change from year to year, it is impossible to suggest any exact formula for handling them. The starching of ladies' underclothing is a matter with which almost every washerwoman is familiar and as there is nothing out of the ordinary about it, special instructions are unnecessary. The starching of soft and of negligee shirts has been fully considered in Part I, Capter 24.

As the subject "The Dryroom" has been fully covered in Part I, Chapter 5, the discussion will not be repeated here, but the author will pass directly to a description of the methods employed in the dampening-room.

CHAPTER 11.

THE DAMPENING-ROOM.

In laundering old work one is handicapped by the requirements of the trade to which the laundryman caters. Work in a custom laundry has usually to be hurried, and not so much time may be given to it for dampening. In consequence the most improved methods are essential, and even they are inadequate to thoroughly dampen the work in the time in which some of it has to be done. Work has usually to be ironed the same day it is dampened, but whenever time will permit, it is advisable that goods should be dampened not less than ten hours. It takes about that time for the moisture to thoroughly penetrate every fiber. Of course, work may be ironed fairly well if dampened a shorter time, but the degree of quality of the finished work usually corresponds to the length of time the goods are dampened. However, as one is required to do work in a short time, the most approved methods should be adopted.

For short-time work the dampening sheet method is the most efficient, as it more evenly distributes the moisture. The moisture takes less time to saturate the fiber, because it does not have so far to travel, as is the case where goods are fed through a dampening machine. The dampening machine wets the goods in spots, and before the goods are properly dampened, the moisture must spread from one spot to another, until the whole surface is moistened. With a sheet, however, which contains moisture evenly distributed, and which is laid on the goods, the moisture is imparted evenly, and less time is consequently required. Of course the use of dampening sheets is not advisable when there is sufficient time to allow of the goods being dampened by machine. The sheets should be used on the short-time work only, as the process is a slow one and more expensive than the use of the machine.

In dampening shirts by the sheet system, the dampening sheets should be made of heavy unbleached muslin cut into pieces about a yard square. These pieces should be thoroughly washed and bleached before using them, and they should not be used more than four times without rewashing. They should be thoroughly saturated with clear water and extracted, when they are ready for use. There should be a dampening press made large enough to press a box of shirts, and to allow the shirts to be laid out full size. The shirts are dampened by first laying on a cloth or sheet, then putting in the shirt full size without folding, then a sheet again, and so on, continuing to pile up the shirts with the sheets between them. When they are all laid in as described the whole mass should be run under the press and full pressure applied. In an hour and one half or two hours shirts dampened in this way will be in perfect condition. Collars and cuffs may be dampened by the same process, excepting that, instead of using the pieces of cloth which are employed for dampening shirts, a long, narrow piece is used, and the collars and the cuffs are rolled up in it. Thus, a row of collars is laid on the damp cloth and the cloth is then folded over once and another row of collars laid on. The operation is continued until the required amount is folded in, after which they are put in a press and heavy pressure applied. The position of the collars is exactly the same as with the shirts, there being a damp surface between each row of collars, which evenly distributes the moisture throughout.

The subject of machine dampening has been fully covered in Part I, and all that need be said here is that it is necessary, in a custom laundry, to have a dampening machine for collars and cuffs which is independent of the shirt dampener. Manufacturers are building a small machine for this purpose.

All goods should be pressed after dampening and should be allowed to remain in the press as long as possible before ironing. There are various makes of shirt presses. Some are provided with screws and springs to continue the pressure on the goods as the goods settle together, making a following pressure which is continuously being applied as the goods gradually contract. This style of press is made in several different sizes, thus meeting the requirements of almost every condition. There are other presses on the market which are operated by hydraulic pressure. These work very nicely where there is a sufficient amount of water pressure. The nature of the press is such that it follows the contraction of the goods, causing as much pressure to bear on them at the end as at the beginning of the process. For the arrangement of racks and the plan of machines for the dampening room see Part I, Chapter 6.

The dampening of ladies' clothes and all goods of such nature should be done with a sprayer. There are several makes of these sprayers. They are usually made to be attached to a rubber tube which is connected with the water supply. There is a hand-valve attached which controls the supply of water, much or little being allowed to pass through as desired. This plan is practically the same as the old method of sprinkling, except that it may be done more evenly with a sprayer. After the goods are dampened they should be rolled tightly together, placed in a box covered with a damp cloth, and allowed to remain until they are in a condition to iron.

Flannels or underwear should not be dampened but should be simply pressed. This is sufficient to iron them all that is necessary. Handkerchiefs, towels, napkins and goods of that nature should be dried and redampened before ironing. If they are ironed directly after they come from the extractor or a mangle they will be too stiff and hard.

CHAPTER 12.

THE IRONING-ROOM.

What has been said in connection with gas and power for laundering new work in Part I, may be applied to the ironing-room where custom work is to be ironed. Regarding machines, there are more to be found in the ironing-room than in any other department. In fact, there are machines manufactured to iron most everything that is sent to the laundry. Very little of the work requires ironing by hand, because competition has produced a condition making it almost imperative to iron everything by machine, as hand ironing is too slow and expensive. Furthermore, ironing machinery has been so perfected that it is quite possible to iron by machine as well as by hand. There are some laundries, however, that still hold to the hand ironing methods. They get extra prices usually, and have a profitable business. This is more on account of the fact that there is a certain proportion of people in every community that are prejudiced in favor of hand ironing, and therefore they patronize the laundry which employs hand ironing methods.

The subject of shirt ironing will first be taken up. There are machines manufactured to iron every part of a shirt. The most important machine being the bosom-ironer, it will be considered first. All bosom-ironers employ the same principle in ironing. This is a revolving heated roll moving in contact with a padded surface. This principle is modified in very many ways in the different makes of machines, yet they all employ the same principle in ironing. The bosom-ironer, already described in Chapter 8, Part I, which has a reciprocating movable table, and moves on only one stroke, is a machine which is well adapted for old work as well as for new, and is used in a great many custom laundries. It is fully described in the chapter just mentioned.

As this machine irons one way only, it does not gloss the bosom as much as a machine which irons both ways. In large cities the demand for low gloss or domestic finish is universal, and this type of machine is generally used, but in smaller towns where a high gloss is in demand, a machine which irons both on its forward and backward stroke is universally used.

The latter type of machine irons the shirt bosom, in either direction. That is, the shirt is ironed as the bosom is carried forward and is also ironed when the bosom is reversed and carried backward, the hot roll being in contact with the bosom all the time the shirt is under the roll. The reversing apparatus usually consists of a double-belt movement, one belt being crossed and the other straight, and an arrangement to shift first one belt and then the other on to the tight pulley at the will of the operator, producing motion in either direction. Some of these machines are arranged to reverse automatically when the carriage has reached its full limit of motion, and the same machine may also be reversed at the will of the operator. Such a machine is the "Newark," built by the S. H. Sinclair Co., and illustrated in Fig. 81.

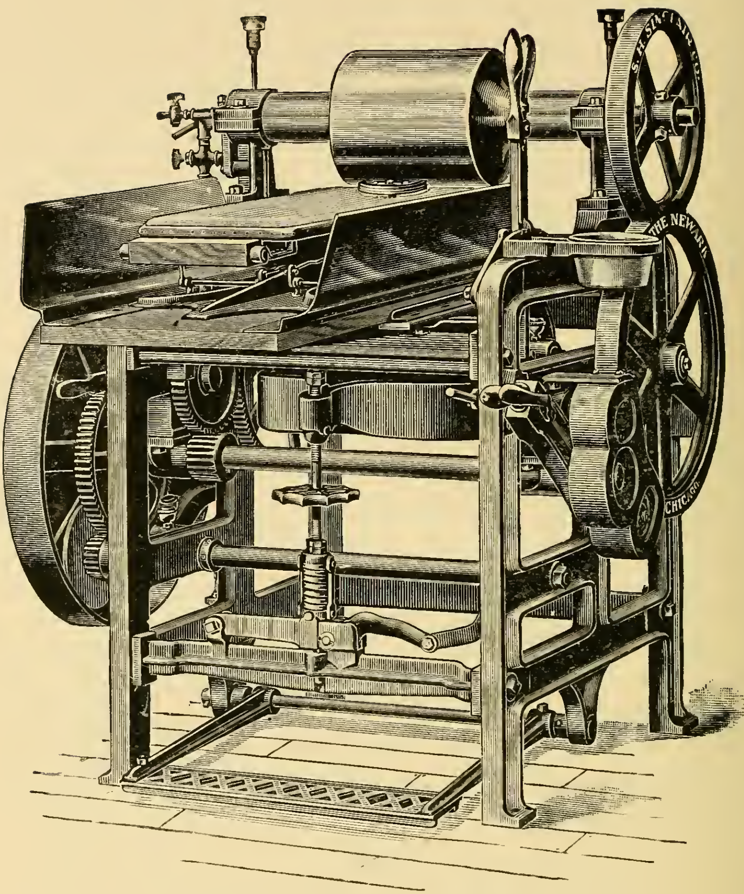
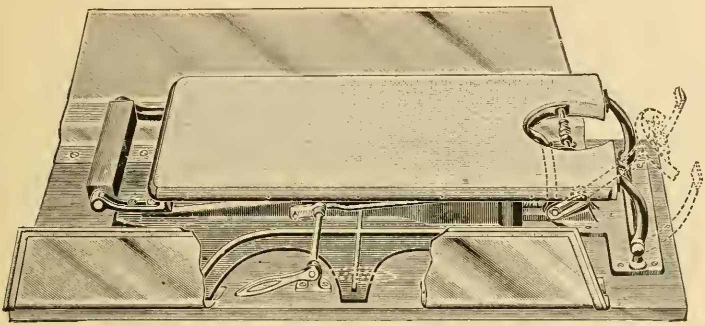


Fig. 81. "NEWARK" BOSOM IRONER.
(S. H. Sinclair Co.)

A few years ago this type of machine was generally operated without neckband or yokeclamp or stretchers. At that time this class of machine was known as "Polishers." Their main object being to polish or gloss the shirt-bosom.

The shape and general character of the shirts was not formerly considered, as people seemed to think that if the shirts only had a "shine" on the bosom it was good



SINCLAIR BOSOM IRONER CLAMP AND BOSOM BOARD.
(S. H. Sinclair Co.)

laundry work, but in these times the people are educated and more attention must be paid to the other details. Consequently, manufacturers have kept abreast of the demand and have made improvements in their machines which enable a laundryman to meet the requirements of his business.

Nearly all manufacturers now have neckband and yokeclamps and bosom-stretchers attached to their machines. Therefore, anyone using a bosom-ironer without these attachments should not flatter himself that he is getting the best of the bargain in shirt-ironing. Thus, shape and general character is getting to be about as much of a factor in old work as in new. It is impossible to iron a shirt-bosom and give the shirt its proper shape without stretching the bosom into shape before it is ironed. Clamping is necessary, in order that the shirt may be ironed in the shape desired, and that it will fit the wearer and present a sightly appearance before it is worn.

There are other types of machines having the reverse motion for ironing, which differ in construction and mechanical movement from those already described. The bosom-board, instead of being straight, forms a curve. The curve is the arc of a circle, and in moving it swings about the center of the circle. In this type of machine, much of the friction is removed as the carriage swings on supports which are the radii of the circle. This arrangement does away with all tracks or bearings, such as are necessary in machines having a carriage which runs in a straight line. As it is the same in principle as that first described, the finish of the work is practically the same. An example of this type of ironer is the Stone "Racer."

In order to meet the demand for a more perfect machine to produce a domestic finish, manufacturers have made their machines with a large heated roll which is geared to run at or near the same surface speed as the bosom-board as shown in Fig. 82. No friction on the ironed surface results from this arrangement, and on account of its larger circle the roll presents a greater bearing surface on the bosom. If this machine is run slowly enough and the work is properly dampened, it produces practically a domestic finish. Especially is this true with the machine that irons one way only.

The tendency in ironing both ways is to produce a gloss. As gloss is produced by polishing the mole-

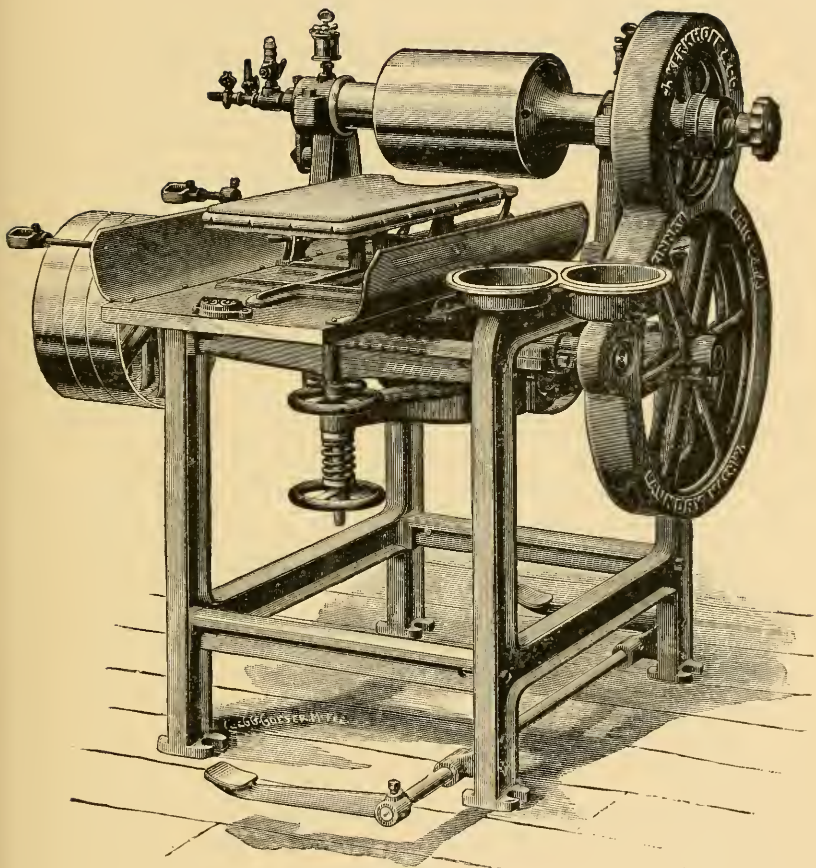


Fig. 82. LARGE ROLL BOSOM IRONER.
(Grever, Kerkhoff & Co.)

cules of starch, if the ironing agent is supplied from both sides of the molecule, a higher polish is produced than if it were applied from one side only, and this is just the difference between a machine ironing one way and a machine ironing both ways.

In order to increase the polish, the machine should be increased in speed, for the greater the number of times the heated roller passes over the goods before they are dried, the higher will be the gloss it will impart. If one wishes to try this let him reduce the speed of his machine to an extremely slow motion and note the finish; it will be practically domestic. From this point gradually increase the speed, and note the finish produced by each of the different speeds in the machine. The experiment may be continued until the desired amount of gloss is obtained. A gloss that is obtained at a slow speed is accomplished by ironing goods on a hard bed with heavy pressure. This plan is not a desirable one, as its tendency is to injure the goods and to draw the starch to the surface, producing a mottled, greasy appearance on the surface.

The greatest mistake one is liable to make in the operation of a bosom ironer is to use too much pressure. It kills the goods, and destroys their appearance. Laundrymen usually leave the goods too dry after dampening, and then try to iron them by crushing the life out of the work with pressure on the bosom ironer. The bed of the bosom-ironer should always be soft. Never should the felt be used more than one day without changing. If run too long, the surface becomes hard, does not absorb the moisture. Consequently the moisture has to escape through the bosom and a longer time is required to dry it, resulting in a bad effect on the finish. The felts

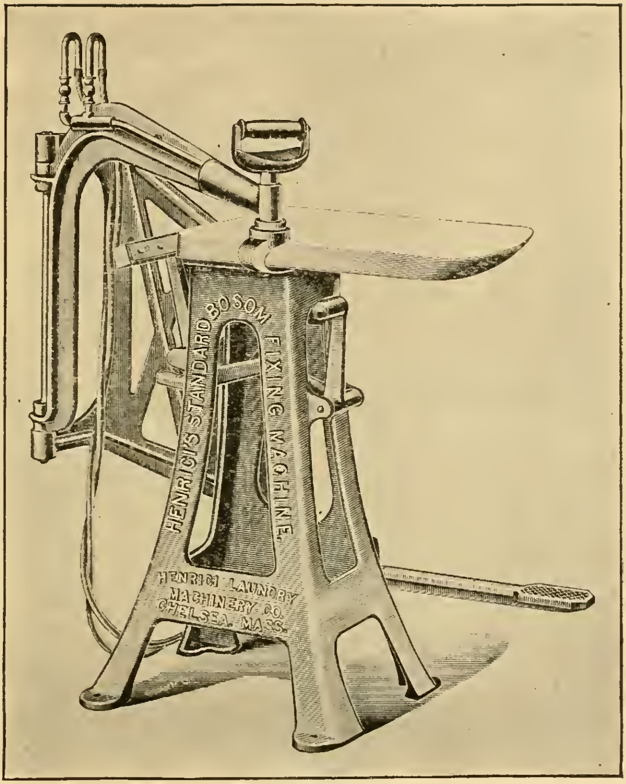


Fig. 83. FINISHING MACHINE.
(Henrici Laundry Machinery Co.)

should be washed and dried after they have been used, and then they may be used again. One should use all-wool felt on a bosom-ironer. The top layer should be of 10-oz. duck, which makes a firm, durable surface to iron upon. When the duck is moistened it shrinks, and it will not wrinkle like other material. A woven felt is preferable, as it can be washed without its coming to pieces. There should be a rubber covering made from rubber belting placed next the iron surface of the bosom board, two or three felts on top of that, and then the covering of duck.

Other machines for ironing shirts have been fully considered in Part I, Chapter 7. All these machines are essentially the same, both for new and for old work, excepting the body ironer. Usually the bodies are ironed on the roll machine similar to the one described for ironing sleeves, and the flat body ironer is seldom used in old work. The yoke-setter is rarely found in custom laundries, as almost all old work is finished without buttoning the back neckband. The price for which it is laundered does not permit of expending as much labor on old as on new work. Consequently laundrymen do not button the shirts and set the yokes, although should the price warrant it this would be an ideal way of handling old work. As it is, the flat-iron usually takes the place of the yoke-setter.

Where space will permit, the machines are arranged practically in the same order as for new work, it being desirable that the work should go from one operator to another in the order in which the work is done. It is also necessary to have the same racks and tables distributed about as for new work.

The bosom-fixing table is not placed in the same position in the line of machines arranged for old as for new work, but it is used after the sleeves and the bodies are ironed. It serves not only as a bosom-fixing table, but as a folding table as well. Of course if anyone chooses to adopt the same method for laundering old work, that which has been described for laundering new work, he will have a bosom-fixing table and a yoke-setter. Usually these are omitted, however, and the shirts go

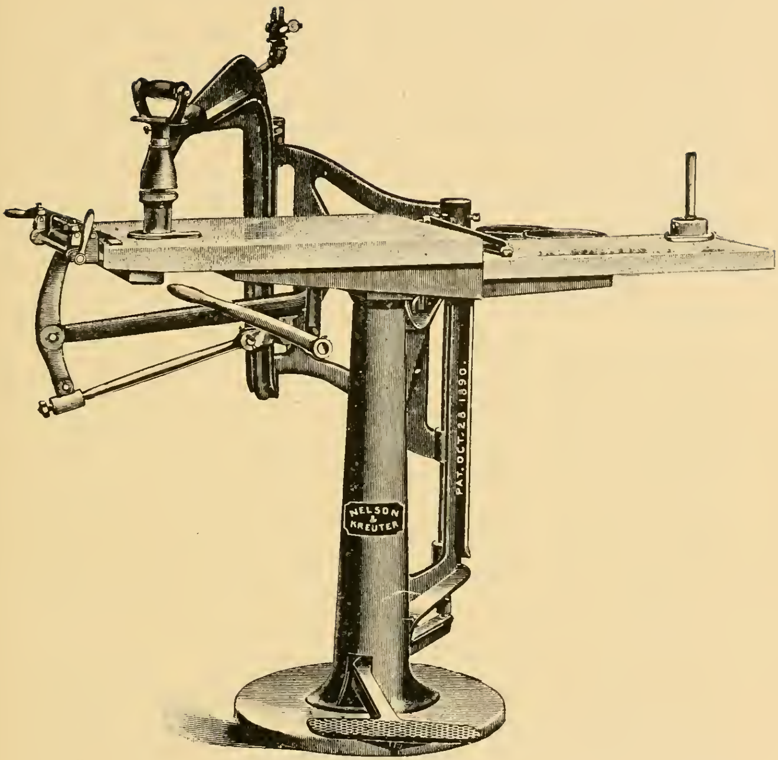


Fig. 84. FINISHING MACHINE.
(Nelson & Kreuter.)

directly from the wristband ironer to the sleeve and the body ironers.

There are machines manufactured that are known as finishing machines, and a great many laundries use them. They are designed to finish the bosom under the plaits and around the neckband, and to touch up any imperfection there may be in the bosom. One type of this machine is made with a gas-heated iron having a projecting flange which is made wedge-shaped to allow it to pass under the plait and iron that portion of the shirt that is not touched by the bosom ironer. It has a bosom board over which the shirt is drawn and the skirt clamped, the neckband being towards the operator. The heated iron is mounted on a universally swinging arm which permits it to be moved to any position on the bosom board. To this arm pressure is applied by means of a spring and its own weight, and, in order to raise it, the operator presses the foot-lever and releases the lever when the iron is placed in contact with the work. This heated iron has a wood-covered handle by which the operator controls it. Such a table is made by the Henrici Laundry Machinery Co., and is shown in Fig. 83.

Another type of machine of this character has a revolving heated flange mounted on a swinging arm. This flange revolves continuously, and when it is placed on the work it produces a circular ironing effect. The thin edges of the flange pass under the plait and iron the hitherto unironed portions. This machine has a bosom board or table. In many cases it is used also for ironing the outside yokes and for creasing them where they naturally fold. The work goes directly from this machine to the folding tables. The latter type is exemplified in the Nelson & Kreuter machine, Fig. 84.

CHAPTER 13.

IRONING-ROOM METHODS.

The methods of ironing old work are in a great many ways similar to those of ironing new work, the difference being principally that the prices which are paid for laundering old work will not permit of the elaborate methods employed in ironing new work. Furthermore, the trade does not demand the kind of laundered shirts which are necessary to preserve shape and character while it is waiting to be marketed. The customer usually wears the shirt very soon after it is laundered, and about all he requires is to have clean shirts well ironed, with a soft body, a soft yoke and a stiff, immaculate bosom.

Shirts are handled in ironing in practically the same way in both cases, except, as has been said before, the yoke-setting and the bosom-fixing processes are not included. The first part ironed is usually the inside yoke. This is done best by hand, although many laundrymen iron it successfully on the bosom ironer. The chief reason for not ironing the yokes on the bosom ironer is that it reduces the capacity of the bosom ironer, while the same work may be done on a roll machine which does not cost one-quarter as much as a bosom ironer.

If the yokes are to be ironed by the bosom ironer, the yoke is placed across the top end of the bosom board with the binding of the shirt at the back where it opens, at right angles to the bosom board. It is then laid towards the top of the board. The shirt is held in position by grasping the neckband which lies over the sides of the bosom board with one hand, and the back of the shirt with the other, holding that part of the shirt which is on the bosom board taut. While it is being held in this position the bosom bed is moved forward and backward, its stroke being regulated to the distance desired to be ironed on the yoke.

Another method of ironing yokes on the machine is with the roll machine. Almost any wristband machine having a 6-inch roll is well adapted to iron yokes. A description of the way in which a yoke is ironed on a roll machine may be found in Part I, Chapter 13.

When placing shirt bosoms on the bosom board, great care should be exercised to preserve the shape of the shirt and to iron it so it will fit a man. A great many laundrymen pay too little attention to this point. They allow their shirts to go out ironed in such a way that they are very uncomfortable to wear. The operator should examine every shirt, to note how it is cut, before he irons it. If he finds it to be low in the neck, then he should understand that the sides of the bosom should be well held up by the yoke clamp, and that the slope of the bosom should be stretched down so that the lowest point in the neck will be brought down to its relative position. Starching and washing a shirt naturally throws it out of shape, and the bosom ironing operator should study to bring each shirt into its proper place by stretching it here or there.

One might ask, "How is an operator to know what shape a shirt is to be ironed after it has been starched out of shape?" To this it may be replied that an operator who knows his business can tell when he places a shirt on a bosom board whether it is cut high or low in the neck; whether it should have square or sloping yoke seams, and whether it has a heart-shaped or a round neck. This is all determined after he puts it on the board and pulls it a little. After being stretched here and there it will indicate its cut, and when the operator discovers this he should stretch it in those places which will give to it its natural shape and contour. To many laundrymen these remarks may seem farfetched, but it is just these little details which make the difference between good work and poor work. If one would reach the righest pinnacle of perfection obtainable, he must not ignore these little things.

How often one hears the remark, "I wonder what is the matter with my shirts since I sent them to such a laundry; they were cut to fit me, but now they bunch up under my chin, and do not seem like the same shirts." This is spoken truly. It is just what happens in a great many laundries. Laundrymen do not pay enough attention to preserving the shape of the shirt. After a shirt has been stretched and ironed out of shape it will not fit, no matter how carefully the shirtmaker prepared his patterns or took the measurements. The shirt is unyielding until it is laundered again.

After the shirt has been placed on the bosom board and put into proper shape it should be clamped that way and ironed. It is not advisable to use a machine for ironing bosoms without a neckband clamp and a yoke clamp. It is true that more bosoms can be ironed on a machine without a clamp, but capacity is not the only thing desired in the laundry. A great many open-front shirts do not fit because the eyelets or buttonholes in the front of it do not match, and when the stud, or button, is put in, it bulges one side of the bosom out of shape and causes a strain on the other half. Great care should be taken to have these buttonholes, or eyelets, even, so that when the stud is put in the bosom it will lie flat.

Another fault is ironing the bosom and having the neck drawn up too high, so that, when the shirt is worn, the collar-button which joins the neckband in front punches into the wearer's throat, making it very uncomfortable. This trouble is due to the tendency of all operators to place the neckband too far under the clamp. The neckband clamp should be in perfect adjustment. The neckband, where it laps together on an open-front shirt, should be let down as low as the neckband clamp will allow and yet hold it. This is because the neckband is not joined together, as is the case with an open-back shirt.

The neckband clamp has to hold the band in place with sufficient pressure to overcome the resistance or pull on the bosom while it is being ironed. It is also necessary to have the upper lap of the bosom a little farther down, or, in other words, to have the under lap a little longer than the upper lap. This should be done so that, when the neckband is squared up, it will not cause the upper lap to bulge. In order to do this properly the neckband clamp must catch very near the upper edge of the neckband on the side of that half of the bosom which is to be the shortest. For this reason it is necessary to have perfect neckband clamps and to have them properly adjusted.

After the neckband has been clamped in place, the yokes are drawn into their proper relative positions, care being exercised to preserve the lines of the cut of the shirt around the yoke and around the upper part of the bosom. After the yoke clamps have been adjusted the bosom is ready for ironing.

The matter of pressure is of considerable importance, and all machines are built with nice adjustments to regulate pressure. Too much pressure will cause the starch to come to the surface and produce a blotchy appearance and an uneven gloss. Too little pressure leaves the goods rough dried and soft. Goods that are well dampened require moderate pressure. The proper mean between the two may be determined by careful experiment. Open fronts should be ironed on a very soft board with light pressure in order not to show the crease or impression where the laps join together. It is well to sort the open fronts from the open backs, as a different adjustment of pressure is usually required and a board which is not too hard for open backs is too hard for open fronts. Therefore, it is well to change the covering after ironing open backs and before ironing open fronts.

That portion of the bosom on the lower lap which does not get ironed when the laps are laid together, should be ironed afterward by releasing the neck and the shoulder clamps, allowing the lower lap to remain on the bosom board, pulling back the upper lap so as to leave the unironed portion exposed, and then passing the iron over this surface of the under lap, effectually ironing that portion which is not ironed during the first operation.

Plaited bosoms are handled in about the same manner as plain bosoms, with the exception that the plaits have to be raised. It is better to raise the plait after about the second passage of the iron and before the bosom is dried out. Then finish ironing the bosom, and finally raise the plaits again the last thing. If the bosom is entirely dry before the plaits are raised, it will be hard to raise them, and there is danger of tearing the bosom.

Pique shirts are usually ironed on the wrong side in order to bring out the figure. They must be starched very carefully, and all wrinkles removed, as a wrinkle will show very prominently when the bosom is ironed on the wrong side. There is some difficulty experienced in ironing open-front pique shirts on the wrong side owing to the lap of the bosom. It is impossible to finish those portions under the lap if the bosom is ironed on the the wrong side. This can be done best with a hand-iron. In fact, pique bosoms require considerable handwork after the machine, to make them look nice. The process is a combination of hand ironing and machine ironing.

It is well to use the machine to press the plies together and produce a stiff bosom, and then to turn the shirt right side out and finish the bosom with a large flat-iron on an ironing table. When using a flat-iron it should be applied to the face of the bosom, and it should not be moved about any more than is absolutely necessary, as the friction will produce a gloss and destroy the appearance of the pique. The process is more of a pressing than an ironing. To get the best results, simply place the iron where it is required, and press it as hard as possible, at the same time moving it slightly. Pique figures are usually embossed, and if they are flattened too much, their embossed appearance is destroyed.

If the bodies are to be finished on a flat body ironer, the next machine in oredr after the bosom ironer would be the back ironer. Since the flat body ironer irons only the front of the shirt, it is necessary to iron the back on another machine. In this case the back ironer is placed in the line next to the bosom ironer. A description of the back ironer and its operation will be found in Part I, Chapter 9. If the shirt body is finished entirely by a roll machine, the back ironer is omitted and the shirt is passed directly from the bosom ironer to the neckband ironer.

There is great difference of opinion in regard to the relative merits of neckband ironing machines. Some claim that the revolving heated roll is easier on the goods, and that it will not stretch the bands, while others claim that the machine with a stationary heated iron will do better work. The author believes that the stationary iron will produce a stiffer band, but that with its use there is greater wear on the band, owing to the greater friction. This form has also a greater tendency to stretch the band. Work done on the revolving roll machine will not be so stiff, but as there is very little friction, it will not wear the band as much nor stretch it as much as the other. The only danger with a machine of this kind is that the operator is apt to wind on the cloth too wide, making the padded roll longer than the heated roll. The result is that the pressure of the heated roll soon forms a sharp angle in the padded roll, and this angle has a tendency to cut the bosom where the neckband joins it. The iron roll presses down the surface which comes in contact with it, leaving the end of the padded roll standing up in a ridge and producing a shearing action between

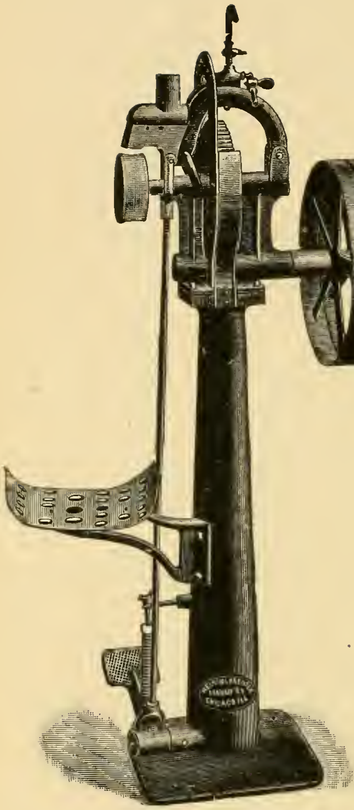


Fig. 85. (Nelson & Kreuter.)

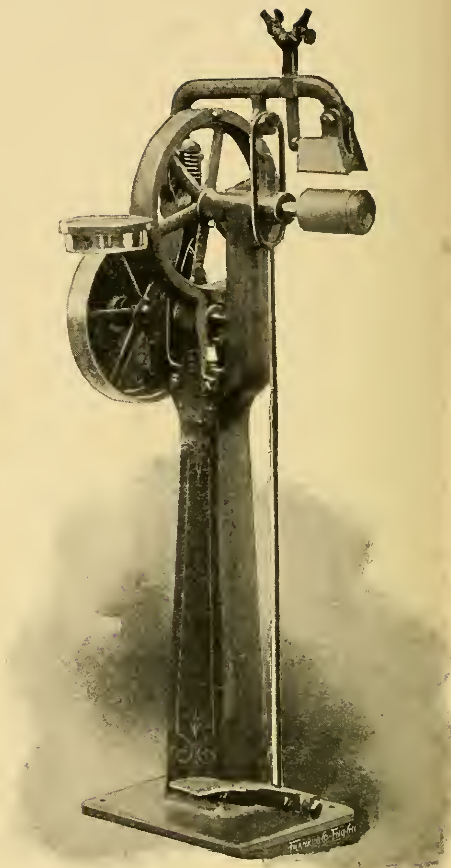


Fig. 86. (American Laundry Machinery Co.)

SHOE NECKBAND IRONERS.

the iron roll and the edge of the ridge. It is well, in covering machines of this kind, to wind the cloth exectly to the end of the revolving roll, so that it will form no ridge in the padded roll. The last few layers of cloth may project beyond the iron roll in order to make a complete and compact covering. Examples of these two machines are shown in Figs. 85 and 86.

It is impossible to do good work on a neckband machine of any kind without a soft padded roll, and the padded roll of a neckband machine will become hard more quickly than on any other machine owing to the extreme pressure which is applied to its limited surface. It is well to recover a neckband ironer every day, when it is in constant use. If it becomes too hard it will glaze the neckband, and because of the starch being pressed out the work will have a greasy, grimy look.

Usually, neckbands are ironed the poorest of any other part of the shirt. They are often left too soft, and many times they get dirty. The operator must have absolutely clean hands. Even the natural perspiration will produce a stain on the neckbands after they are ironed, especially if they are ironed on a hard roll. The neckband has to be held quite taut as it is fed through the machine, and its being damp makes it a ready means for removing any foreign substances which may be on the thumb and the forefinger through which the band passes. The operation of neckband ironers will be found described in Part I, Chapter 15.

The subject of wristband ironing, methods and machines has been quite fully covered in Part I, Chapter 15. All that it is necessary to add here is that there are several types of these machines not already mentioned. One of these is a machine having a revolving

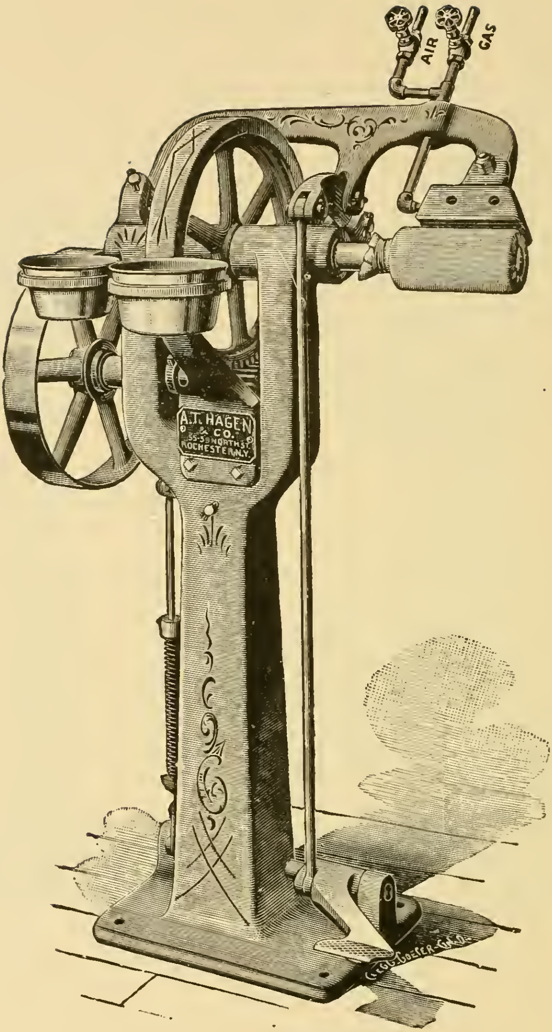


Fig. 87. WRISTBAND IRONER.
(A. T. Hagen Co.)

heated roll mounted on a shaft, and the roll extended beyond its bearings to permit of running the revolving padded roll within the sleeve, with the wristband out of contact with the ironing rolls. This machine not only irons the wristbands, but it also irons a portion of the sleeve next to the wristband. As shirts are usually starched more or less in the sleeve next to the wristband, ironing in this manner does not stick the sleeve together, but gives it a nice finish. The Hagen machine, shown in Fig. 87, answers the above description.

It is usual to iron the bodies in a custom laundry just after the wristbands are ironed. The same machine is used to iron the sleeves as well. All of the machine ironing is finished before the shirt has left the body ironer. On this machine the body is ironed by placing the shirt over the revolving roll and ironing around it; ironing the back first, and then the front up to the bottom of the bosom. Next, the sleeves are ironed, and the shirt is finished as far as machine work goes.

If the work has been well done the shirt will by now be nicely ironed, and about all that is necessary now is to pull the bosom on the bosom board, iron under the plaits and touch it up here and there. Lay the shirt flat on the table and press the outside yokes and crease the yokes where they naturally fold; iron out any little imperfections in the body, and then fold it. It is not customary to pin shirts that are folded in a custom laundry, but usually a shirtband is fastened around them which holds the shirt together, at the same time produces a good appearance, and is a means of advertising as well. It is advisable to have the folder supplied with a hand eyelet raiser, and to raise the eyelet before the shirt is folded, otherwise, if the eyelet is raised as in stock shirts, by a machine, it is liable to destroy the paper band which holds the shirt and allow it to become unfolded.

Should a neckband be crushed or broken while handling it, it can be easily fixed, after the shirt is folded, by redampening the band and ironing it again on the neckband machine. If the operator is careful, the bosom will not be at all injured, and the band may be very much improved.

CHAPTER 14.

NEGLIGEE SHIRTS AND LADIES' WAISTS.

Negligee shirts may be handled in a custom laundry to good advantage and ironed almost entirely by machines. They should be dampened in the same manner as a stiff-bosom shirt and care should be used not to have the dampening roll too tight or else the buttons will be crushed or the goods cut. The inside yoke should be ironed by hand, the neckband by machine, and the wristband or the attached cuff by machine. Then the shirt should be drawn on to a bosom board, buttoned, a ring placed in the neck, the front drawn taut and the front ironed by hand, covering the part which shows where the shirt is folded.

After this the body and the sleeve are ironed by machine, and the shirt goes to the folding table. It is usually folded over a thin board and should be about 9 by 18 inches. The latter may be made of pasteboard or of wood beveled down to give it sharp edges.

A full description of the above method may be found in Part I, Chapter 24. The method brings about a very good result and at a low cost, and it may be made very satisfactory. It applies to the plain negligee shirt, but, of course, silk shirts require a more elaborate method. The best results are those produced by ironing the silk shirt by hand, although quite satisfactory results have been obtained by the method just described for negligee shirts. The silk front only should be ironed by a steam heated iron. The puff ironer, or the ladies' sleeve ironer, affords an excellent device for ironing these silk fronts. The bosom is drawn over the surface of this steam heated bulb, the moisture is evaporated rapidly, and the silk takes a beautiful finish.

As the styles of ladies' waists change every season, both in make and material, it is quite impossible to describe any method which will be applicable to the various styles of these garments. About the only practical way to handle them is to iron them by hand. Almost any woman who can do family ironing can iron ladies' waists well, and no attempt will be made to formulate a plan whereby any one style of these garments may be properly ironed or laundered.

CHAPTER 15.

COLLAR AND CUFF IRONING.

Nearly all of the machines built to iron collars and cuffs have been described in Part I, Chapter 25. Laundering old work is essentially the same in the ironing-room for collars and cuffs. It will, however, be found necessary to study the theory of the different finishes which the trade of different localities demands. In the smaller towns, where the great majority of the work is from the rural districts, a very high gloss is asked for. The country people seem to think that, if a collar is well glossed, it is well laundered, and that it will keep clean longer. For this reason one will invariably find that in these small towns the gloss finish is desired.

There are some peculiarities in regard to gloss or to obtaining it which are hard to understand. Theories do not always hold in the matter of gloss. The theory advanced to explain what causes goods to receive a gloss, is that the ironing roll must have a much greater surface motion than the goods which are ironed, thus producing greater "slip" in the ironing process, and that the less the slip the less will be the gloss. But this theory, in many cases, does not hold true in practice. An example of this may be found in what is known as the Gardner reciprocating ironer, which is so arranged that the ironing roll may be made to roll over the collars without the differential motion; or, in other words, without any slip. Yet it will produce the highest polish imaginable. Many manufacturers have experimented to a great extent in following out this theory, and expecting results which they have often failed to obtain. The author once made a machine having a differential motion of nearly 12 to 1, thinking to go to the extreme and prove the theory, but the results as far as gloss was concerned were not satisfactory. It did not produce higher gloss than a machine which ran two and one-half to one.

Gloss seems to be the result of a peculiar combination of conditions which it is difficult to explain. The No. 7 collar ironer, the small machine which has a heated roll on top of the padded roll, is the machine which will produce the highest gloss of any cylinder machine, and it is used even in some of the largest laundries because it is the only machine which will produce a high gloss. Now this machine has no greater slip than the average, nor as much as some, yet it produces the highest gloss.

Some manufacturers build a machine which is known as the "combination." This machine has a flat table covered with cloth on which the goods are ironed, and it works on the plan of a double belt shirt bosom ironer. It has two tables, one for ironing shirt bosoms and the other for collars and cuffs. The table for collars and cuffs is much wider than that for bosoms. It is an excellent machine for laundries doing a moderate business, as it combines the shirt ironer and the collar ironer in one machine. The finish it gives is usually a gloss; possibly it gives a higher gloss than the No. 7.

Aside from these two machines there are none which produce the enameled finish such as the country trade wants. The other styles of roll machines produce finishes all the way from a fair gloss down to a domestic finish.

Work that is to be glossed should be dampened so that it will be soft and pliable, as it is quite impossible to gloss a piece if it is too dry. It requires dampness sufficient to allow the pressure of the machine to crush the plies thoroughly together and to get the fiber well pressed down. This is required in order that the surface will become smooth without having any small cavities between the threads of the goods. When the goods are in this condition they are capable of receiving the polish, as the whole surface of the fabric is like one continuous piece to which the polishing action is applied. If one should look at a well-polished piece of linen with a microscope, the threads, instead of looking like round ropes, would appear to be flattened and the space between them filled in level with starch, making one continuous surface. In order to produce this condition, dampness is required, but there is danger of having too much dampness. Too much dampness produces a condition such that, when the goods are ironed, the pressure brings the starch to the surface in the same way that a wringer drives the dampness out of goods. The starch that is thus forced to the surface produces a greasy appearance when the goods are ironed, which is unsightly.

With the larger machines for ironing collars and cuffs so much dampness is not required. But these machines do not produce so great a gloss as those described above. These machines, as has already been described, are so arranged that they may be altered from one differential motion to another.

In some machines several motions can be obtained, and these different motions produce various grades of finish. The theory that the slip produces a gloss holds true to a certain extent. The gloss is increased in these machines up to a certain point by increasing the differential motion between the hot roll and the revolving padded roll. Starting with the highest gloss, the machine will produce many different finishes down to the domestic finish. These variations are obtained by shifting the gears.

The manufacturers of steam-heated collar ironers make no claim for gloss work. The natural product of this machine is a domestic finish, although some gloss can be obtained. This machine has been found exceedingly well adapted for the fine work customary in large cities. The work for the steam machine should be well dampened, should be soft and flexible, and yet it should not be too wet.

Good results, with any ironing machine, depend largely upon the condition of the machine. Good work can not be obtained on a hard bed, and especially is this true in collar and cuff machines. If the roll becomes too hard, the goods will be flattened too much, the seams will turn yellow, and they will crack easily when being turned. The covering for the roll of the collar ironer should be always soft and pliable. There are various ways of covering an ironing machine, a great many of which are good. One good way is to proceed as follows: First cover the iron drum with several layers of wool blanket; follow with several layers of double-faced canton flannel, and then finish with heavy unbleached muslin. Wind on all the goods the adjustment of the machine will allow. A machine covered this way it will not be necessary to recover for some time.

When the machine is in constant use it will be found best to change the covering once a month. Then it is well to remove all the material on the rolls and supply new. The old material may be renovated and rendered fit to be used again by running it in a washing machine in steam only. Do not use water; simply shake and steam it, and allow it to dry without heat. It will be found that this process will raise the nap of the goods and make the material nearly as soft as it was when new.

There are many tricks and devices employed in finishing collars after they are ironed which add to their appearance and comfort to the wearer. Among the latest inventions is the saw-edge machine. This invention is a machine for removing the roughness on the edge of a standing collar, making it comfortable to wear. There are various machines for this purpose. Some are sold outright and others are leased on a royalty basis. Any machine that will remove the roughness of a standing collar is a blessing to humanity. It seems strange that this invention, or, rather the need of it, was not discovered sooner, as the idea is so simple and the demand was so great. Any laundryman who does not have a saw-edge machine is not up to date.

The machines which remove the roughness on the edge of a collar most successfully are those having an ironing motion applied to the edge of the collar. Machines of this class usually consist of several revolving heated disks. The edge of the collar is first moistened and then it is passed through a groove, having its edge brought in contact with these revolving disks, thereby ironing the edge of the collar as much as its sides.

There are other devices in using which the collar is passed through a heated slot. This, to a certain extent, is satisfactory and a great improvement over leaving the edges rough, but it is not as satisfactory as the class of machines first described.

There are several devices, machines and schemes for manipulating different styles of collars; the shaping machines for turn-down collars; the shaping machines for stand-up collars; forms to mould lay-down collars; devices for shaping roll collars, and several makes of seam dampeners, any of which devices possess merit, and should be found in every well-equipped laundry. It is not necessary to fully describe each machine and method. It is sufficient to add, that any laundryman who is not fully equipped with these little adjuncts may become quite well posted on the subject by referring to the trade journals, and any machine or device which may strike his fancy owing to its inexpensiveness will be sent to any responsible laundryman on trial. As the expense of a trial is not very great, it is a practical way to learn of what value these devices may be.

A tipping machine, already described in Part I, Chapter 25, is an essential adjunct to machines which iron the goods by one passage through. The wing-point collars, or collars which turn over in front, are not finished on the inside, and consequently, when they are turned over, they will not have the appearance of the outside of the collar, and will need finishing. Here is where the tipping machine comes into play for finishing the point of the collar and throwing the impression of the seam to the other side.

CHAPTER 16.

MISCELLANEOUS IRONING.

There is always an amount of miscellaneous work sent to the laundry which forms quite a large proportion of the business. Much of this work can not be conveniently laundered by any set method or formula. The judgment of the laundryman and the skill of the employes may usually be depended upon to relaunder this class of work satisfactorily. Only a few of the most common articles will be mentioned here and a few suggestions given in regard to laundering them.

The white duck coat is an article which almost all laundrymen have to relaunder, and so it will be well to make a few suggestions in regard to it. These coats are worn by barbers, butchers, waiters and others whose occupation makes the wearing of this coat desirable. Usually, these coats become very much soiled and require vigorous washing in lots of strong soap and hot water. The process is about the same as washing white shirts, with the exception that no oxalic acid is used. This is because these goods are very hard to rinse, and there is danger that all the oxalic acid will not be removed, and that an injury to the goods will ensue. The souring should be of acetic acid only. The goods should be dipped in starch of the consistency of that given by eight ounces of cornstarch to a gallon of water.. The starch should be hot and contain some bluing and acetic acid

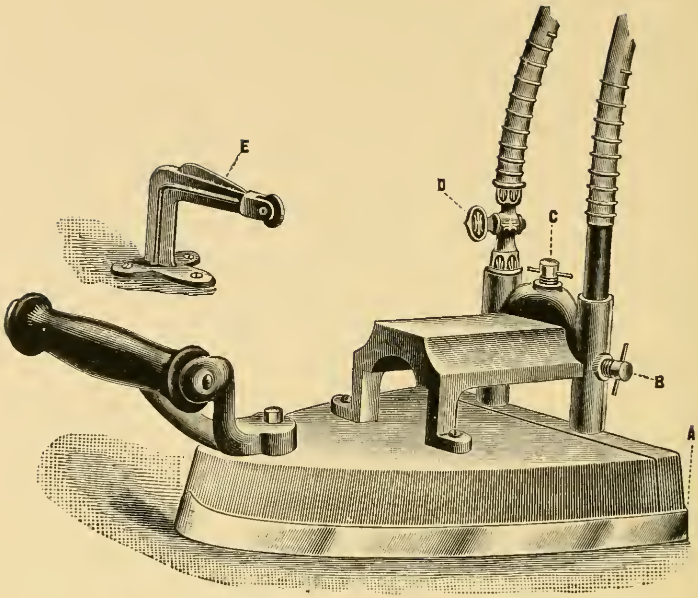


Fig. 88. CROWN IRON.
(The Alden Speare's Sons Co.)

After the coats are dried they should be sprinkled, rolled up tight and laid aside for six or eight hours to thoroughly dampen them.

A common way of ironing these coats is by hand, a process which it will not be necessary to describe. What is known as the "jumbo" flat-iron is also used very effectually. This iron, which is shown in Fig. 88, is what might be called a giant flat-iron. The method of using it is the same as that employed with the ordinary flat-iron. It is heated by gas, which burns within the iron, the iron being controlled by means of a handle attached at the pointed end. When this iron is not in use it is suspended from a hanging arm which holds it from the table and prevents it from scorching the cover. When it is to be used it is taken from the arm and rests on the table. The article to be ironed is laid on the table and the iron moved over it. Duck coats may be ironed quite satisfactorily with this iron, as well as handkerchiefs, napkins, towels, flannels, stockings, and, in fact, all pieces of family work of this nature.

Many laundrymen use the body ironer for ironing duck coats. They iron the body part, the collar and the sleeves on the machine and finish up around the shoulders and the yoke with a flat-iron. This method is about as cheap as any, and where a large number of these coats are handled, it enables one to handle them conveniently and without loss of time or confusion of the work.

Skirts and ladies' underwear are usually ironed by hand. These goods have usually more or less fancy work on them, and unless it is ironed nicely it is never satisfactory. A great deal of this kind of work requires fluting. For a great many years there has been in use a small fluting machine which must be heated by iron slugs and operated by hand. Manufacturers have recently been building fluting machines which are operated by power and heated by gas. These machines accord with modern practice and are convenient to operate. This machine is illustrated in Fig. 89.

It is necessary, when ironing a skirt, to iron it on what is called a skirt board. This, for convenience sake, is made quite long, and is fastened to a table and projects beyond it, so that the skirt may be pulled over the board without trouble. The board being on the inside of the skirt, as the skirt is ironed it is pulled around, and the operation continues until the skirt has been completely ironed.

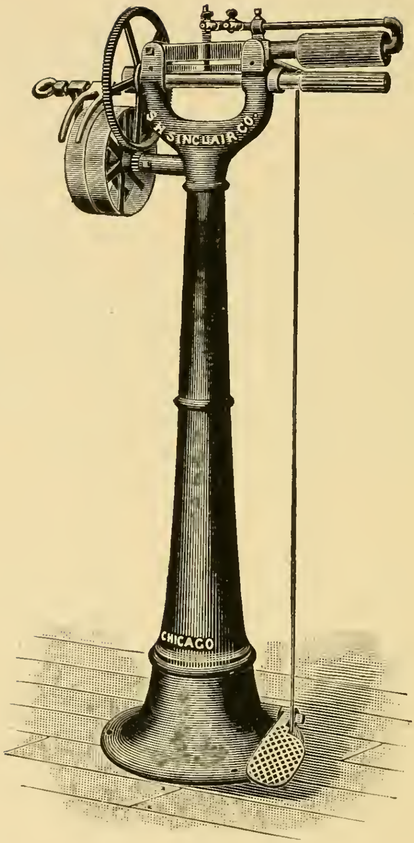


Fig. 89. POWER FLUTER.
(S. H. Sinclair Co.)

The steam-heated body ironer is an excellent machine with which to iron many pieces of family work, and especially is it valuable in laundries where no mangle is used. This machine is arranged with a feeding table, which makes it very convenient to iron such pieces as napkins or handkerchiefs, which require straight edges and square corners. Care must be exercised when ironing handkerchiefs and napkins on this machine to get them square and straight so that the edges and corners will fold evenly. The table may be thrown back from the feeding roll, permitting those goods to be ironed which necessitate having a covered roll operate within the garment. This machine is used in some laundries for ironing shirt bodies and sleeves. It produces excellent results when the dampness is just right, but when the goods are a little dry they are not ironed as well as they would be on a roll machine, consequently this machine is not recommended for shirt work, but it is very good for family pieces.

CHAPTER 17.

MARKING, SORTING AND HANDLING LAUNDRY WORK.

The point has now been reached where it is necessary to explain in detail some method of marking and keeping a record of the various articles of clothing which are brought to the laundry, and to describe some system whereby the goods may be kept track of and assorted ready to be delivered to their owners. It will be supposed that there is a laundry doing an average business of $500 a week. This laundry is assumed to be equipped with all modern machinery, devices and appliances, and the system which is about to be explained may generally be adopted by this size laundry. The system may be applied, however, in any laundry if the difference in the volume of work is taken into account. The larger the business, the greater number of separate lots go through each day, the reverse being true for a smaller business, as it is the best plan to have always about the same number of pieces in a lot, no matter whether the business be large or small.

Let it be supposed that this laundry has received a number of bundles consisting of miscellaneous pieces. As these bundles are received at the office or collected by the driver, a laundry list is attached to every bundle. Each list has the owner's name written on it, and, if it is to be delivered, it has the owner's address as well.

If it is to be called for, the list should be marked "call." A laundry list is usually a printed blank naming the items that are generally sent to the steam laundry, with the standard or fixed price printed opposite the name of each article. This makes it an easy matter to make out a list, as it is only necessary to mark the number of each kind of article in the bundle opposite its name.

Beginning with the first bundles received on Monday, the office hand opens the bundles and marks on the list what the bundles contain. They then go to the marking table, where the articles are marked with indelible ink, and the mark is recorded on the list. The character of the mark which is put on the garment is of no great importance so long as it is distinct and permanent enough to stand the laundering. If the articles are already marked, the same mark may be be used, providing it is distinct. In that way covering people's goods with unsightly and objectionable laundry marks is avoided. If there are no marks, it is well to use the customer's initials, as this plan might be useful in locating a stray article at some future time. Garments should be marked neatly and with great care, especially when they are handkerchiefs and fine articles of lace or underwear. The figures or letters should be small and located where they are the least likely to be seen when the article is in use. It is important to have the exact mark that is used on the garment placed on the list. Stockings and black goods in general are usually marked with the aid of a marking-tag. This is a metal device having a white cloth insertion on which to place the mark, and it is arranged to clasp to the garment.

The bundles and lists are held at the marking table until there is a sufficient amount of work to make up a lot. A convenient sized lot consists of from 80 to 100 dozen collars and cuffs and the shirts, underwear, handkerchiefs, and all other articles which have come in with this 100 dozen. This lot is called number one, as it is the first lot in the laundry at the beginning of the week. The lot is kept together and is known as Lot No. 1 in every department of the laundry. The lot now goes to the washroom and the lists are sent to the office, where the price of each item is extended and the list totalled and recorded. The lists are entered in a regular laundry record, with all the items and prices, together with the customer's name, address and mark.

The goods are separated in the washroom and washed by the respective methods, the colored goods being assorted from the others and washed separately. In every instance this lot of goods should have something to indicate where it is. If it is in a washing machine, for instance, there should be a figure No. 1 and the name of the goods being washed marked in some way on the washing machine. For example: If the collars of No. 1 lot are in the washing machine, a card as follows: "Collars and Cuffs, Lot 1," should be placed on the washing machine. The same method should be applied to the lots when in the starchroom, the dryroom or the dampening boxes, or when being ironed. Then, when the goods have been laundered, the lot may be delivered to the sorting-room in a bunch, as it was delivered to the washroom.

The ordinary course of events would bring out the underwear and pieces of flat-work sooner than the rest of the lot, and it is the usual practice to sort the underwear first, while waiting for the balance of the lot.

Sorting shirts and underwear is best done on shelves or in pigeonholes, while collars and cuffs are being sorted on a table. In a business of the size under discussion two sorters are required, one for collars and cuffs, and one for other articles. It requires considerable ability on the part of the sorter to separate all these articles correctly, as it has to be done by memory. In a lot of 100 dozen collars and cuffs there are twelve hundred pieces to be looked at and placed with other pieces having the same mark. In sorting collars and cuffs this is done by taking a bunch of them and laying down the first piece looked at in a certain place on the table, the next one beside it, and so on until a piece has been reached having the same mark of one already laid down. This piece is then laid with that having the same mark, and so the process continues until the entire lot is assorted. In the meantime the shirts have been sorted and placed in pigeonholes or on shelves with the underwear, handkerchiefs, etc. When the collars and cuffs are sorted they are assembled with the balance of the bundle and the list placed with them. Should any garment get soiled in the process of laundering and require relaundering, it should be marked with a tag, which signifies that it is a "put-back," and that it should be pushed ahead of everything else in order that it may be delivered in time to go with the rest of the goods.

After the goods have been sorted and assembled they are checked off and compared with the list; they are next delivered to the wrapper to be put in shape for delivery. Finally, the bundle is wrapped and the original list is tied to it, when it is ready for delivery.

This system presupposes that the first thing in is the first thing out, and in the ordinary course of laundering this is true. If the public could be regulated, this system would be all that would be required. However, there are always a lot of people who are in a great rush for things, and who must have their laundry work finished at the earliest possible moment. If the laundry would retain such trade it should have a system of putting through "Specials" in the quickest and most complete manner. The demands on the modern laundry in this respect are very great, but in most instances the laundry is equal to it.

A special bundle should have a special list, with the time at which it is to be delivered marked on it. The bundle is marked in the ordinary way, but each garment should be marked with a special tag. Some laundrymen use a piece of red cloth or string made of turkey-red oil calico. This is an indelible color and is not affected by bleach. It easily catches the eye, and the operator will almost involuntarily push it ahead of everything else. Garments having this special mark are worked upon while the ordinary lots are waiting their regular course. Many times there is a lull between the lots of regular work, and such times are quite opportune for handling specials.

Of course, specials naturally keep regular lots back to a certain extent. If there are too many of them they become a nuisance, and they should not be encouraged, for it is impossible to do good laundry work and rush it. Specials can not have the time put upon them which is necessary for laundering them well. Everything has to be done in a hurry, and if time is gained it is at the expense of quality.

There are a great many other systems of handling laundry work, some of which are more complex, and perhaps some are more simple, but the foregoing plan is recommended as being in all probability as practical as any of them. What the author has tried to do is to show a system devoid of useless red tape, or complications which might handicap the running of a system in the hands of regular laundry operatives.

In writing the foregoing pages of Parts I and II the author has endeavored to set forth a complete and connected method whereby both new and old work may be laundered successfully, and has attempted to show each and every operation in natural sequence. It is hoped that the reader of these pages, if he is not able to follow the plan of work in this book, in the order in which it is given, he may take from here and there such information or advice as may suit his individual case and in this way apply what has been set forth to his personal requirements.

PART THIRD.

CHAPTER 1.

MANGLE WORK—COMPARISON WITH ORDINARY WORK.

Mangle work, or, what is known in the trade as flat work, has become to be a business distinct from the ordinary laundry work. Plants are equipped especially for this grade of work and nothing else, and the treatment of the work is entirely different from the ordinary laundry work. This branch of the laundry business has been brought about as a natural result of the demand for quick delivery and the handling of work in large quantities. In large cities and in seaport towns the mangle business has reached enormous proportions. There are many large plants equipped at great expenditures, and every known modern device is sought to facilitate the handling of the work or to make the process more rapid in operation. Machines are used which cost thousands of dollars, and more money and experimenting has been expended upon the steam mangle than upon any other laundry machine.

Such machines are now made which iron and finish the goods on both sides with one passage through. The goods are taken to the mangle directly from the extractor, and these machines will iron pieces as fast as several operators can feed them. The modern steam mangle is an illustration of what American enterprise and ingenuity can accomplish. This invention has revolutionized the flat work business. A short time ago nearly every hotel and large restaurant had laundries of their own. The introduction of this machine has greatly cheapened the cost of doing the work and increased the capacity of the laundry which employs them. They make the price of doing flat work so low that the hotels and restaurants can not afford to do their own work, as the machine is too expensive and of too great a capacity for the average hotel. Laundrymen who have equipped their plants with these large machines made the price for doing flat work so low that the hotel laundries and every laundry doing this class of work on a small scale has been compelled to abandon it. This large machine gives its owners a good margin of profit at a price for doing the work which is much lower than the average laundry could afford to do it for. The result is that the laundering of work of this class has been centered at plants equipped with large steam mangles.

There are quite a number of laundrymen who operate custom laundry plants and who have also a mangle work department. This department is usually distinct from the others. The methods and the general conduct of the business are quite different from that employed for regular custom work. The help need not be as high-priced as regular laundry help, as the handling of flat work requires less skill than handling of custom work. Therefore, to reach the point of greatest success in this class of work it is well to have it independent of and apart from the regular laundry business.

This class of work does not require marking, as the lots may be run separately with each order by itself, and delivered to the shipping department complete as received. It is the usual custom to keep a record of all goods and to check them off when they are finished. There is, however, so great a diversity in mangle work that no attempt will be made to formulate a plan of handling it. The laundryman who does the work for large steamboat lines must necessarily have different methods of keeping track of the work than the man who receives work from small restaurants, barber shops and hotels. A plan of operation is all that will be here given, and the methods of registering and carrying the work through will be left to be arranged according to the conditions peculiar to the various localities.

CHAPTER 2.

ARRANGEMENT OF THE WASHROOM.

The washroom for mangle work as regards the floor, the water, the sewer, and the power is about the same as has been described for a washroom for doing custom work. The machines may be essentially the same. It is well, however, to employ heavy washing machines of large capacities. They should be connected with the hot and the cold water supplies by large pipes, and large outlets should be attached to them. Mangle work has generally to be handled in a rush, and in equipping plants of this kind one should study means for economy of time. Hence, large water connections and discharge pipes are essential. The cylinders of the washing machines should have deep ribs and should be large in diameter. The metallic machine is preferable to the wooden one on account of its greater durability, and as the metal cylinder has large and deep ribs or projections on the inside, it is the more desirable for washing flat work. The illustration, Fig. 90, shows a washer suited to this work.

It is also necessary to have large extractors of the most approved make, and machines that will run readily in balance while at a high rate of speed and carry a heavy load. It is necessary to extract as much water as possible from the goods in order to get the greatest capacity out of the mangle. Flat work is not dried in the dryroom, but on the mangle when it is being ironed

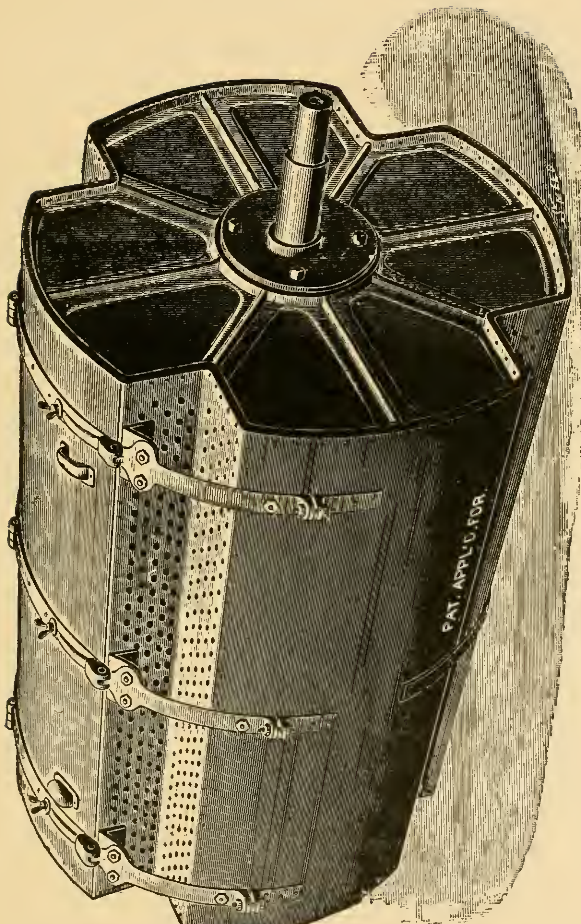


Fig. 90. METALLIC WASHER CYLINDER.
(A. T. Hagen Co.)

Therefore, it is necessary to remove all the moisture possible before the goods are mangled, and the very best extractors are required.

It is well to arrange the bluing tanks higher than the washing machines, similarly to those already described in Part I, Chapter 2. While the bluing operation is not so particular in flat work as in custom work, it is quite necessary to dissolve the blue in a quantity of water to prevent it from spotting or streaking the goods. Following this plan is strongly advised where ultramarine blue is used.

CHAPTER 3.

METHODS OF WASHING MANGLE WORK.

Where it is practical, it is better to sort table napkins, tablecloths and towels and to wash them separately from sheets, pillow cases, etc. Table linen is usually very much soiled and requires to be washed thoroughly and bleached considerably. When washing a load of table linen, the machine should not be too full, and the first water used should be warm. The goods should be run for five or ten minutes without soap, after which the water is changed and sufficient soap is added to make a good strong suds. If the goods are to be bleached, the bleaching should be done after the first suds. Rinse twice after the suds used before bleaching. The usual bleaching formula, which is given in Part I, Chapter 3, is applicable to flat work, and the method of rinsing there described is also advised. It is not customary to bleach flat work every time it is washed. The goods need only be bleached every four or five washings.

When flat work is bleached it is best to blue it with aniline blue. As it must be blued after the washing process, there is no economy in using ultramarine or other insoluble blues. As aniline blue gives the nicest color, it is better to use it when economy in time is not imperative, or when no time will be lost in using it, as is the case on a load of goods that has been bleached. Bluing flat work with aniline blue is easy.

The bluing is mixed with water in the elevated tank, and to the water is added five ounces of acetic acid for each load of goods of the average amount, the goods having been previously treated with a sour bath to neutralize the effect of the bleach and to render them more sensitive to the color.

When it is not desired to bleach the work, the bluing operation is done in the suds by the use of ultramarine blue. The whole solution of soap water and bluing should be mixed in warm water in the elevated tank, and the water kept agitated to prevent the blue from settling until it is run into the machine. It should be run into the machine while the machine is in motion, and the machine should not be permitted to stop while this solution is on the goods.

A very pretty color may be obtained this way, but as ultramarine blue is insoluble in water, it precipitates easily and causes spotting and streaking. If, however, it is kept continuously in motion, this difficulty is not often experienced. The strong point in favor of the use of ultramarine is economy in time, as it is used in the suds, and a second operation for bluing is not required. The goods are simply rinsed once or twice after the suds, and they are ready for the extractor. A load of flat work may be well washed in this way in thirty minutes and be ready for extracting. When using mangles that will iron the work directly from the extractor, it is possible to launder this class of work in an astonishingly short time. The demands so many times made on the laundry are such that it would not be possible to meet them unless these short methods were possible. Many of the smaller and cheaper restaurants do not have linen enough for a change, and it must be laundered between meals. It is also often the case in larger establishments that the owners do not invest in a change of linen, as they have found it quite convenient and practicable to have one set only. The modern flat work laundry has made it practicable to relaunder this work in such a short time.

Work that requires starching is rarely sent to a flat work laundry. Consequently, no provision need be made for starching any part of the work.

Napkins and table linen should be finished soft, and in order to produce this finish they should be well extracted. If they are mangled too wet on a roll mangle they are likely to be too stiff, and therefore it is necessary to be very thorough in the matter of extracting. If possible, the extractor should run fifteen minutes at as high a rate of speed as it is safe to operate it. Information regarding the speed of extractors will be found in Part I, Chapter 2.

CHAPTER 4.

THE MANGLE-ROOM.

It is very desirable to have the mangle-room well ventilated, as the steam, which comes constantly from the machines, soon renders the air oppressive and impure. There is such a large amount of evaporation that it is necessary to have some system of enforced ventilation, and this is best done by means of ordinary ventilating fans, like that in Fig. 91, placed in the ceiling or side walls. For a room having 200 square feet of floor space, two 36-inch fans, speeded at 500 revolutions, are none too large in capacity for thoroughly ventilating such a room.

The floor of a mangle-room should be of hard wood, and this should have a good filling of linseed oil in order that it may easily be kept clean and that it will wear well. The machinery may be driven by belts from shafting overhead, but in locations where it is practicable to do so, it is better to have the shafting under the floor in order to keep the mangles free from the dust and the oil which usually falls from the shafting and the belting when it runs overhead.

There should be a large supply of steam in order to give the mangles their full capacity. It is advised that not less than a two-inch pipe, running from the boilers to the mangle-room, be used. After the pipe has entered the room it may be reduced and the several branches from the different machines may be connected

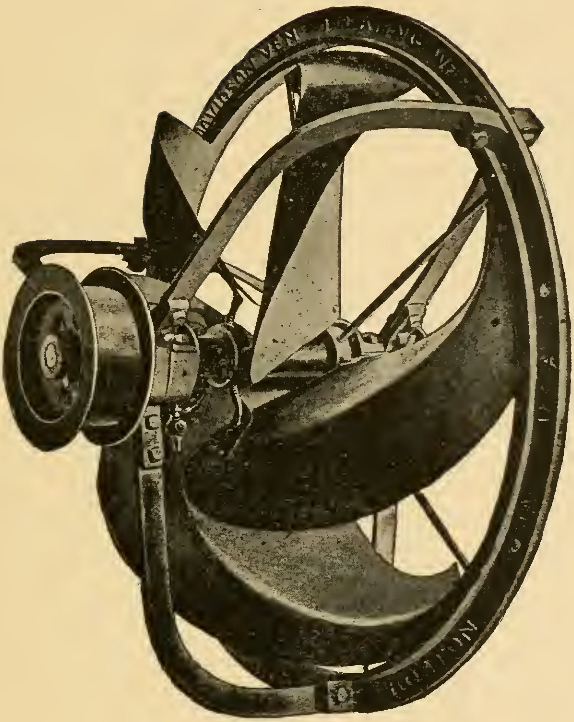


Fig. 91. EXHAUST FAN.
(Massachusetts Fan Co.)

into the larger pipe with a reducing coupling or bushing. All steam pipes leading to the mangles should be covered with suitable pipe covering to prevent radiation. The exhaust-pipe from the mangles should be connected to a steam-trap. A good steam-trap will allow all the water to escape and hold back the dry steam, thus keeping the mangles free of water and as hot as the steam will make them. From the steam-trap the condensed water should be run to a well near the boiler and be pumped into the boiler from the well. There should be a steam-gauge attached to the main steam pipe to indicate the pressure of steam on the mangle, and it is advisable always not to carry less than eighty pounds of steam on the mangle, and 100 pounds should be used if possible, as the higher the pressure of the steam the hotter it is.

It is advisable never to operate a mangle without a steam-trap. The water can not be discharged by any system of valves as effectually as with a trap; and, where blow-off valves are used, it is a common fault to blow off much of the live steam, which means a waste of fuel and an unnecessary expense. Steam is not so effectual a heating agent when it is allowed to escape as when it is confined and retained at its greatest pressure, and a means is provided whereby the condensed steam is removed as formed.

TEMPERATURES OF STEAM AT VARIOUS PRESSURES.

The following table showing the temperature of steam at various pressures will be found useful for reference when it is desired to determine the temperature of the steam at any pressure usually carried in a laundry.

Gauge pressure in pounds per sq. in.	Temperature in degrees F.	Total heat in heat units from water at 32 degrees F.
40	286.54	1169.3
50	297.46	1172.6
55	302.42	1174.2
60	307.10	1175.6
65	311.54	1176.9
70	315.77	1178.2
75	319.80	1179.5
80	323.66	1180.6
85	327.36	1181.8
90	330.92	1182.8
95	334.35	1183.9
100	337.66	1184.9
105	340.86	1185.9
110	343.95	1186.8
115	346.94	1187.7
120	349.85	1188.6
125	352.68	1189.5

CHAPTER 5.

STEAM MANGLES.

The modern large mangle may be divided into three distinct types: First, a machine like that shown in Fig. 92, having a large steam-heated cylinder with several rolls running in contact, the latter being covered with a fibrous material and pressing against the heated cylinder with considerable force. These covered rolls are placed on the upper side of the cylinder and surround the top. They are provided with pressure springs attached to sliding boxes in which are mounted the covered rolls. These springs are compressed by means of a handscrew, which causes greater or less pressure of the rolls on the cylinder, as may be desired. Beneath the heated roll are two endless aprons which carry the goods in contact with the cylinder and around it, returning them under the cylinder between the two aprons and delivering them to the receiving table. This class of machine gives a finish to the goods in the first operation and dries them out in the second operation, while the apron holds them in contact with the heated cylinder. The arrangement of the rolls and the apron is such that nearly the whole circumference of the cylinder is brought into contact with the goods. That is to say, the goods pass nearly around the cylinder, giving the machine great capacity.

The second type of machine, illustrated in Fig. 93, consists of a series of crescent-shaped, steam-heated

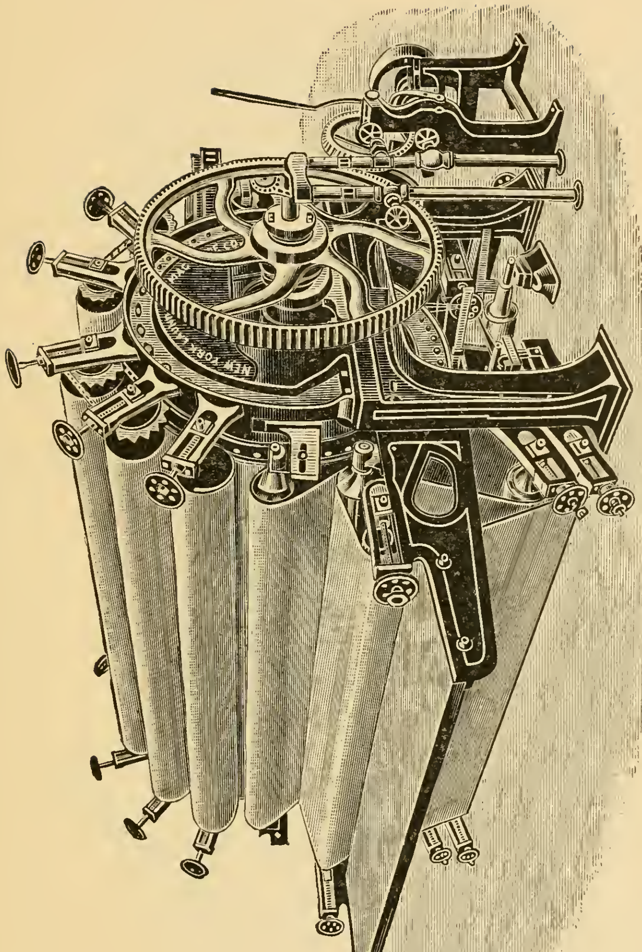


Fig. 92. ANNIHILATOR.
(New York Laundry Machinery Co.)

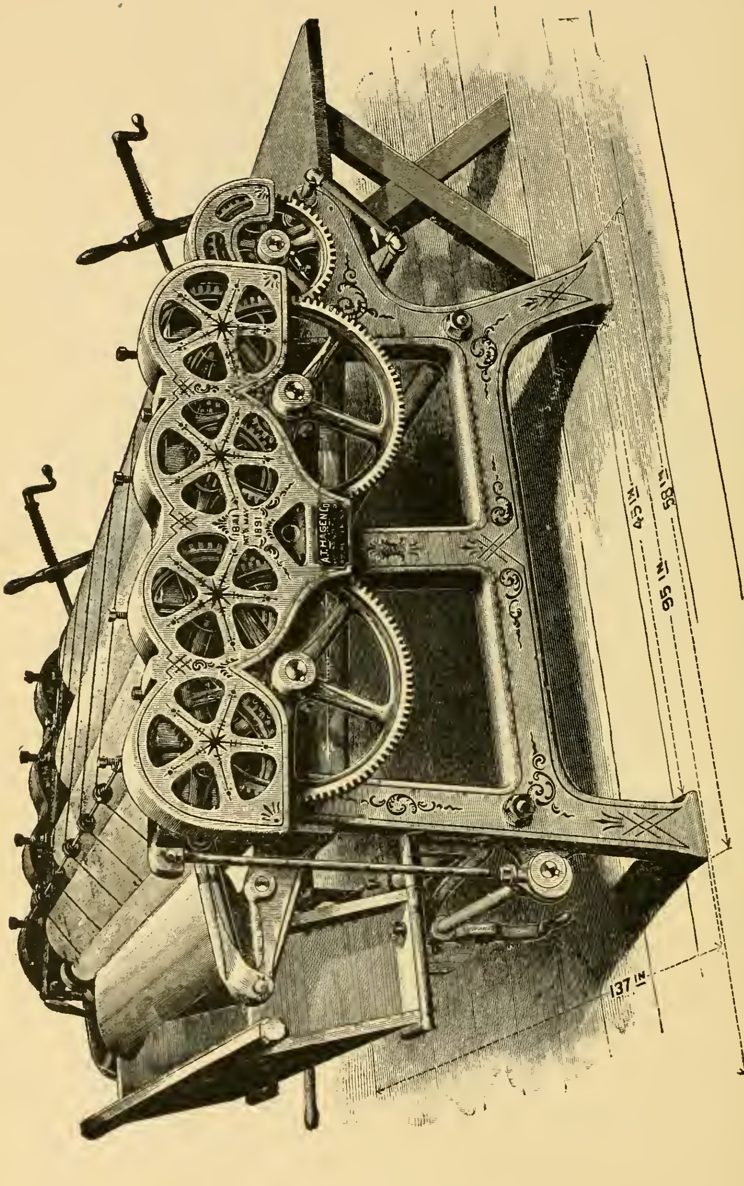


Fig. 93. HAGEN FIVE-ROLL MANGLE.
(A. T. Hagen Co.)

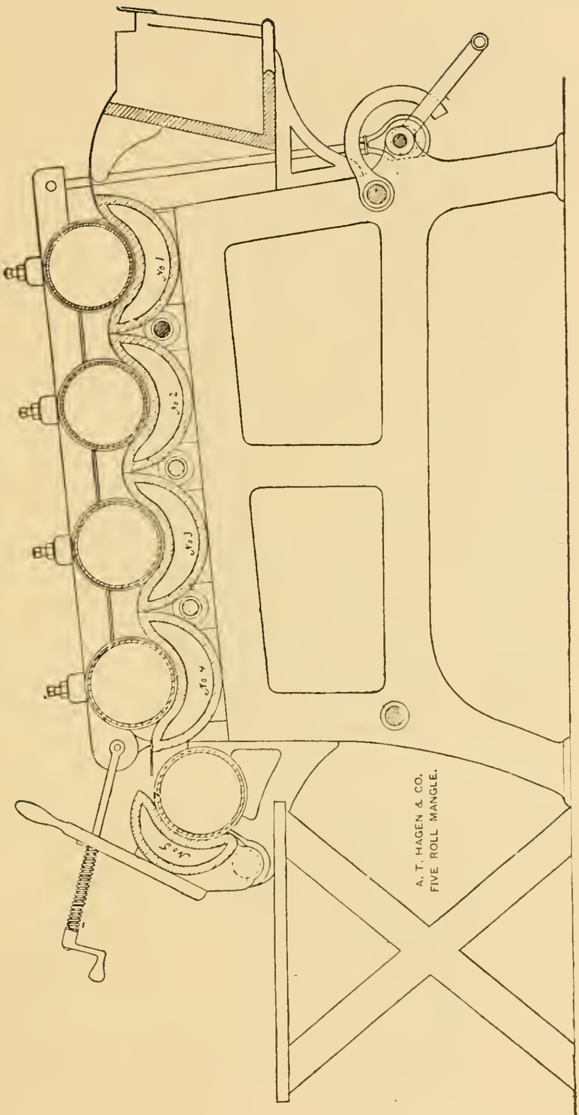


Fig. 93a. **HAGEN FIVE-ROLL MANGLE.**
Sectional View.

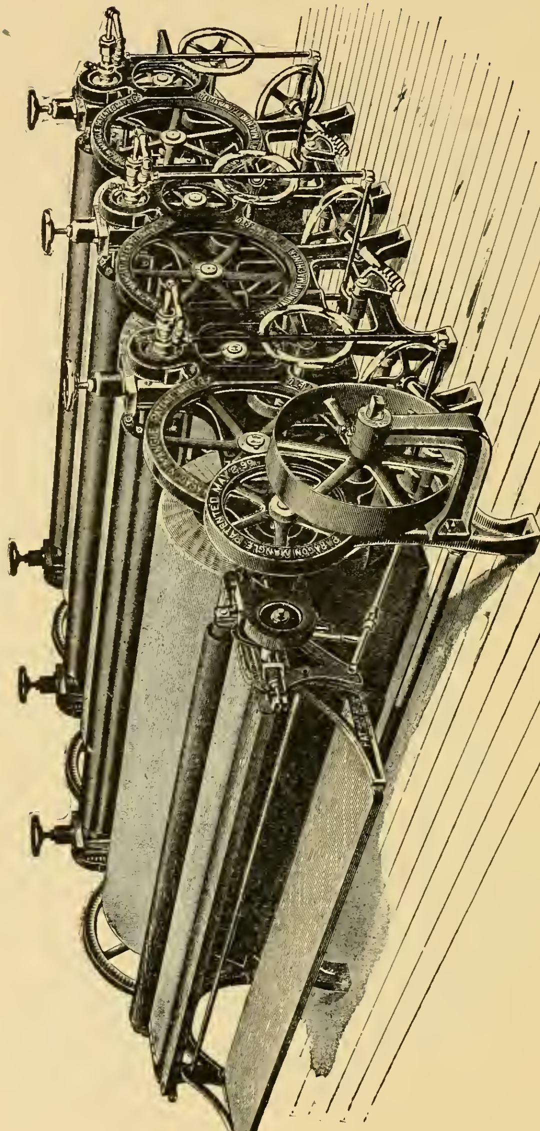


Fig. 94. PARAGON MANGLE.
(Troy Laundry Machinery Co.)

shoes in which revolve padded cylinders. These crescent plates or chests are so arranged that the goods will pass between one covered cylinder and its accompanying steam-chest to another covered cylinder and steam-chest, and so continue until the goods are dried and ironed. One make of this class of machine, the Paragon, Fig. 94, is made in sections, and, when a greater capacity is desired, new sections are added. This machine is sometimes arranged with revolving heated cylinders running in contact with a padded drum, so that the goods are first ironed on one side and then on the other. The revolving heated cylinder gives the goods a finish, and the stationary shoe gives it the drying capacity. The A. T. Hagen Co. make a machine which has an arrangement of endless aprons to carry the goods back underneath and in contact with the heated plates. The surfaces of these plates are finished on a planer, making a smooth surface for the aprons to move over. After the goods have been carried back the full extent of the heated surface, they pass between two aprons and return to the delivering table.

This machine has a large capacity and produces a fine finish on all grades of table linen. The tendency of this method of ironing is to finish the work without exerting an excessive pressure at any point. The pressure is distributed throughout the surface of the plates, the goods being drawn firmly along the hot surface, giving them that finish so much desired by the owners of fine table linen. The cylinder of the padded drum is perforated to allow the escape of steam which is evaporated from the goods.

The third class of mangles, The "American" Mammoth, as shown in Figs. 95 and 95a, is constructed with

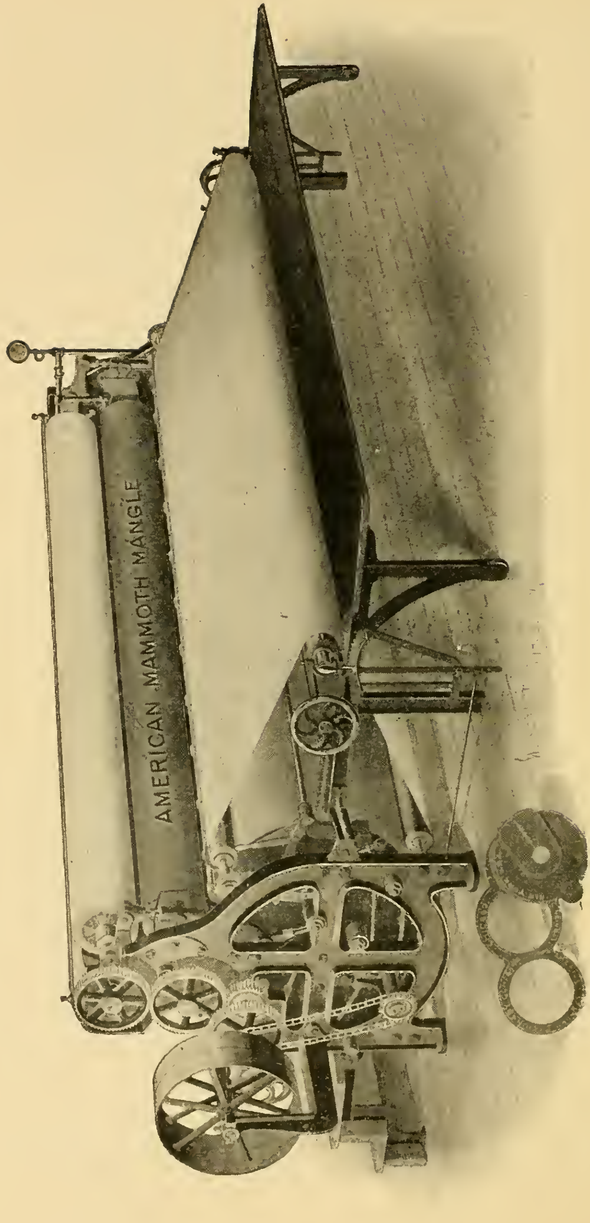
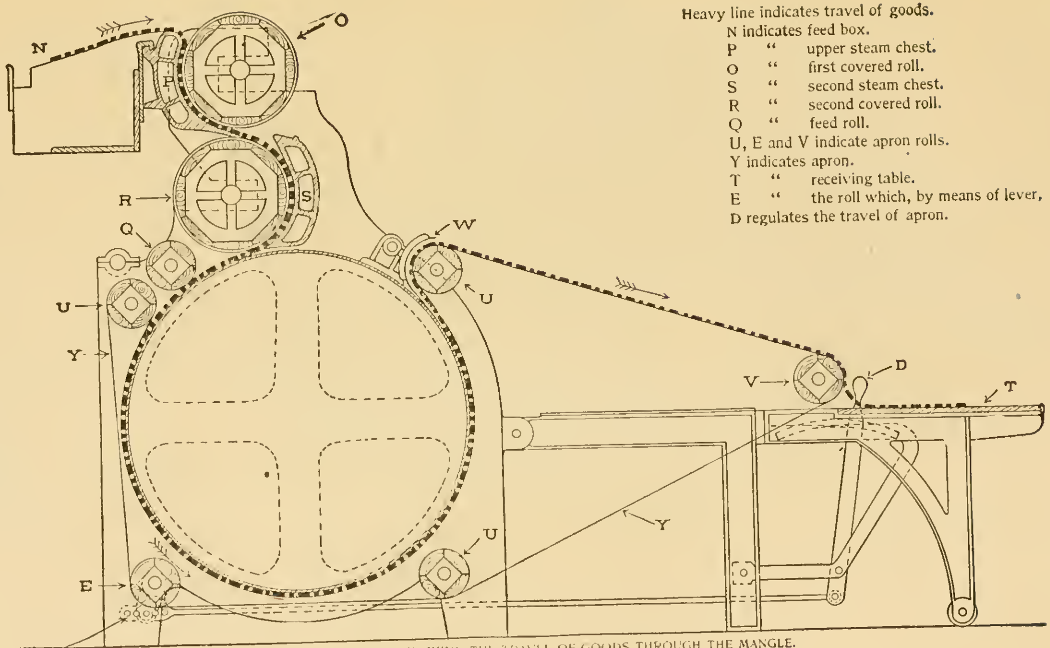


Fig. 95. **AMERICAN MAMMOTH.**
(American Laundry Machinery Co.)



Heavy line indicates travel of goods.
N indicates feed box.
P " upper steam chest.
O " first covered roll.
S " second steam chest.
R " second covered roll.
Q " feed roll.
U, E and V indicate apron rolls.
Y indicates apron.
T " receiving table.
E " the roll which, by means of lever,
D regulates the travel of apron.

SECTIONAL VIEW, SHOWING THE TRAVEL OF GOODS THROUGH THE MANGLE.

Fig. 95a. AMERICAN MAMMOTH.
Sectional View.

a large circular drum which is heated with steam, and arranged to move around it is an endless apron which carries the goods in contact with the heated surface while the drum remains stationary. Above the drum are arranged in reverse order two concave steam-heated chests, and revolving in contact with these chests are two padded cylinders. The goods are fed in at the top of the machine between the first steam-chest and the first padded cylinder, and are ironed on the side next to the ironing chest. Then the goods are passed to the next covered cylinder and are ironed on the opposite side of the goods by passing in contact with the other iron chest. The direction taken by the goods is on a curve shaped like the letter S. The goods are then carried to the large steam-heated drum and slid around it by means of revolving carrier rolls and endless aprons. This machine affords a large heating surface, and it subjects the goods to such friction under slight pressure that it produces a soft and beautiful finish on bed and table linen. It, in fact, affords a means of ironing any piece, from a lace curtain to a bedspread.

The three machines just described are well adapted to all grades of work. There are other machines, however, made on a large scale, which perform the function of drying machines rather than that of mangles. Like the machines just described, they have large capacity, and where the laundryman has a large number of sheets and pillow-cases to launder, these machines are recommended on account of their simplicity and the little wear they produce on the goods. One of the machines alluded to is illustrated in Fig. 96. It is constructed with a very large perforated drum, which is covered with a regular mangle covering, and surrounding this

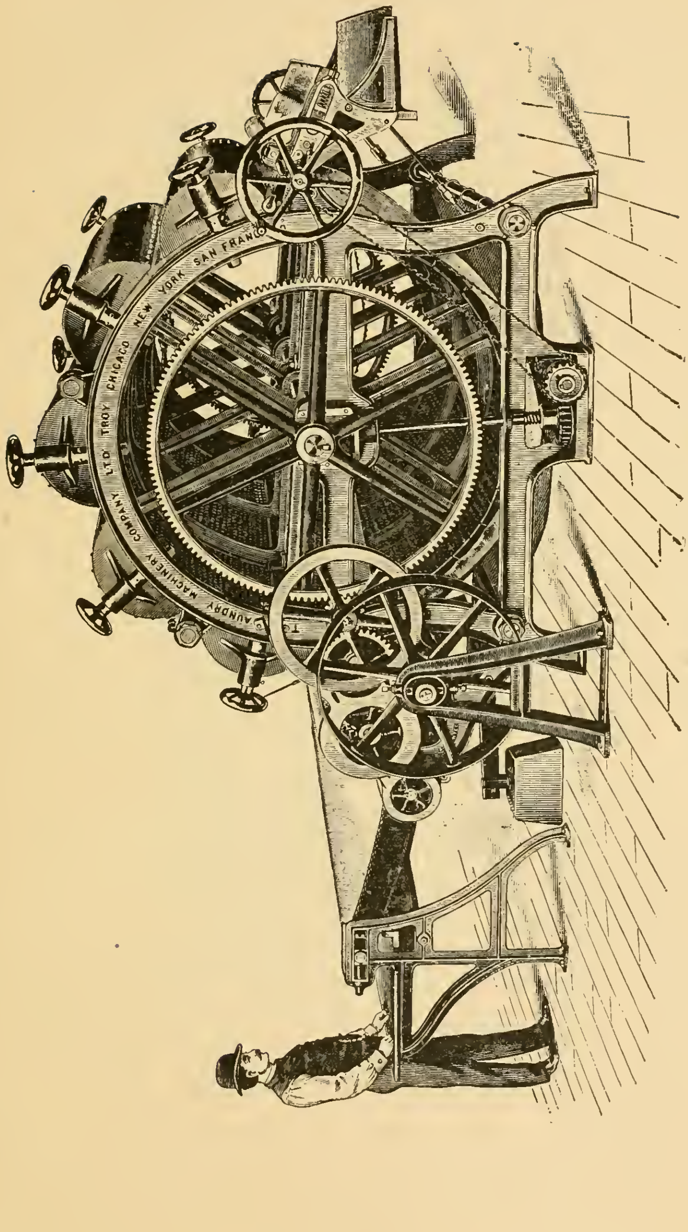


Fig. 96. **WILES' DUPLEX MANGLE.**
(Troy Laundry Machinery Co.)

drum is a series of concave steam-chests which are in contact with the drum, and the surfaces of these steam-chests conform to the circumference of the drum. The drum is revolved, carrying the goods against the steam-heated concave plates or chests. Arranged at the delivering side of the mangle is a padded roller running in an opposite direction to the motion of the large drum. This roll takes the goods off the large drum and passes them on between itself and the steam-heated cylinder, giving the goods a slight finish just before they leave the machine. This machine is an excellent one for heavy pieces, such as bedspreads, roller towels, sleeping-car linen, and all goods that absorb large quantities of moisture. It is an exceedingly simple machine for one so large, and is built on scientific principles that give it great drying capacity.

Another machine which acts more as a dryer than as a mangle is made with a series of steam-heated plates through which passes an endless apron to carry the goods in contact with the large heated surface. The friction of the goods against the iron produces a very good finish, which is desirable where a large quantity of bed linen is handled.

Much thought and much experimenting have been given to the subject of material for covering mangle drums. Experience has taught that the best material to use for this purpose is an all-wool fabric of good absorbent quality. Wool absorbs and evaporates moisture very rapidly, and for this reason it is much better than material made of cotton or a mixture of cotton and wool. The coarser the weave of the wool covering the better will it allow free evaporation.

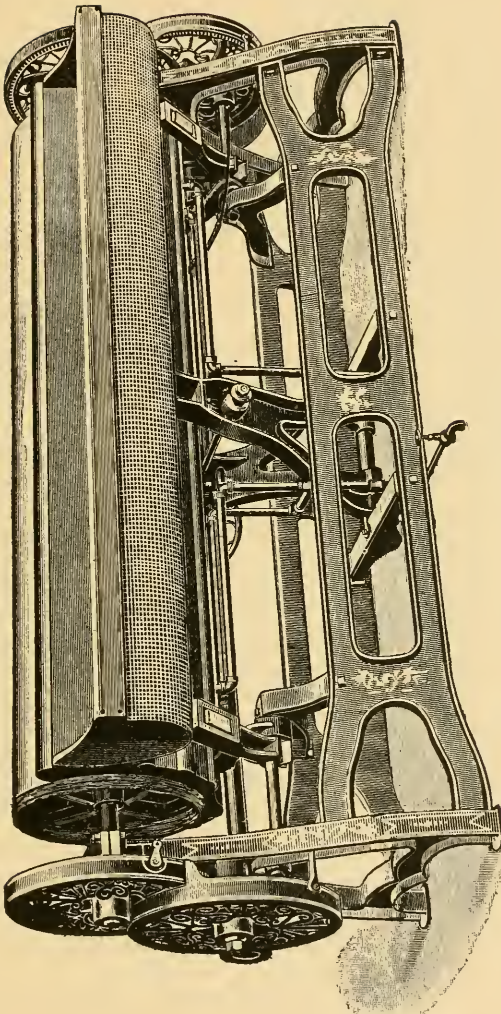


Fig. 97. POLAND MANGLE.
(Poland Laundry Machinery Co.)

Too much covering should not be put on the drums, as it will produce a thickness too great for the moisture to pass through. If the drums are padded and are too large in diameter, they will crowd when in a concave steam-chest and the goods will feed through only with difficulty. Outside of the wool covering there should be wound two or three thicknesses of good muslin in order to give a smooth surface to iron on.

There are mangles of more or less capacity which are built with simply a large heated cylinder having smaller padded rolls running in contact with it. This class of machine, of which an example is shown in Fig. 97, is made in all sizes, from one in which the capacity is very limited, up to a machine which has nearly the capacity of the largest mangles already described. The largest machines, in some instances, have an extra heated cylinder so arranged that the machine will iron the work on both sides. The work done on these machines, especially on table linen, is very near perfection. It is necessary, however, to dry the work and redampen it, with the exception, perhaps, of the work from the larger machines. A laundryman doing a small business in mangle work had best have a machine of this class. The makers of these machines do not claim that they compete in the cost of doing work with the other class of machines, but they do claim that the quality of the work can not be improved.

Goods will have a better finish that are dried and redampened before mangling; and while it is not practical to do this in connection with a large business, where circumstances will permit, it is always advisable to do so, as the goods finish much softer and usually give better satisfaction.

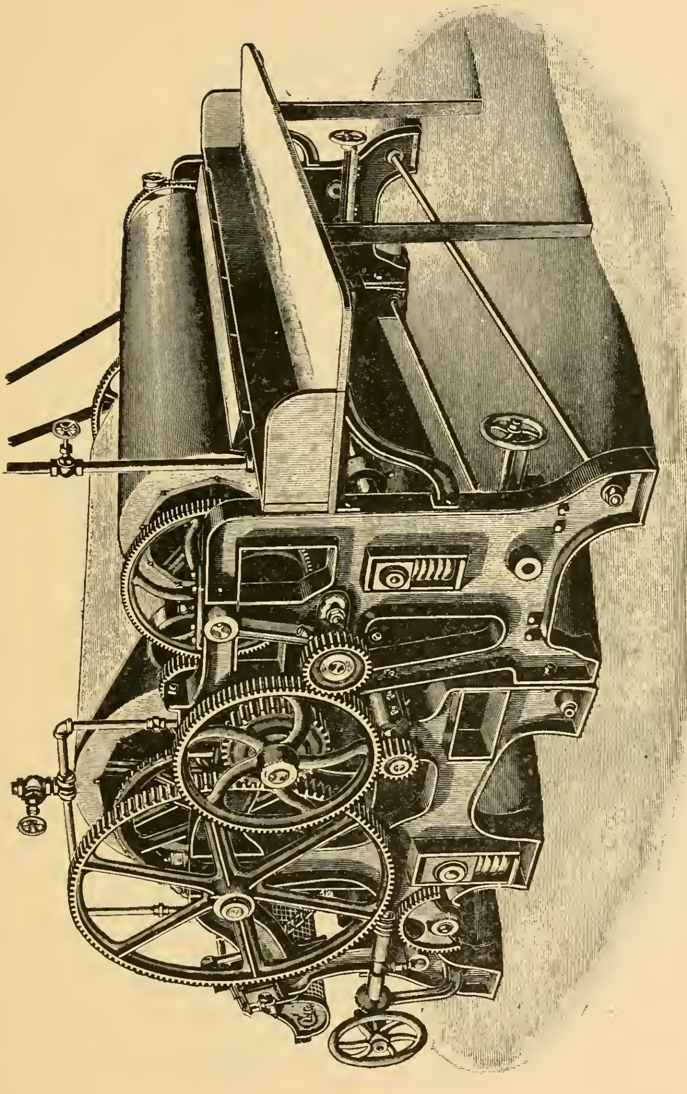


Fig. 98. CRAWFORD MANGLE.
(Crawford Laundry Machinery Co.)

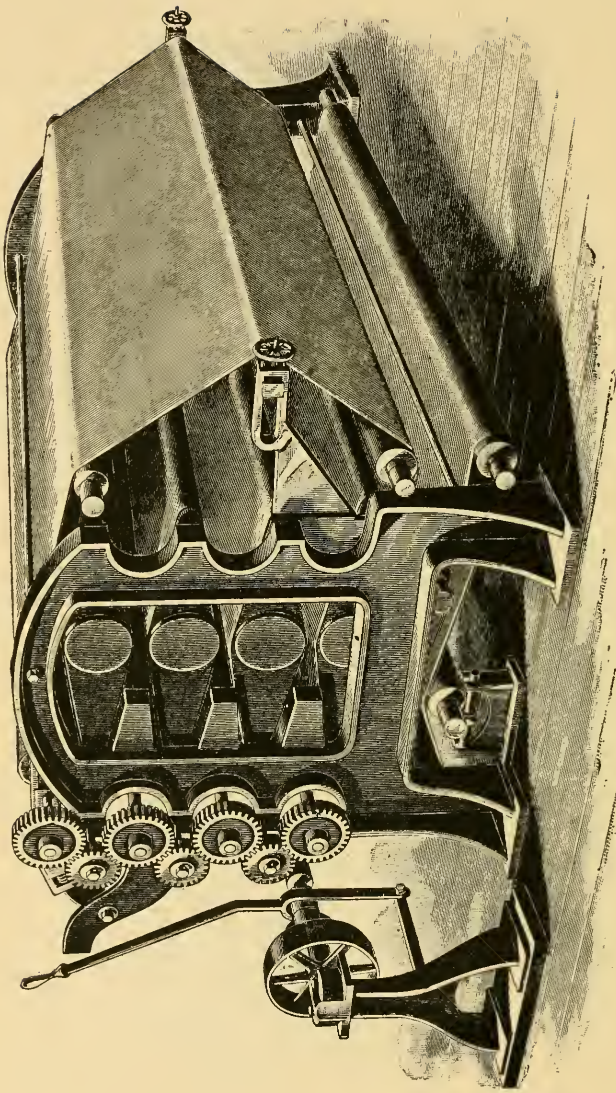


Fig. 99. COLUMBUS MANGLE.
(New York Laundry Machinery Co.)

Manufacturers usually arrange their machines so that any degree of speed may be obtained, making it possible to increase the capacity where the pressure of steam will warrant it, or, in other words, regulate the speed of the machine to the pressure of the steam. If it is found that the goods do not dry by one passage through, the machine should be given a slower motion in order to allow the steam sufficient time to dry the goods.

There is much difficulty experienced in feeding goods into a mangle so that the edges will be straight, and especially is this true of large pieces. An automatic apron feed has been recently invented which largely overcomes this difficulty. It not only affords a means of feeding goods into the mangle evenly, but it also affords a safety appliance as well, and should be attached to every mangle. More terrible accidents have occurred with steam mangles than with any other laundry machine or device. In order to feed goods into the ordinary mangle the operator's fingers must go dangerously near the line of contact between the rolls of the mangle, and a slip of the foot or a push from another operator, or many other causes, will bring the operator's hand in contact with the rolls. The relentless machine pulls in the victim, making it the most cruel accident which can be imagined. A laundryman may not do any thing more humane than to attach a safety appliance to his mangles, unless he already has them.

Two mangles representative of other types are The Crawford and The Columbus, shown in Figs. 98 and 99.

CHAPTER 6.

METHODS OF THE MANGLE-ROOM.

As the goods come from the extractor they should be placed in the tumbler, which is a machine for shaking out the goods and leaving them in a loose condition, to be sorted and straightened out. The goods are under great pressure in the extractor from the centrifugal force, which compresses them firmly together, and before they can be handled to advantage it is necessary to shake them out. This difficulty occurs more especially in soft goods, such as towels, tablespreads and soft napkins. The trouble is not experienced so much in sheets and pillow-cases and goods of similar character, which have more of a wiry thread, and they might be handled without the use of the tumbler. However, it is a small matter to run the goods a little while in a tumbler, which will thoroughly loosen them and put them in the condition necessary for rapid handling.

After the goods have been thoroughly shaken up they should all be placed on a large, roomy table and as many hands as possible should sort the pieces into lots by themselves, and carefully straighten them out, laying them in bunches ready for feeding to the mangle. The larger pieces, such as sheets and spreads, should not be folded through the center, but they should be gathered together in such a way that as one edge enters the mangle the article may be conducted into the machine without its bunching up or forming wrinkles.

The goods, as they are folded, should be shaken well by hand to remove the lint which is on them, and to straighten the fringe, if there is any.

Feeding small articles requires more operators than when feeding larger ones. When small pieces, such as napkins, are being run, as many operators as can conveniently stand at the machine are necessary. About the same number of operators is required to receive the goods as to feed them, in order to get the largest capacity out of the machine when on small pieces. The larger pieces require only two operators to feed them, two to receive them, and two to fold.

Good mangle work requires that the edges of the goods be ironed straight, and considerable skill is necessary to do this. The feeders should have long practice and learn to work in unison. If not, they will find it hard to prevent one side of the piece from getting started ahead of the other, or the corners from starting ahead of the center. In either case the article would have an unsightly appearance after coming through, and would not pass as good laundry work, even though the washing and finishing may be perfect. The operators who receive the goods also require considerable practice to get the correct fold, and to keep up with the capacity of the machine.

The small pieces are folded on the receiving table, but the larger pieces must be folded in the air. As a large piece comes from the machine, two operators take hold of the corners of the article when it first emerges. Then, as the article moves forward, the operators carry it along, and just as the last end of the article leaves the machine two other operators catch the corners, and the garment is folded through the center, the center forming the edge of the fold which hangs down between the operators. The ends are then brought together, making another fold, and so on, until the article is folded as compact as is desired. All this has to be done very rapidly in order to keep pace with the machine, and it requires expert operators or the capacity of the machine will be lessened. All goods having fringe should be brushed out with a hand-brush, or, what is better still, with a revolving brush.

Usually all kinds of mangle work are finished by passing once through the machine; and with the modern large mangle, if any goods are not finished dry by one passage, it would indicate the goods were left too wet, or that there is not sufficient heat in the cylinders. In the event that the first is true, better extracting is required, and should the second be the cause, more steam pressure is required, or attention should be given to the steam-trap. If the trap is not working as it should be, water will remain in the cylinders and decrease the heating capacity to a great extent. All conditions being right, any one of these large mangles will finish the work direct from the extractor, iron it dry with one passage through the machine, and as fast as is possible to feed the goods and to receive them. Of course, exceptions should be made in the case of roller towels where there are two thicknesses, and in the case of counterpanes, and goods of a similar nature.

A good formula for making potash soap, especially adapted for washing woolens: Boil together 50 pounds of olive oil roots, 50 pounds of tallow, then add to this five pails of water, and enough caustic potash to make a solution of a specific gravity of 20 degrees Beaume-hydrometer test. After this add enough hot water to make 120 gallons of solution, then boil slowly with open steam pipe until solution saponifies.

Don't add potash while hot water is running on as it will foam and overflow. This formula affords an excellent soap for washing any soft garments of the wool nature, as it softens the fiber and prevents the harshness which is common in flannels washed with a soda soap.

Formula for making bleach solution from chloride of lime: 25 pounds of chloride of lime, 4½ pounds of caustic soda; place in a barrel, add 36 gallons of cold water. Have lime mixed with water before soda is added, let solution stand six hours, then draw off the clear liquid and put it in a stone crock. This will make a bleach solution of the specific gravity of 12 to 15 degrees test with Beaume-hydrometer.

This formula is to be used in connection with washing formulas given in foregoing pages of this work.

TABLE OF WATER ANALYSES.*

GRAINS PER U. S. GALLON, 231 CUBIC INCHES.

WHERE FROM	Lime and Magnesia Carbonates.	Lime and Magnesia Sulphates.	Sodium Chloride. (Salt.)	Iron Oxide, Carb. Sulph., etc.	Volatile and Organic Matter.	Total Solids in Grains.
Buffalo, N. Y., Lake Erie	5.66	3.32	0.58	....	0.18	9.74
Pittsburgh, Allegheny River	0.37	3.78	0.58	0.37	1.50	6.60
Pittsburgh, Monongahela River	1.06	5.12	0.64	0.78	3.20	10.80
Milwaukee, Wisconsin River	6.23	4.67	1.76	20.14	6.50	39.30
Galveston Texas, 1	13.68	13.52	326.64	Trace	Trace	353.84
Columbus, Ohio	20.76	11.74	7.02	0.58	6.50	46.60
Washington, D. C., city supply	2.87	3.27	Trace	0.36	2.10	8.60
Baltimore, Md., city supply	2.77	0.65	Trace	0.10	3.80	7.30
Sioux City, Ia., city supply	19.76	1.24	1.17	1.03	4.40	27.60
Los Angeles, Cal., 1	10.12	5.84	3.51	2.63	4.10	26.20
Bay City, Michigan, Bay	8.47	10.36	20.48	1.15	8.74	49.20

Bay City, Michigan, River	4.84	33.66	126.78	3.00	10.92	179.20
Cincinnati, Ohio River	3.88	0.78	1.79	....	Trace	6.73
Watertown, Conn.	1.47	4.51	1.76	Trace	1.78	9.52
Ft. Wayne, Ind.	8.78	6.22	3.51	1.59	10.98	31.08
Wilmington, Del.	10.04	6.02	4.29	8.48	6.17	35.00
Galveston, Texas, 2	21.79	29.149	398.99	....	4.00	453.93
Wichita, Kansas	14.14	25.91	24.34	....	2.00	66.39
Los Angeles, Cal., 2	3.72	12.59	....	0.76	6.00	23.07
St. Louis, Mo., well water	27.04	23.73	15.57	3.49	0.46	70.29
Pittsburgh, Pa., artesian well	23.45	5.71	18.41	1.04	0.82	49.43
Springfield, Ill., 1	12.99	7.40	1.97	2.19	8.62	33.17
Springfield, Ill., 2	5.47	4.31	1.56	4.28	5.83	21.45
Hillsboro, Ill.	14.56	2.97	2.39	1.63	Trace	21.55
Pueblo, Colo.	4.32	16.15	1.20	1.97	5.12	28.76
Long Island City, L. I.	4.0	28.0	16.0	....	1.0	39.0
Mississippi River, above Missouri River	8.24	1.02	0.50	....	5.25	15.01
Mississippi River, below mouth of Missouri River	10.64	7.41	1.36	1.22	15.86	36.49
Mississippi River at St. Louis W. W.	9.64	6.94	1.54	1.57	9.85	29.54
Missouri River above mouth	10.07	8.92	1.87	3.26	11.37	35.49

* From Catalogue of The Heine Safety Boiler Co.

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