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THE VOYAGE OF THE GRAPHIC BALLOON.
As the 10th of September, the day setapart for the ascent of the Graphic balloon, is also the regular day of publication for the present issue of our journal, we are obliged to go to press without waiting to learn the circumstances of the de parture. In case the latter take place, however, the facts will be found in our following number. We have obtained, through the courtesy of Mr. Donaldson, a number of original sketches by that gentleman of novel and interesting apparatus and modes of performing operations pertaining to the voyage. These ingenious conceptions, we illustrate on our initial page, and give herewith various explanations and particulars concerniug them.
The representation of the air ship itself, which forms the center piece, is intended to give an idea of the proportionate sizes of the balloon, car, and life boat. The great sack is 108 yards in circumference, and is constructed in nine elliptical sections, each 176 feet long by 54 feet wide. These are joined together by means of two rows of stitching to each seam, in the style known to seamstresses as "felling"; and then each seam is covered with two coats of varnish composed of linseed oil, beeswax and benzine. The sewing together of the fabric is at the time of writing completed, and nothing remains to be done but to add the "re-inforce" or crown piece, consisting of one additional thickness of sheeting extending twenty feet in every direction from the zenith of the globe; and to complete the riveting-in of the safety valve at the extreme top. The marline netting which is to en velope the balloon, will then be put in piace and inflation proceeded with. The car is fourteen feet high. and is divided into two compartments, the upper of ten and the lower of four feet. The second floor, on which the aeronauts will live, is nine feet in diameter. The small cabin thus formed is furnished with tables, chairs, instruments, etc., and the space below is devoted to ballast and stores. The exterior of the car, which is now completed, is covered with blue and white striped canvas, and quite prettily decorated with flags. The peculiarity of this part of the apparatus is that it may be readily cut away, piecemeal, when it becomes necessary, through the escape of gas diminishing its sustaining power to lighten the balloon. After the ballast is all gone, the lower part, and then the upper portion, of the car is dropped, leaving the lifeboat still suspended from the concentrating ring, as a means of support to the voyager. The boat is twenty-two feet long by four feet broad, built of Spanish cedar, copper fastened and clinker built. She is fitted with the necessary spars and sails, and is considered fully able to keep afloat, even in the roughest weather.
The arrangements for suspending boat and car are shown in our engravings. In order to avoid any danger through the breaking of the concentrating ring, and at the same time to have the netting firmly secured thereto, the device shown in the lower left hand corner of the engraving is employed. This consists in fastening the heavy ropes (sixteen in all), which carry the weight of the car and its contents, around the ring by a clove hitch, and splicing a thimble in the upper ends to which the netting is attached. If, as was the case with the unfortunate La Mountain, the ring should break, the ropes would merely swing out and still support break, the ropes would merely swing out and still support ing without the clove hitch slipping from the latter.
Ing without the clove hitch slipping from the latter
In case gas should escape from the main balloon to such an extent that the aeronauts find themselves rapidly descend-
ing, the ballast goes first, then all movables, then the car, piece by piece, then the small balloon, until nothing is left but the life boat and also the canoe hanging from the concentrating ring. Four ropes lead from the boat up outside of the car to the ring, so that it hangs from the latter, independent of any other portion. The party is now in the boat but the balloon is still descending. As they near the water, drag composed of a number of canvas buckets attached at intervals along a rope is thrown out, forming a sort of sea
anchor and steadying the balloon. As soon as the life boa touches the surface, the sustaining ropes are cast adrift leaving her attached to the balloon by a single line which i fastened to the bight of another rope, the ends of which pass through rings near the bow and stern of the vessel, joining amidships. At the same time, a canvas drag is veered astern, keeping the bow of the boat in the direction the bal oon is travelling. This arrangement will be understoo from the drawing marked "detaching the canoe," an opera tion afterwards performed in a similar manner. Knots in the rope prevent it being drawn through the rings in the boat in the wrong direction. At the word, one of the party cuts the line between the rings, out of both of which at once the ends are of course pulled by the balloon. The boat is then free, and sail is made. Meanwhile one of the party (Donaldson) has remained behind. We may here remark that four persons are all that will undertake the voyage; the two aeronauts, Wise and Donaldson, an officer lately of the mer chant service, and a reporter of the Daily Crphic. While the operations of getting the large boat clear have bee under way, Donaldson has been letting out his drag of buckets, securing his canoe to the concentrating ring and finally fastening to the latter two blocks, through which he reeves a rope, to one end of which he attaches a bag of sand to act as a counterbalance, and to the other-himself. It is clear that, as soon as the life boat is cut adrift, unless some thing hold the balloon, it will, on being so greatly relieved shoot upwards too suddenly and dangerously. Here ths can vas buckets come in play, bu up to enable the balloon. once clear, these must be hathis is to be done, another of our drawings represents. Donaldson lets himself down by his drawings represents. Donaldson lets himself down by his
cord, the sandbag balancing him, until he can get hold of cord, the sandbag balancing him, until he can get hold of
the rope, then he pulls upthe buckets and empties them one the rope, then he pulls up the buckets and empties them one
by one. It is hoped that, by thus so greatly lightening the balloon, it may with its single passenger be enabled to reach the European shore in safety; but in case even these endeav ors prove fruitless, Donaldson will have to take to his canoe and trust to reaching land in her, or else to being picked up y some passing vessel.
The drawing of a man dangling like a spider from a line, on the right of our engraving, represents the mode of taking observations of the sun. The navigator is placed in a sling or chair, and hoisted by a whip from the balloon netting, well out on the sunny side, so that a sight can be got without the shadow of the globe. This apparently unsteady position will really, we think, be susceptible of less motion than on the deck of a rolling ship; the correction for "dip" to be applied to the observations, however, we imagine, will be something rather extraordinary.
The two upper sketches are a plan of an ingenious descen larm and of an automatic ballast regulator, both ideas of Mr. Donaldson. The former consists of an ordinary barom eter tube, A, ending below in a cup, B, filled, of course, with mercury. Passing up through the latter are two insulated wires, which, as shown, cennect with a battery and burglar alarm bell. These wires extend up the tube until they reach a point, corresponding to the hight of mercury due to an elevation of 2,000 feet above sea level. Here they meet, and at the junction is a non-insulated point of metal. Of course just so long as the balloon remains at an altitude below the point of junction of the mercury will be located descent occurs below that elevation, themercury, rising, comes in contact with the non-insulated metal, establishes the cur rent and sounds the alarm. The 2,000 feet mentioned is merely arbitrary, as the instrument will be regulated to give warning whenever the balloon sinks below the current of air in which it is desired to travel.
The ballast regulator is an ingenious contrivance for keeping the balloon balanced, so to speak, at just a certain hight. Mr. Donaldson informed us that the position of the air ship can be thus adjusted with the greatest nicety, and mentioned an instance where he managed to sail for a considerable distance at a hight of only six feet above the ground, hardly varying his altitude an inch until on carelessly throwing out a piece of bread, he was surprised to notice that he had ascended some feet. The apparatus referred to consists of a bladder, A, inflated before ascending, with common air, and placed ketween two boards, one of which is fixed upright and the other hinged thereto. A rubber spring keeps the movable piece up against the bladder, and, by suitable connection, the moving board is attached to the handle of the pigot of a water barrel, so as to turn a stream on or off in accordance with its motion. This connecting device is so adjusted that, when the bladder swells, as the balloon rises into atmosphere of greater tenuity, the handle of the spigot is moved to diminish gradually or check the escape of water Should, however, the balloon descend slightly, the contrac tion of the bladder allows the rubber spring to pull open the faucet, and permit a sufficient discharge to enable the re sumption of the proper level.

## HELL GATE

Owing to the reduced appropriation made this year for he improvement of the East River channel at Hell Gate, he work on Hallett's Point progresses slowly, very few mi ers being employed. The headings and galleries are nearly completed according to the original plan; still an immense olume of rock remains to be removed.
Our readers will remember that it was at first intended to remove part of the rock dry and the rest by grappling after the breaking up of the reef by a grand explosion. The experience since gained on Pot Rock has shown the cost of grappling in a current like that of Hell Gate to be much
der the unfavorable conditions that prevail at Hallett's Point It has, therefore, been decided to sink the entire excavation under the river some twenty feet deeper, making a cavit capacious enough to engulf the shell of the reef and its sup ports, yet leave a depth of water above sufficient for the passage of the largest vessels. The deepening of the ex cavation has been begun in the Humphrey and Hoffman headings.
The skill and care with which the work has thus far been carried on give assurance of the successful completion of the undertaking at as early a date as the funds provide will admit of. Already 90,000 blasts have been fired, con suming 33,000 pounds of nitro-glycerin, without a single acci dent-a remarkable record for an explosive material having such an ominous reputation for going off inopportunely. An elaborate survey of the Gridiron has been made by sound ings, during the year, but as no appropriation has been granted for its destruction, its lease of life is indefinitely ex nded.
Among the valuable scientific observations made during the progress of the work at Hallett's Point is an extensive
and very interesting series on the transmission of power by and very interesting series on the transmission of power by
compressed air. The drills are several hundred feet distant from the compressors, yet the var he receiver and the drills is surprisingly small, ranging about two or three pounds in a pressure of fifty. Not un requently the gage at the drill records a pressure one or two pounds greater than that simultaneously observed at th receiver, the excess being attributed to a pulsation cause by the periodic stroke of the drill.

## THE VIENNA PRIZES.

The complete list of awards to American exhibitors at the Vienna Exposition has at length been received, and 359 prizes have, it appears, been won by our representatives the otal number of whom, according to the latest information as 922 . It seems, therefore, that but a little over a third of all present, including those not competing, received distinc tions. Out of 412 grand diplomas of honor, the highes award, America has taken eight; four of these go to the group of Education, and are given respectively to the Smith sonian Institution, the National Bureau of Education, the State of Massachusetts, and the city of Boston. The re mainder are won by S. S. White of Philadelphia for arti ficial teeth, W. A. Wood, Hoosac Falls, N. Y., for mowing and reaping machines, William Sellers \& Co., Philadelphia, for puddling furnaces and tools, and Corliss for perfection of steam engines. The latter gentleman was not an exhibitor, although his improvements appeared on large numbers of both American and foreign engines, and consequently there is considerable dissatisfaction expressed by other per sons who went to the expense of competing but failed to gain the diploma
The medal for merit was awarded to 155 exhibitors. It seems that there was no comparison instituted between like articles in the departments of different nations, and that the premium simply means that a meritorious display has been made. One medal is as good as another, so that invention of real value and excellence, exhibited by originators and manufacturers, gain no higher distinction than articles of much less importance contributed through dealers and com mission merchants.
The medals ior progress number 57. This distinction is given for valuable designs or inventions made since the Paris Exposition of 1867. It may be fairly considered as a higher prize than the medal of merit. It has been awarded for chromos, photographs, several agricultural machines, the sind blast, and to the Remington, Howe, Wilson, Singer, Wheeler \& Wilson, Secor, and Weed sewing machines; be sides other articles, of which, for lack of space, we are obliged to omit mention.
The medal for good taste was designed for artists who do not compete for the progress or merit medals. Four have been awarded to Americans, two of them being to artists (Bierstadt and Healy); and, strange to say, two to makers of artificial teeth, which is probably a mistake in the published artifici
list.
The

The coöperative medal, given to assistants for producing meritorious articles of work, has been conferred upon 19 per sons. Three are awarded for labor on the Wilson Sewing machine, two for the Wheeler \& Wilson, three for the Singer three for the Howe, and one for the Weed
Honorable mention (or the diploma of recognition, as it is termed) has been made of 116 individual exhibitors, and also of ten cities for school reports.
In the absence of the particulars regarding the number of awards gained by other countries, it is hardly possible to estimate the relative proportion of prizes taken by Americans. It appears, however, ihat the comparison cannot be much in our favor, for it is stated that over $30,0 \mathrm{C} 0$ medals and diplomas were granted, and that the mere list filled a quarto volume of 529 pages. The only award of any real value is the diploma of honor, for the medals indicate no particular excellence. Our sewing machines, known to be the bestin the world, gained no higher distinction than the awkwardest imitations from English and German factories.
The description of the ceremony of presentation of med als characterizes it as an extremely stupid and tedious af fair. The Emperor was not present, and the awards, which it was supposed would be conferred by him in person upon distinguished inventors and others, were read from a list in the hands of Baron Senborn.

A New railway tunnel through the rocks of Jersey City Hights, opposite New York, has been begun by the Delnware, Lackawanna \& Western Railroad.

## the patent ice machine.

An interesting case pertaining to the artificial production of ice has lately occupied the attention of the Commissioner of Patents. We allude to the application of F. P. E. Carré for an extension of his patent for ice machines, patented in France in 1859, and in this country in 1860.
The Commissioner has refused the petition for extension, and the invention is now public property.
The general method of effecting congelation by artificial means is to make use of a liquid which will energetically assume the gaseous state at a low temperature. In passing from the liquid to the gaseous state, the gas takes up a large amount of heat, and it draws this heat from whatever body it happens to be in contact with. This phenomenon may be readily illustrated by pouring a few drops of water upon a plate, and resting the bottom of a watch crystal on the plate in contact with the water. If now a small quantity of ether is placed in the watch crystal, the ether will evaporate or is placed in the watch crystal, the ether will eaporate or assume the gaseous form withgreat rapidity, and will draw
so much heat from the water as to freeze it. This is the genso much heat from the water as to freeze it. This is the gen-
eral principle on which most of the ice machines operate, eral principle on which most of the ice machines operate,
and various refrigerating liquids are employed. In some of the mechines ether is used, in others sulphuret of carbon, in others the light liquids from petroleum. These subsiances, after having passed from the liquid to the gaseous form, may be again restored to the liquid condition by the application of pressure, to wit, nearly 100 lbs . to the square inch. For this purpose pumps worked by steam engines are usually employed, but the great pressure of the gas results in much leakage and consequent loss of power ; and until Carré brought out his improvement, the business of making ice was always attended with difficulty and expense.
In the Carré apparatus, a boiler containing ammonia and water is used, to which heat is applied, and pressure produced whereby the ammonacal gas is driven over and condensed in a suitable receptacle in liquid form. The pressure
is then shut off, when the ammonia immediately begins to is then shut off, when the ammonia immediately begins to
boil and expands into the gaseous form with energy. The chamber in which the ammonia is allowed to expand surrounds a vessel of water, from which the expanding gas absorbs caloric, and the water congeals. The ammoniacal gas is then brought into contact with cold water, by which it is absorbed, and the ammonia water is then returned to the boiler and again used in the manner described. The process of ice manufacture is thus made continuous. There is little or no waste of ammonia, for it simply circulates around through the apparatus in pipes and chambers, condensing at one point and expanding at another as required, no pumps one point and expanding at another as $r$
being required to effect the condensation.
The wonderful absorption, by water, of
The wonderful absorption, by water, of ammonia renders the use of this agent especially advantageous over any others at present known, for the purpose of ice making. At the
ordinary temperature, water absorbs over seven hundred ordinary temperature, water absorbs over seven hundred
times its volume of ammonia, while the latter may be readily expelled from the water by the application of heat, It requires a temperature of $103^{\circ}$ Fahr. below zero to solidify liquid ammonia. Placed in an iron vessel, it produces, at a temperature of $50^{\circ}$ Fahr. a pressure of $97 \frac{1}{2}$ lbs. to the square inch. It was used at one time in New Orleans as a motor for a street car, an engraving of which appeared some time ago in our paper.
It appears, from the proceedings before the Commissioner of Patents, that the Carré ice machine is now in extensive and successful use in various parts of the country, especially at the South. The city of New Orleans is chiefly supplied with ice made by this apparatus, which furnishes ice for $\$ 5$ a tun less than the price at which it can be imported from
the North. The Carré machine is one of the most valuable the North. The Carré machine is one of the most valuable
inventions of the day, and it is not therefore surprising that inventions of the day, and it is not therefore surprising that been compelled to use condensing pumps, should appear in full force at the Patent Office, to prevent the extension of the Carré patent. In this they have succeeded; and now they may throw aside their steam engines, discard their expensive pumps, and adopt the simple, effective and brilliant inve tion of Carré.
What surprises us is that the Commissioner of Patents should have rejected Carré's petition on the slender reasons that he assigns. He states that Faraday bent a glass tube into $U$ form, and put ammoniated chloride of silver in one end, to which heat was applied. The result was that the ammonia was driven over and liquefied in the opposite end of the
tube, which he now dipped in water. The heat being removed, the liquefied ammonia then expanded into gas, extracted caloric from the water and congealed it, and the gas went back to the other end of the tube and was again absorbed by the chloride of silver.
The Commissioner states that all that Carré did was to take this principle, first illustrated by Faraday, and substitute it, in ice machines, in lieu of the exhausting and condensing pumps used in Twining's, Perkin's and other ice apparatuses. Carré's labors during a period of thirteen missioner thinks is sufficient compensation.
This decision of the Commissioner, drawn up by a Board of Examiners in Chief at the Patent Office, is only one more illustration of the worthlessness of the Washington examinations, by which inventors are too often deprived, not o of credit for their discoveries but of substantial benefit
What Carré did was to give to the public a new and splendid refrigerating apparatus, whereby cooling chambers for the preservation of important articles of food, and the production of ice, could be readily and econonically effected. This was a great achievement, something never done before and entitled the author to the highest consideration as a public benefactor. The economic advantages conferred up-
on this country, by the introduction of Carre's invention, already amount to millions of dollars per annum; and every year, as the use of the invention is extended, these benefits will be augmented.
In the face of these undeniable facts, which are presented in the Commissioner's report, he dismisses the petition of Carré and attempts to belittle the invention by pronouncing Carre and attempts to belittle the invention by pronouncing
it merely a substitute for pumps, and merely an imitation of Faraday's tube. Faraday's glass tube experiment was made public in 1823 , but remained inert and useless, so far as practical ice manufacture was concerned, for more than a generation. It was not until Carré, in 1859, produced the present invention that ice could be economically manufactured, and but for Carré it is probable that we should not now be in possession of this remarkable and invaluable process. The Commissioner's conclusion is narrow-minded ard erroneous. A device which is merely a substitute for an other, is only capable of the functions of the original. Carré's invention was far more than a mere substitute. It eliminated from ice machines all the difficulties that had attended their operation. It rendered them effective, economtended their operation. It rendered them effective, econom-
ical, and commercially practical, when before they were pxical, and commercially practical, when before they were ex-
pensive, leaky, and well nigh useless. The tube of Farapensive, leaky, and well nigh useless. The tube of Faraple. But, commercially speaking, it was not an ice machine. It required more than thirty years of time and the inventive genius of a Carré to give the principle practical embodiment, or harness it into duty for creating ice.
The action of the Commissioner of Patents in decrying the merit of Carre's discovery we regard as a disgrace to the country; and we trust that the next Congress will make prompt amends by reversing the Patent Office decision.

## PENS AND THEIR FAILINGS.

It is a noteworthy fact that the man who made more steel pens than any other, and better ones,-the late Joseph Gil-lott-never wrote with a steel pen. With all the men and machinery at his command he was never able to produce a pen that suited him so well as the time-honored plume of the old gray goose. Mr. Gillott was not alone in his prefer-
ence for the inconvenient yet easy quill. The kindly firm. ence for the inconvenient yet easy quill. The kindly firm
ness of its bearing and its easy movement have never been approached by any of its metallic imitations. The iridium pointed gold pen, properly ground, comes nearest to the writing quality of the quill, and greatly excels it in durabilSteel pens, though excellent properly ground by the too hard, scratchy, and tiresome for rough and ready writing, their persistent use resulting in that painful exhaustion of the nerves and muscles of the hand and arm known as writers' cramp-a malady due not so much to the necessary abor involved in tracing the letters as to the unnecessary and exaspeating effort constantly called for in forcing the
pen to go the way it goes hardest, and in keeping it from pen to go the way it goes hardest, and in keeping it from
swerving right and left into easier paths: a malady, it may be added, which dates its origin from the introduction of steel pens, and which is demonstrably not caused by the chemical action of the ink and the resulting electric currents, or anything else save the vicious action of the pen itself. To return to the goose feather is impossible. The supply is inadequate to meet the great and increasing demands of modern witing. For much of this literary and commercial labor, the writing machine in some form or other will be re quired; but there will still remain an immense amount of irregular writing which must be done by hand with metal pens; and the penmakers began to furl some blinding effect of tradition qualities of the quill. Only the blinding effect of tradition and training can account for the failure of penmakers to discover and correct the radical and
plainly apparent faults of their productions. Take for ilplainly apparent faults of their productions. Take for il-
lustration, the most common and mischievous of pen defects, faulty pointis:g.
One of the first principles of mechanical construction is that the bearing surface of any sliding tool or structure should be such that the line of least resistance shall lie in the direction in which you wish it to go. Skate irons, sled runners, and a thousand other illustrations will occur to the reader. The principle is too plain and self-asserting to be overlooked by the dullest, save in the matter of penmaking. In pens, how ever, the line of least resistance, if there be any, is sure to The any direction rather than that of the general stroke The only effort made to lessen the resistance shows itself in
giving a round point to the pen, a device most commonly adapted by gold pen makers. This is better than nothing still it is faulty, in that it compels the user to constant exer tion in keeping the stroke from wavering; and at the same
time it reduces the bearing surface of the pen to the minimum, time it reduces the bearing surface of the pen to the minimum, thus increasing friction and making fineness coincident with scratchiness. It is like setting an ice boat on round knobs,
To give a fine stroke easily and smoothly, a pen should rest not on a point but on an edge several times longer than it is thick, its length lying in the direction of the up stroke. By this means, the bearing surface of the pen is increased many times, and the smoothness of the writing in proportion. And as the least resistance is met in the line of the upstrok the writing will have a regular slant without any effort on
the part of the writer to steady his hand. The down strokes lying at a slightly greater angle to the line of writing will, of necessity, be a trifle broader, giving distinctness to the letters, likewise without change of pressure or other effort.
Sharpen a lead pencil, making one end flat and the other to a round point; then compare the writing of the two, for il ustration of the position here taken.
A wrist all but crippled by the use of pens of ordinary
pen points, experimental as well as theoretical, for his own relief. Through the destruction of innumerable pens,-a the surgeon spoiled his "hatful" of eyes-the following process has been developed for converting an ordinary stiff, scratchy, tiresome pen into one that will glide over the paper as kindly as a quill. It is comparatively easy to give a quill point to a steel pen; but it soon wears sharp and require frequent retouching on a fine stone to keep it in condition A well tempered gold pen is better. Choosing cne with a large point-a Mabie, Todd \& Co.'s "Broad I'oint" is the easiest to improve,- carefully grind the back bevel-wise un til the "point" presents a long sharp edge, like that of a narrow chisel, slightly oblique to the line of the slit. This done, rub the writing edge lightly on a fine hard stone, hold ing the pen as in ordinary writing. This will give a bearing surface as above described. The outer and inner corners of the edge and those at the slit will require a few light touches to round them slightly. Any roughness due to the coarseness of the stone may be removed by delicate rubbing on a finer stone or on hard paper. If the pen lacks the soft quick spring of a good quill, grind or scrape away as much gold from close to the point as may be required to bring it to the desired flexibility. A pen so improved will have all the good qualities of a quill, so far as attainable with a metal so slow tempered as gold. It is impossible that, by the use of some more elastic non-corrosive alloy like American Sterling, a perfect quill action could be attained, together with
durability. What penmaker will try it, and bless mankind while making a fortune for himself?
DEODORIZING THE OFFAL FROM SLAUGHTER HOUSES We publish, on another page, an illustrated description o an invention and process for treating the offal from slaugh ter and rendering houses, and converting it into a fertilizer. This subject is most important from a sanitary as well as from an economical point of view; and this new system is probably destined to come very largely into use. In Cbicago the health authorities have suppressed the use of all othe apparatus for this purpose, on the ground that the hygienic necessities of the case were not complied with, leaving the Storer method master of the field.

## SCIENTIFIC AND PRACTICAL INFORMATION.

## silica lenses.

In a new work entitled Telescope and Microscope, recently published in France, the fellowing method of obtaining a lens for a cheap microscope is ascribed to an experiment o Sir Humphrey Davy. The process consists in igniting one end of a wheat or hay straw and allowing the entire spea to consume gradually. The cinder is then heated in the blue flame of a burner; and from the silex contained, a solid glob ule of glass is formed, said to be well suited for microscopi purposes.

## mushet steel

Professor Heeren has analyzed this remarkable metal and finds that, excluding carbon and perhaps traces of other sub stances, it contains 8.3 per cent of tungsten and 1.73 per cent of manganese. Untempered, this steel resists the file; but after tempering, it becomes much softer and readily yields.
ammonia in pneumatic tubes.
MM. Tommasi and Michel have suggested the substitution of ammoniacal gats air, in propelling dispatches through the tubes of pneumatic systems. First combined with wa ter, the gas disengaged by heat enters the orifice of the tube and, being under sufficient pressure, drives the dispatch boxes through before it. On reaching the exit opening, it re-condenses, forming a vacuum in the pipe through which the boxes may be roturned by atmospheric pressure. Th apparatus is said to require very little fuel or gas.
methyl green
In preparing substitution products of rosaniline (fuchsin) with the alcohol radicals, instead of causing the iodine com pound to act upon a salt of rosaniline, it is now customary to produce them directly by the oxidation of methyl-aniline In this way a compound is obtained, which is chernically identical with the so-called iodine violet, but which is pre pared without the use of iodine. It is known in the trade as methyl-violet, to indicate the method of its preparation. It is distinguished by its losing none of its brilliancy by arti ficial light. This preparation of methyl-violet could not fail to influence the manufacture of iodine green. A means wa sought for causing the methyl violet to take up the radica methyl so as to form the green methylated methyl rosaniline In this case the use of iodide of methyl was not absolutel necessary; and in many manufactories in South Germany the chlorine compound is used, which produces a green crystalizing in beautiful crystals, while the iodine green is an amorphous powder; the chlorine green is also more solu ble in water than the iodine. Not being obtained as a by product in making violet, there is no foreign dye adhering to it, and a fresh dye bath gives as soft a green as one that has been used, which is not the case with iodine green, a fact generally known. Hence the so called methyl green has two impo
methyl.
methyl.
First,
First, it is more permanent than iodine green, and the solu ion may be boiled without decomposition. Secondly, woo is dyed with methyl green alone, it not being necessary, a formerly, to neutralize with ammonia and afterward brighten with acid. In dyeing different shades, this is of great importance. The extensive use of iodine in the man
ufacture of aniline colors for the last nine years has caused ufacture of aniline colors for the last nine years has caused a fi, urfold increase in its price, and was continually becom
ing more expensive, so that it is important to be able to dis pense with it altogether.

We presume there are few of our agricultural readers who at some period have not heartily anathematized the moles. Although these little animals do a considerable amount of good in killing insects and worms which would destroy grain, they more than counterbalance the benefits they confer upon the farmer by the injuries they inflict upon the work of the gardener. They appear to have a taste for the choicest bulbs and for the roots of the rarest flowers, while their tracks very speedily ruin the appearance of smooth and neatly kept lawns.
The Patent Office records show that plenty of inventive genius has been expended in attempts to devise an efficient mole trap. Of these inventions we have tried quite a num ber in our efforts to rid our garden of the nuisance, but we have found none so satisfactory as the very simple plan re presented in our engraving. As soon as a fresh mole run is

found, indicated of course by a ridge on the surface of th ground, a hole should be dug and a large sized ordinary flower pot set therein. Over the top of this receptacle, a piece of board is placed, leaving a space of about three inches between it and the edge of the pot so that dirt from above will not fall into the latter. The openings of the run lead, as represented, into this space. The earth is replaced and the surface of the ground restored. The mole in following his usual road blindly comes to the orifice leading to the pot, into which he incontinently tumbles. As he is unable to crawl up the sides or burrow through the hard earthenware, he decides to remain and wait for assistance, which generally comes in the shape of a gardener and a rat terrier. The transactions of the mole with the last mentioned of this pair are such as to destroy his taste for bulbs or for fucure min ing investigatious.
In using this device, we caught seven moles the first day and three on the second day after setting. Since then we have captured one occasionally. The result is a marked improvement in the aspect of our lawn and flower beds. Ths trap was contrived by George Becker, a gardener in Llewellyn Park, Orange, N. J., and is not patented.

## Water Gas

The improvements of W. D. Ruck are now in successful operation at the gas works of Chichester, England, and that city is now lighted by the new method, which is described as follows in Engineering:
The elements are water, coke, iron, and spirit. The water is converted into steam, which is passed through a superheater, and then through a set of retorts containing coke and iron, the charge for each retort being $1 \frac{1}{2}$ cwt. of coke and 1 cwt. of iron One tun of coke put in and worked off, plus the steam, produces 132,000 cubic feet of gas, and to effect this 2 tuns of coke are used in the furnace. The gas thus produced is passed through a condenser and a washer similar to a Coffey's still, and afterwards through a purifier containing oxide of iron. From the purifier it is conducted to the satuator, where it passes through rectified petroleum spirit, which increases the bulk of the gas about 25 per cent, so that
132,000 feet becomes 165,000 feet, the cost of which is stated 132,000 feet becomes 165,000 feet, the cost of 'which is stated to be 40 centf per 1,000 feet.
In carrying out the manufacture of water gas at Chichester, the gas works have been only partially altered, so that the manufacture of coal gas is still carried on; the public, in fact, being supplied with a mixture of the two gases. This, it would appear, is the most economical method oi applying the water gas, inasmuch as the coke from the coal gas can be utilized, and the latter gas can be made from cheap coal, as the former is found to be a very rich gas. Hence gas companies will probably find the water gas process useful as a supplementary manufacture while and whenever coal is dear, for it is not intended that it shall supersede the ordinary manufacture. At any rate, present experience at Chichester goes to place this beyond a doubt, for there a pure and brilliant combined gas is produced, having an illuminating power of 18.50 candles. The city and environs of Chichester have for some six or seven weeks past been lighted by a mixture of the two gases in proportions varying from one third to two thirds, the present proportions being equal parts. Arrangements have been made for lighting the city for twelve months with this gas. In order to demonstrate to those interested in gas making that the process can be applied to existing works practically and economically, more than a hundred gentlemen, the greater portion being gas engineers and managers, re cently visited the works. They were conveyed from London to Chichester by special train, and when there saw the whole process in operation, explanation being given by Mr. Spice and Mr. Quick, the engineers to the new gas company. Mr. Spice was put under cross examination by several gentlemen who were skeptics on various points, but he reasonably and conclusively answered every argument brought to bear against the new gas, both with regard to details of manufacture and commercial points. At the Chichester works cual costing 30 s. per tan was formerly used, while an inferior coal at 21 s . is now employed in the retorts, the re
sulting coke being utilized in producing the water gas The stability of the gas has been proved by keepingitfor si months, at the end of which time it is stated no separatio or condensation had taken place. Its travelling capacity i shown by the fact that it has been delivered by itself, and is now delivered in combination with coal gas to lights $2 \frac{1}{2}$ miles from the works, and burns freely. That the lighting of the city is all that can be desired was admitted by th visitors who strolled through the streets after dark, previous ly to their return to London. The new gas has been sub jected to the test of a reduction of temperature to the ex tent of 27 degrees without its illuminating power being af ected. In fact everything appears to have been done to prove in it a commercial manner, the greatest proof of all being its practical adoption at Chichester, by which, up to the present time, it is shown to be a scientific as well a a commercial success.

## DEEP SEA DREDGING APPARATUS

The headquarters of the United States Fish Commission have been established for the present season at Casco Bay Me., and the work to be accomplished consists in explor ing the waters and sea bottom in the vicinity in order to ob tain all ascertainable facts relative to the animals inhabitin that region. The Blue Light, a steamer of 85 tuns, has bee fitted with all the latest appliances and machinery, an placed at the disposal of the Commission.
We extract from the Tribune the accompanying illustra tions of the instruments employed in deep sea explorations, he most useful of which is the dredge, which, in its presen


Fig. 1.
form, is capable of scraping, from the ocean floor, everything lying in its path. It consists of an open iron frame ( $a$ in he engraving, Fig. 1), which acts as a scraper, and to which is attached a fine meshed net, $b$, about four feet in length


Fig. 2
d, serving to protect the former from injury while it is dragged over rocks. To extricate the implement in case it becomes caught on any obstacle at the bottom, the drag rope $d$, is attached to only one of its handles, and is connected to the other by a light line, $e$. It follows that, when a har rain comes, the light line breaks, and the heavy rope pull hereafter at one end of the frame. The obvious result is to

pull the scraper sideways out of its predicament. This is simple modification of an old device, and is quite efficacious To bring the scrapers down to their work, a weight of about wenty pounds is attached to the drag rope, one or two yards in advance of the dredge.

The specific value of the apparatus is as a scraper, as it rings up an abundance of material from the sea bottom but where the bed is comparatively smooth, and the chie object in view is to obtain fishes and other active marine an mals characteristic of the locality, the trawl (Fio. 2) is a more serviceable instrument. The front of the trawl is a beam $a$, in our second figure, ten or twelve feet long, to the ends f which are affixed curved iron shoes or runners, $b$. From it depends a funnel shaped net, $c$, of perhaps thirty feet in depth, weighted by a string of leads, $d$, on the forward low r edge. These weights and that of the runners are suff cient to sink the trawl, and it does not usually need an extr weight in front, on the drag rope, as does the dredge. Pro jections or webs, $e$, proceeding from the inside of the net called pockets, serve to prevent fishes captured in the ne from getting out by the route that they goin. Over a smooth bottom and meeting no obstructions, such a trawl may be dragged along for hours at a time, till it grows so heav with its accumulated treasures that its safety requires tha t be hauled up and emptied. But, on the other hand, it may catch suddenly. Having caught, unless the strain is a nce relaxed, it will be torn to pieces. On the other hand if skillfully managed, it may be made to bring up almos anything which it incloses, and there is shown at the land ing near the laboratory, on this island, a rock weighing near ly a quarter of a tun, which the Blue Light brought up in the trawl. The problem, therefore, is, when the trawl catch es, to relieve the strain at once, and this accomplished in the following manner: The trawl, suspended by a strong rope is let down rapidly from a davit on the bow of the steamer until the slackening of the rope indicates that bottom is reached; the steamer meanwhile moving slowly backward till a suitable angle is secured, so that the trawl will drag properly over the sea bottom. Then, while the rope is stil running out, a seaman swings himself out on the davit and ties one end of a light line, called the check-stop rope, with a skillful knot, fast to the drag rope, and the other end to the side of the vessel. The business of trawling is now fairly begun, and the steamer is backed slowly along ove the ground selected, at the rate of about a mile and a hal per hour.
Fig. 3 shows this check-stop arrangement; $a$ is the davit the drag rope, and $c$ the check- stop line.
The trawl is now dragging from the bow and suddenly catches on the bottom. The strain has been all along on the check-stop rope which now parts with a snap. Instantly the order is given to reverse the engine; but long before the motion of the boat can be changed, the slack of the dra rope, which this simple contrivance has provided, relieve the strain, and time is afforded to let it out until the motion changes. The boat is then run rapidly forward until it stands over the sunken trawl, the steam engine winding in the drag rope. Then, with a little dextrous managemen the trawl is easily pulled away. This device entirely take the place of the costly accumulators used in the telegrap cable service, instruments which interpose a sort of drum made of india rubber in place of part of the drag rope, the elasticity of the material serving to release a heavy strain.

## The Heart and the Circulation of the Blood.

 Dr. Marey, says Les Mondes, has recently demonstrated that the heart acts like all mechanical motors in that the fre quency of the pulsations varies according to the resistance which it meets in driving the blood through the vessels. When the resistance becomes greater, the throbs diminish they accelerate, on the contrary, if the opposition become less. During life, the action of the nervous centers make itself felt on the heart, of which it renders the pulsation slower or quicker, whatever may be the resistance experi enced. Dr. Marcy eliminated this nervous influence by re moving the heart of an animal, and causing it to work under purely mechanical conditions. The heart of a turtle was ar ranged with a system of rubber tubes representing vein and arteries. Calf's blood, defibrinated, was caused to cir culate, and a registering instrument noted the amplitude and frequency of the movements of the organ. When th tube containing the blood leaving the heart was compressed the liquid accumulated in rear of the obstacle and the hear emptied itself with greater difficulty, the pulsations weaken ing perceptibly. On relaxing the pressure, thos allowing free course to the blood, the throbs accelerated rapidly.
## Pure Sub-Iodide of Mercury

Lefort recommends the following method for preparing the sub-iodide of mercury free from iodine and from metallic mercury: 60 grains of pure crystallized pyrophosphate of soda are dissolved in 300 grains water, and 30 grains acetate of the suboxide of mercury added. The solution require several hours, during which it is frequently shaken. If the soda salt is chemically pure, the mercury salt dissolves per fectly; but this is seldom the case, and the excess of alkal precipitates some oxide of mercury, so that the solution re quires filtering. It is then still further diluted with water and a solution of 30 grains iodide of potassium in 2 ounce of water gradually added with constant stirring or shaking This produces a precipitate which is at first a brownish green, but becomes a bright green, closely resembling oxide of chro mium, and on settling acquires a yellow green color. If the mercury solution contains any mercuric salt at the start some biniodide of mercury is formed, giving the liquid pinkish color; but this is easily avoided by adding a slight excess of iodide of potassium, which is so dilute as not to decompose the sub-iodide, while it is able to dissolve the bin iodide. The precipitate is washed with cold water by de cantation, collected on a filter and dried with gentle heat in the dark.
 ever while the work is going on, so that there is no
generalprogress of the manufacture. (6) The gas pipes, be ing supporters also of the platform surrounding the fur nace mouth or top, render the said platform indepen dent of the blast furnace proper, and that without involving

The inventor, whose extensive experience entitles him to speak with authority, states that he has been using this meth od for the last six years with the very bestresults. Its application is very simple indeed, and free from the objectionable features of other known methods, since the work of the
bottom of the furnace can be performed in case of need with. out depending upon the mouth of a tweer for run ning off the slag.
The hearth is closed in by a cast iron tymp placed in the usual position (se Fig. 2). This tymp arch is cooled by a current of wa ter passing through a coiled iron pipe fixed in the cas iron. In the center of this plate, there is an aperture o orifice measuring 0.75 inch running almost over the en tire hight, and the cooling pipes are situated as near this kind of slit as may be This slit is closed up means of ordinary clay $A$ the uper ordinary clay. A the upper portion of the slit, is placed two or thre inches higher than the cen
ter of the line of ter of the line of the tweers.
$b$ is the level center of the tweers, $c$ the column of the breast, $d$ the dam, $e$ the tap hole, $p$ the space between the dam ston (tymp closed in with slay) (tymp closed in with clay) T, cast iron tymp. The slag ing above the dam ascend ing above the dam stone and reaching the level of the tweers, runs off easily through a hole driven by means of a light steel bar into the said slit; and since the level of this hole may be altered at will, a means is thus afforded for chang ing the level at which the slag is run off over a rang of 24 inches, which is very great advantage in it self: but, in self; but, in addition to that, there is this further facility, namely, that no thing hinders one from tap occasion to apprehend any extinction of the fires so long as
the in-wall is not destroyed. The hearth and boshes can be renewed without affecting the in-wall injuriously. (4) Each particular brick being accessible during the working of the furnace, corrosion can be obviated by cooling down with water thrown on the several parts, or by means of water vessels or tweers, whereby the wear and tear can be checked. (5) The utilization of the gas at the furnace mouth can be so managed as to make it yield the best results. The pillars supporting the platform of the furnace top are gas pipes, and drop into sheet iron vessels fixed to the summit of the base of the stack where it slopes away. These vessels are open on one side, so that, when filled with These vessels are open on one side, so that, when flled with
water ap to a certain hight, they can be shut down by means of a valve measuring a few inches square. The gas issuing forth out of the furnace mouth finds its way into these receptacles, and in its passage through them travels over a
clearing off the dust and grit that may still be clinging to
the inner walls of the pipes. Moreover, there is the ad-


Fig. 2.
vantage of confining these subsidiary appliances to a spot on the works, which does not in any way interfere with the
ping the melted ore at this same slit
We are indebted to the Engineer
We are indebted to the Engineer for this illustration and for part of the explanation thereof.

## HOW TO CONDUCT SLAUGHTERING, PACKING AND

 RENDERING WITHOUT OFFENSE.The subject of the disposition of the offal from slaughter ing and packing houses, at present agitated in all our grea cities, has become a matter of national importance. These establishments are necessary to civilized life, and therefore have legitimate claims to existence; but the people who suf fer from the offense caused by them have also a right to fer from the offense caused by them have also a right to
insist that they shall be carried on without injury to health insist that they shall be carried on without injury to health
or property. In many instances, otherwise most desirable and valuable suburbs have been monopolized by these estab lishments. The interests of a business so extensive and
important should be made to harmize important should be made to harmonize with sanitary laws

and rights of land owners. Suggestions to this effect have been made and many plans devised, and we now present to our readers a plan which is claimed by the inventor to be the quickest and most comprehensive method of accomplish ing the end. All the offense from these establishments arises from the manipulation of the blood and offal.
By the apparatus and processes of Jacob J. Storer, of Boston, these are so handled and treated that no cause of com plaint can exist. The accompanying engraving illustrates the revolving deodorizing cylinder, designed by Mr. Storer, for converting the blood and offal into fertilizers. The cylin der consists of a boiler shell lined with fire brick. It is se at a slight incline for the more ready delivery of the dried fertilizer, is supported on friction rolls, and made to revolv by gear or belt. At the feed end of the cylinder is a fireplace in which a fire is maintained for the ignition of the pulver ized fuel, which, under the Whelpley \& Storer patents, is the principal agent of the work. At the delivery end of the cylinder is a receiving chamber or pit, into which the dried material falls, and whence it is removed by a bucket elevator. Just beyond this pit, and in the base of the smoke stack, is the gas mingling and combustion chamber, having a dome shaped perforated roof
This machine is operated as follows: The fire is urged in the first fireplace until it has become hot enough to instantly ignite the pulverized coal, which is injected over it by the pulverizer or blower, as shown in the engraving. The jet of burning pulverized coal, entering the cylinder, quickly heats it to the desired temperature. At the same time, the fire on the grate in the gas combustion chamber has brought the walls of the chamber and the perforated dome to almost a white heat. The cylinder is then put in revolution at the rate of four tuns a minute, and the blood and offal, sepa rately or together, are fed into it by an elevator. The mate rial, as it passes through the cylinder, is exposed to the direct contact of the flame and products of combustion, and to the direct radiation of the hot brick lining of the cylinder As it contains from fifty to eighty per cent of moisture, an enormous volume of steam and gases is immediately generated. These reove forward into the gas-mingling and combustion chamber. and, by the high temperature therein maintained, are decomposed and burned, the perforated dome retaining them sufficiently long for this purpose. There escapes, then, through the perforations of the dome, an intense white flame, of sufficient volume to generate stean for all the purposes of the work, not the slightest offensive odor escaping.

The fertilizer is preferably allowed to discharge from this machine while it still contains from 8 to 10 per cent of mois ture. It is found that, notwithstanding the high temperature in the cylinder, it cannot be charred or burned, because of its envelope of steam, while it contains this percentage of water
A cylinder 4 feet in diameter and 30 feet lon $\gamma$ treats from 3 to 5 tuns of raw material per hour, converting it into a fertilizer containing not more than 10 per cent of moisture. A cylinder 6 feet in diameter and 50 feet long will treat from 10 to 15 tuns per hour, according to the character of the material, or above 250 tuns per diem.
The capacity of these machines and their rapidity of work are such that one of them will dispose of all the refuse o any one of our large cities,obviating thenecessity of an hour' accumulation of raw material about any establishment. A cylinder of 5 tuns capacity per hour, with necessary auxil iary machinery and buildings, can be erected for about $\$ 10$, 000 . Works of twice this capacity could be erected for about $\$ 15,000$
Most of the offense of slaughtering and rendering est ab lishments arises from the escape of tank steam and gases,
from the accumulation of "tank stuff" and blood, and the from the accumulation of "tank stuff" and blood, and the
manner of disposing of the "tank water." The steam and manner of disposing of the "tank water." The steam and
tank water are disposed of inoffensively in the following manner: The tank steam and gases are carried through cold iron coils for condensation. The condensed steam is then passed through efficient filters, while che uncondensed steam and gases-already reduced to a minimum-are carried into a combustion chamber like the one attached to the deodoriz ing cylinder, and there burned.

The tank water is made to flow through a series of "catch basins." Each series, used alternately, is divided into sets of two or more basins. In the first set the heaviest particles
of animal matter are deposited. In the second set the particles of animal matter in suspension are deposited by the application of a proper precipitant, while the third set of basins is furnished with proper filters, for further purification of the water, and from these it may flow into the sewers or streams without contaminating them. The precipitated animal matter-which amounts to 8 or 10 per cent of the weigh of the " tank water"-is remov
By spreading a slight covering of fine charcoal upon the
tank stuff" as soon as it is discharged from the tanks, and upon the surface of the blood in the receiving tubs, the escape of offensive odors is entirely prevented. The same ap plication is made to these, as well as to the dead animals, when they have been loaded into cartsor boats for transport ation.
For further information, address J. J. Storer, 161 Tremont street, Boston, Mass.
Progress of the hoosac Tunnel during August, 1873. -Headings advanced from the east end westwardly, 158 feet; from the west end eastwardly; 93 feet. Total advance
during month, 251 feet. Entire lengths opened to Septemduring month, 251 feet. Entire lengths opened to DeptemWhole length of the tunnel, 25,031 feet.
on the honey-making ant of texas and new MEXICO.
by henry edwards, Californian acial of scian
The natural history of this very curious species (Myrmecocystus Mexicanus, Westwood) is so little known that the pre servation of every fact connected with its econon:y become a matterof considerable scientific importance, and the fol owing observations, gleaned from Captain W. B. Fleeson of this city, who has recently had an opportunity of studying the ants in their native haunts, may, it is hoped, be not with out interest.
The community appears to consist of three distinct kind of ants, probably of two separated genera, whose offices i the general order of the nest would seem to be entirely apar from each other, and who perform the labor allotted to them without the least encroachment upon the duties of their fel ows. The larger number of individuals consists of yellow worker ants of two kinds, one of which, of a pale golden yellow color, about one third of an inch in length, acts as nurses and feeders of the honey-making-kind, who do not quit the interior of the nest, "their sole purpose being, apparently, to elaborate a kind of honey, which they are said to discharge into prepared eceptacles, and which constitutes the food of the entire popu ation. In these honey seeking workers the abdomen is dis ended into a large, globose, bladder-like form, about the siz of a pea." The third variety of ant is much larger, black in color, and with very formidable mandibles. For the purpose of better understanding the doings of this strang community, we will designate them as follows: 1. Yellow workers; nurse and feeders. 2. Yellow workers; honey makers. 3. Black workers; guards and purveyors. The
ite chosen for the nest is usually some sandy soil in th tighborhood of shrubs and flowers, and the space occu pied is about from four to five feet square. Unlike the nest of most other ants, however, the surface of the soil is usuall undisturbed, and, but for the presence of the insects them selves, presents a very different appearance from the ordina ry communities, the ground having been subjected to no disurbance, and not pulverized and rendered loose as is th ase with the majority of species.
The black workers (No. 3) surround the nest as guards sentinels, and are always in a state of great activity. They form two lines of defence, moving different ways, thei march always being along three sides of a square, one colum moving from southeast to the southwest corners of the fortif cation, while the other proceeds in the opposite direction In most of the nests examined by Captain Fleeson, the direc tion of the nest was usually towards the north; the east west, and northern sides being surrounded by the soldiers while the southern portion was left open and undefended In case of any enemy approaching the encampment, a num ber of the guards leave their station in the line and sally forth to face the intruder, raising themselves upon thei hind tarsi, and moving their somewhat formidable man dibles to and fro, as if in defiance of their foe. Spiders wasps, beetles, and other insects are, if they come too near
to the hive, attacked by them in the most merciless manner and the dead body of the vanquished is speedily removed from the neighborhood of the nest, the conquerors marchin back to resume their places in the line of defence, thei

object in the destruction of other insects being the protec tion of their encampment and not the obtaining of food inels, another and still more numerous division will be found busily employed in entering the quadrangle by a diagonal line bearing northeast, and carrying in their mouths flowers and fragments of aromatic leaves which they deposit in the center of the square. A reference to the ac-
companying sketch will give a more clear understanding of their course, the dotted line, $a$, representing the path ofthis atter section, while the mound of flowers and leaves is marked $c$. If the line, $a$, be followed in a southwest direc tion, it will be found to lead to the trees and shrubs upon which another division of the black workers is settled engaged in biting off petals and leaves, to be collected and onveyed to the nest by their assistants below. On the west side of the encampment is a hole, marked $d$, leadin own to the interior of the nest, which is probably chiefly in ended for the introduction of air, as, in case of any individ als carrying their loads into it, they immediately emerge and bear them to the common heap, as if conscious of having
been guilty of an error. A smaller hole, near to the south east corner of the square, is the only other means by which theinterior can be reached, and down this aperture, marked $b$, the flowers gathered by the workers are carried along the ber of smialler yellow workers (No. 1) who, with their weak er framos and less developed mouth organs, seem adapt ed for the gentler office of nurses for the colony within It is remarkable that noblack ant is ever seen upon the line, $e$
${ }^{\text {and }}$ no yellow one ever approaches the line, $a$, each keeping his own separate station and following his given line of duty with 2 steadfastness which is as wonderful as it is ad mirable. By removing the soil to a depth of about three feet, and tracing the course of the galleries from the entrance $b$ and $d$, a small excavation is reached, which is spread in the form of a spider's web, a network of squares spun by the insects, the squares being about one quarter inch across, and the ends of the web, fastened firmly to the earth of the sides of the hollow space which forms the bottom of the excavation. In each. one of the squares, supported by the web, sits one of the honey-making workers (No. 2), appar ently in the condition of a prisoner, as it does not appear that these creatures ever quit the nest. Indeed it would be difflicult for them to do so, as their abdomens are so swollen out, by the honey which they contain, as to render locomotion a task of difficulty, if not to make it utterly impossible.
The workers (No. 1) provide them with a constant supply of tlowers and pollen, which, by process analogous to hat of the bee, they convert into honey. The fact that the remainder of the inhabitants feed on the supply thus obtained, though it is surmised, has not been established by actual observation; indeed with reference to many of the habits of these creatures, we are at present left in total ignorance, it being a reasonable supposition that, in insects so remarkable in many of their habits, other interesting acts are yet to be brought to lightrespecting them. It would be of great value to learn the specific rank of the black workers (No. 3), and to know the sexes of the species forming he community, their season and manner of pairing, and whether the honey-makers are themselves used as food, or if they excrete their saccharine fluid for the benefit of the inhabitants in general, and then proceed to distil more. I reret that at this time I am only able to bring before the notice of the Academy specimens of the honey-makers (No, 2), the other members of the community, except from Cap. tain Fleeson's description, being quite unknown to me. It is, however, my hope that, at a future meeting, I may be enabled to exhibit the other varieties, and to give some more extended information upon this interesting subject. The honey is much sought after by the Mexicans, who not only use it as a delicate article of food, but apply it to bruisel and swollen limbs, ascribing to it great healing properties. The species is said to be very abundant in the neighborhood of Santa Fé, New Mexico, in which district the observations of Captain Fleeson were made.

## Cutrespondente.

## Hight of the Earth's Atmosphere.

To the Editor of the Scientific American:
In an article on this subject which appears this week in the Scientific American, No. 7, page 101, under the sigature of J. E. Hendricks, the celebrated method, first sugested by Kepler, of determining at what hight the atmo phere ceases sensibly to refract light is explained and illus. rated. Nothing can be added to the lucid and compact state ment of your correspondent
I propose, however, to suggest a new method of proving the hight of the atmosphere, which is worthy of attention on account of the precision with which such element in the formula can be determined. The average highest temperature under the torrid zone is not to be identified with the mean temperature, which is much lower, being about $82^{\circ}$ Fahr., while the highest temperature is $1115^{\circ}$ Fahr.
Let $\mathrm{d}=$ density of air on the hydrogen scale, $\mathrm{h}=$ hight above base, $\mathrm{p}=$ pressure at base, $\mathrm{a}=$ coefficient of expansion per $1^{\circ}$ Fahr., and $t=$ average highest temperature at equa tor. We will take one mile of atmosphere, one inch in thickness, on which to make the experiment and test the formula so as to estimate the hight to which this atmosphere will ex tend when all the elements have been applied.
$115^{\circ}$ Fahr. $\times 0.002036 \times 14.75 \times 14.416=48 \cdot 2478$. Other wise arranged for our terrestrial atmosphere: $\mathrm{h}=\operatorname{tapd}=$ $48 \cdot 2478$ miles ; $t=\frac{\mathrm{h}}{\mathrm{dpa}}=111 \cdot 5^{\prime}$ Fahr ; $\mathrm{a}=\frac{\mathrm{h}}{\mathrm{dpt}}=0.002036$; $\mathrm{d}=\frac{\mathrm{h}}{\text { tap }}=14 \cdot 416 ; \mathrm{p}=\frac{\mathrm{h}}{\mathrm{dta}}=14.75 \mathrm{lbs}$.
Hence, it follows that, if we could take a mile of our at mosphere, or any other pure gas of equal density, and subject it to the temperature, expansion, pressure, and density hich are now normal to our atmosphere, it would reach an altitude of 48.2478 miles; and the refraction of twilight con. firms this result, for it terminates when the depression of he sun below the horizon amounts to $18^{\circ}$, or, more correctly, $178^{\circ}$.
It is easy to deduce from this fact that the atmospheric re fractive power ceases when the light exceeds 49 miles; for the angle of incidence and also of refraction being each $9^{\circ}$, we have $9 \times 69 \cdot 5=625 \cdot 5$ miles; hence $625 \cdot 5^{2} \div 7925$ (earth's diam eter) $=49 \cdot 3$ miles, hight of refractive atmosphere. Our new formula gives the result 48.2478 miles with much greater pre cision, and the angle $17 \cdot 8$ more correctly agrees with obse vation than $18^{\circ}$.
S. Beswick.

Paterson, N. J.

## Pure Air in Cars. Scientific American:

To the Editor of the Scientific American:
The desire of your correspondent F. S. C. for pure air in railroad cars might be gratified by constructing ventilating filters, which should be regulated by the conductor or some other official. The filters should be made of thin layers of raw cotton, kept in place by coarse wire gauze. .This, I believe, is the best air filter known. They would require cleaning or emoving perhaps once or twice a month.
E. M. G. J1.

Baltimore, Md.


THE GREAT EXPOSITION-LETTER FROM UNITED STATES COMMISSIONER PROFESSOR R. H. THURSTON.
nUMBER 10.
Vienna, August, 1873.
In the Machinery Hall, the United States is most largely represented in that section of the classification which embraces

## wood and metal working tools,

and we find strongest competition also in this section of the exhibits of the principal foreign countries. The largest and at the same time most noticeable exhibitors of metal working machine tools are Messrs. Sellers \& Co., the Browne and Sharpe Manufacturing Company, and Pratt \& Whitney, from the United States, Messrs. Sharp, Stewart \& Co., Ransome \& Co., and two or three other firms from Great Britain, and Ducommun \& Co., from France. These firms all exhibit machinery which is ren:arkable for neatness and effectiveness of design, excellence of material, wonderful accuracy in fitting up, and also for the extent to which tool finishing has been made to excel and to supersede the older practice of finishing by hand. Many other firms, and especially those of European countiies, exhibit fine looking tools; but there is usually but little originality to be discovered in in their designs, and they present, to the eye and hand of the mechanic accustomed to our American practice, evidence that they have been produced under a system which is now rapidly going out of use in the United States and Great rapidly going out of use in the United States and Great
Britain. Half effaced file marks show that the more truly Britain. Half effaced file marks show that the more truly
mechanical method of obtaining accurate surfaces by the mechanical method of obtaining accurate surfaces by the
use of the broadnosed tool and the many other refinements use of the broadnosed tool and the many other ref.
of modern practice are unknown to their builders.
The beautiful planer of Messrs. Sellers \& Co., with its odd kinematic combination of the worm and the rack for driving the table, and its neat reversing gear, have long been known to mechanics at home. That at least some of the leading foreign builders have also appreciated it is proven by the appearance, in the exhibits of continental firms, of copies of this machine marked "système Sellers." All other nations, in fact, seem to copy American and British machinery, and rarely to produce original designs. In many cases, the copy is acknowledged, and sometimes the fact is evident knowledge that it will render their productions more evident knowledge that it will render their productions more
readily salable. Where attempts have been made to produce readily salable. Where attempts have been made to produce
original designs, the departures from our standards have very generally been marked by most awkward proportions and frequently by extremely ungraceful shapes.
'There is really very little in the exhibition which approaches, in any respect, the machinery exhibited by the several firms named; and those American mechanics who have come here to learn acquire only the knowledge that those from whom they expected to learn are simply following the leaders whose practice is already familiar to every American and British artisan. Nearly all of the machinery of this class in the United States section has been for a long time placarded "sold;" and it is extremely probable that several of the more novel machines have been purchased to serve as models from which to copy. Looking at these fine pieces of mechanism a few days ago, a distinguished member of the jury, whose opinion is probably as much respected as is that of any one of his colleagues, pronounced their
builders "the leading constructors of the world, beyond disbuilders " the leading constructors of the world, beyond dispute." And as even the leading French firm of Ducommun
\& Co., and the leading firms of every other nation (not excepting, in some departments, the British), copy their constructions, it may be readily believed that our American mechanics are occupying a most creditable position. The Sellers planer, the Browne \& Sharpe universal milling machine, and the Pratt \& Whitney screw cutter seem to have been most copied.

In the manufacture of metal working machine tools, the practice in America and in Great Britain is generally very similar. Strong, heavy frames, the absence of all moldings and other kinds of ornamentation which were so much in vogue a few years ago, great accuracy of workmanship, and the least possible use of hand tools (either in "assembling" or in finishing) seem the prominent characteristics on both sides of the Atlantic.
If a difference is remarked at all, it is usually that British builders put in more metal and build rather more substan-
tial machines, while the Americans excel in she ingenuity tial machines, while the Americans excel in ohe ingenuity
and skill which they display in matters of detail. It may certainly be questioned whether the former do not err in
building machinery with a view to surh extreme endurance. Improvements take place so rapidly that these very longlived machines must frequently be superseded long before they are worn out; and when thrown into the scrap heap, they still represent considerable capital; and the machine which is set aside by the progress of improvement, at a time which is set aside by the progress of improvement, at a time
when it has more nearly reached the limit of its endurance, when it has more nearly reached the limit of its endurance,
is the better machine of the two. To determine precisely is the better machine of the two. To determine precisely
where to find the proper limit is certainly a problem; but it can hardly be doubted that our best machinery is capable, usually, of doing good work for a length of time which will probably exceed that limit. It may be added also that, where capital is as valuable as it is in the United States and in all new countries, a good business policy dictates that a smaller proportion be expended in first cost and a greater in maintenance than in countries like Great Britain, where capital is plentiful and cheap
The remarks which have besn made in regard to metal working machinery at the Vienna exhib:tion will also apply to wood working machines. Here, also, the United States and Great Britain have been the leaders and the originators, and continental builders have copied from them. In this department, the American mechanic can probably claim more credit for originality than the British; but our transatlantic competitors, while adopting American machines, have some times improved upon them, and they have generally built them very much more substantially. This contrast is much
more marked here than in the preceding class of machines, more marked here than in the preceding class of machines,
and attracts considerable attention. The British machines and attracts considerable attention. The British machines
are also all painted a plain lead color, while those from the United States are often elaborately painted in "loud" colors. While the latter colors offend the eye of our friends on this side of the water, they also render more apparent the difference in strength and simplicity of frames. A comparison of the work done by the two is not at all to the disadvantage of the American; and a comparison of prices, making allowance for the difference in the cost of stock and of labor which is charged against each, is decidedly in our favor In the French section, the
band saw
is exhibited by Perin, its earliest successful constructor ; but the leading English firm of Ransome \& Co. copy the beautiful machine of Richards, London \& Kelley of Philadelphia. We consequently find exhibited, in the United States and British sections, a pair of precisely similar machines. The most thoroughly well contrived band saw in the exhibition is, perhaps, that of Mr. B. D. Whitney, the inventor of the pail-making machinery which has so greatly interested visitors, particularly foreigners, who are not generally familiar with machinery of special application. In this band saw, the arrangement of spindle bearings and of springs, and the contrivance for taking the back pressure of the blade, are exceedingly well planned. Perin uses neither springs nor weights, but the British builders use weights very generally for taking up the stretch of the blade as it warms up and expands while running. A well arranged spring, in consequence of its greater compactness and the absence of motion, is considered by our mechanics to be preferable; but the weight is almost invariably used in Britain, and Perin insists that, when a saw is hot enough to slip on its pulleys, it is time to stop it, and thus explains his omission of that detail. The French exhibit some beautiful specimens of band saw blades. Of
WOOD PLANING, MOLDING,MORTISING, AND OTHER MACHINES, the largest and finest collections are found in the British section. Rogers \& Co., Fay \& Co., and Witherby, Rugg \& Richardson, who are the exhibitors of the excellent tools in the United States section, while equaling in quality, do not all taken together equal in magnitude the exhibits of either of several British and continenial builders. The patterns used throughout are, however, generally those which, having become standard in the United States, have spread abroad. The continental builders exhibit nothing original; but a few firms make very creditable copies. Some of the Swiss work is excelleni, and the German exhibits of Zimmermann and of Schmaltz, with the fine display of Carl Pfaff from Austria, are also well worthy of notice. The latter is "ausser Concurs," its exhibitor being a member of the jury.
The British builders seem to find a market for what they call a
combination machine,
and nearly every exhibit contains an example of this multum in parvo. A planing and a molding machine, a circular saw, a mortising and a tenoning machine are all placed on one compact but exceedingly complicated frame. Its compactness and the somewhat lower cost, as compared with a similar collection of detached machines, are probably the reacon of its success in the market. It seems improbable, however, that it can be well adapted for use in establishments where much work is done. Separate tools, with ample space around dependently, are indispensable for such places. These combination tools seem well adapted for pattern shops and for small carpentering establishments.
The French section contains one wood planer which is particularly interesting and novel. The knives are slender strips of steel which are wound spirally in grooves about a metal cylinder revolving on a horizontal axis above the table of the machine. The knives are thus so contrived as to make a "draw" cut, and do their work rapidly and beautifully. The machine would, however, probably prove far less efficient were it not for the neat method adopted of set ting and sharpening these spiral blades. Directly above the cylinder carrying the knives, and upon a parallel axis, re
volves an emery grinding wheel, which can be very readily set properly ; and being then put into rapid motion, it is moved from side to side by a slow feed while the knives are slowly revolved beneath it. The blades are thus sharpened in place and are given perfectly keen, straight and properly set cutting edges. The blades themselves are simple in form, very light, and are easily made by cutting them out of thin steel plate. This seems a most excellent tool. It does not require the fixed scraping blade which is now so generally adopted for making the smooth finishing cut on the or dinary tool.

## MACHINE TOOLS OF ALL KINDS,

the ideas which have been the secret of the success of our largest buildars, -that of making them in large quantities from carefully considered and staudard designs, and of do ing as much work as possible by means of machines, special ly constructed for the accurate production of each important detail; in fact, of manufacturing, rather than simply making (and of which the sewing machine and the gun-making trades are the most perfect illustrations),-are at last becom ing appreciated and are being adopted on this side of the Atlantic, manifestly to the great advantage of both producers and consumers.
There is, however, one way in which it teils strongly against them where they compete with our own people Lacking that wonderful ingenuity and originality which Nature and our
patent system
have conferred upon the Americin mechanic, their standard designs are always a little less perfect than our own stand ards. They are what were standards with our builders at an earlier date, and thus it happened that, while always closely following, they never quite overtake. The modern system of manufacturing renders change of design a far more important matter than before, and the caution which is naturally induced by the expense of changing designs tends to keep them farther behind. A liberalization of patent codes and the gradual training of the workmen of Europe to a knowledge of the importance of good workmanship and of the methods of securing it will, at a time which we may hope is not very far distant, do much toward remedying all this, and toward the improvement of the condition of the people in Europe. We draw some of our best material from among them, and it seems sufficiently evident that not upon Nature but upon man's own imperfect political systems lies the responsibility of the existing unsatisfactory condition of manufactures in Europe.
R. H. T.

## Aretic Regions.

The 80th of the series of papers on the progress of geographical research in the polar regions, published by Dr Petermann in his Mittheilungen, contains a résumé of what is known from all sources respecting the American north polar expedition under the late Captain Hall, and is accom panied by an elaborate map, in which the results of this expedition, as far as these are known, have been critically compiled, together with data of the former voyagers, Kane and Hayes. The story of the Polaris voyage is already well known in England, and no fresh tidings of the ship, which wintered, 1872-73, with the ten remaining members of her company on the coast of Northumberlard Island, in lat. $77^{\circ} 20^{\prime} \mathrm{N}$. in Baffin Bay, have reached us since autumn of last year. Two vessels, however, generously sent by the American Government, have for some time been on their way northward to find and succor the Polaris crew.
In his remarks on the general results of this voyage Dr. Petermann draws a remarkable contrast between the advances made by the various expeditions which have been undertaken in steam vessels, and by those in which sledge traveling has been tried; maintaining that, since Hall's expedition had shown that there is no such thing as a permanent covering of ice in this branch of the Polar Sea, sledge traveling is little to be depended on and steamships should alone be employed. The discovery of drift wood on the shores of Hall Land (the east coast of Robeson Strait, between $81^{\circ}$ and $82^{\circ}$ N.) makes it not improbable, Dr. Petermann believes, that the land breaks up here into an archipelago of islands, or at least that there is communication by which Asiatic drift wood find its way hither; and on the other hand the presence of numerous musk oxen in these regions makes it very probable that Hall Land is in uninterrupted connection with the coast of East Greenland in lat. $770^{\circ}$ N., explored by the second German expedition of 1870.71.-Academy.
Production of Vegetable Tissue.-It has been ascer tained by Professor E. N. Horsford that an ethereal extract of green leaves, which has been separated by hydrogen chloride into two layers. a yellow and a blue layer, contains in both portions phosphoric acid, iron, potassium and calcium. He has further observed that a mixture of sodium phos phate and iron protosulphate in presence of water is able both in light and darkness to reduce carbonic acid to carbonic oxide. From these observations it appears probable that the formation of a solution of a phosphate of iron protoxide may be a preliminary stage towards the production of vegetable tissue from the element of carbonic acid, water and ammonia. Formic acid, it is well known, may be formed by the direct combination of carbonic oxide and water.
The caststeel works of Mr. Krupp at Essen, Prussia, now cover an area of 1,000 acres-larger than the Central Park, New York city. Nearly 18,000 men are employed in connec tion with the works. The area under roof is 200 acres.

## DEVICE FOR TRANSFERRING MOTION

 By means of the invention represented in the annexed engraving, an efficient substitute, it is claimed, for cog wheels is provided, in cases where it is desired to transmit motion from one shaft to another, both working with the same velocity. The device is stated to be cheaper and to operate with less loss of power than the cog wheel gearing; and also, to be able to transmit positive power for any distance, from one to twenty feet, and thus is of especial use in cases where belts would slip.A and B are crank arms of two shafts, between and in a line with which is a fixed standard, C. The latter at its upper end has a stud or pin. D is the connecting bar, slotted longitudinally along its middle part for connection with the stud on the standard, as shown. One end of this bar is pivoted to crank arm, B, and the other extremity is provided with a short slot by which it is connect. ed to the pin of the opposite crank.
When one shaft is set in motion, power will be communicated by the lever, U , to the other, which will rotate in an opposite direction. The inventor believes that, by connecting together a number of these devices (attaching a third shaft to the second by another lever, and similarly a fourth to the third and so on), power may be transmitied over considerable distances. Patented July 15, 1873, by Mr. William H. Benson, of Waynesboro, Augusta county, Virginia, who may be addressed for further particulars.

## AUTOMATIC BOAT DETACHING APPARATUS

Our engraving illustrates a new form of boat lowering and detaching device, by means of which, it is claimed, the boat can be lowered quickly, and safely and automaticall set adrift as soon as it floats upon the water.
A A are bolts secured to the boat near the bow and stern, having, on the under side of their heads, V shaped recesses extending upwards. B B are slip hooks fastened, by a ring or other suitable means, to the ends of the chains, C. The lower ends of the hooks are turned upward and fit, as shown in the detail figure on the left of the illustration, into the recesses in the bolt heads. By this means, the boat is suspended from the davits by the chains, C. The latter are led inboard over suitable sheaves and fair leaders to drums on the shaft, I . Ratchet wheels and cranks are arranged in connection with the shaft, the pawls of the former holding the boat in position after it is hoisted by means of the usual tackles on the davit heads.
When the boatis to be lowered quick ly, the falls are unhooked, and its weight allowed to hang by the chains, C. The pawls are then thrown from the ratchet wheels, and the shaft, $D$, is allowed to revolve by the chain unwinding, as the boat descends. The rapidity of the low ering is regulated by the brakes, $G$, pressed down by their levers against pulleys on the shaft. As soon, however, as the boat reaches the water, the chain slackening allows the hooks, B, to fall below and clear themselves at once from the recesses in A, leaving the boat free from any connection with the apparatus. It should be noted that the V shaped grooves and hook ends are of peculiar form, that is, they are angular and ye turn upward, so that, when once held to gether by the suspended weight of the boat, vertical, as well as transverse and lateral, displacement of the parts is prevented. It is claimed that it is impossible to disengage the boat until it is fully afloat, and that no matter how much the craft may rock, sway, or swing against the ship's side in descending
Patented April 29, 1873. For further particulars address the inventor, Mr . Charles A. Enell, 307 Walnut street, Philadelphia, Pa.

## THE INDIANA STATE EXPOSITION.

Indianapolis, during the coming fall, is to be the location of an exposition of the industries and manufactures of the State of Indiana. Whether or not the fair, in comparison with the similar shows to be held in St, Louis, Louisville, Chicago, Kansas City, and other points, will realize the anticipations of its projectors in being the finest exhibition in the Western States, it all events deserves the credit of being organized in a thorough and substantial manner, and after a system which, it seems to us, might be profitably followed in all future local displays. A committee representing the State conferred with another delegation from the capital city, and the joint body decided on the amount necessary to secure the State from any loss. This sum, fixed at $\$ 100,000$,
was guaranteed by the leading firms and individual citizens was guaranteed by the leading firms and individual citizens of Indianapolis; and, thus founded on a sure pecuniary basis, the preparations for the enterprise were begun; committees were sent to other cities to obtain information regarding cost and construction of buildings, and then plans were submitted and fixed upon. The State fair grounds were ready at hand, so that no land had to be purchased. The buildings are now completed, and they afford a grand aggregate of over four hundred thousand square feet of exhibiting space. There is to be a fine collection of paintings in the art department; and a
marked feature of the exposition will be a museum of natural history, archæology, mineralogy, etc. The central portion of the buildings is a substantial brick structure, two stories of 20 feet each in hight, 308 feet inl ength, and 150 feet in breadth. The edifices on the east and west are in the form of a cross, and are $200 \times 200$ feet.
Liberal premiums are offered to the exhibitors in the horticultural department. There are two lists, one each, respectively, for amateurs and professionals, which include


## BENSON'S DEVICE FOR TRANSFERRING MOTION

vessels, covered with a bladder, paper, or good closing lid. If the linen filter is not thick enough to keep other ingredi ents from passing throug lesides theliquid tallow and water it is better to repeat the filtration. Tallow thus obtained may be used for ordinary food, for pomades by the addition of pure olive oil, for salves and plasters, by the addition f white wax, and may be kept well preserved for a time, a free from smell as when first prepared.

## Asbestos Piston Packing.

From an address, by J. G. Gibbon, before the London Association of Foreman Engi neers, it appears that the name of this inde structible compound is derived from the Greek word asbestos, which, translated, literally means unburnable-a title which is justly earned by this extraordinary substance. As bestos is a mineral; it is found in nearly every part of the world, and occurs in distinct veins and seams, usually in the serpentine formation of rocks. In order to procure it, it is tion of rocks. In order to procure it, it is necessary to mine seams by blasting and tunneling. work the seams by blasting and tunneling The manufacture of asbestos steam packin is at once a simple and beautiful process. Th raw material is brought to the manufactory in considerable quantities from different parts of the world. It comes in sacks, and resembles most closely chips and blocks of wood, although of a beautifully white color. The fragments are picked apart and reduced to a fiberous condition like jute, or flax, or cotton. The material once properly opened up, it is, by means of simple and ingenious machinery, formed into packing of the usual market sizes. The machines themselves are as easily attended to as are weaving looms. As to what has been really accomplished by this packing, I have no direct evi really accomplished by this packing, I have no direct evi-
dence to offer, but from the sample I have here I think it dence to offer, but from the sample I have here I think it
does not seem to possess a good fiber; and that when the does not seem to possess a good fiber; and that when the
flaxen twine which binds it is cut, it will become very much flaxen twine which binds it is cut, it will become very much
like cotton waste. I am inclined to think, therefore, that likecotton waste. I am inclined to think, therefore, that
when the glands get heated and the flaxen twine is cut when the glands get heated and the flaxen twine is cut
through, it will blow out like charred flax, and have no elasticity. However, I am here to be corrected in my opinion if I form a wrong one, by those who can offer contradictory evidence. A large screw steamer lying in the West London Docks has just replaced the whole of its packing by asbestos.

Why do not the makers of street cars contrive a seat back that will be comfortable? Do their customers (pre ferring "short fares") order the cars to be made so as to discourage long riding It would seem so, unless the painfu curves of the seats are specially contrived to accommodate the humps of wirework and newspapers, so much affected by the women folk. Certain it is that the hu man form divine, male or female, has no curves to correspond with those set for the weary traveler to lean against. Only by making a hoop of kimself can an normally shaped human being get his spine to touch the seat back where it ought to find support.
A caustic Briton declares it to be a characteristic of the genuine American that he always wants to sit on the smal of his back. To judge from the ordina ry structure of car seats, one would think his sole desire to be to hang him self up by the shoulder blades, the only certain line of contact between the sit ter's back and the seats invariably cross ing that portion of the body. Below that line, you can usually stuff a book or a bundle, or even a small satchel, with ease and comfort.

In many cases the original perversity of the seat back is hightened by fasten

## NELL'S AUTOMATIC AT DETACHING APPARATUS

tainable on application. Saw mills, reapers, mowers, threshers, separators, and grain drills will receive no award, for the reason that it is not practicable to have such thorough tests
and examination of their merits as will be just to the exand examination of their merits as will be just to the ex-
hibitor. The board will, however, provide every necessary facility for their display, and propose, as an inducement to manufacturers and dealers in these articles, to appoint an examining committee, composed of members of the board, who will give each article of this kind such consideration as will enable them to report their respective merits for publication in the annual reports. We also learn that, by special request, no premiums will be offered for fire and burglar-proof safes, bank and safe locks, sewing machines and musicalinstruments, The fair opens on September 10, and closes on October 10

## To Purify Tallow

In order to obtain tallow quite free from smell, and to pre erve it for a longtime withnut becoming rancid, the follow ing simple process, says the Chemical Reviev, may be used. The fresh tallow is melted in boiling water, and when completely dissolved, and consequently hot, it is passed througn a linen filter-it is then boiled along with the water and care-fullyskimmed-then rendered solid by cooling and washed with water, and lastly separated from it carefully by pressure. may be melted at a moderate heat and preserved inj earthen although ample provisions will be made for their exhibition.
ing a ridge of wood so as to increase the gap between the
hollow of the sitter's back and the opposite curve of the seat. hollow of the sitter's back and the opposite curve of the seat
If the same board were placed six inches lower down, it If the same board were placed six inches lower down, it
would make some approach toward affording the passengers would make some approach toward a

The Compass in Iron Vessels.
Captain R. B. Forbes, of Boston,Mass., states that the com pass in iron ships is specially affected in certain localities on the coast of Nova Scotia, which accounts for the loss of steamers in that region. He further says that, in spite of corrections, applied in England, whereby iron ships may be safely navigated in a given course approximately westi-south west and east-north-east, when they come to head more to the north or south by several points on the American coast their corrections, good on the coast of England, are valueless in some ships. It is well known that the heeling of the iron ship, the rolling, the pitching, the concussion of the waves, have an important effect upon the compass-hence, nothing but constant observations of the sun at noon and the north star can insure a correct course.
W. P. H. suggests placing a box in the corner of a room for the purpose of destroying a rat or mouse. Let there be room enough for the vermin to get behind the box, and a little pressure will crush the offender against the wall.

Journalism.
There are three papers published in this country, which, taken together, are adapted to furnish a liberal education to any person who will read them conscientiously and intelligently. These are the New York Tribune, the Nation, and The Scientific American. The first is distinguished as the very Bayard of newspapers-without fear and above as the very Bayard of newspapers-without fear and above
reproach. Its news is accurate, comprehensive, well arreproach. Its news is accurate, comprehensive, well ar-
ranged; and it is written in excellent English. The Nation ranged; and it is written in excellent English. The Nation
we admire as a literary journal. Though its political articles we admire as a literary journal. Though its political articles
are admirable specimens of candid and able writing, its reviews of books are more characteristic and distinctive. The Scientific American is least known of the three papers mentioned, for the reason that it is popularly supposed to be designed for specialists. Nothing could be further from the truth. In the same sense that the Tribune is only a newspaper and the Nation only a literary journal, the Scientific American is only scientific. It is worth, to the man of common school education, twice over more than any rival journal in the United States, and it will teach no man to despise the English language, or to regard less the purto despise the English language, or to regard less the pur-
suit of knowledge-for its own sake, and for what it will suit of knowledge-for its own sake, and for what it will
bring. What we have written is wholly unsolicited testibring. What we have written is wholly unsolicited testi-
mony to the worth of three papers that come to this office; mony to the worth of three papers that come to this office;
it is given from the purest motives, and without the slightest idea that it will be of service to anybody, except those persons whom it may induce to subscribe for one or al of three excellent journals.-Interior.

## ThE TURKISH TREASURE PAVILION AT VIENNA.

Among the one hundred and forty special buildings, in ad. dition to the main exhibition edifice, pertaining to the Vienna World's Fair is the Treasure Pavilion of the Sultan of Turkey, or King of the Ottomans. The pavilion is in the form of an oriental kiosk. The domed within ceiling is painted in arabesques, and pendant from it are five large golden walls. Here may be read the history of the Sub lime Porte from the days of the conqueror of Byzantium Mahmoud II., to the present Padishah, Abd-ul-Aziz. The golden throne of Nadr-Shah is here, which was renowned in the East before the peacock throne of the Great Mogul at Delhi was dreamed of. It is marvelous in its workmanship, large enough for a coach, and weighs four and a half hundred weight. It is enameled in celadon, green and crimson, dredweight. It is enameled in celadon, green and crimson,
and its patterns of arabesquerie are in rubies, emeralds and and its patterns of arabesquerie are in rubies, emeralds and
pearls. Above it hang the turban and armor of Sultan pearls. Above it hang the turban and armor of Sultan
Murad, heavy with gold and gleaming with jewels. Near it are the horse caparisons of Selim III., with the heavy Mameluke stirrups and Arab bit of solid gold, encrusted with diamonds. Scabbards, where nothing but diamonds can be seen ; cinctures of diamonds; bowls of China porcelain, their patterns marked out in gold and reset with rubies; clocks encased in diamonds and glistening with crescent moons and stars; hookahs with golden bowls, and chibouques whose amber mouth pieces are encircled with rings of diamonds, gleam and glisten everywhere.
vion is

## Finishing Stereoscopic Transparencies.

The method adopted by many, of fitting up transparent sides for the stereoscope by mounting them with a plate of ground glass is very far being a good one. The coarse gran ularity present in a picture when in jux taposition with ground lass is totally subversive of the fine details.
Thin paper has been tried as a backing for stereoscopic ransparencies, but no sample that we have seen is free from objection. It is true that when it is used the granular ap pearance peculiar to ground glass is no longer present; but paper has a kind of texture and unevenness peculiar to itself which is very far from being pleasant; and when such a quality of paper is used as shall be homogeneous, it possesses so much "body" as to seriously interfere with the trans mission of light.
The req uirements of a body that shall act in the most perfec manner as a backing for stereoscopic slides are homogeneity, a requisite degree of translucency, and facility of application. The great manufacturers of transparencies in France thought hey had provided a successful rival to ground glass by the ntroduction of "ground glass varnish," that is, a varnish which, instead of drying bright and transparent, dries dead and, therefore, more or less granular. A varnish composed of wax dissolved in chloroform is a type of this class of varnish. But none of these ground glass varnishes anwer well for the purpose in question; while, however, they are quite as good as, in most instances better than, ground glass, they are still inferior to what they should be. A backing of a far superior kind to any of those now in general use may be made by means of white pigment emulsified with one of other of several substances that we hall name presently
Carbonate of lead forms a good pigment for the purpose It is known as white lead, and flake white. The carbonate of commerce usually contains a large proportion of sulphate of barytes, which, however, does not affect it for this purpose. Some samples of carbonate are more opaque than others. It may be made of a fine trunslucent character by pre cipitating a solution of either acetate or nitrate of lead by a solution of carbonate of soda, by which carbonate of lead is precipitated and acetate or nitrate of soda left in the solution. When this is washed-at first with water, and then with methylated spirit-and is added to plain collodion, an emulsion is obtained which, when poured upon a plate of glass, forms a layer of great smoothness and uniformity, and as free from apparent grain or tex ure as a plate of opal glass.
Anotherfine white, known as 'mininiature painters' white,' is obtained by adding dilute sulphuric acid to an acetic or nitric solution of litharge, and washing the white precipitate. There is a fine and permanent white known as "alum white," which makes a beautiful emulsion with collodion. It is known by some as "Baumé's white," and no difficulty ought to be experienced in ohtaining it under one or other of these designations. Ordinary Spanish white we have not found to answer well; but pearl white, sometimes called "Fard's Spanish white," makes a useful pigment
for our purpose. It is the trisnitrate of bismath, and in he favourite pigment used by ladies who do not feel satisfied with the degree of whiteness imparted by Nature to their complexions.
When one of these pigments is mixed with collodion and is applied either to the picture itself (although, without an intermediate layer of gum or india rabber, this cannot be one) or the face of the protecting glass, next to the picture he transparency will then have a charm it never previously possessed. The most delicate tints will be seen with even greater distinctness than if a backing of opal glass were em ployed; and the operation can be conducted with great celerity and at a trivial cost, for the quality of the collodion need not be taken into consideration.-British Journal of Photography.

## Boiler Explosions.

R S. H. writes to deny the possibility of the formation of an explosive gas in a steam boiler, and states his belief that the small quantity of water injected at a time, by a feed pump, could never cause an explosion, even if some of the plates were red hot. Further, a red heat would, he says, as suredly start the seams and cause leaks so as to extinguish the fire before water could corne in contact with the plates. He asserts that high pressures are much more dangerous than people generally believe, even if the boilers are unusu ally strong; and he cites, as an instance of the manner in which safety valves are overloaded, a case on the Union Pa cific Railway, in which the engineer tied down the valve lever of a new Baldwin ten wheeled engine; in a few se lever of a new Baldwin ten wheeled engine; in a few se
conds the boiler burst, and six inch axles were torn in two by the explosion.

## Ship Canal through Syria

T. L. F. writes to point out the possibility of constructing a ship canal along the valley of the Jordan, the advantage in the route being the low level, which is beneath that of the Mediterranean. There is no doubt or the possibility of sueh work, but its magnitude, and the fact that the Suez canal s already in operation between the two seas, will probably deter capitalists from aiding the scheme.

Cork Jackets for Steam Boilers.-M. Chevallier, a French engineer, has adopted cork for the jacketing of boilers and other parts of machinery. Cork is known to be an excellent non-conductor of heat, and these cork jacket are said to diminish the outward radiation by $15^{\circ} \mathrm{C}$. The cork is cut in the form of staves, and these are united to gether by tongues, as in the case of flooring boards, so tha the lines of junction are protected, while the cork staves ar easily removed when the necessity occurs. Portions of one of these jackets, which had been on a boiler at work for fifeen months, were exhibited the other day at a meeting of he Paris Society for the Encouragement of the Arts, etc. and were not found to have been in any way affected by the heat of the boiler.


THE MAGIC LANTERN AS A MEANS OF DEMONSTRATION. BY HENRY MORTON, PHD. Part 2.
We have thus far considered the condensers chiefly in re ference to the first portion of their office, namely, that of collectors of light from the radiating source. We will now, however, pass to some of those general considerations which may claim our attention when we look at the condensers in their relation to the objects and object glasses or objectives. relations of condensers and objectives
To make the subject entirely clear, we should revert for a moment to the general properties of lenses as producers of
images from luminous objects. Let CD (Fig. 6) be such an obimages from luminous objects. Let CD (Fig. 6) be such an obcus of the lens, A B. Then all rays emanating from any point (as, for example, C) will be collected at a corresponding point, E, and will there form a point of the image, E F. This will be true for each point of the flame, CD, and consequently a perfect image of this flame will be formed at E F. The perpertion of this image would evidently be unaffected by any possible irregularity in the rays from CD. Thus, if very possible irregularity in the rays from C D. few rays went in the direction, C A, and nearly
the line, C B, the point of the image, at E, would be the same the line, $\mathrm{C} B$, the point of the image, at E , would
as if all the rays reaching it came through $\mathrm{C} \mathrm{A}^{*}$.


Fig. 6.
If, now, in place of the candle flame, we suppose a luminous surface to exist, at C D, an image of this surface will be produced at E F, and will be clear and uniform, provided only that the surface, $C D$, is uniform in emitting equal amounts of light from its different points, no matter how irregular may be the directions of the rays leaving these points, always providing that they enter the lens, A B.
Thus, suppose that, in the luminous surface, A C B (Fig. 7), rays from $A$ were so emitted that above they were closely packed, while below they were thinly scattered; rays
from B were emitted in an opposite order, and from C were close packed in the center and scattered on the outside; yet, if an equal number of rays or quantity of light came from each element, the image of each
would be equally bright: and if this were true of each point or element of the surface, the image would show an uniform field of light, no matter how irregular the emission of the various points might be as regards the direction of the rays. If, however, one point emitted or furnished more rays than another, or gave light of a different color, any such irregularity or difference would be represented faithfully in the image.
We will now apply these general principles to the case of the magic lantern. Let A B (Fig. 8) be the front element of the condenser, through which rays are passing into the object glass, C D, which is at such a distance that it makes on the screen, EF, an image of any point in A B. Then, if an equal amount of light is coming through each point of AB, an uniform white disk will appear on the screen, E F, no mat-


Fig. 8.
ter how irregular (in the sense above described) are the directions of the rays. The irregularities will, in fact, be very great, for besides such as are due to the aberrations of the condensers, these lenses will themselves be tending to form somewhere an image of the source of light. In fact, such an image would be formed, at $O$, about the principal focus of the lens, A B, if the objective, C D, were removed. This formation of an image at $O$ involves a great irregularity of the distribution of light between $O$ and A B, indeed, the existences of imperfect images of the source of light. But of all this, the objective, C D, takes no account, and simply forms, at E F, an image of the distribution of light which actually exists at A B. Suppose now, however, that C D were removed to $\mathrm{C}^{\prime} \mathrm{D}^{\prime}$. Its focus remaining as before, it would clearly form an image, not of the surface, AB, which is now beyond its reach, but of a surface, $\mathrm{A}^{\prime} \mathrm{B}^{\prime}$, at its proper
distance. But it evidently would by no means follow that, distance. But it evidently would by no means follow that,
because the light was evenly distributed at A B, it must also because the light was evenly distributed at A B, it must also
be so at $\mathrm{A}^{\prime} \mathrm{B}^{\prime}$. On the contrary we have already seen that, be so at $\mathrm{A}^{\prime} \mathrm{B}^{\prime}$. On the contrary we have already seen that,
as we advance from A B , the distribution of the light will as we advance from A B, the distribution of the light will
become more and more irregular; and it will be an image of this irregularly luminous surface which will be thrown on the screen at EF.
This shows us that, to secure a clear and even field of light on the screen, we must, in the first place, have such a combination of lenses in the condenser as will secure an even dis. tribution of light at the outer surface of the last lens ; *Nors,-We are here, of course, , neglecting all effects of aberration, or, in
other words, are assuming an idealliy perfect lens, as sthe point in question does
not depend upon any of the conditions so excluded
and, secondly, that the objective must be so placed that it will, as we say, "focus" on this surface, that is, have this outer surface of the condenser and the screen as conjugate foci. To fulfil this last conclusion it is evidently necessary that the object (such as the picture to be shown, or the like) should be placed close to the front of the condenser, since it, as well as this surface, must be in the focus of the lens, that is, the conjugate focus with the screen. It is for this reason that the plan, sometimes proposed, of using a small picture with large condensers, by bringing the picture forward on the cone of rays to some point where they will just embrace it, fails of a satisfactory effect. The field of light is more or less discolored and un effect. The field of light is more or less discolored and un-
equal; and though, by cutting off its margin, we can improve this, it is at best but unsatisfactory as compared with the effect obtained with the same light and smaller conden sers. The same explanation also shows us the advantage of that divisibility of the condenser, which we have before mentioned, into the collecting lens or lenses, by which diverging rays are brought into a parallel bundle, and of the condenser proper by which they are concentrated into the objective. Thus, for example, suppose that we desire to polarize the light, by reflection, from a bundle of glass plates. If the condensers are inseparable, the object must be placed beyond the reflecting surface, and therefore very far from the surface of the condenser, and thus involve an uneven field of light, not to mention imperfect polarization, in consequence of the difference in angle of various parts of the cone of light.
If, however, we can separate the condensers from the col lectors, and introduce the reflecting surface between, we then have the rays all parallel, when reflected hence at the same angle and equally polarized, and the object in contact with the front surface of the condenser (see Fig. 9). Again, if we desire to exhibit objects that mus be kept in a horizontal position, such as waves in a tank of water and the like, this separation of the condensers affords a ready mean of accomplishing it in a most sa tisfactory manner. This modif
cation of the instrument is, how ever, so important an appliance to the magic lantern, when used as a


Fig. 9. means of demonstration, that it deserves some more extended notice.
the vertical lantern.
This instrument involves such natural and simple applications of appliances, familiar to every one using such apparatus, that, as we might naturally expect, in some form or other it has been independently devised by several persons. Thus such an attachment to his ordinary lantern was made by Duboscq, at least as early as 1868, as the present writer is informed by Dr. H. Schellen, the renowned author of "Spectrum Analysis," though this mannfacturer does not seem to have thought it worth while to describe it until very recently. From the imperfect arrangement of the condensers, it also does not yield very satisfactory results.
Professor J. P. Cooke, of Cambridge, Mass., used a vertical lantern at a very early date, of which he published a description in the Journal of the Franklin Institute for December, 1871, Vol. LXII. page 411. In the Chemical Newes for July 8, 1869, is described a very imperfect arrangement in which the lantern is turned over on its back, and a square prism is used to throw the rays upon the screen. Beside the inconvenience and danger to the lenses, of having them thus directly over the light, the square prism fails to reflect a large part of the rays unless the screen is very much above the level of the lantern.
In the Chemical News for February 25, 1870, there is de scribed, by Edwin Smith, M. A., an arrangement for showing the motions of a galvanometer on a screen, identical in all respects with that of Duboscq and Professor Cocke. ln none of
these were the condi these were the condi tions required by theo ry, as above explained, fully provided for, and the action was consequently so far unsatisfactory that the in brought into any general use.
The form devised by the present writer, in B 1871, which seems first
to have made its way to have made its way
into general use and to into general use and to have conferred the name "vertical lantern" on the instrument, is shown in the accompanying engraving, Fig. 10. The collecting lenses of the condensers are attached box, and are omitted in the figure; and from them a bnndle of parallel rays falls on the mirror of silvered glass, A B, and is reflected upward to the condenser proper, placed horizontally at C. Passing through
this it meets the object, a tank of water or the like, resting or supported immediately above, and then traversing the objective, E F, is, by the mirror of silvered glass, F G, thrown pon the screen.
Mr. George Wale, of Hoboken, N. J., by whom this in strument was first made for the present writer, has devised a very pretty arrangement by which all the advantages of the vertical lantern can be combined with those of the or dinary instrument, and has manufactured a large number of such instruments, which are now in use in the principal col leges of the country.


Its arrangement is as follows: A metal box, mount ed on pillars, con tains the source of light; to its front inside, are attached the collecting ele ments of the con denser. The con densing element is supported in hinged plate, to the side of which is also secured a stou od Whrack work, etc., carrying the object glass and up per mirror. When the instrument is to be used as a ver-
tical lantern (see tical lantern (see
Fig. 11) this hinged piece is raised into a horizontal position, and supported by a triangular case holding the first mirror; and when employed as an or dinary lantern (Fig 12) this case is re moved; the conden ser, and with it the rackwork and ob jective, is lowered and the upper mir ror is slipped off This instrument is probably the most complete, for purposes of demon
Fig. 12. stration, which has
been heretofore constructed. But while it is desirable to have the most perfect appliances where we can, yet much may be accomplished with very simple means. Thus Dr. R. M. Ferguson, in the Quarterly Journal of Science, 1872, No. XXXIV., page 267, suggests the following arrangement, in which only such apparatus as is found in any laboratory is needed, in addition to an ordinary magic lantern. The con densers of ordinary lanterns are generally of rather long focus, so that if the light is hrought to within about three inches, a bundle of approximately parallel rays will be obtained. An ordinary retort stand is then so arranged in front of the lantern that its lowest ring shall carry a mirror, and the next one a large watch glass filled with water. This makes the condenser; and, if we want to show the motions of waves or cohesion figures, this water-lens itself furnishes the necessary tank. The object glass and second mirror are carried by another ring of the same retort stand. The present writer has further simplified this construction by using a small watch glass, also filled with water, for the objective This last, indeed, gives us a curious means of illustrating certain relations of lenses. Thus, with the ordinary verticertain relations of lenses. Thus, with the ordinary verti-
cal lantern, we remove the objective and substitute a watch glass. Then, placing a conspicuous picture as an object upon the condenser, we see only a blur of light on the screen; bu as soon as a little water is poured into the watch glass, the image starts out with perfect distinctness. If, now, the size of the image on the screen is noted, and alcohol, bichloride of tin, or other highly refracting liquid, is substituted for the water in the watch-glass-objective, we shall find it necessary to bring the lens nearer to the object to secure a good definition; while, at the same time, the image on the screen will be proportionately enlarged. Watch glasses of various curvature may be likewise employed to illustrate the effect of zhis condition. The only serious objection to the use of water lenses, as above described, both for condenser and objec tive, is their liability to disturbance by motion, which obli ges us to avoid the least jar to the apparatus, since this entirely confuses the image on the screen.

## Loose Pulleys.

G. P. says: "I have had great trouble in procuring a small loose pulley that would stand running at a higb rate of speed with a very tight belt. After trying a large number of dif ferent kinds, of wood and iron, with long and short bearings, bushings of Babbitt, copper, etc., none of which would stand more than two months, I at last procured some sole leather I put the flat surfaces together and bolted through with four bolts; after boring and turning, I soaked it well in oil and put in place. It has now been running about one year and s, apparently, as good as new. It requires very little oil."
Remarks by the Editor.-If a loose pulley is properly arranged, it will run as well as a shaft bearing. It must be long enough, and have efficient provisions for lubrication.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT
OF SCIENCE. OF SCIENCE.

## Medicine

was the subject of two papers read by Dr. H. W. Wiley, of Indianapolis, and Professor E. B. Elliott. The former gen tleman said the other sciences have adopted a uniform system of weights and measures, and that it is now proper time for medicine to accept the doctrine of science. Proximately we may take the gramme as 1.5 .5 grains. It is evident that all medicines now given in from one to two grain doses could as readily be presented in gramme doses, since all grain weights could easily be reduced to corresponding terms of the gramme. In regard to fluid remedies, we can make similar reductions.
Thus 1 cubic centimeter equals 16 minims; $\cdot 25$ centimete equals 4 minims; 2 centimeters equal 32 minims; 4 centi meters equal 64 minims, equal 1 fluid dram, equal 1 tea spoonful, equal 60 drops.
The paper was principally devoted to the subject of unification of doses, in order to avoid those serious accident which result so often from the carelessness of physicians, druggists, and nurses. In order to this, both solid and liquid remedies should have a standard dose, say for solids 2 grammes, and for liquids 4 centimeters, or a teaspoonful This could be accomplished by rubbing up the solids with some inert substance like sugar of milk or chalk, and mixing liquids with mint water.
Professor Elliot harmonizes the metric and apothecarie systems on the basis of the troy grain. If we augment the weight of the troy grain by about three (more exactly 2.88 ) per cent, the new grain so formed will be contained in the gramme exactly fifteen times-a very simple ratio; and the accidental substitution of this new grain for the old grain and vice versa, by the apothecary, would not appreciably change the quantity of medicine in a dose. The following is the scale of relation to the new grain with the metric series proposed by Mr. Elliott:

| Proposed Apothecaries Weigh | Equivalent wt. Troy grains. |
| :---: | :---: |
| 5 grains* equal to 1 tergram ( $\frac{1}{3}$ grain). | 5.144+ |
| 30 tergrams equal to 1 decagram.... | $154 \cdot 32+$ |
| 100 tergrams equal to 1 ounce (new). | 514.4+ |
| 30 ounces equal to 1 kilogram. | $154 \cdot 32+$ | 100 tergrams equal to 1 ounce (new)

30 ounces equal to 1 kilogram
The corresponding table of measures of capacity is as fol lows:

5 minims* equal to 1 fluid tergram. ............ $5 \cdot 41830$
30 fluid tergrams equal to one centiliter (in fluid
decagram).
100 fluid tergrams equal to 1 fluid oz............... 541.8493000
30 fluid ounces equal to 1 liter...
16254.90000

Professor G. W. Holley discussed
The Proximate Future of Niagara.
Professor Tyndall said that, if the rate of recession named by Sir C. Lyell, a foot a year, was correct, in 5,000 years the Horseshoe Fall would be far above Goat Island, and the American channel would be dry. Professor Holley showed that Sir Charles's rate was the result of a conjecture founded on a guess. He also, by means of the most trustworthy data we have since the commencement of the historic period, before the Falls would recede a mile. He also described the formation of the bottom of the river, the course and depth of the different currents and the location of the bars, all of which indicated that the American channel would never be without water.
Professor Tyndall thinks that the depth of the water will determine the course of the chasm channel as the gorge re cedes, and the rate of excavation. Proféssor Holley cited the physical facts which tend to prove that it is the character of the bed of the river, the harder or softer nature of the material to be broken down, that will decide these points. He particularly noticed the fact that the Falls were constantly diminishing in hight as they receded, until they reached their present site, where the river makes an acute angle with its former direction. This was necessarily the case, because they were receding in the line of the dip of the underlying rock. They are now rising on the dip, and will be 50 feet higher than now when they are two miles up stream. To this bend in the river we owe one of the most beautiful features of the greatcataract-the rapids aoove the Falls.

## Do Snakes Swallow their Young

was the title of a paper read by Mr. G. B. Goode, of Middletown University, in which he referred to the habit observed in certain snakes of allowing their young a temporary refuge in their throats, whence they emerge when danger is past. On this subject,through a note inserted in a monthly journal asking for observations, the testimony of 96 persons had been obtained. Of these, 56 saw the young enter the parent's mouth in 19 cases, the parent warning them by a loud whistle. Four saw the young rush out when the parent was struck; 18 saw the young shaken out by dogs or running from the mouth of their dead parent; 29 who saw the young enter killed the mother and found them living within, while only 13 allowed the poor parent to escape; 27 saw the young living within the parent, hut as they did not see them enter, the festimony is at least dubious.
In the opinion of Professors Wyman and Gill and other physiologists, there is no physical reason why the young snakes may not remain a considerable time in the dilatable very feebly upon living tissues, and it is almost impossible to smother reptiles. Toads and frogs often escape unharmed
from the stomach of snakes. If the habit is not protective if the young cannot escape from their hiding place, this habit is without parallel; if it is protective, a similar habit i seen in South American fishes of the genera arius,bagrus and geophagus, where the males carry the eggs for safety in their mouths and gill openings.
Professor Gill, in commenting on the above, said that the popular idea that snakes are sometimes swallowed by men and live afterwards in the stomach was an error which he was glad of the opportunity to denounce.
Professor Burt G. Wilaer, of Cornell University, read several papers on the general subject of

## The Erain.

This organ has been studied with three objects: the descriptive anatomy of its parts, the comparison between the brains of man and apes, the iluation of function. The the study of fissures especially commented upon. The speaker said in conclusion: After a pretty careful study of the specimens at my command, and the consultation of all works in which brains are accurately delineated, I feel justified in asserting that we cannot as yet characterize the fissural pattern of any mammalian order, family, genus, or even species, without the risk that the next specimen will invalidate our conclusion: that our studies in this direction should be based upon the careful comparison of accurate drawings of a much larger number of specimens than now exists in any museum; that nearly allied forms of carnivora should be compared; and that the most satisfactory results re obtainable from large series of fætal and young brains of the same species, and if possible, family and sex, in orde to eliminate minor differences

## An Automatic Filtering Apparatus

was exhibited by Dr. H. W. Wiley, which consists of an ordinary filter stone with two arms. The upper arm car ries a large funnel of from one to three quarts capacity, an electro-magnet with a system of levers for working a stop to the funnel, and a glass bulb and mercury cup. The lower arm is fitted with an ordinary Bunsen funnel, in which floats the glass bulb attached by a platinum wire to a lever carrying the mercury cup. As the fluid in the small funnel falls, the float sinks, and the mercurial cup rises, until the mercury touches two platinum wires, which are the poles of a small galvanic battery connested with the electro-magnet. This completes the circuit. The armature of the magnet is pulled
down, the stop in the large funnel is raised, and the liquid runs through into the small funnel until the connection i broken. This continues until the whole of the fluid runs through into the small funnel. By means of this apparatu the quantitative analyst can save several hours daily.
Dr. J. S. Newberry exhibited a series of exquisitely pre served small scaled

Fishes from the Cannel Coal of Ohio.
In these fishes every scale and fin ray is shown; and the hole animal is coated with a thin film of sulphide of iron and thus '"gilded." Sharks' teeth and spines, scales and teeth of large ganoids, and skeletons of many carnivorous salamanders are found all preserved in the same beautiful manner. Dr. Newberry also read a paper in which he said that the different strata which compose the geological column have been divided into several groups or systems, of which the base is formed by the old crystalline rocks called Laur entian and Huronian. Each of these systems consists of circles of deposition ; first, sandstone, Potsdam, Medina, etc. second, mixed mechanical and organic sediments, the calci ferous, Clinton, etc. : third, a limestone, the Trenton, Niagara etc. : and fourth, a mixture of mechanical and organic sedi ment, the Hudson, Helderburg and the coal measures. Dr. Newberry claimed that each of the circles of sediments wa formed by an invasion of the land by the sea, producing, first, a sheet of sea beach sand and gravel; second, the off shore deposits following and covering the first; third, the open sea calcareous organic deposit-a limestone; fourth, a mixed sediment-shale and limestone, or an earthy lime stone-the product of the retreating sea. Between these submergences perhaps millions of years elapsed, in which the fauna of the sea and the flora of the land were changed. Hence the different fossils of the different geological sysems.
Dr. Hill of Portland related a striking anecdote of a toad which had swallowed one end of a large earthworm, and had become so tired in its attempts to get the rest down that it was in danger of losing the whole, the worm crawling out of the toad's mouth faster than it could be swa.lowed. The toad then brought upits right hind foot, and grasping its stomach and the worm in it, held the worm in with its foot,
taking a fresh grip after every gulp, until the job was finished.
In closing the session, Professor Lovering delivered a speech congratulating the members on the extent and variety of their labors during the past year. The usual resolution of thanks to everybody concerned in the affair were adopted, and it was afterward decided to hold the next meeting at Hartford, Conn., on the second Wednesday in August, 1874 The President elected is Dr. Le Conte, of Philadelphia ice President, Professor C. S. Lyman, of New Haven Conn. ; Secretary, Dr. Hamlin of Bangor: Treasurer, Wm. S Vaux of Philadelphia.

Section Q---Scientific Fun
A burlesque session, in which a number of the members participated, was attended by a large audience, which several learned professors managed to keep in convulsions of laughter for an hour or more
Professor Morse, taking the chalk, stepped to the black
oard and began the reconstruction of an unknown animal
fragment of bone belonging to which had been found Proceeding step by step and speaking as he sketched, he quickly built up the figure of a hideous tomcat. Then he sucgested certain anatomical objections and improvement which produced amusing changes in the drawing. Finally he concluded to restore the fragment on a different hypothe is, and by a few strokes revealed the true character of the ossil, which proved to be the handle of a jug. Profosso White, discoursing on ancient shell heaps, produced a heav bag, which, he said, contained specimens collected near Por land. A broken shovel, a stone bottle, a lobster, and a pile of clam shells were recognized, amidst peals of laughter, as relics of the recent clam bake participated in by the Associ tion. Each separate article was then described in connec tion with the peculiarities of the race that had used it,as in dicated by its condition. Perhaps the most amusing of these was a corn cob, which indicated the size of the mouth by the bite that had been taken out of it. A blackboard draw ing was then made to illustrate a race with these peculiari ies. "You can infer," said the speaker, alluding to a pa no great value read the previous day, "that the ength of this mouth indicates that its maternal grandmam ma must have been very long lived.'
Severai other speakers read ludicrous papers, their re marks being illustrated by Professor Morse with grotesqu ketches on the blackboard

## VIENNA PREMIUMS AND SEWING MACHINES

 We copy
## the region of the sewing machines.

If Dante had been gifted with the spirit of prophecy, he would have set apart a region in his Inferno to illustrate the ivalries and emotions of the sewing machine manufacturers of the United States. The conflicts, the misunderstandings, the ambitions, the yearnings for approbation and notoriety the odd, incessant efforts to win medals of progress and re nown and merit and honor, which inspire the gentlemen who manage this industry, have given constant motion and lif o the American department. So, when His Majesty came to the sewing machine department, every effort was mad by our Commissioners to introduce him to each special ma hine and explain its peculiar qualities. Let me give you ist of the machines in the catalogue, so you may know what His Majesty was asked to do. First, the Howe Machine Com pany, New York; then the Singer Manufacturing Company New York; the Whitney Sewing Machine, Paterson, N. J. the Wheeler \& Wilson Sewing Machine Company, New York; the Wilson Sewing Machine Company, Cleveland Ohio; the Wilcox and Gibbs Sewing Machine Manufacturing Company, New York; Ezra Morrill \& Co., Derby Line, Vt.; George N. Bacon \& Co., London, England; the Weed Sew ing Machine Company, Hartford, with the patent effectiv stop motion of Fairchild's attachment; the Secor Sewing Machine Company, New York; the Mackay Sole and Sho Machine, Cambridge; the Universal Feed Sewing Machine Company. Every exhibitor expected a special visit from the Emperor, and His Majesty, with a patience and courtesy tha hould be commended, endeavored to visit them all.
After waiting a few minutes to comprehend the explana tions to him of the advance of the industry so largely repre ented in America, the Emperor continued his tour of the other departments, especially inquiring of his attendants what different principles were presented by each separate machine, in what respect one machine differed from the other-all of which was explained to him, especially the new principle of the patent stop, or the application invented by Mr. Fairchild, and now owned by the Weed Machin Company, by which the action of the needle is arrested by he pressure of a spring, without stopping the motion of the wheel.
In the New York Herald of August 19th, we find awards were made as follows:
To the Wilson Sewing Machines of Cleveland.
Elias Howe Sewing Machine Company, for sewing and stitching.
Wilcox \& Gibbs Sewing Machine Company of New York, for best single thread sewing machine.
The Weed Sewing Machine Company, for best stop mo tion applied to sewing machine treadles.
The Wilson Sewing Machine Company being the only xhibitor that received a grand prize medal for the best sewing machine, and medals of honor.

## Small Fast Steamers

J. G. X. states that he and a friend are building a smal steamer, of the following dimensions:Length 24 feet, width amidships 6 feet 4 inches, hight amidships 3 feet and a siern 4 feet. She has a white oak keel, her ribs are of hickory, and she is built up with a double thickness of half inch white pine boarts, all joints being lapped and tarred. She is covered with sheet zinc, the joints being lapped and sol dered. "The boiler is an upright tubular, 3 feet high, 20 inches diameter, and has 19 two and a half inch flues, with fire box 18 inches diameter and 1 foot high. The engine attached to the boiler perpendicularly, is of about the same power as the boiler, and has double cranks set at right an gles. The boat will be propelled by a 20 inch screw of fou blades, each blade having a pitch of 6 inches, with space be tween each blade of one third the size of blade, and is so constructed as not to make any wave towards the banks of the canal. She is expected to run at from 8 to 12 miles an hour. The boat and all the maohinery have been constructed by us two, it being our first piece of carpenter work. We ed by us two, it being our first piece of carpenter work. We
ing hours, and together we spent twenty days on the wood work. She is to be used as a pleasure boat on the Schuylkill canal, and will carry about 30 passencers."

## DECISIONS OF THE COURTS

United States Circuit Court--District of Kentucky. PATENT BALING PRESS.-WENDELL E. KING Compar. THE LOUISVILLE CEMENT
COM.

Improved Terret and Martingale Ring.
John Geraghty, Jersey city, N. J.-This invention consists of a futed
 the ordinary check rein rings for guiding and controlling the relns; also,
for alding the driver in controlling the horse by turning freely with the for alding the driver in controliling the horse by turning freely with the
rein when pulled backward by the driver, but not turning in the other direction, so that when the horse gets advantage

Improved Trace Buckle.
John Kennedy, Osage Mission, Kansas, assignor to himself and John
Mofft, of same place. This invention consists in a trace buckle in which Moftt, of same place. This invention consists in a trace buckie in which
the tongue is pivoted and provided with a lock. As the trace is pssed for the tongue is pivoted and provided wilh a lock. As the trace is passed for-
ward the tongue enters the hole therein ; and as it draws back it pulls the tongue plate into the angular recesses in the lugs of a plate, and thereb plate. With this buckle the trace is kept straight and smooth, withou or wrinkles.
Combined Fender and Ash Sifting Attachment. Winam c.Dobbin, Zanesville. Ohio.-Thisinvention sith attachment, to be used in connection with ordinary fire place fire grate, for the purpose of separating the ashes from the unburn pieces of coal that fall from the fire grat
replaced upon the fire freed from ashes.

Improved Car Coupling.
John Crist, Tiffin, Ohio.-This invention relates to automatic car coup ings wherein the link lifts a catch hook by its own forward movement, and consistsin attaching said hooks to a bar pivoted at the rear end, held down by a spring and lifted by a vertical rod. It also consists in a novel and
effective mode of raising the lift rod.

## Improved Cotton Bale Tie.

William J. Orr, Charlotte, N. C.-This invention relates generally to bale
ties, but particularly to that class consisting of a strap of thin matal ties, but particularly to that class consisting of a strap of thin metal having
one end turned into the form of a hook, and the other end broadened into a one end turned into the form of a hook, and the other end broadened into a
ransversely slotted eye piece provided with a side stop at the outer end of the slot. There has been experienced, practically, with these bale ties a
good deal of difficulty in turning the band after it is tightened sufficiently to secure the hook and eye together, while there is necessarily more or less playof the hook in the eye afterwards, which causes the sleeve to becom
displaced and the bale to become loose and even untied. The invention consists in the peculiar mode of arranging and constructing this eye piece so that it can be easily inserted within the hook of the strap and be
securely held, with or without the sliding sleeve or loop which is some securely held
times used.
Improved Composition for Waterproofing Wall Paper.
Cornelius Van Herwerden, williamsburgh, Cornelius Jansen, of same place.-This invention has for its object to fur Cornelius Jansen, of same place.- nis nvention has for paper which shall be so prepared that, when appied to the wall nis the ordinary manner, the papered wall may be washed, and which will
leave the colors upon the paper wholly unaffected. The invention consists in firstdissolving white soap in warm water. When fully dissolved, white
wax and isinglass are adced and the mixture stirred continuously until it boils. When fully cold it is ready for use. To apply the mixture, the paper is spread upon a smooth table, and the former is applied with a soft
brush, care being taken to cover the paper evenly by rubbing it well with brush, care being taken to cover the paper evenly by rubbing it well with
the brush. The paper is then rubbed with a dry brush to give it a gloss.

Improved Glove Fastening.
Charles H. Hall, Trenton, N. J., and Robert Knott, Brooklyn, N. Y.-This invention cansists of a little bar with a series of notches in each edge and wide portions between the notches, hinged to a clip fastened to the glove
at one side of the slit for the wrist, and a notched hook on a clip fastened to the glove at the other side, so arranged that it can engage the bar behind
any one of the enlargements to fasten the glove tight or loose, as may be any one of the enlargements to fasten the glove tight or loose, as may
desired. The clips by which the bar and the hook are fastened to the glove consist of thin plates of silver, gold, or any ductile metal, with spurs formed
on them, to fasten them to the glove, by punching them out of the metal in the ordinary way of making such fastenings.

Improved Ice Shaving Machine.
James D. Freeman, Abse invention fassignor to himself and James Gilles pie, of same place.-This invention furnishes an improved machine for
attachment to the counter in soda water and other saloons for shaving the ice. The forward parts of the downwardly projecting sides of a hopper are cut away to allow a tumbler to be placed beneath said hopper to receive
the shaved ice. In the lower part of the hopper is placed a small cylinder,
to The piece of ice is placed in the hopper, rests upon the cylinder, and is he The plece of ice is placed in the hopper, rests upon the cylinder, and is held
down by a plate which is placed upon it, and which is attached to a lever. The lever passes through slots in the hopper, and its for ward end is pivoted to a plate which slides up and down in a groove. The latter plate may be
raised and lowered to adjust the position of the lever and plate accordin raised and lowered to adjust the position of the lever and plate according
to the size of the piece of ice to be operated upon. The rear end of the to the size of the piece of ice to be operated upon. The rear end of the
lever projects so that the operator can grasp it in one hand to hold the ice down with the requisite pressure while he operates the crank with the other hand to shave the ice.
Improved Insect
William Henry Ball, Brooklyn, N. Y. provide a commercial package for insect powder, which may also be used
as a gun or ejector for discharging the powder into crevices, etc. at the as a gun or ejector for discharging the powder into crevices, etc., at the
same time that the cost will not be much more than common packages. The invention consists of a cylindrical box, of light and inexpensive mate rial, and a short piece of flexible tube joined together at one end, the paper or wood box having a cap at the other end, ard, by preference, a hopper. shaped bottom at the end connected to the fiexible tube, with a small hole for the powder to pass from it into the said fiexible tube. The latter has a
small nozzle through which to eject the powder by compressing the tube the nozzle being detachably connected so as to pack the packages economically. The hopper bottom is employed to retain the mass of the materia in the paper or wood box in which it is packed and deliver it in to the flexi ble ejecting portion in small quantities as the box is shaken.
Improved Steering Apparatus for Vessels.
Amie Siebenthal, Vevay, Ind., assignor to himself and F. R. Dufour, o same place.-The object of this invention is to construct for river and ocean
vessels an improved steering apparatus, by which the power transmitted to the rudder is equalized, and the same more fully within the control of the helmsman. The invention consists in the hinge connection of the tiller
with the rudder post, together with a supporting gulde arm of the same The nearer the tiller approaches the center, the quicker turns the rudder post, so that the rudder moves rapidly when in position at either side of the
azis of the vessel, where also less power is required. On the approach of the tiller to a horizontal position, the ruäder moves with decreasing speed but with increasing power, as the pivoted arm relieves the strain on the

保
Improved Composition Filling for Painters. for carriage manufacturers an improved "painters' rough stuff," which is put on after the paint, and leaves a smooth and solid surface after rubbing
It consists of a mixture of pulverized pumice stone a and white lead, by coachmaker's japan and rubbing varnish. The wood is first flled with from three to five coats of keg lead, and then coated with this surface pro-
tector, which causes the work to take a fine polish. tector, which causes the work to take a fine polish.

Imprioved Cotton Bale Tie.
Willam Crone, Galveston, Texas.-This invention consists of a small shaped bar for tying the bands and cross ribs on the bands, both lower and upper sides, at short distances apart near the ends, which are fastened to-
gether. This is effected by Inserting the band in the notches of the aforesaid bar, one part on each side, in a very simple manner

Improved Straw Cutter.
Thomas Webb, Elyria, Ohio.-This invention is an improvement in th class of straw cutters having feed rolls, one of which is adjustable verti-
cally, and yet so geared with the stationary roller as to continue its revolution, whether theyare separated by a small or large quantity or thick-

Improved Tool for Seating Bung Bushes.
Lomax Littlejohn, New York city.-This invenvion has for its object to furnish an improved tool for beveling the bung hole of a cask and counter-
sinking said hole to adapt it to receive a bung bush. The body of the tool is cast hollow, and of such a taper as will give the desired bevel to the bung hole. In one side is formed a recess to form a seat for the knife cut ter, in which, directly opposite the edge of the cutter, is a slot for the
chips to escape through. Around the upper edge of the tapering body is a
flange of a breadth equal to the desired breadth of the countersink of the flange of a breadth equal to the desired breadth of the countersink of the bung bush. Upon the upper side of the flange are formed two proiections,
one of which is so arranged that its face may be nearly flush with the edge of the flange, so that the cutter attached to said face and the cutting point jectbelow the flange to cut around the edge of the count The other projection is arranged across the flange so that the cutting edge sink. Upon the upper edge of the body is formed a rigid ball, having a sock et formed upon 1
toolis operated.

## Improved Saw Swage.

Andrew J. McCollum and George D. Emery, Indianapolis, Ind.-This in
vention consists of an improved attachment of a saw swage, by means of which the swage will be held perfectly square across the tooth, so as make all the cuttingponnse exactly alke, and thus enable the saw to b filed much more quickly than it could otherwise be done. The invention
consists in the guile arms connected at their upper ends by a back, and pivoted to the stock of the swage. The guide arms are provided with a set
screw which passes through one of said arms and screws into the other arm, so that the lo wer ends of the arms may be adjusted closer together farther apart, as the thickness of the saw plate may equire. By using the
swage upon the teeth of a saw partly filed, and then filing the teeth by the marks of the swage, it is claimed that the saw may befiled in less than hat the time that would otherwise be required.

## Improved Inside Blind.

Elliott Metcalf, Rome, N. Y.-This invention has for its object to improve
the construction of Venetian or inside blinds, and it consists in the a rangement of an upper roller, carrying front and rear ribbons, attached $t$ se slats of the bind, and provided wable the blind to be lowered and raised from the top. This same, with the angular adjustment of the slats is effected by turning the rolle The vertical movement of the slats from the bottom is accomplished by
elevating cords. The invention further consists in a novel method of atelevating cords. The invention further consists in a novel method of attaching the slat-shifting ribbons to the latter, dispensing with the use of rivets, staples, or other astening devices, and insuring, also, a more per-
fect closing of the slats ; and it consists in passing or looping the ribbons through slots near the edges of the slats, so that when the latter are in a
vertical or closed position the edges of the same will abut more perfectly than in ordinary blinds.

## Amasa S. Thompson, Little Falls, Minn., assignor

Aasaly, ofsame place.-This in vention is intended to furnimself and Louis enient means for raising and discharging paint and similar substancés, readilyspread by the operator. The invention consists in a rubber syring nd flexible tubes provided with suitable valves and arranged in the handle of the brush. A tube conducts the liquid from the reservoir to the appa tus.

Improved Plow.
Andrews Riviere
.
Thomas G. Andrews and Andrews Riviere, Barnesville, Ga.-This inven on consists in the construction of plows, so that the plow plates may be ent no unevenness for the soil to catch upon, and which will enable th low gate to be quickly attached and detached. It consists of a lever brace voted atis rear end to the sloted lower end of the plow standard, se houlder or pin for securing thably to the plow beam, and provided with

Improved Spark Arrester.
and sparks are deflected by nverted cone (the upper parts of the stack) drawn through a perforated horizontal disk, and are thrown in each direction. They are still further etarded before they escape by an interior flange around the top of the that when they escape from the hood any fire which they may retain is instantly extinguished by contact with the atmospheric air

Improved Reed Organ Swell.
John R. Lomas, New Haven, Conn., assignor to Bernard Shoninger, or
ame place.-The design of this invention is to make a clear and open pasage for the escape of the sound from the reeds through the case of the in ith a sultable connection with the ordinary swell, or the lever which ith a suitable connection with the ordinary swell, or the lever which op sound waves a clear, open, straight passage through the case, whereby large gain of power is obtained without any extra exertion on the part of
the player, at any desired time, giving nearly double the effect of the front eeds.

## Improved Carpet Lining Machines John R. Harrington, Brooklyn, N. Y.-This invention re

John R. Harrington, Brookyn, N. Y.- - ing invention relates to a combiand condensing rollers, the object of which is to receive the cotton, flock r other fibrous material from a willow or breaker, form it into a smooth ap of uniform thickness, and deliver it bet ween sheets of cloth or paper, and secure the lap. The inventor, we believe, is the originator of carpet ningsmade with one or more cont egether by mucilage or sewn. The capacity of the machines is claimed to
e, 000 yards per day. Mr. Harrington has taken several patents on the me subject, but he asserts that the invention now under consideration preferable to any other.
Improved Railway Rail Chair.
Samuel Huber, Danville, Pa.-The main object of this inv
Samuel Huber, Danville, Pa.-The main object of this invention is to pre aged by passing trains, and it consists of a cavity or recess beneath the oint of the ralls, whereby a certain degree of elasticity is allowed the ends of the rails.
Improved Manufacture of Boots and Shoes.
John Boyle, New Yorkcity.-Theobject of this invention is to
John Boyle, New York city.- The object of this invention is to provide nimproved clamping connection of textile or other fabrics with hard and unyielding materials, as wood or composition soles, etc., so that shoes or
otherarticles of manufacture may be produced quicker and cheaper by eans of machinery, and the hand labor, hitherto necessary for such work, be dispensed with. The invention consists in grooving the wood sole or
other material at the upper edge, and binding the fabric, by a suitably haped metallic clamp, firmly thereon, so that a strong and intimate co haped metallic clam

Improved Printing Press.
Calvert B. Cottrell, Westeriy, R. E. This iveaion consists in gearing the sliders with the frame of the press, also with the reciprocating type bed prevent the overrunning of one by the other, which now happens in conseuence of the irregular action of the beil on the sliders, caused by the press
re of the cylinder on the bed when going one way and the freedom pressure when going the other way.

Improved Rubber Shoe.
Lewis L. Hyatt and Jared H. Canfield, New Brunswick, N. J.-This inven tion consists of india rubber boots and shoes, the uppers of which are made considerably thicker and stronger at the junction with the sole than
at the top and in the upper portions, and gradually lessening in thickness rom the bottom upward. In carrying out the invention dies, are sunk in eeper in the parts in which the lower portions of the uppers are formed than in the parts whereon the upper portions are formed, and thus the $r$ quired variations in the thickness are produced at the same time that the
sheets are made.

September 20, 1873.]
Frinutific Ammixan.

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dles. Shaping Machine for Woodworling. T. T . Balley

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J. E. R. should try to blue his steel articles
y the process mentioned on p. 10 or, vol. 26.-C. H.D. will Ind a method of making bone phosphate detailed on $p$,
343, vol. 26.-R. W. Whould read the answer on p .862, will ind a description of the horticultural fertilizer on . 401 , vol. 23. It should be phosphate of ammonia, not
iphosphate.-D. R. Is informed that the published ac counts of phospho. oronzor e o no no mention the the propo
tion of phosphorus, which can doubtiess be ascertaine by experiment.-H. J. H.'s query as to the names of the steam en yine is incomprehensible.- T. A. C. can find the roper weight of ball proportioned to length of leve
ora a afety $25 .-\mathrm{S}$. H. W. should read some elementary work ou chemistry, and had better advertise for the other infor
nation.- J. T. L.'s query is a trade matter: he shoul consult an engineer.-We are obiliged to \&. \& \& . . for
their correction ; the mistake was not ours. - P. P. can bronze cast iron by using the process described on p. 58 ,
vol. $26 .-\mathrm{B} . \mathrm{L} . \mathrm{B}, \mathrm{s} \mathrm{s}$ equation is a catch; the answer mat -w. B. J. will ind the needed inform ztiton as to mold E. F. L. asks: Would two steam boilers of other a horizontal and return tubular, walled in, each
having thirty-three feet of smoke stack, do the same vork with the same cual? Which would be the mos tho omical, and what per cent will the one save ove
he other, and why? Answer: We suppose thehorizon tal boiler would be the most economical, be
would be better protected against loss of heat. G. D. asks: Does it require more force to
ring a moving body to rest than it does to give it the yotion? I should say not; yet it would seem to be so
f IIIghtly understandyour reply to I B. . the current volume. I reason that in an engineer can
tump rom his engine at the rate of 15 miles an hour, it ampes no difference, so far as as his relation to the engin is concerned. Whether it is in motion or st rest. If the
engine is moving west at the rate of 15 miles an hour an the engineer jumps east with the same velocity, when
he strikes he earth he will be moticnless. Is not this so? think J. B.T. T. mistaken in thinking that "engineer
tc., invariably jump in the direction of the te., invariably jump in the arrecton of the movin
rain." It is true that they face in that direction, but then usuanlly jump with a swinging backward motion,
making the head and body move as rapility as possible In the direction opposite to the train. If an enginee jump back wards with a velocity of ten miles an hori,
and the train is moving in the opposite direction at the rate of 22 milise an honar, he strikes the earth with the
velocity of only 15 miles an hour, the force of which can asily be reited miles an hour, the force of which can players freautently ban ordinithory man. Anjury when runannin
 body than 1s reauired to impart the motion to 1 it; bu cases. We will try and make this platin, by a few simpl 30 miles an hour, and strikes against something whic stops it instantly. Now if a man were standing up in that train, facing to the rear, the effect would be the
same as if he were to jump with a velocity of 30 miles to remain standing and uninjured. On the contrary, we
know that he would perform a few involuntary somer saults, and the chances would not be very favorable fo his escaping with his ilife. This is because, though just
as much force was brought to bear to stop his motion as had been used in producing the motion, there was an
amount of work stored up that required time as well as force to overcome it. A train moving from a station
starts slowly, and gradually acquires speed, so that the
 30 miles an hour, couplings would break, passengers
would b be thrown in all directions, and general havoc
would time is required to impart a rapid motion to a body, if it is to be done without shock. We might multiply these
Ilustrationsto any desired extent. Suppose we have a hi wheel with a heary rim and crank a attachenent, and
that a man working on this srank makes the wheel volve at a high velocity. Now let him try to stopit suddenly, and he will find that the power stored up in the
wheel is sufficient to lift him off his feet, and throw him to some distance. The case instanceet by our correstration. Probably one of these players rarely runs fast er than at the rate of 18 miles an hour, and so many ac-
cidents have happened at first base by the difficulty of stopping suddenly without injury that the rules have
been amended, and a player on reaching frrst base does not have to hold it, but may run over it and cannot be
put out, until the ball has been returned to the pitcher. Our correspondent 18 right in remarking that persons
jumping from a moving tratin face in the direction of
ofe Schuylkill Haven used to excite the admiration of all who saw him by jumping from a train which was moving at the rate of 22 miles an hour. He may still displa,
nis agility and nerve, tor his aglity and nerve, for aught we know, although it
must be confessed that this proceeding was somewhat risky. His plan was to go to the rear platform, place his
feet on the buffer and his hands on the rall leaning back as far as this position would allow. When he reached
and the place where he desired to stop. he would dexter
ously release his hands and feet simultaneoust reaching the ground in an upright position, would walk off to his work with an unconcerned air. We are not relating this incident to Induce our readers to go and
do like wise. If they arevery desirous of experimenting

Tailure will be a few bruises and the derision of the bystanders. We ence knew a man who jumped from a
canal boat, in a drection contrary to that in which
it or, instead of landing gracefully on his feet, his head collided with the ground, and he went home a wiseran asader man. We think there is one case in which erson could jump back wara from a moving train,
everything were propitious. Let him tart end of a platform car, and run back as fast as the train
vas moving forward; then he could jump with safety.
 ment.
W. H. M. says: In your answer to M. C., in
No. 8 , Voi. 29, you saa : Multiply the diameter of the cylthot be the suane of the diameter? Do you deunc anything for friction? 2. What books shoolla a young an read so asto get a good diaa of machinery in gen
crul , and about what would they cost? Answers $: 1$. It hould be the square of the diameter, of course. In cal. uction is mistakes of this character, and will thank our reader o point out errors whenever noticed. 2. Appleton'
Dictionary of Mechanics,", price 82.00 , will sive you Dictionary of Mechanics,", price 8.0.00, will give you
good general idea of machinery. Spon's "Dictionary, now in course of pub
nd more complete
 possible to draw a curve, from $c$ to $d$, such mhat its tan orces of gravitation and centrifugation acting on the

ball at whatever point of the curve the ball shall be
placed, say at $e, f$, or $g$, the number of revolutions being constant Answer: The curve is a parabola, with ver
con
oit at the lowest point. We would be glad to receive at tue lowest point. We would be glad to receive
solution me of our readers.
$\xrightarrow[\text { R. L. asks: }]{\text { R }}$ Can a correct test of the he foot and in exact proportion to one of fullsize? An wer: Small models are generally strong
tion to their size, than the actual works.
F. P. says: In constructing a pair of scales relative length of beam, and chains or threads to which ach end of the beam, and a straight linedrawn mow fa above the line in the center of the beam should the
ivot be, to make the most sensitive results? Winl th scales be more sensitive with the pivot just as near the arther? 3 . Will the knifeededed pivot be as delicate mode as any? 4. A frlend says that the index above
he pivot must be of a certain length and weight to make the scalessensitive. I contend the index is mere Which is right? Answers: 1. This does not affect th ensibility. 2. By placing the pivotas close to the cen ter of gravity of the beam as is practicable, the sen
ty willbe increased. 3 . Yes. 4. You are right.
N. H. T. asks: 1. What is the cost of a first illit produce in a rope or chain fastened to some imnovable body? 3. In what position should the crank of a double engine be placed, to act to the best effect,
they being keyed on to the shaft at right angles to one nother? 4. Give a rule for compound gearing used on
 1. A bout 812,500 .
About 5,000 pounds. Each 450 from midd position. . L. Let $\mathrm{t}=$
thraeas per inch on 1 ead
serew and $T=$ threads serew, and $T=$ thread
per inch to be but $n=$ revolutions per minute
of lead screw to one of main spinde. Then any number of change
wheels: Let $A=$ number of teeth in gear on cone spindle. $\mathrm{B}=$ teeth on 1 st 1ststud pinion. $\mathrm{D}=$ teet on 2nd stud wheel. E $=$ teeth on 2nd stud pinion
$\mathrm{F}=$ teeth on 3 rd stud heel. $G=$ teeth on 3rd stud pinion, etc. L=teeth in whee to one of cone spinde, $\mathrm{N}=\frac{\mathrm{A} \times \mathrm{C} \times \mathrm{E} \times \mathrm{G}}{\mathrm{B} \times \mathrm{D} \times \mathrm{F} \times \mathrm{I}} . \quad$ And if $\mathrm{M}=\mathrm{num}$. ber of revolutions of main spinale to one of cone spindia $=\mathrm{N} \div \mathrm{M}$. To find $\mathrm{M} . a=$ teeth in wheel on cone spindic $b=$ teeth in 1st $w h e e l$ on back speed shaft. $c=$ teeth in $2 n$
wheel on back speed shaft. $d=$ teeth in wheel on main pindle. Then $m=\frac{a \times c}{b \times d}$. The accompanyingengraving wil robably make the rules clear
F. E. H. asks: What would be the average oaded Answer: Weight, nine tuns empty, nineteen A. K. asks: 1 . Would it pay to own and run
grain separator where coal 1 si cheaper than wood? Coal is 88 per tun at the bank, distance to be hauled from 2 to 12 miles. 2. How much coal would be consumed by
a 20 horse power engine ina day's wors of 12 hours? An swers $: 1$.
R,000 1bs.

H.F U asks. What shod nozzle will H. F. U. asks: What shaped nozzle will Sine, cateris paribus? Answer: The nozzle Which has
he form of the contracted vein, (see article on "EAllux
A. K. asks: How much of an inch square
nust a steel barbe made, to support a weight of 3,0001 los. he bar tor rest on suppports 2 inches apart? What are
he formuas, if weipht or the ditance of the supports
隹 will depend upon the form, and the distribution of the
veight. We will give you two rules for a steel bar, and ou can assume different depths, weights and distance etween supports, to find the various widh3 require
nder different circumstances. 1 1st. If the weighti is sus pended at the center the width of the bar in inches is
equal to the clear span in feet multiplied by the weight pounds, divided by the feet multiplied by the weight multiplied by 1,000 . 2nd. If the weight is uniformly dis ingthof clear span in feet multiplied by the weight divided by the square of the depth in inches multiplied by 2,000 .
A. B. asks: Why is it that a saw heats on on the loll? 2. Ought a circular saw to be hollowin Your saw is undoubtedly what saw mzkers call open on herim, or possibly it may not be in proper line with the arriage; generally board circular saws are lined wit
he front or cuttingportion a little nearer to the carriag than the back part of the saw, in order to prevent th teeth cutting or scratching the timber ; this causes the aw naturally to incline towards the log and bear agains requires to teep the saw in proner positiosistanc requires to keep the saw in proner position; conse
uently the greater friction, in sawing hard than sof timber, causesit to heat on the rim. If it is more open
$t$ the rim than in the body of the saw, the least amoun at the rim than in the body of the saw, the least amoun of heat expandsit, and causes it to heat still more. 2. A
aw should be flat on the log side, and not hollowing It had better be a verylittle full or convex on the lo ide, but in no case so much as to permit any portion of
he plate to touch the timber.-J. E. E., of Pa. L. S. Says: I noticed in your answer to Davies' "Algebra" and Legendre ; but you will find that
although they were the best in our day and mine, they are far behind Robinson's "Algebra,", especially his
University Algebra," and Greenleaf's "GGeometry," Whichersity Algebra, and Greenlion, ou will find very practical
whewe or
However, the Legendre style (which they follow) never atisfied me. There is none of that solid reasoning ound in Playfairs "Euclid" or Potts' "Geometry." Th We are quite familiar with the works you mention, and nentioned the most suitable text books, according to
our judgment, At the same time we are glad to receive the opinion of others. In an article recently published
we have intimated that it was of more importance how解 N. D. H. asks: In building. an engine to
ropel a boat with twin screws, would friction gear work o more advantage than cog wheels? The latter are to more advantage than cog wheels? The latter are ake a rumbling and disagreeable noise, and are liable to get out of order. Answer: Friction gear will work
very well, if properly constructed. It is well to have $V$ haped grooves in the wheel or pinion having V shape
D. asks: 1. How can I make chloroform nd how is it administered to make a person sleep one
our? 2. How is acidulous mineral water made? ow is lemon syrup made? 4. Whose work on chem stry would you advise me to get, that is, whose is the
nost complete? Answers:1 Chloroform is made b distiling a mixture of alcohol and chloride of lime. It s administered by means of a saturated sponge or hand kerchief placed over the mouth of the patient, but we
would advise you in no case to attempt to experiment sthetic properties, as seriou results might follow. Its administration should be left entirely to an experienced physician. 2. By chargin water. with which the proper chemical ingredients have
previously been mixed, with carbonic acid gas. 3. By mixing lemon juice or citric acid with sugar sy

J . P. asks: Is there any method of prepar
ng cloth or thin leather so as to render it impermeabl o air without destroying its pliability? The ordinar ubber cloth is not, and I am tola cannot be made, tho loth, from which what are known in England that the intoshes are made, might serve your purpose. Th cloth is prepared by coating two sheets of cloth on on side only with india rubber varnish and then pressing
the varnished sides together by means of rollers so as o make one sheet. Thin leather mig
$\underset{\text { ween gold-bearing quartzandcommonquartz? }}{\text { R. }}$ 3. be s gold separated from quartz? 3. Does common san ontain gold ; if so, about how much to a bushel of sand . What are crucibles made of? 5. How can I separate
brass? 6. What work on chemistry is the best? phospho-tungstic acid made? Answers: 1. No diffe nce, except that one contains gold and the other doe the eye. 5. Gold is generally separated from quartz b rushing and grinding the rock into a fine flour; the y means of water the quartz is washed away, leavin fhe heavier gold in the vessel. There are other method
separation. 3 . Common sand does not contain gold . Crucibles are made of black lead or rgraphite, also o
lay. 5. By heat. 6. One of the best is Boxam's. lay. 5. By heat. 6 . One of the best is Bloxam's.
We do not know what our correspondent means unles it be a mixture of phosphoric and tungstic acids.
J. H. K. says: I have an orchard of apple years I have been greatly troubled by the ravages of the canker worm; and unless a stop is put to them, I sha me if there is a remedy. Answer: The female of the canker worm is fortunately without wings, and is oblige to crawlup the trees to lay the eggs. If you can pre ent this, you can put a stop to the depredations of th this purpose, such as the application of tar either di rectly to the bark itself, or on strips of cloth, paper,etc wound around the trunk, Melted india rubberhas bee roughs flled with Whole trunk near the grous This plan indeed has been tried with success on a sma sale. When the worms are on the leaves, showering with a mixture of whale oil soap in water (1 lb. soap to
7 gallons water) will kill the worms without injuring leaves or frult.
to Vegetation.
F. T. H. asks : What will take nitric acid
tains from cloth? stains from cloth? Answer: Try strong ammonia o
hartshorn. Apply with a small piece of sponge or cloth
J. C. M. asks: How are grass and bouquets
crystalized, so that they preserve the same form and color? Ans wer: What you mean is probably that the
grasses or flowers are coveres with some crystalline salt. This might be done by aipping them into or sprink. ling upon them a strong warm sonution te sexano leting each portion crystalize before the next 1 s applied I. C. asks: Will a suction pump work sat200 feet distant horizontaly, with a perpend.cular rise o e, to cause the least outlay of labor $1 n$ using the pump Would it be preferable to lay the pipe according to the contourof the grouna, or go to the additional expens of laying it nearly as regular in ascent as practicable, by dill answer; and it will be just as well to lay it accord ng to the contour of the ground. The pump must be
kept well packed, and will work satisfactorily, except that it will probably be a laborious operation for any tine, working a pump placed at the well and forcing the water to the house, is quite often employed in case of this kind.
J. S. P. Says: In your issue of July 19,
c. M. P. asys: "i nave devised a machine which will grind a perfect lens of any size or shape." I should like
to know how his machine is made, if he has no objection to pu pulishing a description of it. I should like also an
explanation of Professor Boyle's experiment which you eferred to in the same paragraph. I don't understan how a polisher moving in cycloid curves can correct
spherical surf ace. Can you give a fuller description of Boyle's machine, or tell me where I can find such a des ription? Answer: A spherical refracting or reflecting tion, before it will converge parallel rays to the same folowing manner: A disk of wool coated with pitch or rosin is worked with rouge in strokes across every diameter of the lens. The glass rests on an optician's post
around which the operator walks, continuing the motion until the radius of curvature of the central part of the curve becomes a parabola. Mr. Clark, who uses th method, makes the final correction by placing the len cles at intervals of a quarter of an inch; then, with his orefinger dipped in 1ouge, he rubs the glass gently in
nes, guided by the numberedcircles on the paper be neath. Froun time to time the glass is tried upona star Whorever the zones are long focus, the touches are light
where they are short, the finger is pressed on hard. The achinefor local correction, which Clark says work too rapidly for his use, moves the local polisher to and
fro, and at the same time turns the lens gradually, that the polisher traces hypocycloid curves of greater or
less extent upon the glass. The finger, as it instantry urface as clan as, with his forefinger dipped in rouge, he wipe hat of the pholas, or burrowing mussel which tunn particles of the rock itself .
J. M. says, in answer to J. G., who asked a common spirit lamp and blowpipe with common tin muriate of zinc.
Minerals, etc.-Specimens have been re eived from the following correspondents, and examined with the results stated.
P. S. H.-It is blue clay, a silicate of aluminum. If it
burn white, it might be of value to the potters, in manufacture of earthenware.

## COMMUNICATIONS RECEIVED.

The Editor of the Ncientific American acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects

On the Hot Air Engine. By F. O. C.
On the Pulsometer. By E. D. W.
On the Patent Right Question. By W. On the Paten
On a Device for Saving Fuel. By R. F
On Interchangeable Parts. By B. F. S
On the Million Dollar Telescope. By X.P.M. On a Word to Apprentices. By F. H
On the Manifestation of Energy. By W. D.
Also enquiries from the following
P. R.-H. J. H.-B. L. B.-J. M. S.-C. deA.-A. B. C. manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an the head of "Business and Personal," which is speciall the head of "Business and
devoted to such enquiries.
Correspondents in different parts of the country ask Where can machinery for making cheese boxes be had Where are small rubber articles made? Makers of the
above articles will probably promote their interests advertising, in reply, in the SoIentific American.

## [OFFICIAL.] <br> Index of Inventions

 FOR WHICELetters Patent of the United States were granted for the week endina August 19, 1873,
and each bearing that date
[Those marked (r) are reissued patents.]

[^0]Baling hay, etc., wire tie for, G. L. Laughland. Beer on draft, preser
Bell pull, A. L. Swan
ellows, W. Pilch
Boats, folding frame for, w. M. Ducker
Bolt for sate doors, etc., W. Hall.
Boot heel screw, W. Ackerman...
Boot, plowman’, Walker \& Brown Boot sole edges, burnishing, J. Beasley et al..
Boot sole edges, burnishing, J. Beasley et al. Boot sole edges, finishing, C. M. Chase.....
Boot sole edges, trimming, R. C. Lambart Boot sole edges, trimming, R. C. Lam
Boot lift punching, G. W. Ellis (r).... Borer for sampling cotton, E. A.
Boring machine, earth, J. Burns. Botlle stopper, L. Rhoades Braking hoist, self, W. Hart Bridge, ferry, C.J. Atkins. Bung, self-venting, C. F. Spen
Button fastening, C. H. Reid Can for oil, etc., J. R. Cole. Cane juice with sulphur, treating, w. G. Billiu Car coupling, D. C. Camerer ar coupling, F. F. Seybol ar, dumping, J. Hughes...
Car lanıp, J. E. Cross.......
Car railroad, J. C. Wainds...
ar truck, railroad, G. Dix
ar trucks, kingbolt for, Murray \& Lamason (r)
Chair, self reclining, G. Niderkorn
Chuck, T. R. Almond
nurn dasher, reciprocating, T. Ear
Clothes line holder, w. Cooke
Clothes wringer, centrifugal, H. Rosamyer, J
Cotton lint room, Areproof, R. R. Warren Crib, W. B. Carpente
Cultivator, A. C. Smith (r)
Cultivator, corn, N. G. Blaus
Cutter head, A.H. Shipman
Digger, potato, s. W. Tyler
Door closing apparatus, H. F. Shaw
Dressmaker's marking gage, M. Blauvelt.

## ngine, pable steam, chiedler \& McNa

Engine, rotary steam, O. Adams Engines, regen erating steam in, F. M. H. Motar ertilizer, a Ane, foan Fertilizer, A. F. Andrews Fire place, W. Lossi
Firkin, C. Alvord...
Fluting machine, E. M. Dee Furnace, boller, S. A. For
Furnace for smelting ores s , E . Balbach, Jr Furnace grate, w. B. Le Van..
Furnace grate, J, Withington.
Furnace grate bar, A. Rawson
Gage, micrometer, A. Bonnaz
Game board, G. Wentz.
Gas apparatus, railway car, J. B. Olney
Gas machine pulley E. F. Van Houten
Gate, automatic, J. S. Foit..
Gate, automatic,J. E. Strong
Generator, steam, H. P. Wright
Glass furnace, W. Leighton,
Grain Dinder, A. Yhilippi
Grain steaming apparatus, Eberts \& Pitts
Hammers, die for forming, J. Yerkes. Harness coach pad, A. Gilliam
Harvester, O . Billings (r)
Harvester, J. E. Elward.
Harvester, J. H. Elward.
Harvester, J. H. Elward..
Harvester, J. .. Elward..
Harvester, J. H. Elward.
Harvester, J. H. Elward..
Harvester, S. Luce.....
Harvester, w. Wallace
Harvester wheel and axle, B. G. Turner
Hats and caps, dyeing felt, J. .
Hay tedder, T. J. \& G. M. Clark.
Heater, water,I. S. Mead.
Hinge, E. Boileau........
Hook, cant, F. Mansfiel
Hook, cant, R. Whittie
Hook, flsh, B, F. Allen.
Horses from cribbing, preventing...............
Hose, etc., testing engine, P. Noyes
draulic, E. A. Street
Jce cream, jellies, etc.,mold for, E. M. May
Jack, hoisting, J. H. Churchill
Kettle spout, tea,
Lamp, J. Kirby, IF...............
Lamp extinguisher, F. C. Wirem
Lamp, hanging, G. Bohner (r).
Land marker, G. W. Betts
Latch, reversible knob, C. Moody
Lathe, turning, J. P. Luther
Lathes, centering device for, H. Gray
Lathing, metallic, T. O'Callahan.......
Leather work, seam for, C. Kenisto
Level, pendulum, A. C. L. Delsarte.
Lithographic stone, Moore \& Bagger
Lock, combination, A. D.
Log turner, C. Van Vleck
Loom, J. Zürchen
wher, machine for edging, w.G. Cald well
Match sticks, makinc, F. Zaiss (r)
Medical compound, P. H. Steenberge
Metal bars, bending, S. Holmes.....
Milk, preserving, L. F. Kirchhofter.
Mill, roling, Stephens \& Coope
Millstones, dressing, w. Farrow.
Milstones, dressing, L. Randolph
Molding machine, H.
Mortar mixer, C. Pi
Motor for driving maching, A. Procto. Mowing machine, w.s. Stone.
Nut and bor
Nut and bolt fastening, P. F. King. Pvens, reel for, A. Crumbie.
Panels, machine for raising, F. D. Green.

Panier,J. S. Colby..................
Pantaloon stretcher, L. Kaltenba
Paper bags, making, G. Dunham.
Paper bags, making,. Dunhan
Paper tubes, making, T. J \&
Pipe coupling, L. T. Scofield...
Pipe coupling, L.T. Scof
Pitman, O. F. Thomas...
Plane, match, C. G. Miller
Planter, seed, B. K
Plow, J. Marr.....
Plow, P. H. Stark
Plow coupling, T. . . Thrasher.
Power apparatus, foot, E. \& H. Harding
Press, steam cloth, Dennis \& Weston Presses, mold or box for brick, J. McKenn Propeller, screw, D. Freed. Pump, I. C. H. Kraus..........
Pump piston, W. C. Cubertson
Pump rod attachment, H. H. L Purifier, miädlings, Hunter \& Whitmore Purifier, middlings, Hunter \& Whitmore Railroad rail, w. W. Alter. Raiiroad rall joint, . L. Ludson..
Railroad rail joint, w. LI. Lindsle Railroad water tank, J. Morton ( Rake, horse hay, Lufkin \& Allen. Rake, horse hay, B. Morse Roofing, sheet metal, Hegeler et al Roofing, tile, D. Swain
saw, Luppert \& st. Pierre. Saw teeth, setting, G. W. Bugb Sawing machine, A. Xander....
Sawing machine, W. H. Shugart awiag machine, edging, E. Tarra crew driver, J. H. Davi Se wing machine, E. A. Goodes....
Sewing machine, Rayer \& Lincoly Sewing machine bobbin holder, Barnes \& Mesic Sewing machine motor, B. C. Chamb Sewing machine shuttle, J. B. Secor Sewing machine table, J. Bennor. Sewing machine table, E. A. Jefter
Shaft bearing, Bird \& Sullenberger Shingle bands, notching, C.E. Mc
Shrinking metal bands, w. Carr. Sieve, grain, L. D. Carpenter
Smoothing iron, A. S. Mann. Smoothing iron, A. S. Mann..
Spark arrester, W.D. Farrand Stering apparatus, C. A.Seavey.
Steering apparatus, H. F. Shaw.. Steering apparatus, H. F. Shaw..
Stock shed, portable, D. H. Yeize tone, machine for cutting, P. H. Hopkins... Suspender, B. J. Greeley...
Table, extension, C. Riege abbe, extension, C. Rleger.... Thill couplings, clamp for, M T Thrashing machine conveyor, C.D.Decker Tobacco, hook for hanging, H. N. Strong. Trap, fly, J. R. Johnson.
Trap, steam, Perkins et
Umbrella, J. McAuliffe........................
Valve automatic regulatin, G. Litson
Valve and cut off, rotary, w. S. Bartis.....
ehicle, E. D. Weller..
Vehicle side bar, F. I. Flower
Voting apparatus, legislative, J.....................
Wagon, dumbing, D. D. Smith
Washin
Washing machine, D. B. Dorse
Watch case centers, making, J. C. Dueber
Whip socket fastener, w. W.
Whip socket fastener, w. W. Richardson
Whip socket fastener, W. W. Richardson
Wire pointing machine, F. H. Aiken
Wire to hammer dies, feeding, w. H. Dayton
Wood pulp making, S. B. Zimme

APPLICATIONS FOR EXTENSIONS.
Applications have beenduly flled, and arenow pendin
or the extension of the following Letters Patent. Hea ngs upon the respective applications are appointed for
26,202.-Paper Pulp.-J. B. Palser et al. November 5 .
26,329. $\rightarrow$ Boot TIPs. - N. Silverthorn. November 12 .
XXTENS 55,183.-Nait Machine. - Daniel Dodge. 25,199.-FEEDING PAPER TO PRESSEs.-R. M.

DESIGNS PATENTED
6,803.-Band Saw Frame.-L. M. Collins, Leban on, N.H.
6, 804 -GI ass Goblets.-J. H. Hobbs, Wheeling , W. 6,804.-GIASS Goblets.-J. H.
6,805. - GLass DIshe. J. H. Hobbs, Wheeling, w. Va. 6,806.-SEaL Presses.-C. A. Mathiesen et al., N. Y. city.
6,807.-SA FETY STIRRUP.-R. Renift, Bloomington, Ill.
 6,809.-GAS BRACEET.-. F. Travis, New York city 6,810--OIL Clotr--J. Barrett, New York cit
6,811.-CARPET.-J. Dornan, Philadelphia, Pa 6,812 to 6,818.-OIL Cloths.-J. Hutchison, Newark, N.J 6,819 to 6,883.-CARPETS.-C. A. Righter, Philadelphia,
6,824.-CARPET.-J. T. Webster, Philadelphia, Pa.

TRADE MARKS REGISTERED 1,410.-Corton Gin.- Gullett Gin Mf'g Co.,Amity Citv,La.
1,411.-Fertilizers. - M. J. Solomons, Savannah, 1,411.-FERTILIEERS.-M. J. Golomons, Savannah, Ga.
1,412.-PACEEDOYSTERS,ETC.--Wentzet al.,Baltimore.Md 1,413.-SEleEcted Nalls.-J. Coyne, Pittsburgh, Pa. 1,414 to 1,415.-FANCY AND DRY Goods.-E. Flaxland
Co.,Paris, France.
1,416.-WINEs, ETC.-S. MCCull

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On granting the Extension
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