

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, IIECHANICS, CHEMISTRY, AND MANUFACTURES

## THE JAMIN MAGNET.

It is a well known fact that a compound magnet, formed of a number of plates or layers, each of which is separately magnetized, is possessed of a greater portative force, that is to say, will carry a heavier load than a simple homogeneous magnet of equal weight. Generally, however, it has been heretofore considered that this portative force is, as compared with the weight of the magnet, quite small, and Hacker has established a formula showing that the load carried is equal to
a constant (depending upon the method of magnetization) multiplied by the cube root of the square of such weight. Thus, to illustrate, while a magnet weighing one pound will exercise a portative force of ten pounds, a second one, similarly magnetized, weighing eight pounds, eight pounds, will, according to the formula, only lift forty pounds.
Up to the present time the manufacture of magnets has been principally pursued at the city of Haarlem, in Holland, and to the Dutch workshopsithas been customary men of all counmeies to repair when powerful when powerful apparatus o this description became needed. In spite of the brilliant re searches of Cou lomb, of Biot, and others, but little has been definitely determined regard ing the laws governing the construction of magnets, and magnets, and notably in refe dimensions in order to attain order to attain given power
The manufacture has been, in fact, more a matter of experience and individual skill than of established rule. For some time past, however, investigations have been in progress at the French Academy of Sciences, and M. Jamin has succeeded in not only providing magnets of most extraordinary powers, but also in deducing laws for their construction and for determination of their capabilities, thus adding data of the highest importance in elucidation of a department of physics regarding which, it may be safely stated, we know less than of any other branch
Before entering upon a brief abstract of the principles governing M. Jamin's researches, there are two words which we shall employ, and which may need a previous explana tion: first, by a "contact" we mean a piece of soft iron brought into juxtaposition with a magnet; and, second, by " dissimulation" is understood the temporary neutralization of the magnetism of one body by that of another when the same are together, so that, on their being drawn apart, th normal condition of each may be supposed to return.
I. When a steel plate is superposed upon a bundle of al ready magnetized iron (faisceau), the first effect is that two equivalent quantities of opposing magnetism separate in such a manner that the solenoids, which terminate at the surface of the bundle, appear to prolong themselves through
the new layer, so that the magnetic power is referred to the gained. Replace the contact, remagnetize, and again the new surface, and nothing is added to the primitive state of the magnet. But the latter produces two other actions: it repulses at its exterior the magnetism of the plate, and also determines in the plate a contrary magnetization increasing with its energy. The difference of these two actions represents the gain which the annexed layer brings to the bundle, and this at first considerably decreases with the addition of new layers perior extreme is found. This we may term F, and it is learly transitory and without utility, since it disappears on he first removal of the contact; and although the latter may be returned, unless re-magnetization of the plates be accom plished, the lower limit, $f$, remains constant
III. Arranging two armatures in suitable position, M. Jamin connected his magnetized steel plates with them. If the former touched, he found that they dissimulated all the magnetism of a plates, but when separated, only a portion of this a portion of this neutralized. In other words, the other words, the plates partially discharge each other, and lose portion of the nor mal magnetism but less thanif the armatures did not exist, and still less than before they were separated Now, by applying a contact to the armatures, a per manent portative force was deter mined, was deter mined, $\mathrm{F}_{1}$, greate than $f$, and les than F. For ex ample, by proper arrangement, $F$ or the superior limit noted in our second paragraph was found to be 380 kilogrammes on removing the contact, $F_{1}$ then appeared equal to 260 kilogrammes on displacing the on displacing the reached, equal to 170 kilogrammes 170 kilogrammes on returning the armatures, $\mathrm{F}_{1}$ wa again reached equal to 260 kilo grammes; and the difference between 170 and 260 , in this example, roughly indicates the gain in perma nent portative force resulting from M. Jamin's discoveries.
Lack of space forbids our enter ing in greater de tail into the elabo The magnetization becomes, at a certain point, maximum, |rate theories of the investigator. As regards the materia and a limit is reached, which, it may be here stated, is the inferior extreme of the portative force of the apparatus, and which, for the sake of future clearness, we shall call $f$.
II. Suppose that a contact be suitably fixed and supported, and a number of steel plates, magnetized to saturation, be separately applied in connection therewith. M. Jamin, at this point, finds that an indisputable analogy exists between the influence exercised by a magnet upon iron, and that of an electrified body upon an electrical condenser, as, for ex ample, a Leyden jar.
The magnetisms normal to each body dissimulate each other, and the magnet and its contact constitute a true magnetic condenser. Now, in the case of the steel plates and a contact above noted, the magnetism of the first plate is dissimulated by the soft iron, so also of the second, third, and so on, until a point of equilibrium, so to speak, may be considered as reached, when, if more plates be added, a certain quantity of surplus magnetism becomes free. The plates react upon each other, lose polarity, and eventually a new limit is reached, which is the superior extreme of portativ force. If, however, we remove the contact, the effect noted jected to their mutual influence, and the lower limit is re
composing his steel plates, he adduces the remarkable fact that the degree of temper, re-temper, and of annealing necessary is not uniform, and varies greatly with different kinds of steel, a circumstance which explains the hithert reat uncertainty in the construction of magnetic apparatus. We present herewith an exceilent engraving of the great magnet which M. Jamin recently exhibited before the French Academy of Sciences. The apparatus is arranged in a simple machine for testing the portative force, which consist essentially of a graduated lever, on which is suspended a weight of 132 lbs . The latter is gradually drawn toward he end the by a cord, attached to amall ratch benl of in heel shown, in the hands of the operator, until contact is roken, when a very simple calculation determines the force The magnet is constructed of two armatures placed opposite o each other, and each weighing 35 lbs. They are rigid y connected by heavy crosspieces of copper, and support a cubical contact of soft iron weighing 28 lbs . From their ower ends the armatures spread out and grow thinner, ending in sharp edges. Secured by screws to the exterior sur aces of both is a thin strip of steel, which takes a natura curve from one armature to the other. All the other plates previously magnetized are placed within and left to assume
a natural position, clinging to each other, as to the armatures, by their own elasticity. On using from 40 to 45 layers, it was found that the force, $F$, remained constant, and attained a limit of $1,100 \mathrm{lbs}$. , which could not be exceeded with the conditions of armature, contact, and steel used in the experiments. Stopping at 45 plates, the total weight of the apparatus was determined to be 101.2 lbs., and its portative force 1,012 lbs., or ten times the weight. With a greater number of plates, these proportions rapidly diminished, and the power of the magnet no longer bore so high a relative value in comparison with its weight.
As to whether it will eventually be possible to obtain mag. netized bars of even higher powers than thus reached, it remains yet to discover. Their utility may perhaps be questioned, or at least their direct and immediate application to scientific purposes; but the answer to this, as to every other interrogatory of the cui bono nature, is simply that even the most abstract of theories may, in the light of new investiga tion, lead to other ideas of considerable practical importance.
Suffice it that M. Jamin has taught us how to construct, theoSuffice it that M. Jamin has taught us how to construct, theo-
retically and practically, a magnet capable of producing the highest effect of which it is susceptible, and that it rests for inventors to apply these newly found principles toward the improvement or the origination of devices for their scientific and industrial utilization.

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## PUBLISHERS' CARD.

With the next issue of this paper, the time for which a large number of our subscribers have prepaid will expire. In order that our readers may experience no stoppage in the receipt of the journal, and that we may not miscalculate the quantity of the paper to print at the commencement of a new volume, we hope our friends will signify their intention to continue the paper by early remittances.
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## THE LOSS OF THE VILLE DU HAVRE

Another casualty at sea, which,in its terrible details, fairly rivals the horrors of the wreck of the Atlantic, has recently
occurred in the sinking of the French steamer Ville du Havre while on her voyage from New York to Havre and Brest, France. She left this port on the 15 th of November last,and at 2 o'clock on the morning of the 22 d while in mid ocean, was run into by the British ship Loch Earn. All ac-
counts agree in the fact that the steamer was struck amidcounts agree in the fact that the steamer was struck amid-
ships on the port side, the effect of the blow being to crush in her iron frame for a depth of at least thirty feet, and to cause her to plunge low first under the waves twelve
minutes afterward. Out of three hundred and thirteen minutes afterward. Out of three hundred and thirteen people on board, but eighty-seven were picked up by the
colliding vessel, and of this latter number, fifty-four were a colliding vessel, and of this latter number, fifty-four were a
portion of the crew, including the captain and some of the
officers. A large number of the rescued went down with he ship and were subsequently found by the boats of the Loch Earn, after as long as one and even two hours drifting
in the icy water, clinging to planks and spars. Several were in the icy water, clinging to planks and spars. Several were
killed outright by the crash of the collision, and others subsequently by the almost immediate falling of two of the masts. The Loch Earn experienced serious injuries about the bow, sufficient to excite apprehension as to her safety and accordingly, on her falling in with the American ship Trimountain, the survivors were transferred to the latter vessel and by her carried into Cardiff, Wales. The Loch Earn, although spoken shortly after the disaster, has no since been heard from, and there is some fear of her loss. The Ville du Havre, formerly known as the Napoleon III., beionged to the Compagnie Générale Transatlantique and was one of the largest ocean steamers afloat. Her length was 423 feet, beam 49 feet, depth of hold 40 feet, and tun aage 5,500 . She was magnificently fitted up, and com manded by experienced officers, drawn from the regula
French naval service. French naval service.
The list of the lost includes a number of well known citizens of New York and Boston, several members of the Evan gelical Alliance, who were returning to their homes, and Judge R. W. Peckham, of the Court of Appeals of this State.
In the absence of the complete details of the disaster, to be elicited by a court of inquiry now in progress, for which the arrival of the mails will have to be awaited, it is difficult to assign the immediate cause. That there is gross negligence and carelessness to be imputed to both vessels,
there is hardly room for doubt. It was the steamer's busi ness to give way to the sailing ship, but that the latter could not have, by proper management, lessened the shock of the collision seems very improbable. There are conflicting ac collision seems very improbable.
counts regarding the sighting of the lights of the Loch Earn though it is conceded that the night was clear, in which case
it is hardly possible that the rapid approach of so large a it is hardly possible that the rapid approach of so large a
vessel could fail to have been perceived by the watch of the vessel could fail to have been perceived by the watch of the
Ville du Havre.
In this case as in that of the Atlantic, the Metis, and pre-
ious wrecks, we are again compelled to revert to that incomprehensible economy on the part of owners which sanctions the lavishing of large sums upon elegant upholstery, gorgeous furniture, and luxurious table at the expense of the provision of the simplest and best known appliances for the preservation of life. As a preventive of just such disasters as the present, there is the electric light, which, placed at an elevated position on the bow of the ship, can be seen at a distance of 15 miles , and which illuminates the sur-
rounding space like a room. The apparatus could be driven rounding space like a room. The apparatus could be driven power. In cloudy and foggy weather or at night, the steam whistle, the ship's bell, fog horns, and the firing of guns, pre cautions which are never omitted on board of men of war, afford a means of signifying the position of one vessel to
others in the vicinity. As for life-preserving apparatus, others in the vicinity. As for life-preserving apparatus,
there are so many excellent and well tried inventions that their mere enumeration would fill columns of our journal. Every mattress on board should be stuffed with cork, and the cabin settees and chairs, if similarly filled, would make admirable supports, sure to float in the roughest sea. Life preservers of the most approved pattern should be p throughout the vessel, in numbers largely exceeding the ggregate of people carried. Life rafts should be placed on might be resorted to, in sudden danger, without confusion might be resorted to, in sudden danger, without confusion
or delay. Buoys also might be arranged outside the vessel, and provided with chemicals which ignite on becoming wet, so that brilliant light might be shed around, enabling people in the boats to pick up others. The buoys could be fixed so as to be easily detached, or to disengage themselves on the sinking of the vessel. Similarly, a number of long copper tubes, hermetically closed and provided with life lines might be conveniently stowed in the chains; these would also float clear. In fact there should be, if anything, a superfluity of and to avoid such losses as were occasioned on the Ville du Havre by crushing, a nest of boats should be stowed amidships, and a part of the space now given up to deck houses devoted to that purpose. There are also numerous inven tions of folding and canvas boats, which could be placed around the decks, occupying little space, and which woul also do good service in time of need.
The great desideratum, however, is an unsinkable ship and to this need we desire particularly again to call the attention of inventors. The compartment plan, though it has been the saving of many vessels, has failed to counteract
the effect of severe injuries, which rack the entire frame of the effect of severe injuries, which rack the entire frame of
the ship. What we require is a hull built with a double skin and honeycombed with air spaces, so that, no matter how big a hole is made, the fabric will still float: either this or some similar device which will keep the deck above water, no matter if the entire hold or lower works fill.
There is a need of compulsory legislation on this subject, which will reach not only our own vessels but those belong ing to foreign owners sailing to and from our ports. A clear ance might be refused to any passenger ship unless she could show a satisfactory certificate from proper officials tha her life-preserving apparatus was adequate and in perfect order; or there might be such exemplary penalties attached
to the loss of a vessel, which, upon investigation, it could be proved was not in every particular sufficiently provided, as would force her owners to look to the lives of their passen gers with at least as much care as they now give to the in surance of their ships.

## A STEAM SNOW MELTER.

A new machine for cleaning the tracks of street railways of snow, the invention of John Mullaly of this city, was lately tried here on the Lexington avenue railway. It consists of a car, on which is mounted a steam boiler and a superheater Under the floor of the car, arranged between the wheels, is a steam chamber, three feet wide, seven feet long, from the bottom whereof project a large number of little pipes or openings. The steam issues from the superheater into the chamber, and is there discharged directly upon the snow be neath, which is instantly melted. The steam tank is sur rounded by an apron or curtain, which encloses the escaping team. On the trial mentioned, the machine worked with success, so far as the melting of the snow was concerned. In regard to the actual expense of its use, we haveno data. But considering the large amount of heat theoretically required to melt ice, and the great waste of fuel in the practical heating of steam boilers, it would seem as if this must necessarily be an expensive method of clearing the streets. It would probably be cheaper to shovel up the snow and remove it in carts. But this sort of removal, prompt, economical and ef fective as it is, the railway companies take especial pains to fective as it is, the railway companies take especial pains to
avoid. Perhaps they will prefer the more expensive method avoid. Perhaps they will p
of melting down the snow.
In Park Row, in front of our office, some half dozen different street railways have their termini, and the operations of heir workmen in clearing the snow from the tracks, after a storm, are something ludicrous to behold. The street is oc cupied, for a distance of about one thousand feet, by the convergence of the various tracks, of which there are four. It might, perhaps, occupy two hours of time, if all the compa. nies would unite and cart away the snow. But instead of this, they go to great expense in annaying each other by tossing the snow from one track over upon another, by means of snow plows; and this sort of fun they keep up sometimes for days. Oné company sends down a great snow plow and brush, drawn by eight or twelve horses, which throws aside the snow upon the adjoining track, and makes a clean sweep Fifteen minutes later comes along a similar machine, run ning upon that other track, throws the said snow back again ning upon that other track, throws the said snow back again
So it goes on, until the air becomes milder, or the snow solid ifies and is no longer loose.

## A NEW FUEL---CARBONITE.

A new fuel has recently made its appearance in our mar ket, which, on account of its intrinsic value as well as its novelty, is deserving of notice. Although a natural produc tion it can hardly be called a coal : and although possessing to some extent the properties of coke, it is not produced by any of the methods common to the manufacture of coke. The proprietors have given it the appropriate name of "carbonite." It is found to a limited extent in the bituminous coal fields of Central Virginia, constituting a distinct vein by it self, which is now fairly developed and yielding a steady self, which
supply. It is sold in lumps like cannel coal. The surface supply. It is sold in lumps like cannel coal. The surface
when broken is dull in appearance instead of glossy, as is when broken is dull in appearance instead of glossy, as is
the case with cannel or anthracite coal. It burns with a the case with cannel or anthracite coal. It burns with a
bright flame when first ignited, and almost without smoke, bright flame when first ignited, and almost without smoke,
and subsequently settles down into a bed of bright coals not unlike anthracite in appearance, but lacking the intensity of heat produced by anthracite, and at the same time more en during. It seems to be especially suitable for open grates, and more particularly for parlor use, on account of its freedom from smoke or bituminous smell, and also from the small proportion of ashes (only 21 per cent) resulting from combustion. The ashes are also of such density that, in the process of stirring or removing, they do not rise into the room. The analysis recently made by Dr. Wallace, of Glasgow nd given below, shows a larger proportion of combustible atter than is found in any known fuel, being 96 per cent hat is available for producing heat. It has but a sligh race of sulphur, and is therefore free from the pungen dor and gas incident to anthracite coal. It is superior t any other fuel in the power of producing steam, and may prove especially desirable for steamships making long voy ges, on account of its economy of space.

## analysis.

| Volatile combustible matter. | 14:26 |
| :---: | :---: |
| Fixed carbon. | $81 \cdot 61$ |
| Sulphur.. | 33 |
| Ash.. | 2.24 |
| Water at $212^{\circ}$ Fah. | 1'56 |
|  | $100 \cdot 00$ |

This unique product of the earth is accounted for as folows: Originally a vein of bituminous coal, but lying upon and covered with a fine clay, it appears to have been subject ed to heat by an overflow of trap rock on the surface, there by expelling the gaseous and volatile properties of the coal. A process of nature has thus accomplished on a grand scale a more perfect result than is attainable by artificial means, and has delivered for human use a deposit of natural coke, so condensed, by the process under which it was formed, as to acquire a specific gravity nearly the same as bituminouscoal, and possessing a heating power fully equal to our best an thracite.

## THE COAL TAR INTEREST.

The traffic in coal tar is a comparatively new industry, and its growth has been very rapid. This is attributable to the many wonderful transmutations which have rewarded chemical tests to which the substance has been sub jected. From being considered but the worthless refuse re sulting from the manufacture of gas, and of no commercial value whatever, it has within a few years attained an im portance of no common order and the promise it affords of almost illimitable future development is evidenced by the
fact that it is at present undergoing a wider range of experiments than any other crude material now serving as the subject of the analytical operationsor as an ingredient in the compounding processes of the laboratory. In one of its variations it has proved a positive blessing to humanity; and did carbolic acid alone represent the sum total of virtue derivable from coal tar, still would this isolated fruit of the crucible well repay the time and toil expended in its discovery, and hold its place as one of the greatest material gifts of modern days. But the bituminous distillation flowing from the gas house retorts assumes other marked forms in the chemist's hands; and although they may not so directly contribute to the physical welfare of mankind, yet for certain purposes of utility they are unapproachable. Creosote oil, for instance, is certainly unequaled in its peculiar preservative qualities, which are none the less valuable because the revelation of these special properties is of comparatively recent date. The United States government annually purchases thousands of barrels of this liquid, using it on all wood work exposed to the weather, especially on gun carriages ; 120,000 gallons were employed in saturating the timber composing the bulkheads in the St. Clair Flats,
Detroit river. It is extensively used by railroad companies for the preservation of railroad ties, bridge timbers, and piles, and also upon the blocks constituting the wooden pave ments of Washington, Pittsburgh, and other cities. The artificial oil of bitter almonds (oil of myrbane), of superior fragrance and flavor, is also extracted from the same viscid
base, and is exclusively an American invention and manufacture. But the most remarkable product obtained from ooal tar is the new article called anthracene, from which is produced the coloring matter known as alizarine, the identi cal substance which for two hundred years has been found solely in madder. It is only in the United States that coal tar has been made to yield anthracene in large quantities, several hundred pounds of which are daily manufactured in this country and shipped to Europe on orders from the manufacturers of alizarine, which is not yet numbered among our domestic productions. This article constitutes
the base of all the madder colors-Turkey red, black, pink, and purple. It was first discovered in coal tar by the distinguished chemists Grieb and Leibermann of Berlin in 1867. More than $\$ 10,000,000$ is invested in its manufacture. In several foreign countries, the pitch from coal tar is combined with coal dust and pressed into the form of bricks, and an excellent fuel is thus produced, a given amount of which, it is said, will generate a greater heat than can be obtained from the same quantity of any other combustible material employed for utility or comfort; while at the same time, it can be stored more compactly and in better shape than either wood or coal. It is understood that negotiations are in progress in New York, looking to the utilization, in the manner described, of the $40,000,000$ tuns of valueless coal dust now lying in the vicinity of the coal mines and depots of Pennsylvania

## RECENT ORDNANCE TRIALS.

Some remarkable results have been obtained during recent trials of naval ordnance, carried on under the supervision of Mr. Norman Wiard, at Nut Island, Mr Wiard's improvement consists in rifing an ordinary smooth bore gun with two grooves, having for a 15 inch cannon a
twist of one turn in 50 feet, and cut in the sides of the bore twist of one turn in 50 feet, and cut in the sides of the bore
so as not to cross the bottom. The object of this arrange ment is primarily to allow the gun to be used as if it were smooth bore and with ordinary spherical projectiles, which were the upper and lower surfaces of the interior rifled,
would in balloting destroy the grooves and strain and weakwould in balloting destroy the grooves and strain and weak-
en the piece, while the firing would besides be greatly im en the piece, while
The trials above referred to have, however, proved an unusual gain of penetrating force, due to this system of rifling. Two ordinary smooth bore guns, of 15 inch bore, were selected, one of which was grooved according to Mr . Wiard's plan and provided with conical projectiles. The shot employed. The extremely large charge of 140 pounds of powder was used, and the projectiles weighed 460 pounds each. Two targets, of wrought iron plates 15 inches in thickness, were erected side by side, 160 feet distant. The rifle was fired first, when its bolt went clear through the target, tearing off a huge fragment and throwing the same for considerable dis iance and then burying itself in a sand
bank. The smooth bore shot entered the target for six and bank. The smooth bore shot
a half inches and there stuck.
The experiments were of course designed merely to deter mine penetrative power, and hence were made at very short range, but we understand that further experiments are to be inaugurated for the purpose of estimating the comparative distance and rapidity with which projectiles can be thrown from guns rifled after the Wiard pattern and smooth bores. It will be seen, however, that the results thus far obtained are better than those reached in the celebrated Tegel tests of the Krupp guns in Germany. Two of the cannon employed in that case were respectively of 11 and 10 inches bore. The
range was 164 yards. The 11 inch gun with 88 pounds of range was 164 yards. The 11 inch gun with 88 pounds of
powder drove a shell through a 12 inch plate breked by 26 powder drove a shell through a 12 inches of wood, but the 10 inch projectile did not penetrate. The English 11 inch gun, at 200 yards, with 88 pounds of powder, has sent shot through 13 inches of iron, 12 inches of wood and $1 \frac{1}{2}$ inches of skin, and The Engineer asserts that the shot of a 12 inch 35 tun piece, with 110 pounds of powder, at 330 feet, has entered, but not penetrated, $18 \frac{1}{2}$ inches of iron backed by 12 inches of teak. In the Glatton experiments,
the 600 pound projectile of a 12 inch English gun, weighing 25 tuns, with 85 pounds of powder, at 200 yards, pierced 14
inches of iron and $6 \frac{1}{2}$ inches of oak. Our American 15 inch naval gun, it may be noted by way of comparison, is of about 23 tuns in weight. Until we obtain data based on range in connection with penetrative power, it will be hardly possible to draw more than a general parallel between the performances of our improved ordnance and that of foreign nations. We may here state that the official reports of the naval off. cers, witnessing the Nut Island tests, have created considerable interest in government circles, and it is believed tha there is every probability of future experiments developing even more remarkable results. There is one all important fact, however, which places our gun, from a certain point of view, far ahead of its foreign competitors, and that is that it is made of simple cast iron; while the English and German pieces are either, in the former case of wrought iron elabor ately built up or else steel, or in the latter instance, as is well known, of the cast steel from the celebrated Krupp foundery. It is unnecessary to point out the vast difference in the cost of such ordnance or the high superiority of Amercan iron thus indicated
The ordinary spherical projectiles now in use are to be im roved by the insertion of three brass pins in holes equidis ant from each other on the surface, and hence in the form f a regular triangle. The pins are cut to support the shot exactly in the middle of the bore, so that the windage will be equal all around and the shot receive its impulse directly from the center of the exploding charge. The advantage gained is the prevention of the lodgments or indentation on the lower side of the bore, produced by the escape of the gas through the windage, before the ball has moved from its seat. The elasticity or crowding up of the metal causes the projectile to rebound, and, on its being carried forward by the charge to strike the upper surface of the bore, and there be reflected and re-reflected before it emerges. Of course these last three indentations, termed enlargements, become gradually deeper, and, besides rendering the firing inaccurate eventually cause the gun to become unserviceable.
We understand that the Wiard improvement does not re quire the manufacture of new guns but simply a modification of those already in use. All the projectiles, equipments, etc. ordinarily employed are as available as ever, and in brief the idea is, merely by rifling the pieces, to give them the capabil ities of both rifles and smooth bores, while besides materially adding to their range, penetrative power, and general effi ciency.

## SCIENTIFIC AND PRACTICAL INFORMATION.

TESTING STEAM BOILERS.
It is generally believed that steam boilers become weak ened (for resistance to internal pressure) after continued use from various known and unknown causes, so that the engi
neer cannot judge of the pressure to which his boiler can be neer cannot judge of the pressure to which his boiler can be worked with safety. But this he may determine by a very simple process and means which are always at his command. It is as follows: Let the boiler be filled entirely full of cold water even to the throttle and safety valves, and all closed tight to prevent any escape. Now, by lighting a fire under he boiler, the water will gradually expand and produce a pressure sufficient to even rupture the iron before the tem perature of the water has reached the boiling point. While he pressure is increasing, let the steam gage or pressure in dicator be watched ; and when the test pressure (which may e twice or more as great as the workingpressure) is reached portion of the water may be allowed to escape and th ressure reduced. The pressure results from the fact tha water is expanded by heat more than iron. The process
above given is attended with as much safety as the use of above given is attended with as much safety as the use of
the hydrostatic press, unless the water be heated above $212^{\circ}$, which would not be required unless the boiler leaks. Below this temperature, no disastrous consequences would follow even if the boiler should be torn asunder.

## GOOD FERTILIZER.

Farmers generally have to pay a high price for an article which, with a little skill, they could make themselves during the winter months or on rainy days, when they have little else to do. We give a recipe for a cheap, good fertilizer, which has been used successfully by farmers in Pennsylvania and Ohio. One recommends it especially for potatoes and wheat, and ends by saying that he has used it with success on corn and other products. It is as follows: Take 1,000 lbs. of good mold, sieve and screen it to get the gravel out and make it as fine as possible, then spread on a floor or lbs. common salt, then mix with a rake. When thoroughly mixed, add 25 lbs . pearlash and 25 lbs . sulphate of soda, mix well, then add 400 lbs . ground bone, 25 lbs. best Peruvian guano, and 150 lbs. ground plaster. Mix the whole thoroughly, throw on a pile for forty-eight hours, and it is fit for use. If it is to be used for potatoes in districts where
potato bugs are numerous, 5 gallons sulphuric acid may be potato bugs are numerous, 5 gallons sulphuric acid may be
sprinkled over the mass. Care must be taken not to use the acid in a confined place, as the fumes are bad for the health If it is spilled on the floor, do not throw water on it, as it cacid sprinkled on the ground will kill bugs of any kind and its fumes are especially fatal to the potato bug.
reduction of galena and other lead ores.
When in contact with metallic zinc, galena is readily decomposed by acids. Even oxalic, acetic, and dilute sulphuric acids are capable, when hot, of decomposing galena, me
tallic lead being deposited and sulphuretted hydrogen ga set free; while with chlorhydric acid, the decomposition is peculiarly rapid and complete. Galena is easily decomposed, also, even in the cold, by dilute nitric acid in presence of
zinc, but the reaction differs in this case from that just de scribed, not metallic lead but free sulphur being deposited, while nitrate of lead goes into solution. The reaction with zinc and chlorhydric acid may be employed with advantage for assaying galena, particularly the common American variety, which contains no heavy metal besides lead. The de tails of the process are as follows: Weigh out 30 or 40 grains or more of the finely powdered galena. Place the powder in a tall beaker, together with a smooth lump of pure metallic zinc. Pour upon the mixture 6 or 8 cubic inche of dilute chlorhydric acid which has been previously warmed to $40^{\circ}$ or $50^{\circ} \mathrm{C}$. ; cover the beaker with a watch glass or broad funnel, and put it in a moderately warm place. Chlorhydric acid, fit for the purpose, may be prepared by diluting 1 vol ume of the ordinary commercial acid with 4 volumes of wa ter. For the quantity of galena above indicated, the lumps of zinc should be one inch in diameter by a quarter of an inch thick ; they may be readily obtained by dropping melted zinc upon a smooth surface of wood or metal. The zinc and acid should be allowed to act upon the mineral for fifteen o twenty minutes in order to insure complete decomposition. Any particle of galena which may be thrown up against the cover or sides of the beaker should, of course, be washed back into the liquid. It is well, moreover, to stir the mix Whem time to time with a glass rod.
When all the galena has been decomposed, as may be de termined by the facts that the liquid has become clear and that no more sulphuretted hydrogen is evolved, decant the liquid from the beaker into a tolerably large filter of smooth paper, in which a small piece of metallic zinc has been placed. Wash the lead and zinc in the beaker as quickly as possible with hot water, by decantation, until the liquid from the filter ceases to give an acid reaction with litmus paper ; then transfer the lead from the beaker to a weighed porce lain crucible. In order to remove any portion of lead which may adhere to the lump of zinc, the latter may be rubbed gently with a glass rod, and afterwards with the fingers, if need be. Wash out the filter into an evaporating dish, re move the zinc, and add the particles of lead thus collected to the crucible. Finally dry the lead, at a moderate heat, in a current of ordinary illuminating gas, and weigh.

## A THERMOMETER MOTOR.

M. de Paz, at a recent session of the French Academy of Sciences, proposed an odd though original idea, which it is needless to remark is hardly susceptible of any useful application. He places around the circumference of a wheel, the axle of which is horizontal, a series of precisely similar thermometers. Then he exposes one half the wheel to the sun, and shades the other half. The result, he says, is that the mercury in the exposed instruments dilates and carries their centers of gravity further from the center of suspen-
sion, consequently the effect, he believes, is as if the thersion, consequently the effect, he believes, is as if the ther
mometers on one side became heavier, and hence the wheel turns around.
the influence of gases and of carbolic acid on the conservation of eggs.
According to M. Calvert, if an egg be placed in dry oxygen o alteration takes place; but if the gas be moist, at the end f three weeks or a month, the egg becomes covered with white filaments, some 3 inches each in length. Its interior owever, shows no signs of decomposition. If, however, a he end of the egg a small needle hole be made, putrescenc takes place in dry oxygen, attended with the disengagemen of nitrogen and carbonic acid, and also the formation of great quantities of vibrions and microzymas. In damp ni trogen, eggs, whether pierced or not, may be kept perfectly for three months: and although a light deposit of penicillium appears on the exterior, the contents do not decompose. In hydrogen, the same effect is noticed. In carbonic acid, the conservation is perfect as above, but without a trace of penicillium, whether the gas be moist or dry. Similar results to the latter are obtained with ordinary illuminating gases.
New laid eggs were also plunged in weak solutions (1-500) f chlorine, of hypochlorite of lime, of sulphite of lime nd of carbolic acid; but the author gives no results excep relating to the latter substance, in the liquor containin which, the eggs kept perfectly for three months.
wet plating for brass, iron, zinc, etc
C. Paul says: Brass, copper, and German silver are tinned by boiling with granulated tin and cream of tartar. Iron must first be cleaned by a mixture of 1 part of sulphuric or itric acid with 10 parts of water, and then coppered by dding a solution of some copper salt, moistening with a so lution of 1 part of protochloride of tin in 2 parts of water and 2 parts muriatic acid, and subsequent immersion in a solution of ammonium copper sulpbate. Brass, copper, and German silver, and iron or zinc, which have been coated with copper, can be silvered by rubbing with the following mixture; 14 grains of silver are dissolved in 26 grains of nitric acid and 120 grains of potassium cyanide in 4 cubic nches of water; the solutions are mixed and 24 grains of whiting added.
Professor Joseph Henry, Secretary of the Smithsonian Institution, has received from the French Government a superb porcelain vase, as a testimonial of his services as the United States representative of the commission on the in ternational standard meter.

THE first patent issued in the United States, of which there is any record, was granted to Samuel Hopkins, on July 1 1790, for making pot and pearl ashes. The second was to James Stacey Sampson, on August 6, 1790, for making can les; and the third and last for the year 1790 was to Olive Evans, for making flour and meal. The latter bears date December 18, 1790

ALBINISM AMONG BIRDS th the issue of the Scientific American bearing date Octs of the particu blackbird.

Although this perversive mood of nature is by no means uncommon or unnoted, it is of sufficient importance and rarity to attract the attention of the most untutored observer, whenever an example of the kind presents itself. We hear mention, by eminent ornithologists, of albinism occurring among crows, some of the sparrows, starlings, and the shore lark, but the writer does not recollect finding note of this freak among the thrushes, and therefore presents, with the accompanying engraving, a description of the singular markings of plumage as exhibited by an adult female American robin (turdus migratorius).
For several successive days, in the opening spring of 1870 , this specimen was observed frequenting the grounds of a citizen of Auburn, N. Y., on one of the principal streets. The remarkable markings of this robin, especially as seen in its flight, evoked expressions of surprise and comment from the most casual observers. At this time the bird under notice was busily engaged with its mate, a bird of perfect plumage, in building its nest in the branches of a tall and thrifty pear tree, and assiduously fulfilling its maternal instincts. Not willing that so rare a freak in feather should pass without an examination, a favorable opportunity was seized for bagging it, with the following results:
General color above, wherever occurring (see the shaded parts in the engraving), of a dull or faded umber, much lighter than the shade found in the perfect bird; the rest of the upper plumage, from frontlet to tail, pure white; breast, white, lightly and irregularly interspersed with a faint ferruginous color; bill, yellow; primaries, pale umber, edged with white; alula and scapulars, ashy brown: third tertials, pure white, with the outer webs loose and frayed in appearance; tail, two outer coverts wholly, and the remaining feathers irregularly, tipped and marked upon their outer vanes with white; iris, of the prevailing color of the species; legs and feet, lighter than in the perfect bird; dimensions, regular; specimen active, and note set clear to the predominant scale of the robins. Specimen shot at Auburn, N. Y., April 21, 1870.
A correspondent, E. H. F., sends us the following similar instance: The white blackbird mentioned in your journal of November 25, I have seen twice myself. One of them was in Maine some years ago, and was lost by being destroyed in a burned building. The other is, or was last May, in the possession of Mr. Charles Derninger, of Sauk City, Sauk county, Wis., who is a German naturalist of no mean ac quirements, but of such retiring and modest disposition as to have allowed his light to be hidden from the world a large. He had a very fine collection of mounted birds, all done by his own hands, and among them many albinos: Two white quail (ortyx Virginianus), a white robin (turdus migra. torius), white tree sparrow (spizella monticola), a white swamp or red winged blackbird (agelaius pheniceus), and a white duck, which I believe to be, as near as I could judge, a canvas back. The white blackbird was a young bird of a pure white color, with the exception of some few feathers which were tipped with a dull brown or drab. The wings distinct ly showed the scarlet markings of the species. Mr. Derninger stated that his was the only one he had ever seen, in a twenty-five years' experience, in a country where blackbirds are so plentiful as to be an unmitigated nuisance, at least to the farmers.

## Pinoline

When heat is applied to the retorts a light oil, crude pino line, passes over at first, and then ceases. The receivers ar changed, and the fire augumented, when the heavy oils pass over, and colophonium is left in the retorts. The heavy oils are of a deep violet color. They are boiled for a day with water, and a part of the matter which passes off with the steam is collected. The next day the water is drawn off, and the residue saponified with caustic soda of $36^{\circ} \mathrm{B}$. The almost solid product is then heated anew till no more oil distils over. The oil which has been distilled (single rectified) is submitted again to the same treatment, and that which final ly passes into the receiver is called double rectified. It is used for adulterating fish oils. Crude pinoline contains acetic acid, from which acetate of lime may be prepared by neutral izing the crude product of distillation with chalk, and re distilling the oily liquid.

New Method for Chromic Acid
The following method is based upon the decomposition of barium chromate by nitric acid, with the separation of the barium nitrate thus formed, by means of sulphuric acid.

Precipitated barium chromate is added to boiling nitric acid (diluted with an equal bulk of water) till completely saturated the whole is then allowed to cool, when the greater quantity of the barium nitrate crystallizes out. To the mother liquor a sufficiency of sulphuric acid is added, to precipitate the re mainder of the barium; the barium sulphate settles readily to the bottom of the vessel. The supernatant liquor, containing chromic and nitric acids, is drawn off and evaporated to dryness on a water bath, when all the nitric acid is ex pelled, leaving a residue of nearly pure chromic acid, which may be purified by crystallization. By this method, nearly
bottom, A. The pot is then placed on the fire, when the steam generated in A forces a continual flow of water up through pipes, B, into drum, C, thence through the perfo rations in the bottom of the latter to the coffee, which has previously been ground and placed in the muslin bag, D This circulation is allowed to continue until the strength o he coffee is extracted, when the drum and bag are removed and the pot filled with hot water. No boiling over can tak place, and the infusion is made very quickly, thus prevent ing the escape of the aroma and flavor of the coffee
Patented through the Scientific American Patent Agency September 23, 1873, by Ma garet J. Stubbings, Lock Box 41, Youngstown, Mahoning county, Ohio, to whom letter for further information may be addressed.

Life in the South
A correspondent in Phillips Southern Planter thinks that the agriculturists at the South should make their homes mor attractive, and advisesthat th farmers quit raising so much cotton and put in something to eat. He further says: "The Northern people have ten time as much amusement for them selves and children as we do The fact is that the cotto planter works harder, lives harder, endures more trouble has fewer comforts, rides poor er horses, sees less of the com forts or pleasures of life than any other people on the globe The only excitement he has i in the spring: it is in making calculations for so many bale at one hundred dollars pe bale, amounting to so many thousand dollars, and in the fall in finding out that it ha cost him all his year's work, and all his crop came to, to pa the expenses of making it."

ALBINO ROBIN
hromate quantity can be obtained

## IMPROVED COFFEE POT

Very few persons know how to make good coffee. In the majority of cases, and especially in hotels and restaurants, the beverage is served in a reasonable state of clear ness, but has an astringent and bitter flavor, while, if it be allowed to stand in the cup until cold, globules of oil may be noticed upon the surface. Coffee thus prepared has los its caffein, which is the nutritive and valuable principle of the bean, and the infusion swallowed is merely a decoction of indigestible tannin. Good coffee, in small quantity, is deleterious to but very few organizations, and is healthy to most persons except those of extremely nervous temperament; but when badly cooked, it is productive of headache nausea, and other disagreeable ailments.


In order to aid those who have not learned the art of making clear and aromatic coffee, we illustrate herewith a new y invented apparatus which, according to the inventress will produce an excellent beverage. The outer part of the pot is of the usual form, and is provided with a tightly fit ting lid. A is a cylindrical cover which rests upon the bot tom, and has notches, as shown, at the lower open circumfe rence. Two or more vertical pipes, B, of slightly conical shape, connect with the top of the steam cover, and carry, by means of elbows which fit closely over their upper ends, the cylindrical drum, C. The bottom of the latter is perforated and below it is suspended a muslin bag, D, which is held by a ring that fits between the elbows and rests on suitable lugs. Boiling water is first put in until it covers the steam
[We think, at the high pric
cotton fetches this year, the planter will find considerable profit above the cost of pro duction, and we are in much doubt if any other crop he can produce will net him as good return. But it is desirable to produce will net him as good return. But it is desirable to
make home as attractive as possible everywhere. We agree with the writer in this advice.-EDs.

## Mennonites of Southern Russia

The Secretary of the Interior, in his recent annual report says:
"I desire to invite the attention of Congress to a reques rom a colony of Mennonites, now and for several genera tions residing in Southern Russia, near the shores of the Black Sea and the Sea of Azov, for a modification of the ex isting land laws in certain particulars, to enable them sttle upon our public domain in a compact colony.
By a decree of the Russian government, this people, num bering between forty thousand and fifty thousand persons, bave been deprived of certain immunities which they hav njoyed ever since their first settlement in Russia, and the granting of which had originally induced them to leave thei former homes in Prussia and settle in their present place of bode.
It is their desire to come to the United States and to oc cupy a portion of our public lands in a compact body, with no strangers to their religious faith within the exterio bounds of their possessions. Such exclusive occupancy they deem essential to enable them to carry out their peculia system of farming, which to some extent involves a com munity of interest in and occupancy of the lands; and they also wish to avoid, as far as possible, the presence of any disturbing elements in their immediate neighborhood.
The deprivation of the immunities heretofore enjoyed by them does not take effect until the expiration of ten years from June, 1871, the date of the imperial decree. Within that it is their desire to dispose of their property in Russia, and remove to a country where they may enjoy civil and religious iberty; and they have selected the United States as a place where they can most fully realize such freedom.
In order, however, to enable them to obtain possession of lands in a compact body, some concessions must necessarily be made from the present requirements of the land laws. would respectfully suggest that the Secretary of the Interior be authorized to withdraw from sale or entry such land as they may desire to occupy, for a term of years long enough o enable them to emigrate to this country and settle thereon, and to dispose of such lands to those personsamong the emi grants who shall make the proper entry or purchase thereof in accordance with existing laws. Should they desire to ttle within railroad limits, the authority should enable the withdrawal, in like manner, of the alternate sections be longing to the Government. It is possible that the entire body of the emigrants may not desire to locate in one colony but would prefer the selection of two or more colonies or 10 cations. It would be well, therefore, to confer such discretio on the Secretary of the Interior as would enable him to meet their views in that regard. The entire area they wil probably require will be about 500,000 acres.'

## THE HULL DOCK COMPANY'S NEW OFFICES.

The wealthy corporation who own the extensive docks a Hull, in England, have recently erected a highly ornate build ing for their offices, of which we present an engraving. The structure stands on a triangular piece of ground, its plan consequently presenting much difficulty, especially as a maximum accommodation was required upon a comparative limited area. The architect, by designing the building to follow the outline of the complete site, has utilized the whole area, and obtained space for a central court for light and ventilation. There being much water in proximity to the site, the Italian style of architecture, of the Venetian type, has
square standards at intervals, capped by escutcheons and crowns.
Within the building is an open court; this affords means or thorough ventilation and lighting. The warming and ventilating arrangements are effected by means of a fan, worked by a small steam engine.

## Labor and Machinery

The rapid introduction of steam power and machine labor into all branches of trades and industries shows how capital, availing itself of invention, science, and steam and animal power, is daily gaining an advantage over labor. When
be to some extent relieved from muscular toil and from need of it at the same time. But before that time comes, the process of re-adjustment must be attended with serious disturbance. Every day is changing the field of labor, putting more upon the machine and less upon the man. If, as is claimed,the expansion of industry and production shall make room for labor in a higher position, requiring more skill and returning a better reward, the final result will be only beneficial. How this is to be done without some convulsions remains to be seen.-American Builder.

## Secondary Currents and their Applications.

## by m. G. Plante.



In pursuing the study of the phenomena presented by secondary couples with plates of lead, I have made the following observations: The chemical modification of the electrodes, which constitutes the source of the secondary current, is rendered more complete by alternate charge of the primary current in two directions, with repose between this double action. By the successive action of the prinary current in two directions, the deposits of oxide are reduced, and the electrodes are modified in their molecular constitution not only at their surface but in their mass. By rest, the deposits formed on the surface of the plates, whether the deposits be of metallic oxides or of reduced metal, acquire a crystaline texture and strong adherence which contribute to protect the sub-adjacent de posits tending to form themselves under the continued action of the primary current. By following this course of opera tion, which I have termed the formation of secondary couples, deposits of great thickness may be obtained, admitting in the discharge of calorific effects more or less prolonged. A secondary couple, having less than five and a half square feet surface, charged under the foregoing conditions by two Bunsen elements, will redden a platinum wire of 0.02 inch diameter during twenty minutes, and a wire of 0.008 inch diameter for about an hour, without any communication with the primary source, even forty-eight hours after charging. A battery of 16.5 square feet surface, equally well charged, preserved sufficient of its charge to redden a platinum wire for some minutes a month after charging. Although the formation of the secondary couples necessitates the use of two Bunsen couples, of which we change the direction, with intervals of repose, in order to give the deposits time to take a crystalline aggregation, once this operation is effected, it is no longer necessary to change the direction of the current, and the secondary couples can then be charged by the aid of a very feeble primary current acting constantly in the same direction, such as that furnished by a sulphate of copper element, even mounted with water around the zinc. The chemical work produced by this feeble pile accumulates slowly, but nearly without loss, in the secondary couples, and there will be received, in the discharge, effects of an intensity infinitely superior to that of the primary source. These observations facilitated the several applications of the secondary currents that I have already mentioned, and have led me to construct the apparatus that I have the honor to submit to the Academy. It consists of a small couple perfectly prepared, or formed, contained in a box, of which the base and sides carry a system of connections arranged so as to redden a platinum wire, and to ignite, by simple pressure of a finger on a metallic touch, a wax candle, spirit lamp, or gas jet. The battery intended to put the apparatus in action consists of three elements of zinc and water, copper and sulphate of copper, and copper, and is placed at a distance or near the apparatus. It is not necessary to maintain the secondary couple constantly en charge under the action of the battery; for, once charged, we can produce a hundred consecutive ignitions. The ignition of a wax candle can be produced instantly, and such method of been adopted for the building, which is arranged with three this aspect of the case was first presented, and the laborer by ignition is very economical and safe. The apparatus may be
facades, corresponding with the frontages. The main façades are connected with each angle by short circular façades, but having projecting porticoes, with detached Ionic columns, on the ground floor, which serve as buttresses to towers and cupolas surmounting these angles.
The entire building is faced with selected Ancaster stone, excepting the principal sculptures, which are of Portland, and the basement, which is of Bramley Fall. The roofs are covered with Westmoreland slates. The whole structure is surrounded by an iron railing, the uprights formed of ornamental tridents and harpoons placed alternately, with solid
instinct, as it were, denounced the machine that excelled him both in quality and amount of labor, he was met by a livelihood. It was asserted that the only effect would be to change his mode of employment, to relieve him from slavish drudgery, to quicken his intelligence by illustrating the triumphs of mind, and to elevate him from a mere beast of burden to the presiding spirit over the powers of nature. Within certain limits, all this is true. In that new and golden age, when all the relations of society are properly adjusted to the true standard, it may be that every man will
is rendered too feeble to work the bells, the secondary couple is capable, by the electricity which it accumulates, of putting them in action. By a combination of the apparatus, not only may sound be produced, but light may be obtained at the same time.-Comptes Rendus.

## Corxespondente.

The Treatment of Cancer by Press
To the Editor of the Scientific American:
Pressure is supposed to act beneficially in cases of cancer by diminishing the supply of blood, and consequently of nourishment to the tumor, by preventing the growth of the cells by depriving them of the necessary space, by injuring them from direct violence, and by promoting absorption. The credit of this discovery is due to the writer of this. Although there were many who doubtless had some vague glimmerings of the truth, yet none ever put their ideas into practice. The number of cases subjected to the pressure system alone was nineteen. Of these, seventeen were can-
cer of the breast, and two, ulcers of the cheek and upper lip. cer of the breast, and two, ulcers of the cheek and upper lip.
Twelve cases terminated by cure, and five were considerably benefited, the two cutaneous ulcers being somewhat im proved. The majority of the tumors were hard, irregular, tuberculated, and the seat of great pain. Six of them wer ulcerated and discharged ichorous pus. Even in the worst cases, the tumor diminished in size,
So favorable results attracted but little attention, and al most all my resources were exhaasted, and I was afraid that I would have to give up any farther experiments, when I attracted the attention of M. Récamier, of the Hotel Dieu, Paris, who consented to go on with my experiments. One hundred cancerous patients were selected, on whom the pressure system was employed; sixteen appeared incurable and underwent a palliative treatment. Thirty were completely cured by compression alone, and twenty received considerable benefit from it; fifteen were radically cured by extirpation and pressure combined, and six by compression and cauterization. The compress used was made by using strips of soap plaster and adhesive plaster. Since then, I have used soft rubber balls, three quarters full of air or water, binding them on the ulcer with a common form of bandage The artery feeding the cancer must be compressed by a spring truss, and great care must be taken that no ulceration of the artery ensues. A caustic plaster may be used to ad vantage under the ball, where the cancer is small.
Give the patient carbonate of iron, of which the dose is from 6 to 12 grains. Keep the bowelsopen; and if suffering great pain, use hydrate of chloral. The diet must be care fully attended to, and stimulants may be freely employed. In every place where this treatment has been pursued, every case has been cured with but one exception. Iron has been cried down, and been as little used as possible of late years; but it exerts great influence on cancer, and kills the cancer cells that may exist in the blood and allows no other cells to gather. I have just received a letter, from a gentleman of high standing in medical circles, in which he assures me that he has used iron in the form of the carbonate, and that in every case it has effected a cure.

Geo. W. Bailex, M. D.

## Two Wrinkles.

To the Editor of the Scientific American:
Mechanics who want small gig saw blades will find that the steel springs of which hoop skirts are formed will make capital ones of any lengths; and they vary in width so as to be suitable for a variety of uses. They can be jointed straight by brazing, and then they make capital band saws. I would suggest the investigation of the practicability of wearing covers for umbrellas, of a circular form, with a selvage around. The invention of a loom to produce such work would furnish ample study for an ingenious man, and would probably lead to fortune.
W. P. Hopkins.

Lawrence, Mass.

## The interplanetary Telegraph.

To the Editor of the Scientific American:
Officers of the United States Coast Survey have long been accustomed to converse together at stations over 100 miles apart, by long and short flashes of sunlight reflected from the surface of a mirror. Similar signal lights are occasion ally used at sea.

1. Any cryptogram, hieroglyphic, or signal flag alphabet is readily solved by modern ingenuity, often without a key. We may safely assume that any race of beings, who have de veloped a superior civilization to our own, would be able to interpret Morse signals, if their attention was once attracted thereto. That such beings exist, we infer from the fact that our sun is only a second rate yellow star, of comparative insignificance.
2. Light is the only means of communication available or possible for traversing space.
3. It is therefore probable that light messages are even now passing around us in every direction, between the inhabitants of different stellar systems.
Let us assume, for example, that the huge planets which travel around Sirius or Procyon are peopled by intelligences slightly more advanced in science than ourselves, and that they communicate with thanus or Neptune in the manner
supposed. It is evident that we need only a large telescope supposed. It is evident that we need only a large telescope
wherewith to verify the existence of such a conversation, in wherewith to verify the existence of such a conversation, in
order to join in it with manifest profit to ourselves. In such a case we should select the simplest telluric language, per-
haps the " modified English" of Minister Arimori Mori. Our stellar correspondents would perceive a flash of light
from each metallic element in turn, followed by its English ight rays mis signals. Wherever in the universe thes pectroscope, there the observer would become aware of the existence of an inquisitive humanity.
One objection to my project of an interstellar telegraph is the insufficient swiftness of light, only 186,000 miles per second. Thus no less than four hours are required to send a message to Neptune, and three years are necessary to sen a signal from our earth to the planets of a neighboring star The same length of time must elapse before receipt of a
mmediate reply.
Samuld H. Mead, Jr. mmediate reply.

Samuel h. Mead, Jr.

## New York city

## scientific Prophets,

Underthisheading the New Orleans Picayune very tersel ives the results of the labor of the learned scientific Amer icans who lately met in Portland, from which it would appea that the prospect of the denizens of this sublunary world is no of the most cheering character
" Professor Young tells us that the sun is nothing bui igantic spherical mass of gaseous matter, which is constant y being contracted by the gradual cooling of its outside circumference. The central kernel of this huge star wil always, according to the learned Professor, finally be crusted over with a thick, impervious coating, through which nei ther light nor heat can possibly reach us. The result, as far as we are concerned, will be total darkness, intense cold, the end of animal life, and a return to primeval chaos.
General Barnard-another scientific seer-compares the The spherical rotary motion, any accident such as the bursting up of some great volcano, the shock of a comet or of a meteoric body, would open a vent through the thin rind upon which we live whereupon the incandescent matter would at once project expiring humanity into vacant space.
" Professor Walling denounces the
ho wastes with stupendous folly his in as a spendthrif and light, and who, thanks to his prodigal habits, is fast progressing towards that bourne whence no traveller returnsthe bankruptcy court.
" Professor Franklin Hough draws it more mildly, as he only threatens us with the total disappearance of water, owing to the wanton destruction of trees and forests.
" Professor Le Comte has paid special attention to insects, and warns us that their frightful increase will ultimately lead to the total destruction of the vegetable world, after which man himself will become theirprey. The earth will then be a gigantic parish of Plaquemines, in which the mosquito tribe will rule supreme, until some other equally noxious vermin hall arise and devour them.'
This cheerful resumé of the labors of our American savans ndicates, adds the American Builder, that the human race is decidedly in a tight place. If the sun is to go out like a snuffed candle and the earth to explode like an old steam boiler, we may as well overlook the lesser contingencies of rainless years and the universal prevalence of vermin. D minimis non curat scientia

## Impure Water

Public attention cannot be too often called to the danger of using impure water in households. The origin of typhoid ever, which so frequently runs through families in city and country, is oftener in wells and springs than is sup posed. In cities it is easy to understand, when aqueduct water is not supplied, how wells may become contaminated, but for many it is not so easy to'see how wells in the country, among the hills or in the green valleys, can become so im ure as to be sources of disease
Since the general introduction of aqueduct water into large cities, typhoid fever has become more common in the country than in the city, and this disease is certainly zymotic, or one which results from a poison introduced into the blood. Wells in the country are very liable to become con taminated with house sewage, as they are generally placed, for convenience, very near the dwelling, and the waste liquids thrown out upon the ground find easy access by percolation through the soil to the water. The instances of uch contamination which have come to our notice, and which gave rise to fevers, are numerous. The gelatinous mat ter, which is often found covering the stones in wells affected by sewage, is a true fungoid growth, and highly poisonous when introduced into the system. It is undoubtedly concerned in the production of typhoid fever. How it acts it difficult to determine, but it is at least conceivable that he spores of the fungus may get into the blood and bring about changes after the manner of yeast in beer. These spores, as is well known, develope rapidly by a kind of budding process, and but a little time passes before the whole circulation becomes filled with them, giving rise to abnormal heat and general derangement, called fever. These fungoid or confervoid growths are always present in waters rendered impure by house drainage, and great caution should be used in maintaining well waters free
sources of pollution.-Boston Journal of Chemistry.

Moth Preventive.-The following recipe for keeping moths out of clothing is a favorite in some families: Mix half a pint of alcohol, the same quantity of spirits of turpen tine, and two ounces of camphor. Keep in a stone bottle,and shake before using. The clothes or furs are to be wrapped in linen, and crumpled up pieces of blotting paper dipped in the liquid are to be placed in the box with them, so that it smells strong. This requires renewing about once a year.

Specifications of the English patents of R. Werderman C. E., have lately been published, which are interesting as presenting a new application of electricity to the arts. This hew purpose, to which electricity lends its aid, is to the reduction of metals from theirores, and the refining and puri fying of the reduced metals, without the ordinary chemical action of carbonaceous matter, the purifying and refining aking place at the same time and by the same process, during the reduction from the ore. The ores, that is to say, ox ides, sulphides, carbonates, or other combinations in which the metals exist in Nature, are first crushed, and then heat ed in a suitable furnace or retort. After the whole charge is raised to a red heat, two pieces of carbon or platinum, or some other suitable material which conducts electricity, are plunged in the crushedore. These two pieces are connected by platinum or other suitable wires or ribbons with the two poles of a galvanic battery or magneto-electric machine. The electrical action and chemical decomposition which then take place may be seen from the following equations, whic re given for the purpose of illustration, and are arranged in the order for their elimination

| Oxide of zinc. . . . . . . . . . . ZnO | Zn | 0 |
| :---: | :---: | :---: |
| Red oxide of copper. . . . . . . $\mathrm{Cu}_{2} \mathrm{O}$ | 2 Cu | 0 |
| Plumbic oxide. . . . . . . . . . . . Pb b | Pb | 0 |
| Sesquioxide of manganese. . $\mathrm{Mn}_{2} \mathrm{O}_{3}$ | 2 Mn | $\mathrm{O}+\mathrm{O}+\mathrm{O}$ |
| Loadstone. . . . . . . . . . . . . . . $\mathrm{FeOFe}_{2} \mathrm{O}_{3}$ | 5 Fe |  |
| Hematite................. $\mathrm{Fe}_{2} \mathrm{O}_{3}$ | 2 Fe | $\mathrm{Ph}_{2} \mathrm{O}_{5}$ |
| Brown hematite........... $2 \mathrm{Fe}_{2} \mathrm{O}_{3} 3 \mathrm{H}_{2} \mathrm{O}$ | 3 Fe | ${ }_{\text {SiO }}^{3}$ |
| Spathic iron. . . . . . . . . . . . F $^{\mathbf{F e C O}}{ }_{3}$ | Fe | $\mathrm{CO}_{2}$ |
| Sulphide of zinc (blende). . $\zeta \mathrm{ZnS}$ | Zn | , |
| Subsulphide of copper.... $¢ \mathrm{CuS}$ | $\left\{\begin{array}{l} \mathrm{Cu} \\ \mathrm{Cu} \end{array}\right\}$ | CuS |
| Sulphide of nickel..........Ni2S | 2 Ni | $\left\{\begin{array}{l}\mathrm{SO}_{3} \\ \mathrm{SO}\end{array}\right.$ |
| Bisulphide of iron (pyrites) $\} \mathrm{FeS}_{2}$ | Fe | ${ }_{2} \mathrm{SO}_{3}$ |
| Manganous carbonate........ $\mathrm{MnCO}_{3}$ | Mn | $\mathrm{CO}_{2}+\mathrm{O}$ |
| Carbonate of zinc (calamine). $\mathrm{ZnCO}_{3}$ | Zn | $\mathrm{CO}_{2}+\mathrm{O}$ |

The reduction of iron ores may be effected either in the sual manner in the melting furnace with carbonaceous mat er, or in a reverberatory furnace with some suitable flux only. The best ore for this purpose is the hematite, be cause it is a good conductor of electricity. As soon as the oxide begins to flow, the reduction takes place, and all nox ious elements are eliminated in the following order, viz sulphur, arsenicum, phosphorus, titanium, silicon, carbon. By regulating in a suitable manner the electromotive forc and the intensity of the electric current, and stopping it a the proper moment, cast iron, wrought iron, or steel can be produced directly from the furnace without any intermediate operations. This puddling by means of an electric cur rent will occupy from 10 to 15 minutes only, instead of sev eral hours as in the ordinary puddling by hand labor or ma chinery, and consequently a great saving of time will be ef ected
The entire liberation of the electro negative elements is in ome cases not effected immediately, but an intermediat transformation of the ore takes place. For instance, in treat ing the subsulphide of copper, this ore does not conduct ele ricity at the ordinary temperature, but at $230^{\circ}$ Fahrenheit it ecomes a very good conductor, copper is then produced a he negative electrode or pole, and at the positive pole sul phide of copperis formed, which, being a good conductor a a lower temperature, is now entirely decomposed and converted into metallic copper. A great difficulty in the reduc tion of plumbic oxide in the usual process consists in the ormation of silicate of lead, due to the presence of silicate mixed with the ore. This difficulty is entirely overcome by the application of the electrical current for the formation of the silicate of lead, which is readily fusible and is no obstacle nd all ores rich in silicates, which could not be treated til the present time, can now be employed for the extraction of ead.
Instead of treating the sulphides and carbonates and other more complicated combinations directly by the electrical cur ent, such ores may first be converted into oxides by roast ing them in the usual manner for some time in contact with tmospheric air or oxygen.
While the metal is being reduced, all impurities and noxous elements mixed or combined with it are eliminated, so that finally the metal is collected perfectly purified and re ined.
In purifying metals, the removal of the metals or metal oids which are to be eliminated is effected either in a melt ing furnace or in a crucible or converter or puddling furnace Two pipes of fire clay are dipped in the molten metal. Two hollow cylinders of carbon or platinum or other suitable matter are fixed inside the clay pipes at the end immersed in he molten mass. To the carbon or platinum cylinders are attached two platinum wires or ribbons, which run up inside the clay pipes and are connected directly or by means of copper wires to the two poles of a galvanic battery or magneto electric machine. To prevent the development of heat in the battery or magneto-electric machine, the connecting wires pass through a cooling apparatus. Instead of hollow cylin ders of carbon or platinum, solid cylinders or sheets, or any other suitably shaped pieces, of carbon or platinum or othe suitable matter can be used; in the latter cases, space must be left between the said pieces and the fire clay envelope, to permit the eliminated metals or metalloids to be volatilized and to escape through the clay pipes, and to be collected in suitable vessel, in which they are converted either into the iquid or solid state or into salts, in bringing them in thi tatu nascendi in contact with any suitable matter to which they have great affinity.

## About Dyspepsia.

Sufferers from this horrible malady will find some of their own feelings described in the following article from the December number of the Overland Monthly
Did you ever have the dyspepsia? Did you ever haveor ever imagine you had-a complication of all known, and several unknown diseases? If yes, then you have had the dyspepsia, or its full equivalent. Chronic dyspepsia may be defined as an epitome of every complaint wherewith
transgressing mortality is scourged. It is as nice a thing to transgressing mortality is scourged. It is as nice a thing to
have about you as a trunkful of tarantulas, with the trunk lid always up An eminent English physician has said: "A man with a bad dyspepsia is a villain." He is, and worse. He is by turns a fiend, a moral monster, and a physical coward-and he cannot help it. He is his own bottomless pit, and his own demon at the bottom of it, which torments him continually with pangs indescribable.
When a worm of the business dust of this world has writhed with the dyspepsia until it has assumed a virulent chronic form, who shall find colors and abilities varied enough to paint his condition? His blood becomes first poverty-stricken, then impure, and, as "blood will tell," every part of his system is contaminated by the foul stream. The brain complains bitterly on its own acconnt, and vehement complaints are being continually sent up to it from the famishing liver, bowels, spleen, heart, and lungs. Like
"sweet bells jangled out of tune," the entire organization "sweet bells jangled out of tune," the entire organization
breathes discords. Even the remote toes telegraph up to breathes discords. Even the remote toes telegraph up to the brain:" We are starving down here: send down some provender." The brain makes requisitions on the stomach, which are futile. The stomach is powerless to provide, and conspire together, suspend work and undertake to compass by riot what they fail to get by appeal. Then life trembles in the balance. Then the consolation-0, the consolation! -that is visited on the dyspeptic. Friends--when he is -that is visited on the dyspeptic. Friends--when he is
lifeless from lack of vitality-friends will exasperate him lifeless from lack of vitality-friends will exasperate him
with taunts of being " lazy," "shiftless," "indolent," and with taunts of being " lazy," "shiftless," "indolent," and "without ambition!" Nor can his friends be made to apdergoing constant torture and consequent exhaustion to have "ambition" as it would be to expect a corpse to have an appetite, Remedy: everybody's advice-that is, ride everybody's hobby. Cure: death. Drugs are but aggravations, and " bitters" are bitter indeed we have heard of a chronic dyspeptic who took his cue from his chickens, and by swallowing daily a moderate handful of gravel stones of the size of a pea down ward, finally succeeded in transforming " cue" into "cure." He claimed complete restoration. In the face of this evidence to the contrary, we re-assert that, for chronic dyspepsia in its worst form, there is but one certain cure-absolute rest. Preventive: take as good care of the coats of your stomachs as you do of the coats of your backs. Do you wish for faith in God, in human love, in earthly happiness, in the beneficence of Nature, and in immortality?
Keep your digestion vigorous; on that hang all of these. Keep your digestion vigorous; on that hang all of these.
Would you prefer an abiding faith in tortures unspeakable, Would you prefer an abiding faith in tortures unspeakable,
in horrors inexpressible? Destroy your digestion. Would you live in the body for ever? Keep your digestion in full vigor; and although the end of the world may come, you end will not come-you will have to go after it. Old age is but the failure of nutrition. Nutrition is life; non nutrition is death.

Spontaneous Combustion of Hydrocarbon Vapors During the years 1870, 1871 and a portion of 1872, at the Wood Preserving Works in San Francisco,Cal.,several instances of spontaneous combustion occurred, accompanied by explosions of hydrocarbon vapors. Mr. I. C. Woods, manager of the works, at the last meeting of the California Academy of
Sciences, gave the particulars of some of these accidents and a statement as to the remedy successfully applied. The hydrocarbon vapors used for the preservation of wood are obtained by the distillation of coal tar. A brick pit is attached to each two stills, to hold the hot pitch product as it runs from them. This pit has an opening in the side for access and a ventilating chimney through which the vapors from the pitch pass off into the atmosphere. The opening for access to the $\mathrm{pi}^{+}$. is closed by an iron duor. The tar used is made at the gas works in that city. The stills used have a capacity of from 1,200 to 1,800 gallons.
In the progress of the work, the still containing the coal tar is run until the thermometer on the top, near the man hole, indicates a heat of $420^{\circ}$ Fah., when they cease firing. The still and contents are then allowed to stand and cool until the thermometer indicates a heat of from $200^{\circ}$ to $212^{\circ}$ Fah. At this heat the liquid pitch is allowed to run from the still into the pitch pit; as it cools, it becomes solid. From the time the thermometer in the still indicates a heat of $420^{\circ}$ Fah. untilafter the time of letting out the pitch. the corks remain open in the vapor pipe connecting the still with the wood-preserving tank.
Until April, 1872, this letting out of the hot pitch was attended with danger of fire, because of the tendency of its vapors to spontaneous combustion. If running the still daily, such accidents would occur three or four times a year. The vapors from the pitch in the pit, as they passed out of the ventilating chimney, were yellow, being the vapors of
the naphthalin oils contained in the coal tar. The combusthe naphthalin oils contained take place after the pitch had been running freetion would take place after the pitch had been running free-
ly from the stills for some minutes. It was always accomly from the stills for some minutes. It was always accom-
panied by an explosion, loud enough to be heard across the panied by an explosion, loud enough to be heard across the
street, and strong enough to forse away the wooden braces street, and strong enough to forse away the wooden braces
placed against the iron door. Pieces of timbering in the pitch would take fire and burn until extinguished.
From the time the fire is extinguished under the
the time of letting out the pitch, there is always an interval of fourteen hours. The furnace of the still is always closed with an iron door and clayed up. There is a strong draft up the chimney of the still. The top of the ventilating chimney of the pitch pit is as high as that of the fire chimney of the still; and there is always a strong draft up this chimney through the crack between the iron door and the brick work of the pitch pit. A person standing at the iron door would not smell any of the vapor of the pitch. The distance from the outlet of the pitch pipe of the still to the furnace door of the still is not less than twenty two feet. At the time of the last explosion, the furnace of the still had been carefully examined before the pitch was let out; no remains of fire were found there, nor was there any other fire in the build ing. The hour w
This property of heated hydrocarbon vapors to spontaneously ignite after absorbing a certain quantity of atmospheric air is not generally known. The remedy devised by Mr. air is not generally known. The remedy devised by Mr.
Woods is simple and complete. It consists in the introducWoods is simple and complete. It consists in the introduc-
tion of a small quantity of water into the pitch pit while the pitch is running from the still. The hot pitch vaporizes the water, the yellow vapor from the chimney is changed to white vapor, and the desired safety is obtained. Too much water must not be put into the pit at one time, or the pitch will boil over: not a dangerous but a troublesome result.
Mr. Woods had noticed that the hydrocarbon vapors would eat away in holes the seat and valves of composition globe valves; and whenever this took place, steam was liable to leak into the wood-preserving tank during the process of did so wood was destroyed. This led him to try with success the experiment of the effect of steam on the vapors of the pitch. Since April 28, 1872, when the remedy described was first applied, not a single explosion has occurred at the works. The water is applied through a half inch iron pipe, connect ed with the city mains and regulated by a cock. Mr. Woods has reason to believe that the vapors from a combination of coal tar and petroleum are more liable to spontaneous com bustion than the vapors from coal tar alone.-Mining and Scientïfic Press.

## Magic Squares

I will give three positions of a square of four figures to a side:

The second position is obtained from the first by inverting the two middle vertical columns, and the third from the second by inverting the two middle horizontal columns. It will be observed that, in the third position, each vertical col umn, each horizontal column, and each diagonal column sums up 34.
In a square of eight figures to a side, invert the four middle vertical columns, and then the four middle horizontal col umns.
In general, invert the middle half of the vertical and horizontal columns.
After discovering this rule, I applied it to a square of welve figures to a side, and so simple is the process that I wrote down not the first position or the second, but the third, at the very first dash, and without mistake. I subjoin one with eight figures to a side, so that the application of this principle may be seen:


|  |  |  |  |  |  |  |  |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 1 | 9 | 24 | 32 | 40 | 48 | 49 | 57 |
| 2 | 10 | 23 | 31 | 39 | 47 | 50 | 58 |
| 59 | 51 | 46 | 38 | 30 | 22 | 11 | 3 |
| 60 | 52 | 45 | 37 | 29 | 21 | 12 | 4 |
| 61 | 53 | 44 | 36 | 28 | 20 | 13 | 5 |
| 62 | 54 | 43 | 35 | 27 | 19 | 14 | 6 |
| 7 | 15 | 18 | 26 | 34 | 42 | 55 | 63 |
| 8 | 16 | 17 | 25 | 33 | 41 | 56 | 64 |

The sum of each row is 260 .
The reader may try his ingenuity in constructing as many tables as he pleases. Ascertain beforehand what each col umn should sum up, by the usual method of arithmetical progression. Thns: the sum of the series $1,2,3,4,5$, etc. to 64 , is $\frac{65 \times 64}{2}=2080$. Dividing by 8 , the number of ver tical or horizontal columns, we get 260 for the sum of each. For the series 1, 2, 3, on to 144 , briefly, each vertical column $=\frac{145}{2 \times 144}=145 \times 6=870$.
I found a square of six numbers to a side rather harder, and one of five to a side quite troublesome. The reason was that the above method is not applicable. By approximating it, however, as nearly as practicable, and then using tentaive means toward the close, I succeeded in both cases.
These tables are not useful in the ordinary sense of that term ; they do not teach us how to measure corn cribs or survey farms; but they may interest pupils in arithmetic, and may cultivate the necessary but irksome art of adding up columns of figures. Let the teacher take an ordinary checker board some winter evening, cut out of card or leather sixty-four men, namely, round pieces of the size of a nickel number them from 1 to 64, and set the boys and girls to work to construct a magic square. My word for it they will go at
it with an interest such as the rule of three has failed to it with an interest such as the rule of three has failed to
awaken.-Home and School.

At a recent meetimospheric Refraction. ophical Society, a of the Manchester Literary and Philo Winstanley.
Mr. Baxendell has noticed the fact that at the moment of the departure of the sun below the horizon, the last glimpse is colored bluish green. Dr. Joule also observes that on wo or three occasions he had himself noticed the phenome non in question, and that, "just at the upper edge where bands of the sun's disk are separated one after the other by refraction, each band becomes colored blue just before it vanishes."
During the past eighteen months the writer, from his residence in Blackpool, has had frequent opportunities of observing the setting sun, and has noticed the phenomenon of the final colored ray certainly more than fifty times. To the naked eye its appearance has generally been that of a green spark of large size and great intensity, very similar to one of the effects seen when the sun shines upon a well cut diamond. The color, however, is by no means constant, being often, as in the case of Mr. Baxendell's observation, bluish green, and at times, as mentioned by Dr. Joule, quite blue. The period of its duration, too, is likewise variable. Sometimes it lasts but half a second, ordinarily perhaps a second and a quarter, and occasionally as much as two seconds and a half.
When examined with the assistance of a telescope, it becomes evident that the green ray results at a certain stage of the solar obscuration, for it begins at the points or cusps of the visible segment of the sun; and when the "setting" is nearly complete,extends from both cusps to the central space between, where it produces the momentary and intense spark of colored light visible to the unaided eye.
"Respecting the increased range of colors seen when the phenomenon is observed with telescopic aid, I may mention that, on the 28th of June, the sea was calm and the sky quite cloudless at the setting of the sun. Of the final colored rays, fifteen diameters showed the first to be a full and splendid yellow, which was speedily followed by the usual green, and then, for a second and a half, by a full and perfect blue. Respecting the increased duration of the color, I have found that, when the atmosphere is sufficiently favorable to allow power of sixty diameters being employed, with a 3 inch ob ject glass, the green effect is seen at that part of the sun's limb in contact with the horizon, even when one half the sun is still unset, and of course from then till final disappear

The different colors seen, together with the order of their appearance, are suggestive of the prismatic action of the at mosphere as the cause of their production, and the intercep tion of the horizon or the cloud as the cause of their separa tion.

Assuming the correctness of this view, it becomes evident that an artificial horizon would prove equally efficacious in separating the colored bands, and also that,if employed dur ing an inspection of the sun's lower limb, the least refrangi ble end of the spectrum would be disclosed. Accordingly, I introduced into an eyepiece of my telescope a blackened disk of metallic copper, having a slit cut in it of about the one hundred and fiftieth of an inch in width, and proceeded to make an observation, in July, when the sun was about one half of its meridian hight. The blinding glare, however of that portion of the sun seen through the slit,rendered the observation futile. By projecting a large image of the sun into a darkened room, I was enabled to get the whole of the spectrum produced by the prismatic action of the at mosphere in a very satisfactory manner. In this case, a semicircular diaphragm was used, so placed that its straigh edge divided the field of view into equal parts, from one of which it obscured the light. The diaphragm was placed as before in the focus of the eyepiece, and by rotating it every portion of the sun's limb could be in turn examined, and that too in the center of the field, so as to be equally subjected to the minimum of the peculiarities of the instrument. When the sun's lower limb was allowed to descend into the field of view, the first rays were intensely red. After a momentary duration, they gave place in succession to orange, yellow, and green, which were then lost in the ordinary re fulgence of the sun. The upper limb gave green, blue, and finally purple, which latier color I have thus far never seen on the natural horizon. It shou!d be remarked that the colors seen were vivid and unmistakable, and each one of them de tained at will, or the whole phenomenon recalled, by the ad justing screws of the instrument. I apprehend that the re sults here given sufficiently prove that atmospheric refrac tion is the cause of the colored rays seen at the moment of the sun's departure below the horizon. I have, however, thought it worth while to examine the light proceeding from the moon's limb by the aid of the artificial horizon, and of course by direct observation. The results were decisive and satisfactory, the spectral colors being easily observed. The green effect I have also frequently seen on the departure of
the moon beneath the edge of a dark and well defined bank the moon beneath the edge of a dark and well defined bank
of clouds. Telescopic aid has, however, in every instance of clouds. Tel
been required.
The rapid changes in color observable in the case of almost any large fixed star at an elevation of twenty or thirty degrees above the horizon, and which changes vary between red, green, and blue, may I think be fairly attributed to the same cause as the color in the sun's final ray. Particles of dust floating in the air act, I apprehend, for the moment, in the capacity of diaphragm or horizon, and thus enable the eye to perceive, even in the light of the stars, the prismatic action of our atmosphere."

A TRER near a chimney will often cause a down draft of air.

## THE UNIVERSAL BORING MACHINE.

Among the tools used in woodworking establishments, few have been more neglected than the wood-boring machine. As a general rule, shops otherwise well supplied with labor-saving devices lack this important and useful tool, or, when its want becomes felt, seek to supply its place with an apparatus which, perhaps, partly answers for the special object sought, but which lacks the ingenious contrivance to make it advantageously used or even applicable to a great variety of work.
Our engraving represents the Universal Boring Machine, which, the manufacturers inform us, they have made a special study so as to effect the necessary improvements in order to enable it to meet the wants detailed in many inquiries which they have received relative to its adaptability for different uses. The machine is strongly built of iron and steel, and combines, in the small space it occupies, nearly all the facilities needed for boring large and small holes in any desired angle. It is cast with a heavy solid frame and body, and has two cone pulleys with three faces, for giving the mandrel the proper speeds for different sized bits. The mandrel, which is of steel, is made to traverse by a foot lever. The operator can adjust the leverage in a moment, so as to stop at any desired depth up to 11 inches. The adjustable table has a surface of 21 inches in width with 15 inch es slide, and it can be raised or lowered 16 inches, enabling one to bore in the center of 32 inches. Adjustable rests upon the table render the work readily placed at any desired angle in the horizontal plane, while the table top itself can be set on an incline towards the bit to any angle not exceeding $45^{\circ}$, and the same can be raised or lowered and slid forward or back, preserving the inclination given.
Augers and machine and pod bits of the various sizes can be employed,as an adjusta ble chuck is fitted to the mandrel for holding the same. The levers are in the inside of the machine, where they are protected, and where no dust and shavings can ob struct their movements. There is no spring connected with these parts to impart return motion, which requires a great er amount of pressure at this point of the operation than is needed to secure a smoothly finished hole.

It will be seen from the foregoing that the machine is always ready for doing either light or heavy boring at any angle desired, with ease and, it is claimed, with great rapidity

It is claimed that, on machines or devices where the stuff has to be moved up to the auger, there is a liability of twist ing, of making a crooked hole, and of breaking the bit, es pecially if knotty or crossgrained material be used; and that the expense of bits would, in a short time, amount to the cost of the present invention.
The countershaft attached to the machine rests in adjust able boxes, and has a tight and loose pulley of eight inche diameter and three and a half inches face, and should mak 900 revolutions per minute.
Messrs. Bentel, Margedant \& Co., of Hamilton, Ohio, th makers of a great variety of woodworking tools, descrip tions and illustrations of which have already appeared in our columns, are also the manufacturers of this machine Letters for further particulars may be directed to their ad dress.

## COMBINED COOKING, HEATING, AND DRYING

 APPARATUS.The inventor of the device illustrated in the annexed engravings claims to have succeeded in producing a combination of useful appara. tus relating to the operations of cooking, drying, house-warming, and ventilation. To families generally and more especially to those residing in circumacribed quartors notably residing in circumscribed quarters, notably French flats, this invention, it is believed, will prove of much utility, as it is practically a complete kitchen compressed into dimensions no larger than those of an ordinary good sized refrigerator. It serves as a range and, at the same time, as a heating furnace, while it exceeds the capabilities of both in its application to drying fruits, vegetables, or clothes. Paints and chemicals, we are told, may be similarly heated with success, and japanning, it may be added, is accomplished with great facility.

Fig. 1 represents the device with its attachments, and Fig. 2 the interior arrangements, portions of which are depicted as broken away. In the latter engraving, A is the fire box surmounted by an iron plate, B. The smoke and gases from the former pass through a tube, C, in which perforations are made, so that air is thus drawn in, which mingles with and insures the more complete combustion of the products within the hollow iron prism, D. With the latter communicates the chimney flue, E .

Surrounding the portions first described is a shield of sheet iron, F , and outside of this is another envelope, or, as it is termed, deflector,


THE UNIVERSAL BORING MACHINE
at a suitable register in the top of the casing, and, if desired, may be conducted into another apartment by the flue shown. In weather during which it is not necessary to warm the room, the register and flue may be closed, when the current

will escape into the chimney flue by the pipe, J, Fig. 1. The vessel shown surrounding the chimney flue in the last men


COMBINED COOKING HEATING, AND DRYING APPARATUS
ted tube, K , is designed to draw in the heavy and foul gases which sink to the floor of the room, thus, it is claimed, pro viding efficient and healthy ventilation.

Within the case, which may be of wood, marble, or any ther suitable material, and on the left is the oven, the bottom of which is so constructed as to deflect the warm air to its sides and top. It is provided with a glass door in orde that the process of baking may be watched, and with suita ble shelves for the reception of the articles. It is readily removable, and, when in place, rests above the arched portion of the deflector as shown. To the rightis a boiler similarly located; on this being aken out and the cover below lifted, the upper surface of the prism is exposed Che latter, together with the plate, B, Fig 2, serves to receive sadirons for heating or may be used for any of the culinary operations usually carried on on top of an ordinary range.
For drying fruit, the oven and boiler are removed and iron rods are placed on the ledges, L, Fig. 1. These support suitable shelves on which the material is placed and which, in the aggregate, give a large amount of heating surface. It is claimed that the ordinary family sized heater will solidify from three to four bushels of fruit in from eight to ten hours, and that the substance gains from 32 to 35 per cent in weight as well as greatly in appearanc over common dried fruit. An economy is besides, effected in the cost of cans, sugar, abor, etc., as it is stated that the flavo and nutriment of the article heated is per leatly preserved.
For clothes drying, rods are provided over which the garments are hung, inside the case. The operation, we are in formed, is completed in one and a hal hours, during which period the irons may be thoroughly heated, so that the laun dress can proceed at once with the press ing as the garments are removed. In bak ing, the oven is stated to be economical and rapid.
During culinary operations producing smoke, the latter is confined in the casing nd passes freely off through the flue. There are no rang ids to lift, and breathing the heated fumes arising from an pen coal fire is avoided. The device may be adapted to brn either coal, wood, or coke.
Invented by Mr. J. K. Boswell, of Ohio. Applications for erritory or for further particulars should be addressed to S. R. Wells, publisher of the Phrenological Journal, 389 Broadway, New York city, or to Dr. R. T. Trall, 1,516 Chest nut street, Philadelphia, Pa

The Inter-oceanic canal
The Secretary of the Navy in his annual report states tha the expeditions authorized by Congress to furvey the Isth mus of Darien, with a view toward the completion of a cana between the Atlantic and Pacific Oceans, have finished thei labors. The preliminary operations to actual construction are therefore completed, and it now remains for Congress to determine whether the routes, indicated by the officers en gaged for so long in this arduous duty, present sufficient ad gaged for so long in this arduous duty, present sumenent of vantages to warrant the
this very important enterprise.
his very important enterprise.
Two surveys have been made. The Darien expedition, Two surveys have been made. The Darien expedition,
under Commander T. O. Selfridge, has selected a route inunder Commander T. O. Selfridge, has selected a route ind stream has been found to offer a sufficient depth of water fo the heaviest class of vessels. Between this rive and the Pacific a canal is necessary, 28 miles in length; 22 miles of this distance is over a plain having a gradual rise of 90 feet. Finally, there will be three miles further of open cut, and thre miles of tunneling to reach the Pacific. It is es timated that the work will cost from $\$ 50,000,000$ to $\$ 60,000000$, and could be completed within ten years.
Commander Lull, in charge of the Nicaragua expedition, has determined a practicable route for an interoceanic ship canal; having Lake Nicaragua as its summit level. It is proposed to connect this lake with the Pacific by a canal 16.33 miles in length, beginning at the mouth of the Rio de Medio, and terminating at Brito. The first 7.5 miles will require an excavation averaging 5 feet in depth, and will constitute the most expen sive part of the work. Ten locks and one tide lock will be required, and there will be 56 miles of lake navigation.
The San Juan river will be navigated to the mouth of the San Carlos, and will be improved by four dams, in order to get around three of which short canals must be built. From the fourth dam to Greytown, an independent canal $41 \cdot 9$ miles in length is needed. The total length of the canal is $61 \cdot 74$ miles, of which $47 \cdot 34$ miles are an embankment and excavation. No tunneling is required, and it is believed that Lake Nicaragua will supply 38 times the maximum de mand of water. The route surveyed by Com mander Selfridge seems to be much more direct and easier to construct.

## DESIGN FOR A CONSERVATORY.

We present herewith an engraving of a conservatory, called by its designer "a cool conservatory in the natural style." It is intended for the cultivation of such specimens (and they are very numerous and beautiful) as do not require stove heat to bring them to maturity, the protection by glass being generally sufficient. Very little artificial heat is enough to keep the temperature in winter at a minimum of three degrees above the freezing point, which is quite sufficient for the period of repose which is required for many of the plants from Australia, China, Japan, New Zealand, and mountainous tropical regions, etc. One can hardly believe what numbers of plants there are, often supposed to belong to tropical climates, with which a cool conservatory can be furnished. Numbers of our beautiful palms would yield to cool treatment; and hundreds of ferns require no better situation than the shelter of glass. The dracænas, agaves, acacias, dasylirions, ficus, aralias, banksias, tender conifer like the Norfolk Island pine, yuccas, grevilleas, rhopalas and the cactuses, would certainly submit to the same treat ment, without mentioning the smaller kinds, which only thrive under a low winter temperature.
The experience acquired of the natural style of arrangement in conservatories during fifteen years in Europe, says the Garden, enables us to recommend it with confidence.
More than thirty species of palm now flourish in cool houses. A great number grow in the cold regions of tropical mountains, such as the ceroxylon andicola, which is found at 10,000 feet and upwards. The oreodoxa frigida, and several kinds of chamoedorea, rise up to the pine region; the areca humilis reaches to 8,000 feet in Java; the chamerops martiana to 7,800 feet in Nepaul; the phoenix humilis to 6,000 feet; without reckoning the chamaerops excelsa of China, the rhapis excelsa of China, the rhapis flabelliformis of Japan, cory-
pha Australis, etc. For a pha Australis, etc. For a winter garden, palms ought to be kept in pots up to the period when their leaves divide and show their character, and their stems become at their base as thick as the arm. They must not be put in the ground before this, nor until they shall have been kept as much as possible in a warm greenhouse where the pots have been plunged in tan. They should be repotted twice a year, in spring and summer, when their and summer, when their growth is rapid, without cut-
ting the roots, and in pots ting the roots, and in pots deep and narrow. A quiet what sharm what shady, but without stagnant moisture, is best suited to palms when young. Growing ferns have nothing to fear from the open air or the sun; it is only the stemless kinds which flourish in the shade and under other plants, their roots requiring nourishment. The alsophila Australis may be placed outside in the full sun without injury; if it be watered from injury; if it be watered from
time to time with liquid manure, it will acquire considernure, it will acquire considertime, and be of unsurpassable beauty.
time, and be of unsurpassable beauty.
A great number of the plants named will remain uninA great number of the plants named will remain unin-
jured if protected from the frost; but it is better, as has been already said, to keep up the winter temperature a little over the freezing point; and even when the sun strikes upon the glass, raising the temperature, it will not be necessary to open the house at all during the winter. After February, however, when vegetation is getting active, it will be necessary to give air gradually, and to water in the evening. In March you must begin to shade with some light material up to the time that you can uncover the greater part of the conservatory, and at last place some of the plants in pots or boxes in the open air. As to the great palms and tree ferns, dracænas, aralias, etc., they will be hetter slightly shaded throughout the year, taking care to give plenty of air. Where it could be easily done, it would be desirable to remove the roof and allow the contents to be refreshed by the summer rains. Thus managed, with plenty of water and a proper amount of shade, it is very possible to develope splendid vegetation in such a structure.

Dr Monchaux recommends the use of cold infusion of green coffee in the treatment of gout.


## A COOL CONSERVATORY IN THE NATURAL STYLE.

screw blades, and jet propellers had been proposed, and many
of them tried practically, the screw has obtained the masof them tried practically, the screw has obtained the mas-
tery, and we now scarcely ever hear of a paddle wheel tery, and we now scarcely ever hear of a paddle wheel
steamer being built, while the jet propeller has failed even to obtain a footing except in a few experimental vessels for the Government or for pleasure boats. It is scarcely too much to say that, among those who labored to improve the crew propeller, no one is better known, or has been more uccessful, than Mr. Grifiths, whose system has been almost large extent in the mercantile navy.
When, therefore, we hear of Mr. Griffiths again coming before the public with a new mode of applying the screw propeller to drive ships, the recollection of his former suc esses awakens an interest which would not attach to the xperiments of one less experienced in the particular sub ject he has undertaken to improve, when further improve Some time ago Mr. Ariffiths read a parer before the United Service Institution, in which he proposed to supersede the present system of employing a screw outside the ship at he stern by a pair of screws, one in the bow and the other in the stern, both working in tunnels. It had often been
proposed to fit propellers of different forms in tunnels extending through the ship from the bow to the stern, bu these had all been abandoned on account of the enormous loss of power, due to friction, which such a system must necessarily entail. Mr. Griffith's tunnels were not proposed to extend fore and ait; in fact they amounted to two short tunnels, one at each end of the vessel, the fore one, after leaving the propeller, sloping downwards, and coming out with an easy curve at the ship's bottom some distance abaf the bow, and the after tunnel opening from the bottom of the vessel an equal distance on the fore side of the stern and sloping upwards towards the after propeller until it emerges towards the stern in a direct fore and aft line.
In this proposal, of course, the objection on the score of increased friction could not be maintained to the same ex tent as if the tunnels were of great length; but what little experience had been gained of tunnels was not much in their favor, and it was incumbent on Mr. Griffiths to show that with his new system a certain power would propel the ves sel fasterthan the same power applied on the usual system of a screw on the fore side of the rudder post, would propel
her. To dothis a number of experiments have been carried out with models on the canal a the northwest corner of the Horticultural Gardens, at South Kensington, and a close scrutiny and study of these experiments have convinced us that very remarkable results are likely to arise from the adoption of the system, and that while opening up some curious and difficult questions on the thenry of re sistances and propulsion, the subject is full of practical im portance, as affording every en couragement that economical re sults will be obtained of a char acter sufficiently striking to com mand support in these days of high priced coal.
That there is a pressing need for improvement in our steam mercantile marine is apparent engaged in shipping, and hown by the increased number of orders which are beirg re ing ships, compared with the orders for steamers. This ap parent tendency to return to sail ing ships, which characterize the present time, is no doubt due so two causes, namely, the ex pense of working steamers, and the great losses whicl」 have oc curred among them. Both of these objections a.e proposed to be removed, to some extent, by Mr. Griffiths' pian, wbich com bines the most desirable feature of separate engines at the bow and stern, with, as it is contend ed, an equal speed and less ex penditure of power. On this latter point we have witnessed large number of experiments, the details of which we hop shortly to publish, and shal therefore content ourselves, on the present occasion, with giving a brief outline of their results They were made with a coupl of models, so arranged that they could be propelled in the ordina y way or on the tunnel system, and every care and attention wa paid to insure the power applied being accurately recorded, as wel as the number of revolutions of he screws.
Experiments were made with the whole power concentrated one screw at the stern, and afterwards with the power divided, placing half in a tunnel in the bow, and the othe the stern; and the increased speed, with the new system, was very striking indeed, amounting to about 30 per cent in some of the runs; but this, doubtless, was assisted by othe causes, to which we shall hereafter refer.
The most curious results of the trials appear when the model is tested with the engine at one end only at work, and compared with the result obtained with the screw working at both ends, and with the power doubled. It is well known that in ordinary vessels when the power is doubled, the speed is increased by one fourth; but in these experiments, trial after trial appear to show that when the power is doubled by adding a screw in the bow working in a tunnel, the speed is increased by one half.
We regret that space prevents us dealing, on the present occasion, more fully with these valuable and interesting ex periments, to which, however, we shall return, and discus fully the bearing they are likely to have on the steam ship ping of the future.-Engineering

OIl of cloves is effectual in protecting animals agains ties and mosquitoes.

## THE GERM THEORY AND ITS RELATIONS TO HYGIENE.

by prisident f. A. p. barnard, li.d., of columbia colleger.

## [PART III.-Conclusion.]

Parastic arowths.
In order that we may be able to judge of the probability that an infectious disease, of which the cause is unknown, is a result of the invasion of the blond of the viscera of the patient by a parasitic vegetation, it is important to consider first what has been already ascertained of the effects of such parasitic growth infesting the animal organism. A simple form of fungus, called the sarcina ventriculi, is often found in matters thrown up by persons laboring under disorder of the stomach. It has also been met with in other parts of the body when diseased. But it is likewise found, and not unfrequently, in the stomachs of persons in perfect health; and, as Dr. Carpenter says, may accumulate there in consid-
erable quantities without causing inconvenience. This parerable quantities without causing inconvenience. This par-
asite, therefore, cannot be regarded as an inciting cause of disease. The stomachs of many worms and insects are found, moreover, to be frequently infested with fungi, which grow there in great luxuriance. Many of these have been examined and described by Dr. Leidy, of Philadelphia. In the West Indies, according to Dr. Carpenter, it is not at all uncommon to see individuals of a species of polistes (corresponding to our wasp) flying about with plants of their own length projecting from some part of their surface, the
germs of which have been introduced through the breathing pores at their sides. This fungus growth, however, soon kills the insect, and a similar effect follows a similar cause in the case of certain caterpillars in New Zealand, Australia, and China, of which the bodies become so thoroughly interpenetrated and, as it may be said, replaced by the fungoid vegetation that when dried they have almost the density of wood. Our common house fly is a not unfrequent victim of a similar parasitic visitation. A fungus called the em pusa muscce, originating from the germination of a single spore brought in contact almost anywhere with the body of the insect, pervades after a time its whole interior, and, while leaving the surface uninjured, emphatically eats out its substance. When the animal's life is nearly exhausted he comes to rest, and fungoid shoots put forth from his fur, consisting of filaments each bearing a fructification of innumerable spores. The harvest of spores becomes very innumerable spores. The harvest of spores becomes very
conspicuous when the unfortunate animal makes his last conspicuous when the unfortunate animal makes his last
stand upon the window pane, forming a thin film over the glass to a considerable distance around him ; and if by any chance a healthy individual of the same species comes within the limit of this infected area, the disease which has destroyed his fellow will be sure to attack him also
The epidemic among cattle, called in England "the blood," is shown by the researches of Davaine to be occasioned by the presence in the blood of the diseased animals of innumerable living organisms resembling vibrios. This disease is communicable to many, producing what is called malignant pustule, and this is attended with the development of the same organisms in the pustules thus produced Professor Lister, an eminent surgeon of ebserved that, when a chronic abscess is discharged by ago observed that, when a chronic abscess is discharged by tions of fluid are frequently attended with putrefaction, though none had existed before. The putrid mass is also found to be swarming with vibrios, though none had been present in the discharges. No explanation of this singular
phenomenon, according to him, can be given except that the germs of these organisms were introduced in the origina operations with the canula and trocar.
In plants, the smut in wheat, the rust in cotton, the oidium in grapes, and the botrytis in potatoes, are examples of fungi, constantly concomitant with disease, and presumably almost certainly, in the last two instances, its cause. Neither in plants nor animals, however, is it to be supposed that the noxious effects observed are occasioned by the presence of these parasites mechanically interfering with and obstructing the vital functions, or by acting directly as poisons in the ordinary sense; but rather by their own vital activity decomposing the substance of the organisms they infest, and
making them their food. The consequences of their extensive prevalence to the material interests of communities and peoples, and to their means of subsistence, have been occasionally of the gravest character. The oidium may be said to have exterminated the vine from the island of Madeira; the panhistophyton cut down the product of silk in France from $130,000,000$ of francs per annum to $30,000,000$; and the botrytis threatened to depopulate Ireland, by destroying the vegetable which constituted, for the common people, the staple article of their food.

EVIDENCE IN FAVOR OF THE GERM THEORY.
Putting together these well known facts regarding this subj ct, before proceeding to more doubtful cases, we may say that the germ theory has an amount of prima facie evi dence in its favor which entitles it to careful consideration. In certain instances, and in a certain sense, the evidence is complete that the germ theory is true. But when we come to apply it to infectious diseases in general, we find the
analogies which they present, with the limited class of exam ples above enumerated, to be unexpectedly feeble, while the points of dissimilarity are numerous and marked. It is not even enough to discover that in such diseases there are actually present, in the blood, or in the tissues, or in the secre-
tions, or in the dejections, of the suffering individuals,living tions, or in the dejections, of the suffering individuals,living forms of microscopic cryptogams, since the evidence i
rarely conclusive either that these minute bodies are injuri
ous to the patient or that they were present antecedently to the attack. And if, as to the first of these points, the evidence in some cases is satisfactory, as to the second it can hardly be pronounced to be so in any.
As to the frequent presence of vegetable organisms in the blood of men or animals suffering under infectious diseases, it is impossible to entertain a doubt. The testimony of all the observers who have occupied themselves with this subject is concurrent to this effect. Coze and Feltz, Klebs, Bur-don-Sanderson, Klein, and many others, have found bacteria invariably in the blood of patients suffering under typhoid fever, small pox, scarlet fever, puerperal fever, pyæmia, and septicæmia. Dr. J. H. Salisbury, of Cleveland,Ohio, affirms, as the result of his own observations, that in healthy as well as in diseased blood there are always present two species of cryptogams, the one algoid and the other fungoid. In the pustules of small pox, Dr. Salisbury has observed a cryptogam described by him as having both a fungoid and an algoid development, and the spores of this he has also found in the blood. In cow pox, or in the disease produced in the cow by inoculation from a small pox subject, only the in the cow by inoculation from a small pox subject, only the
algoid form appears. This the discoverer has named ios vaciola, while the entire plant in its double form is called ios variolosa vacciola. In typhoid fever, the same writer has de tected a peculiar algoid vegetation developing itself upon the external surface of the entire body and upon the mucous membrane of the interior cavities. This he regards as the efficient cause of the disease, the means by which it is propagated.
The disease which appeared in 1868 among the beef cattle brought to this city from the West, and which is known as the Texas cattle disease, was investigated at the time by Dr. Harris and Stiles of the New York Health Department, who found the spores of a peculiar species of fungus both in the blood and the bile of the diseasell animals. Specimens of hese cryptogams were sent by these gentlemen to Professo Hallier, by whom they were successfully cultivated, and who succeeded in deriving from them three distinct forms o the fungus. The epizootic which attacked all the horses of the country twelve months ago was also marked by the
presence of the fungi in the blood and the urine of the anipresence of the fungi in the blood and the urine of the ani
mals affected, which were described by Dr. Endemann, and y Dr. Charles Am Ende of Hoboken.
About forly years ago, the yeast plant was discovered by agniard de la Tour, and almost simultaneously by Schwann. Till that discovery, the chemical theory of disease had a strong support in the imayined analogy of fermentation. To the suggestion, after the discovery, that fermentation i robably a consequence of the rapid growth of the plant when, in 1843, Helmholtz made a direct experimental test of the question by placing a fermenting liquid side by side with one of the same kind not fermenting, both being conined in the same vessel but separated by a membran which permitted the mingling of the liquids. but prevented the passage of the plant, that analogy lost its force; for the fermenting liquid continued to ferment, while the quiescen liquid remained quiescent. The case of fermentation as umes now a significance quite the contrary of that which had before seemed to possess, and it began to be claimed quite as conclusive in favor of the germ theory, as it had been before in favor of the chemical. This theory,however though among its advocates have been, and continue to be counted many of the most distinguished physicians and physiologists of the past and the present generation, ha never met with universal acceptance.
diseased conditions the pabulum for fungi
What account shall we give, therefore, of the multiplica ion of fungi and algæ in diseased blood, if these organ isms are not the cause of the disease? Simply, that the iseased condition furnishes to the organisms their pabu um, which is not present in the healthy state. For the cause of the disease we,must, on this supposition, look else-
where, and we shall be compelled, perhaps, to fall back where, and we shall be compelled, perhaps, to fall back
upon the chemical doctrine of sympathetic decomposition. Many causes, in fact, produce profound changes in the bloo with which parasites have nothing to do. This is true of
he venom of the serpents, and of prussic acid, both of the venom of the serpents, and of prussic acid, both of black death," which raged in the fifteenth century, Bastian quotes Hecker as saying that "many were struck as if by lightning, and died on the spot," and he cites the testimony of Dr. Aitken to the fact that, when the cholera reached Muscat, instances occurred in which only ten minutes elapsed from the first apparent seizure till life was extinct. These are cases for which the germ theory affords no soluion.
On the other hand, we have the numerous observation and experiments of Coze and Feltz, of Burdon-Sanderson and Klein, of Klebs, of Davaine, of Zahn and Tiegel, and thers, in which rabbits and guinea pigs were inoculated
with bacterious blood drawn from patients laboring under with bacterious blood drawn from patients laboring under icæmia, small infectious diseases, including pyæmia, sep etc., observations and experiments which seem to leave ittle room for doubt that these organisms are, in fact, in hese cases, the vehicl
In view of the conflicting character of the evidence sur ounding the vexed problem under consideration, the con lusion to which the present speaker has been led, if it may be permitted to one so moderately versed in physiologica science to have a conclusion at all, is that neither the germ
theory of contagious disease, nor the chemical theory, is extheory of contagious disease, nor the chemical theory, is ex-
clusively true, but that each of these morbific influences has
a range of action of its own, and that in some cases it is em inently probable that the disease in its inception is attributable to one of these causes, and that is the chemical: but owes it subsequent virulence mainly to the other, that is,
Such has been the success of modern measures for closing Such has been the success of modern measures for closing up all the insidious approaches, by which disease has hitherto individual organism, as to encourage a hope, even so seem ingly wild and visionary, as that a time is coming in which disease itself shall be utterly extirpated, and men shall be gin to live out the days which Heaven intended for them When that time arrives, if it ever shall, your honorable and learned profession may find, like Othello, its occupation gone butit will be itself which will have destroyed it, and which will have established, in doing so, a nobler title to the gratitude of mankind than all its untiring labors for the relief of suffering humanity through centuries of self-sacrificing devo tion hitherto have already won.

## The Emotions

Professor Tyndall, while in this country last year, visited the Falls of Niagara, when, reaching the Cave of the Wind by descending Biddle's stairs, he conceived the idea of at tempting to pass under the blue waters of Horse Shoe Falls from that point. He found a guide who was willing to make the attempt with him, and together, the next day, they passed through the mist and foam of the roaring cataract reached the desired point, and returned in safety. In de scribing his emotions at one point in his perilous journey, he emarks as follows:
" Here my guide sheltered me again, and desired me to ook up; I did so, and could see, as before, the green gleam of the mighty curve sweeping over the upper ledge, and the fitful plunge of the water as the spray between us and it al ernately gathered and disappeared. An eminent friend of mineoften speaks to me of the mistake of those physicians who regard man's ailments as purely chemical, to be met by chemical remedies only. He contends for the psychological element or cure. By agreeable emotions, he says, nervous currents are liberated which stimulate blood, brain, and viscera. The influence rained from ladies' eyes enables my friend to thrive on dishes which would kill him if eaten alone. A sanative effect of the same order I experienced amid the spray and thunder of Niagara. Quickened by the amid the spray and thunder of Niagara. Quickened by the emotions therearoused, the blood sped healthily through the
arteries, abolishing introspection, clearing the heart of all arteries, abolishing introspection, clearing the heart of all
bitterness, and enabling one to think with toleranse, if not bitterness, and enabling one to think with toleranse, if not
with tenderness, of the most relentless and unreasonable foe Apart from its scientific value, and purely as a moral agent the play, I submit, is worth the candle. My companion knew no more of me than that I enjoyed the wildness; but the shelter of his thought it indescribable. The name of this gallant fellow was Thomas Conroy."
There is, in this graphic statement of the eminent savan hint at some truths which, physiologically considered,may be of supreme importance. "By agreeable emotions, ner ous currents are liberated which stimulate blood, brain, and viscera." The "emotions" of every living person are un questionably of more importance to his health, happiness,
and well being than most physicians suppose. Agreeable emotions are curative in their influence, when coming to the relief of suffering invalids. Disagreeable emotions produc disease in individuals who, uninfluenced by them, would be in sound health. A dyspeptic who, at his own table, under the influence of depressing emotions, is unable to par take of an ounce of food without subsequent distress and pain, is able, at the table of a friend, under different circumstances, to eat a hearty meal without discomfort. It is a mistake to regard most diseases as resulting from chemical derangements of the system, and it is a mistake to meet majority of diseases with chemical remedies. We have nown physicians who exerted a moral influence over thei patients, which gave them a success more gratifying and ositive than ever resulted from the administration of any rug. The mind in its connection with the body exerts controlling influence; and one of the great secrets in regard o securing health and longevity is to train the emotions so as to keep them outside of the cloud which hangs ever ready to darken our mental and moral horizon.-Boston Journal of Chemistry.

Mosquito Netting as a Surgical Dressing.-The Medi al Record remarks that in all those cases where it is desira ble to keep up support and pressure, and at the same tim permit the free escape of all discharges from the wound, or ulcer, or whatever it may be, the ordinary mosquito netting,
used for a bandage, meets all the indications. Bundlin used for a bandage, meets all the indications. Bundling dressings are avoided in this way, the parts are kept cool, the discharge goes on unrestrained, and at the same time support is maintained. If the discharge is considerable, a pad of oakum may be placed beneath the parts to secure the discharge, thus insuring perfect cleanliness. This netting erves an admirable purpose in dressing large abscesses for instance, when compression and free discharges are to be associated.

Liquid Nourishment for Sick Stomachs.-The Dublin Medical Journal commends the following: An egg, wel beaten up, to which add one pint of good milk, and one pin of cold water, and salt to make it palatable; let it then b boiled, and when cold any quantity of it may be taken. If boiled, and when cold any quantity of it
it turns into curds and whey, it is useless.

An Obscure Phenomenon in Psychology. A few months ago a writer in this journal gave us a collection of facts illustrating the existence of what he called a ' 'mental atmosphere." Such facts are of much more psychological importance than they are usually deemed. Indeed, most scientific writers fear to speak of them, lest censure for too great credulity be their reward.
This was long the case with mesmerism, until it was in vestigated by Dr. Carpenter, and then it proved a valuable means of furthering the study of mental phenomena, and led to the discovery, or at least the correct understanding, of the automatic cerebral action. This interesting function of the mind is closely connected with more recondite powers by which the brain, or rather the action of the brain, its hythmical workings, become in some yet unknown manner in accord with workings of other brains, so as to lead to the rise of the same idea in two minds. If, with Fechner (still the best authority on all psycho-physical questions), we regard thought action as the manifestation of a series of vibrations subject to mathematical laws akin to those which govern the senses of sight and hearing, then the explanation which suggests itself to these instances of persons en apport, or clairvoyant, is that the thought vibrations are detected by the consciousness as isochronous with those in a another mind, somewhat as a musical ear will detect concord between the pitch of two sounds, when ordinary per sons cannot.
But we care less just now to substantiate this theory than to illustrate the facts for which we are seeking explanations. Two remarkable and well attested instances have been laid before the profession in the last few months, in the pages of the Chicago Medical Journal, in the numbers for June and September
The first is related by Dr. George W. Kittell, of Shabbona ill. A young lady cut her head severely with a pane of glass, mbedding a number of small fragments in the wound. It was not attended to properly at first, and in a few months "the pieces of glass actually removed, from the crown of her head to the soles of her feet, were numbered by thousands." This looks very much like one of those aggravated cases of hysterical dementia which, in their love of self-inflicted suffering, have always been the puzzle of the wise and the wonde the vulgar. In this wretched condition she survived from 1865 to
The part of Dr. Kittell's description we wish to call atten ion to is the following

One curious phase in her history should be noticed. efer to clairvoyance

In this case it was not produced by mesmerism, but by chloroform, and she became more and more susceptible to it nfluence. In the latter stages of the case, this state came occasionally from over excitement.
Before the accident which introduced the case, she wa given chloroform for the purpose of having a tooth extracted The doctor who administered it had not always kept that moral rectitude, in some particulars, which becometh a phy sician. Shortly after the inhalation commenced, she began to upbraid him for his conduct. The doctor was frightened, and accused a man, the only one beside himself who knew he circumstance, of telling. The man protested he was nnocent, for he really was. When Miss Low returned to consciousness she knew nothing of what she had said, or of the occurrence she had related.

My first knowledge of this effect of chloroform on her me in this way: After removing some glass one day, an while she was still under the influence of the anæsthetic, was called out for a private interview. The weather being pleasant, w9 stepped into the orchard and sat down under a tree. When I returned she remarked ' you thought yourself very cute when you went into the orchard to talk; but I heard it all.' I then asked her to tell what she heard, and she related our conversation correctly. She had not left the bed in my absence, and could not see the orchard, as it was on the other side of the house. In fact, she was apparently un conscious the whole time; and when she had fully recovered from the influence of the chloroform, she knew nothing of what had been done or said. I had known her to say strange things while anæsthetized, but till now had not understood it.

Sometimes, after having taken chloroform, she would rise in her sleep and go miles, in her night clothes, to find ar ticles that had been lost. She never had any knowledge of these nocturnal expeditions in her waking state, except the proof afforded by the presence of missing articles, and the condition of the bed in the morning.

Her clairvoyant state was another existence to her When in this state she would tell anything that had trans pired at other times, while in the same condition. I have given her chloroform in enable her to find lost articles, which she could always do. Some little thefts, and sometimes big ger ones, were made known in the same way

When very sick she was often delirious, sometimes for hours, which led many people to suppose she was insane, and some said she was possessed of the devil. It was from this fact that the horse thieves escaped punishment; many would take oath in court against her sanity. She was the principal witness; and popular prejudice, backed by some physicians for no laudable purpose, carried the day.
"To relate all that she said and did, while clairvoyant, would make a long and interesting chapter. The most interesting occurrences of this kind must be omitted bocause of their length. If any doubt is entertained as to the truth of these statements, any further proof desired will be gladly furnished by the author.
An example, not dissimilar in kind, but furnished by a
$\begin{array}{r}\text { rit } \\ \text { st } \\ \hline\end{array}$
young man in perfect health, is given in the number fo September, by Dr. Henry M. Lyman, Professor of Chemistr in Rush Medical College, Chicago. The person was Mr Brown, known as the "mind reader," twenty-one years of
age, sound in body and mind. He exhibited his peculiar power by finding, blindfolded, any object which Dr. Lyman secreted in an adjoining room. To do this, he was obliged to be in physical contact with the person who had secreted it. He did not pass into a condition of trance, but claimed to be guided by a sort of subjective appearance of light. His power varied with the temperature and with his own feelings. It depended also on a distinct knowledge of the whereabouts of
Though neither of these examples present novel features, they are valuable because carefully established by compe tent observers. The deductions from them clearly include he position that the function of cerebration can be stimula ed and directed by other means than those ordinarily con by the exhaustive. The thought vibrations are not bounded by the superficies of the body,nor by the peripheral extrem ies of the nerves, but are continued beyond in space, doub less under some law of decreasing intensity, until, perhaps, hey are metamorphosed into some other form of motion, or lse become extinguished.
Certain brains, usually but not always in abnormal condi tions, are impressed by these vibrations with sufficient for to cause the cerebral action to rise to the level of conscious hought, and hence this singular power of "reading the involved of others." The physiological laws which are her f consciousness; and as these are very extended bearin n other branches of psychology, we shall defer entering upon them until some future occasion.-Medical and Surgial Journal.

## The New Daily Newspaper

Inter Ocean, of Chicago, congratulates itself on its alread arge daily circulation, having increased 25,000 copies during the past ten months, and adds that its regular edition fils ighty large mail sacks. Our contemporary modestly dis claims the honor of its success and virtually ascribes it to the avor of the people; but it seems to us, at least so far as our own experience extends, that the people are not in the habit f converting journalistic enterprises into success unless here be overwhelming reasons, which in fact prevent thei doing anything else. Hence, even at the risk of offendin its modesty, we are obliged to take issue with Inter Ocean and to assert that, unless it had been edited and managed in he very admirable manner which has characterized it in the past and at present, its popularity might still be an affair of the future. At all events, we congratulate our con
temporary upon its prosperity, and cordially wish it th brilliant career to which, from its excellence as a journal, is $f$-irly entitled.

## DECISIONS OF THE COURTS.

United States Circuit Court--District of Massachu-

## hepley, $J$

Without at this time stating the conclusions to which the court arrived in
elation to several questions presented in this case, it will be sufficlent for
 on of Forsyth.
Rubber rolls $f$ or






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## Ferent American and foreign eqatents.

 uantity of tobacco required for a cigarette to drop down to a compresso eneath, by the cempressing action of which the tobacco, being rolled up is inserted afterward into a paper tube ready to receive it, by means of
peculiar device. The paper sheets are laid into a rectangular box of th ke section to the surface of the cigarette paper. A piston is constant hich is called "a hand," forming one end of the box, and intended atch them one by one, and carry them to the rolling rod, whereby the sam are formed into tubes. The paper sheet is rolled up within a cylindric of sald sheet splt through one of ts generating hnes, which spit one edg of sald sheet enters, and is caught by the rolling rod, that is set rotath with the mold, carried up to the compressor containing a roll of tobacc which is then, by another rod, driven into the paper tube. The mold move new and presents the rolled sheet containing its tobacco, and having it lower end folded up, to the action of the upper end folders, when the cigar tte is completed, and the mold returned to its starting point, or under th
olling rod. On its entering the mold, the rod drives out the made cigar ette, and gets hold of a new sheet, which undergoes the very same opera garette foregoing one. From what has been said, the making of th three consists of three different operations, effected simultaneous ng action. The first operation consisis in taking a sheet, rolling tt, an ucing the tobacco into the paper tube thus formed, and the third and la operation consists in folding the upper end.

Improved Spring for Chairs
William T. Doremus, New York city.-This invention has for its obje to furnish an improved spring for use upon articles of furniture, whic consists in ari improved spring.formed by the combination with each othe of the two rubber blocks, between which is placed the middle part of a aped bar. Aned, and thus passes around both the rubber blocks, A yol esses along the upper side of the upper block, and the various parts hespring are connected and held in place by two bolts which pass throug the yoke through notches in the ends of the rubber blocks and through $t$ iddle part of the U bar. By this construction, by tightening and loose the nuts of the bolts, the tension of the spring may be regulated as hair seat to its pedestal.

## Improved Harrow, Milas K. Toung, Glen Haven, Wis.-This invention consists of a coup

 of pulverizing bars in front, four, more or less, bars with knives or teebehind them, and a wide pulverizing bar behind the toothed bars, all co ected together a few inches apart by chains, to be drawn sidewise over $t$ surface. The toothed bars are arranged obliquely to each other to give
side draft to the teeth or cutters, to some extent. The knives incline fro the front backward so as to rise upon the clods, etc., and cuit them by pret ing downward; but they can be made to point forward and downward be used like a colter by reversing the bars.

Improved Means for Propelling Vessels. John O'Nefl, New York city.-This invention relates to improvements e class of propellers formed of osclllating paddles; and it consists, chit y, in the arrangement of the upper pivoe vertical plane of the crank, so hold the paddles in such manner that they dip verticesly into the wal and thussave the loss of power due to beating it obliquely.

Improved Governor for Steam Engines. Carl Robert Rungvist, Stockholm, Sweden.-This invention consists,
more particularly, in the use of an oscillating ring or plate, or of a combination of several parts, which are more or less symmetrically placed n continuous oscillation, so that any point on a line drawn from the cen. ter of gravity, at rightangles with the plane of this plate or ring, will de-
scribe a circle in space. Various applications are made of ihis principle scribe a circle in space. Various applications are made of this principle,
the following of which appears to be the simplest: The disk is mounted the following of which appears to be the simplest: The disk is mounte
by a universal joint upon a hollow support, through which a shaft carrying by a universal joint upon a hollow support, through which a shaft carrying
the three arms and buttons is fitted, a spring crowding said pins against the plate, and serving as equivalent for a weight. A pinion hung loose upon
the shaft, meshes into a toothed segment, that is mounted upon a weighted crank lever from which the connecting rod extends to the valve. When the speed of the engine is increased, the increased friction on the buttons
causes the loose pinions to act upon a lever in such manner as to move it to more or less shit the valve.
Welwood Murray, New York, city Trimmings. ventions of similar nature. The first consists of a has patented three and other articles of wearing apparel for ladies, composed of a dripe Muslin, lace, silk, or any other suitable textile fabric, with cross plaits ar-
ranged in groups of, say, four or five (more or less) plaits in a group plain portions between the plaits of about the same width as the groups thereof. The second invention consists of a reverse box-plaited and puffed trimming for dresses, etc., in which, by reason of the plaits of one side be
ing mademidway between those of the other side, they Ing mademid way between those of the other side, they have the form or an-
ordinary box plait at one margin of the trimming, separated into two members at the other margin, and merged into the two adjacent box plaits thereat. The machine which is used for mazing this trimming consists of a pair of plaiting rollers with puffing teeth or formers in one, and sockets or dies
in the other, and four plaiting blades for plaiting the cloth and pressing the plaited trimming in which the margins, and, when desired, a puff is formed between the plaits at the edge.
To make this trimming a pair of intermittingly rotating rollers is used, with To make this trimming a pair of intermittingly rotating rollers is used, witi
puffing cogs or teeth, when the trimming is to be puffed, combined with a puffing cogs or teeth, when the trimming is to be pu
pair of folding blades or knives and a feeding guide.

## Improved Car Coupling

Warren B. Snedaker, Syracuse, N. Y.-A couplin hook is pivoted in the drawhead, so that it turns freely on a pivot rod. The long limb of thi
hook forms the coupling pin, and when the car is uncoupled is in nearly horizontal position. When the cars come together, the end of the lin strikes the center of the hook, which throws the long limb to an upright
position. Before reaching this position, its end strikes the underside of a position. Before reaching this position, its end strikes the underside of hinged cover and raises it so as to pass a shoulder. The cover drops by its
own gravity, and confines the hook, so that the shoulder forms the abutment against which the link pulls. To uncouple the cars, the cover is raised by means of a chain. A forked weight bar is pivoted at its rearend, and its weight is brought to bear upon the short limb of the hook, by meazs,
of pins, to keep the hook and bar steady, and in position before coupling, or when the hook is turned down. The forks of this bar also drop upon unnecessary to go between the cars to guide the link when coupling the cars together.

## Improved Milk Cooler

James Pearl, Lawrenceville, N. Y.-A water chamber is arranged on
frame by covering it with a layer of sheet metal, painted on both sides to resist the action of the water thereon. The water course is produced by ongitudinal partitions, which connect by apertures at alternate ends, so ber. The cold water passes around the partitions, and is conducted of through an exit pipe. Another sheet of metal, painted on both sides, is placed on top of the water chamber, and attached to the main frame. The milk pan is placed on the cover, being cooled as readily as by being directly
n contact with the water, zinc especially keeping the water cooler, and pren contact with the water, zinc especially keeping the water cooler, and pre-
venting the corrosion of the bottom of the milk pan. The milk pans are thereby kept dry, and last a great deal longer than when placed directly on the water. The top cover forms, also, a table, which allows the use of smaller pans, according to the quantity of milk obtained, keeping also but

## Improved Automatic Hatchway Guard.

George E. Berry and Frank C. Pingree, Detroit, Mich.-This invention the elevator, and connected by cords running over guide pulleys with a the elevator, and connected by cords running over guide pulleys with a
tilting lever. The latter is moved by a ptn on the upper end of the elevator
carriage, and caused to raise the gate out of the way when the carriage carriage, and caused to raise the gate out of the way when the carriage
comes up to the place for unloading and'loading. When, by the passage of comes up to the place for unloading and loading. When, by the passage of
the carriage to a higher floor, the gate is allowed to fall, the descent is
regulated by a pin on the lower end of the carriage, which passes above regulated by a pin on the lower end of the carriage, which passes abo up.
the lower end of the lever just before the upper pin escapes from the up. perend. If the carriage descends without the upper pin passing above the lever, said pin regulates the descent. The gates closed below the carriage are opened by the lower pin on the carriage, and their closing is regulated by the upper pin.

Improved Curling Iron.
Joseph S. Morgan, Brooklyn, N. Y.-The object of this invention is to produce an improved curling iron, which is adapted to be conveniently used
on every gas or other flame, keeping its polish and surface uninjured, and ,erfectly clean for use, and being easily handled with one hand, while the :he other curls the hair on the iron and manipulates it in the proper manler. This invention consists of a hollow metal tube, with a double el-
oowed handle applied to its larger conical base, which is provided with air thannels for carrying up the flame to the full length of the iron, and also with diametrical side recesses having vertical openings, by which the exinguishment of the flame on the burner is prevented.

Improved Box Clamp for Tobacco Presses.
I. Robertson, Madison, N. C. - This invention consists of a clamp ormed of two blocks, made of hard wood, notched across the grain upon heir inner sides, and held together by two or more bolts. The ends of the locks at their inner edges are rabbeted to form grooves to receive the
crew posts. To the outer forward corner of the upper side of the rear lart are secured plates, and suitable arrangements are provided so that
he rear part will not be pushed back out of place while the clamp is being anipulated. The straps are arranged to prevent the parts from being

## Improved Foot Warmer and Impro

John B. Craig, Perrysville, Pa.-This invention is an improvement in the lass of portable heaters consisting of a metal case containing a block of
Japst nne or other material, which is removed when required to be heated. he invention consists in an arrangement of ribs and pins for supporting he block and holding it in place on the cover of the case. The pins pre-
ent the block moving aboui in the box when the latter $i$ is betigg handled, ent the block moving about in the box when the the cover, and thus unduly eating the same, thereby causing injury to the floor. The same inventor ce of florists to stem flowers by attaching them to wooden splints by
leans of wire orthread. The improved device is formed of a wire, shaped eans of wire or thread. The improved device is formed of a wire, shaped ank. To attach the derice to a flower, the stem is drawn down through e coil until the latter embraces the base or the calyx, when
mpressed by slight pressure between the thumb and finger.

Improved Wheel Plow.
Fred Hasbrook, Stokes' Mound, Mo.-This invention has for its object to prove the construction of the wheel plow for which letters patent No
8,899 were granted April 29,1873 . The invention relates to an arrangement a rocking bar and pivoted rod in connection with the tongue and beam: the machine,for the purpose of adjusting them at certain angles to each
her. By this construction the chain braces, in drawing the sulky, tend to her. By this construction the chain braces, in drawing the sulky, tend to
eess the forward end of the plow beam downward, and thus cause the

Improved Cutting Attachment for Sewing Machines.
William H. Sample, Albany, N. Y. - The object of this invention is to fu William H.Sample, Albany, N. Y.-The object of this invention is to fur rics of all kinds may be cut simultaneously with the stitching, and at suit instrument may, with slight variation, be attached to nearly every sewing machine, and consists of two upright arms, one of which is attached the guide casing of the needle bar, and the other is connected loosely wit
the main arm of the seiving machine. The stationary arm carries ower end a cutter blade, which, together with a pivated cutter blade ope rated by thereciprocating arm, cuts the fabric as the same is fedby the ma chine to it and the needle.
Improved Propulsion of Vessels
George N . Jones, Philadelphia, Pa. - This improvement
elling vess spectively operating and formed in a cylinder having a single acuum, re is in communication with the water wherein the vessel floats, whereby the
uuantity of win lant quantity readmitted in continuous succession through the aforesai
later orifice. Thus no supplementary tube or passage is required to supply the
steam and vacuum cylinder with the water to be expelled, but the inflow team and vacuum cylinder with and outflow occur at the same point. The invention further consists in
valve and float mechanism connected with the cylinder, whereby the ad mission of steam is automatically regulated, as the water is expelled and admitted, thereby securing a proper and efficient action and allowing th team pressure to be con stantly applied
Improved Automatic Lubricator for Car Axle Journal.
James Ed ward Bering Newburgh, N. Y. James Edward Bering, Newburgh, N. Y.-This invention consists in method of automatically supplying the hot journals of a car axle with lu-
bricating material by interposing, between the journal and a superposed
lubricent which will geserate combustion.
Improved Implement for Capping Cartridges.
Henry M. Bronson, Sandusky, Ohio.-The object of this inventio provide a convenient little instrument for capping the brass and pape
shells used in the Parker and other breechloading shot guns by which the shells used in the Parker and other breechloading shot guns, by which th operation cin be performed in a quick, neat, and perfect manner. It con
sists of a tubular spring clamp, which takes hold of the caps and transfer them to the countersunk base of the shell by striking sharply the knob of a bolt with spiral spring sliding in the clamp.

Improved Accordion, et
Frederick Goetze and Donat Müller, New York city.-This invention consists essentially of the application of two "unisono" tuned reeds to very key of both key boards of a wind instrument in which the ke will sound by expanding and the other by contracting the bellows, and thus give the same note continuously as long as may be required. The in-
vention also consists of sliding holders, in combination with the key boa of such instruments, by which the bellows can be worked by the wrists of he player, thus slide along the fingers free to work the ken, and allowin ne end on the tnees. The instrument thus improved is called an "

## Improved Slide Valve Mechanism. Ebeneze: E . Gilbert, Montreal, Canada.-The main slid

bes that E. Glibert, Montreal, Canala.-The main side valve has end flanges that hold them movably between guide brackets. When the nabled t ping and disagreeable noise is prevented by the use of an auxiliary valve peculiarly constructed, and arranged in the steam chest and ove
the main valve. This valve has two subjacent cavities which altern tely connect with the exhaust by a vertical passage, and are separa ted by a partition. The steam passes through ports into and tubes, to alternately force the main valve in opposite directions, and re-
cesses, over which pass the ends of the valve, to admit steam 1nto chambers and thence to the tubes. The object of this arrangement is to cut off the theirs percussive fmpact upon the rods. In order to a cender the to preve set adjusting, to take upits own wear, andalso to drop according to the wea that takes place on the main valve below it, an auxiliary valve is provided
which becomes automatically adjustable by its own gravity, both as re spects its own wear and that of the main valve.
Improved Link Guide for Car Couplings.
William Warinner and William L. D. Johnson, Creelsborough, Ky.-The bumper heads of the cars are constructed in the ordinary manner, except
that their cavities are deepened, and have blocks inserted in them. The blocks have stems formed upon their inner ends which enter holes in the inner parts of the bumpers, and around which are coiled the springs by which the blocks are held forward. Upon the forward end of the blocks
are formed flanges to support the pin when withdrawn. A curved frame, the side bars of an innerframe. The rear end of the curved frame is hinge to the rear part of the bumper head, and its forward part is supported by a yoke, the side bars of which passthrough guides attached to the bumpe head. The frame can be raised and lowered, according to the hight of th adjacent car, by simply turning a screw. To the outer end of the inne ward, comes into such a position as to support the link in a horizontal po sition. A weight and cord of sufficient size are arranged to draw the frame forward as soon as released. The weight is supported by a small coiled spring, arranged to relieve the jar when the cars are run together, and th lever nawl waph. The siling frame is held when pushed inward b a lever pawl pivoted to the frame and held to its place by a spring. Th
forward end of the lever pawl projects at the side of the bumper, so that can be readily operated to release the frame and allow it to be drawn for ward by the weight
lmproved Toy Blocks for Object Teaching. signed to facilitate tne study city.-This invention relates to àpparatus defigures, and to familiarize the minds of both the young and old with such two triangular shapéd blocks, made of any material and of any size, by th use of which (and no other) varieus figures are formed by laying them use of w
gether.

Improved Standard for Stools, Tables, etc.
Samuel H. Newcomb, Port Williams, Nova Scotia. The invention consista In an improved stand adapted to support different articles of furniture,
The supporting stand consists of four curved legs, of which one is frrmly connected to the central shaft. The other legs are hinged sidewise to each to close accurately around the shaftestanary leg, and they are arrange around the shaft, and projecting lugs at their outer top ends. These lugs enter recesses of a round support which rests on the legs and binds the with the recesses around the shaft, allow the insertion of the sockets the different parts which are to be connected to this supporting stand.
hook of the outer folding leg closes into an eye at the lower side of ereby the lifting off or otherwise disconnecting the same.

Improved Plow.
es of the beam, pivoted to it by a strong cross bolt, and are connected ri idly at their lower ends so as to form a strong, rounded-off support for the under side of the plowshare. A curved brace is rigidly attached to these
bars, passing up between them and through a recess of the beam, above of inclination under which the plowshare is set. An adjusting rod passes between standard bars along the rear of the brace and up through the
beam, and is raised or lowered by a crank. Different shares may, in this manner, be attached to the plow, as necessitated by the various requir ments of farming, and their angles of elevation and depression be det

William Stephens, Pittston, Pa.-The valve is truncated and, wedge-shaped induction ports and exhavst. The com enters ports nduction ports and exhaust. The steam enters ports at the ends of the
valve, which moves far enough to open them in that way. At the lowe edge the valve rests on a flat seat, and at the top it may or may not be pro-
vided with flanges to bear on the top of the seat. It is fitted on these part oo that it just wedges into the cawity between the seats steam tight. Chan nels are in the corners of the valve at the lower edges, and in the corner of the seat at the top, to admit steam as a check, which prevents the leal ng of the valve to some extent. Such channels can also be employed op will be governed by the area of the cross section of the ports at the line nigh ty ght by such channels, admitting the steam under it. The double sea can be had with the ordinary arrangement. The double ports will unite in ne passage in any suitable way.

Improved Packages of Powder Charges for Blasting.
nry M. Boies, Scranton, Pa.-This invention consists in packing the owder, in convenient quantities, in long tubes of paper or any fabric o materal of sufficient strength, rendered waterproof if necessary, of a
proper shape and size to be used as a cartridge, and of such a length in exess of the powder inside as shall allow of its being folded into a ccm
act form, and divided for use into cartridges of any desired length o eight. Each cartridge tube or package may be easily marked with th ze, and quantity, and brand of its contents ; and when it comes to the con amer, he can measure off from either end the quantity desired for a blas and the cartridge is ready for use, proceeding in the same way until th whole package has been used. Thus the danger of preparing thie cartridg over the open keg and the liability to damage of the exposed powder are
avoided, and the time and labor of making the cartridge, as well as the ma voided, and the time and labor of making the cartridge, as well as the ma avoided, and the

Improved Mold for Fancy Buttons. Frederick Mass, New improved fancy button, the mold of which shail be object to fu ish an improved fancy button, the mold of which shanl be so formed tha without sewing. The invention consists in the grooves formed in the outer surface of the molds, and in cords or threads in combination with the Improved Drill for Well Boring,
Timothy Phillips and Joseph Golletz, Leavenworth, Kansas.-The dril is made tubular and somewhat flaring, so as to cut a hole a little large the stratum through which it is boring the core or central part of the cut passing up through the cavity of the drill. The upper end is rabbeted, and
on it is screwed the lower end of a tube, in the sides of which are formed number of holes to allow the water to flow out, and thus lessen the
weight. In the upper end of the tube is screwed a section of pipe, and other sections may be added as the hole increases in depth. To the uppe he drill is raised, to carry the contents of the tube and pipe with it. With this drill, it is stated, a hole may be sunk by hand to the depth of two
hundred feet, and with a lever to any desired depth. This drill also enables the operator to know exactly the kind and depth of stratums throug hich hole is being sunk.

## Improved End Gate for Wagons ird and Merritt Miller, Heaton, Ill. Thi

 and consists, chiefly, in a lever pivoted to the gate by a link or having, at one end, cla ws orhooksfor taking into notches in one of the side the gate.
## Improved Soap Cutting Machine.

N Y ork city.-The object of thisinvention is to to soap factories and dealers in soap an improved machine for cutting the
soap blocks into pieces of any required size. The invention consists of feeding frame provided with adjustable block carriers for forcing the soa against a suitable cutting frame, on which the cutting wires are rigidl
applied by a stretching device, which consists of a supporting piece whic carries a c a small crank, and retained in stretcheā position by a ratchet and pawl. Improved Churn Dasher.
George Ridier, Rickardsville, Howa.-Mis proved form of churn dasher formed of bars crossing each other, which are
made V -shaped with V grooves in their under side. It was fully illustrate made $V$-shaped with $V$ grooves in their under side. It was fully 111
and described on page 388 of the current volume of this journal.

Inventions Patented in England by Americans.
[Compiled from the Commissioners of Patents' Journal.]
From November 8 to ondensing Mile, ETC.-G. Borden, White Plains, N. Y., et $a$. Gas.-G. W. Morris et al., Baltimore, Md.
Paper Bag Machive.-L. C. Crowell, Boston, Mass.
Praskrving Mile, etc.-G. Borden, White Plains, N. Y., et al.
SPADE BAYONET, ETC.-FF. Chilling worth, Springfield, Mas

## NEW BOOKS AND PUBLICATIONS

or and Metamorfiones of Insects. By Sir John Lubbock, M.P., F.R.S., Vice Chancellor of the University
of London. With numerous illustrations. Price $\$ 1.25$ London and New York: Macmillan \& Co
The author of this book is the head of a large London banking firm, an hairman of the Committee of the Bankers Cearing House, besides time to pursue, to its uttermost detalls, one of the most complicated an voluminous branches of natural history. His numerous contributions to the literature of entomology have been read before the Royal Society, the
Britisi Association, the Ray Society, and many other learned bodies. This reatise now issued in an elegant form, with numerous engiavings, wa riginally published in the pages of Nature.
How to Make Money by Patents. By Charles Barlow
Third Edition. London: E. Marlborough \& Co 14 Warwick Lane.
It is not necessary to give a detalled description of this excelient littl reatiss, as we published a resumé of its contents on page 366 of our volum XXVII. The
tinued utility.

Notes of a Metallurgical Journey in Europe. By John A. Church, Engineer of Mines. With Illustrations ren Streets.
The author here reviews the systems in use in Gerinany and Italy, espe
clally in the Hartz, at Freiberg, and at Agordo. The notes were first pub
Mathematical and Philosophical Manifesto, concern ing a Lacking Link in the Demonstration of the Pytha gorean Problem, Disproving its Absolute Truth, etc. By
Theodore Faber. New York: E. S. Dodge \& Co., 84 John Street.
We have carefully looked through this pamphlet for the disproof of the
Pythagorean argument, and we must admit that th." also is still a "lacking nk." But as the matter is in the hands of the Royal Society of England ve will await the discussion of the subject by that lear

## 

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heavy Machinery, steam Engines, ore Crushers, \&c., \&ce. Address Herrman \& Herchelrode M' ${ }^{\prime}$ 'g Go., Dayton, Ohio
Just Published-" Workshop Receipts" for $\$ 2$, mail free. E. \& F. N. Spon, 446 Broome Street, N. Y.
Buy for your boys, for Christmas, the Tom tery, wires, हeys, and instructions, price $\$ 3$. Neatly Co... 250 Broad way, New York

 duty. Earle C. Bacon, Gen. Ag't, 36 Cortland St., N. Y. For Bolt Forging Machines, Bolt Holding, Small Tools and Gear Whells for MModels.
Listree. Goodnow Wightman,23Cornhill,Boston,Ms. Brass Gear Wheels, formodels, \&c., made to
order, by D. Gilbert \& Son, 212 Chester St., Phila., Pa. Superior to all others-Limet \& Co.'s French
Files. They are cheaper than English fles. They are heavier, better finished, and better tompered. Send for эrice-list.
Street, New
Homer
.
Telegraph \& Electrical Inst's-Cheap inst's
or learners Models and light Mach'y. $G$. W. Stockly Brown's Coalyard Quarry \& Contractors' Ap-
paratus for hoosting and converyingmaterial by ron caide. w.D. Andrews \& Bro. 414 Waterst.N. Y.

Belting - Best Philadelphia. Oak Tanned.
W. Arny, 201 and 303 Cherry ytreet, Philadelphia Pa Mercurial Steam Blast \& Hydraulic Gauges Lathes, Planers, Drills, Milling and Indes For Solid Emery Wheels and Machinery, All Fruit-can Tools,Ferracute,Bridgeton,N.J.

 mangactured at colt's armory, Hartford, Conn. The
arrens sizes havea range of over two miles. These arms are indispensable in modern warfare.
Hydraulic Presses and Jacks, new and sec
ond hand. E. Lyon, 720 Grand Street, New York.
Damper Regulators and Gage Cocks-
the best, address Murrill \& Keizer, Baltimore, Md.

Steam Fire Engines,R.J.Gould,Newark,N.J. Peck's Patent Drop Press. For circulars,
ddress Milo, Peck $\&$ Co.. New Haven. Conn. Parties wishing Patented articles manufac-
tured on royalty or otherwise, address Box 810 , Glovers-

G. W. L. can anneal his lamp chimneys by
the process described on p. 42 , vol. 26. C. F. R. will find the directions for transferring pictures to glass on $p .233$
ool. 26 . ${ }^{\text {p. }}$. 31, vol. 29. - F. W.E. can stop the leak in his pipe by the process described on p. 344 , vol. 29.-R. A. D. Will ind
a recipe for black ink on p . 106 , voi. 27 . For violet ink, ase a decoction of logwood, to
chloride of tin has been added.
S. C. H. says: $I$ have a $\frac{1}{2}$ inch pipe, 2 miles

in length; and at one end there is an atmospheric pressure of 10 ibs on the square inch. What amount of time | would be required, to produce a pressure of 5 lbs. at |
| :--- |
| the other end of pipe? A. A question of this kind | could onely be determinea by experiment. Formulas

anve been established for the velocity of discharge have been established for the velecitity of discharge of
air through long tubes, but the constants have not been air through long tubes, but the constants have not been
determined with suficient precision to apply to this case. You will find the fiow of air through tubes dis. W. E. M. asks: How many pounds will a
steel screw 2 inches in diameter with $\frac{1}{4} /$ inch thread be capable of raising? A. In you mean that the thread ind
cut half an inch deep, the screw will hift about 60,000 bs. G. W. J. asks: 1 . How many revolutions
does the screw of an ocean propeller make in a minute? 2. How is the screw made to revolve with the desired
 between 50 and 65.2 . By having sumficient power in the
engines. Governors are commonly fitted, to correct a endency to change the speed.
F. J. S. asks:
with vinegar, for table can
I tiee of preparing mustard for the table with yinegar
or still more with boiling water , checks the development of the peculiar principles on which its strength almost
entirely depends. Prepare as follo ws: Mustard (ground) 3/1 lis., water sufflcient to form a stiff paste. In haifa a
 pepper, or essence of cayenne, may be added.
L. \& \& \&. say: We have a tubular boiler 12 feet liong, 34 inches diameter, with 30 three inch tubes.
We would like to know how to set it so as to economize
 full size, so that the furnace may be easily and quickly fed, ; with the ash pit connnecting with a passaga e eadidng
outside of build ding to supply draft.
wite

 facturer who makes a specialty of bullding boflers for
places where sawdust and shavings are to be used as
G. Q. asks: 1. How can I find out when
sand contains gold, and how is the gold separated from the sand? 2. What is whiting? 3. What are the propor-
tions of alcohol and chloride of lime used in making chloroform? 4. Is there such a thing as gold wash? If so, how is it made? 5. How can I make lemon soda
water, in bottles? 6. Can you give me a recipe for
 of? A. 1. You can see the fine glittering grains on
gold, if they exist in the sand, and you can separate gold, if they exist in the sand, and you can separate
them by washing in a pan. This pan is best made with sloping sides, and a cireular depression in the center,
into which the grains of gold settle, while the sand and earth are washed along on the edge. 2. Whiting is elu-
torated chalk ${ }^{3}$. chloroform can be prepared as fol torated chalk. 3. Chloroform can be prepared as fol.
lows: Chloride of lime in powder 4 lbs., water 12 lbs. mix in a capacious retort or still, and add 12 fuild ozs. of
rectifed spirit (sirongalcoholl. Continuously distit the rectifed spirit (strong aleohol). Continuously distilt the
mixture as long as a dense liquid, which sinks in the mixture as long as a dense liquil, which sinks in the
water which passes over with it, is produced. Separate
 carbonate of baryta. 4. A gold wash can be made by yag.
thating ether with solution of terchloride of gold for itating ether with a solution of terchloride of gold for
some time. Allow it to repose and pour oft the super-
 and a bottling machine, with reeeptacles for sirup. sota water is only put up convenienty in this way on thie
large escale. 7 . Grind up bisulphide of tin, or bronze
 portions of the potatoes which have undergone putre.
factive ermentation. The sound portions left can be tactive
used.
Paris.
R.T.M. asks: Is there anything that will remove the tatto marks, made in the thesh with com.
mon Indian ink, without leaving a scar? I have heard that they could be made to disappear by frrst rubbing
the marks with a salve of pure acetic acil and lard, then the marks with a alve of pure acetic acid and lard, then
with a strong solutition of potash, and finally with hydro. with a strong solution of potash, and finally with hydro-
chloric acid. Is this so? A . There is is litte doubt that tattoo marks could be made to disappear by the appli-
cation of the chemicals you name, but the entire cuticle and somethiug more would undoubtedly be sacrificed in to be imposed on by applying corrosivivechemicals to the skin. The difltculty of removing the carbon which lies
buried under the outer or scarf skin, withouu removing buried under the outer or scarf skin, withouu removing
the skin at the same time seems unsurmountable, but the skin at the same time seems unsurmountable, bu
perhaps some correspondent may be able to suggest
A. K. Says: I have two upright (externa
tubes) boilers, connected at steam and feed water. Eacll boiler is provided with a stop valve on steam pipe, so that either or both can be shut off. I find that, when
both valves are closed, the water will fall in the one and rise in the other and run out of safety valve, when
he pressure on steam gages indicates the same for eac the pressure on steam gages indicates the same for each
boiler, with no fre under etther of them. Can you ex. plain this? 2. Should the bottom of a circulating boiler
such as 18 used in connection with a cook stove or range, such as 18 used in connection with a cook stove or range,
be set higher than the highest part of the water back bexposed to hean of the rifese or or is it only neecssary to
have the pipe, that carries the hot water into boller, higher where et enters boiler than highest part of water back? A. 1. You do not send enough particulars to en
able us to answer this question. 2. The boiler should able us to answer this question. 2. The boiler should
always be kept full of water; and provided there ts suf.
ficient pressure in the tank or main to secure this it
probably makes no differenceat tions are made
J.W. asks: 1 . What are the relative strength
and freedom from vibration of two tusk trames to curr machinery (especially the burr husks of flouring mills one bullt with timbers all standing perpendicular to the base, and the other with the sides vertical? ? What is
the best work for a millwrights guide A. .1. From
ver your statement it seems to us that you desire to com
pare wo dentical arrangements. 2.. "anchinery and
Mill Work,"
 books. Byrne
H. W. asks: 1 . What is the philosophy of
soap taking grease spots out of cloth?
2. Is there any proft in manufacturing lemon extract on a small saale,
and how is it made? making an oll for light machinery? A. 1. There is an
excess of alkali in the soan. This $m$ ixes with the grease excess of and and fromsmore soap. 2. You can rcadily
on the cloth,
try ry it. For an account of the method, see page 311 , cu ent volume. 2. It would probably be cheaper and mor
L. R. asks: Can you explain the working anged with fioats, so that when they become tlled wit water to a certain hight, a valve is opened below the water line. Thus the water escapes, but the steam is
not permitted to do so a and when the water level 1 is lowered to a given point, the float is not sustained, and
G. J. asks: How can I find the radius of a wheel to make any number of turns, when worked by a
worm or a screw, the pitch being given? A. To tind the radus of the Wheel tom make any desired number of revo
utions in a given time, knc wing the number of tions and a the pitch of the the screw: Multiply the numbe
tion of revolutions of the ecrew by the pitch in inches, and
divide the product by 6 :2832 $t$ times the number of re divide the product by 6 :2832 times the number of rev-
olutions made by the wheel. Example : Suppose a sere olutions made by the whel. $\begin{aligned} & \text { Example } e \text { Suppose a serew } \\ & \text { with one inch pitch makes } 140 \text { revolutions per minute, }\end{aligned}$ What should be the radius of the wheel so that 1t sha $\times 2=11 \cdot 141$ inches, nearly
J. J. P. asks: How is Pepper's ghost pro-
duced? Can I peiform the experiment witha common


tator in front of the stage, as at S, the figure appears to
proceed from a point $G$, behind the glass. Really, the figure would appear to be back of the glass as far as the
image formed in the mirror was in front of it, and thus
T. think that, in the manufacture of shot tower. ought to assume an elongated form, and askg
what prevents, or what makes the shot so round. The spherical form is due to the addititon to the lead o causes it to assume the spherical form when through the strainer. The air chills the shot, which falls
, A. 1.
O. A. F. asks: 1. How can photographs be
taken on another pieee of paper without indury to the original photograph? 2. I have a small engine, 1 inch bore $x 11 /$ inch stroke; ; t makes 400 or 500 revolutions per minute with 60 ibs. steam when loaded. The fil
wheel is $9 /$ inches diameter. What is the actual power of it? A. 1. We have seen seeveral recipes for this pur ose, but are not sure that they are rellable. 2. The en gine, at 500 revolutions, probably developes about one question : It would bee possible to test them by such an apparatus as you descilibe, but great care would be re
quired in the experiments, and it would probably be nec essary to apply several corrections for differences column of , and variations in the bore of the tubes. hight of 2:03575 nchenes, weighs one pound, at a temperawill affect the hight of this column, since mercury ex pands about $0 \cdot 00010085$ of its volume for each degree that
W. J. S. asks: 1 . What degree of heat is
equired to hatchegss?
2. How can construct ano oven for this purpose
Record for 1893
J. E. H. asks: How is lard oil made? By subjecting lard to pressure. In answer to your other
query, enquire for employment in a machine shop, and
J. W. F.- - Four general design of guide
pulieys is correct, except that, unless the connection is very long, it will In on answer to have their shatts vertic-
ail but they must be placed at such an angle that the belt will not have a te tencey to change tts plane of ac ion and thus run 0
T. Y. S. asks: Can a fly wheel be too large
for an engine?
Lhave an eighty have been using at only twelve or fifteen horse power
 plate, loosened the foundation, and otherwise damaged
the engine. I use about 80 lbs. of steam. My idea is that the engine. I use about 88 lbs. of steam. My idea is that
the momentum of the wheel is so great that it wants to the momentum of the wheel is so great that it wants to
get ahead of its work, which the steam will not allow thereby keeping the engine moving on the foundation.
A. We have an idea that the trouble arises from improp. er setting of the engine, or from the fact that you use
such a high grade of expansion as to strain the engine such a high
seriously.
P. S. . asks: Is it dangerous to make oxygen
as (for a stereopticon light) from chlorate of and black oxide of manganese? A. If the pipes from the retort and washer are all of liberal dimensions, we think there is little danger. We call to mind a few ex-
plosions, one of a very serious nature, due to clogeng plosions, one of a very serious nature, due t.
of the pipes owing to their small dimensions.
M. D. asks: How is it possible that a grind
 oft and hard places alternately in the stone from whic
J. E. S. W. asks: 1 . How can I dissolve gum What sind of gum shall I use? 2. What will take ink
lots off paper? 3. How can I make a blackboard? What can I make a mold of, to mold a leaden piece to set ype in, with a level surface and without flaw? A. and use it in the way you suggest. 2. Dip a canel's hal t. 5 . casting. Cast your plate on asmooth piece of fron, with of putty or clay
A. A. B. asks: If a stove has no air to its
furnace except what is dellivered through an airtight sipe, the other end of which runs into water in a barrel,
vith a mander barrel tunce with a smanler barrel turnee bottom up on the water, in
the manner of a a as holder: will the tre in the stover arawa frrom the barrel and burn it, and thereby allow
the smaller burel to fail down entirely inside of the arger? A. If the air in the chimney is heated, tit will lishter than the surrounding atmosphere, hence the
stove will draw air from the barrel, or the barrel will
draw arf from the chimney until the weight in each is draw air f
the same.
C. R. asks: When and where did a race be(British) war vessels take place? A. We do not tind any ccount of this race, but suppose it took place when the Niagara and Agamemnon were engaged in laying the
Atlantic cable. Captain William L.Hudson commanded he Niagara at that time. Possibly some reader may
J. A. E. asks: Can a steam engine give
more horse power than its nominal duty? some persons claim that $a 10$ horse engine can be geared up to 20
horse power. A. The engines of reputable builders will generally do the work at which they are rated with a siven steam pressure and piston speed. Hence by in
creasing one or both of these elements of the power de. the engine could do more
Minerals, etc.-Specimens have been received from the following correspondents, and examined with the results stated
R. R. R.--Wo. 1, bary tes and fluor spar. No. 2, celestine No. 6 , serpentine.
F.H.-Your specimens are crystals of quartz. Quartz
is pure native silica, and is an important constituent of granite and other rockks, and of ordinary sand. TTe
transparent variety, iliee the two larger specimens, is
J. R. G. asks: Can you give a simple pra
ticai rule for tinding the exact onsition of the wrist the shaft of a nailm machine? P-C. F. S. asks how to make
a bue stamping ink for marking knitted goods.

## COMMUNICATIONS RECEIVED

The Editor of the Scientific Americas acknowledges, with much pleasure, the receipt of original papers and contributions apon the following subjects:
On the Science of Iron and Steel. By C. C.
On the Currency. By J. W. H.
On Reconstructing the Navy. By W. Y. Also enquiries from the following

Correspondents in different parts of the country ask:
Who makes life boats from willow and cork? Whese is the best shingle machine? Who builds lime killns? Where can I get stave machinery? Where is oil well
boring machinery sold? Whose is the best cement for making corundum wheels? Who makes a hand willow
peeler? Who makes a good velocipede, ora simullar ma chine to be worked by the hands? Who makesplatinum or ice boats? Makers of the above articles will probably promote their interests by advertising, in reply, in the Soientific American.
Correspondents who write to ask the address of certain
manufacturers, or where specifed manufacturers, or where speciffed articles are to be had,
also those having goods for sale, or who want to partners, should send witt their communication san
amount unticent o cover the cost of pubilication under amount suffcicient to cover the cost of pubilication under
the head of " Busingess and Personal", which is speciult the head of " Business and
devoted to such enquitries.

## Index of Inventions

Letters Patens of the United States were granted in the week fading November 18, $18 \% 3$, nd each bearing that date


|  | Bridge, iron, P. Johnson.................... Bronzing machine, Chaput \& Braidwood. |
| :---: | :---: |
|  |  |
|  |  |

Brush, tiy, J. A. Lyle. ......
Can, measuring, Tice
Car brake, M. Karg.
Car coupling, W. A. Cochra
Car coupling, W. A. Cochran
Car, dumping, L. C. Brady.
Car spring, E. T. Bussell...
Car, stock, O . Severanc
Car safety platform, R .
Carriage coo, J. .. Gill.
Carriage top, H. Sayler
Carriage top, H. Sayler...............
Cartridge holding vest, J. H. Black
Carving machine, , H. Cottrell................
Case, numerical fliling, G. W. Bettesworth
Chair, tilting, J. Enger
Churn, J. P. Friest................
Clasp, corset, J.P. MacLean....
Clothes wringer, T. E. McDonal
Clothes wringer, J. Seaman.....
Cock, lubricating, E. F. Brooks.
Cock, stop, Rodier \& Bates.....
Cock, stop, Rodier \& Bate
Cottin, sheet metal, Farrington, Jr., et al. Collar and cuff, E. P. Furlong.
Corn husking machine, L.
Corset clasp, J. P. Maccea
Cotton gin , N. W. Gadd
Cotton gin, R. McKenna,
Cylinder and piston valve, Picki.............
Desk, etc., writing, D. Schafer
Desk, etc., wring, D. schafer...........
Door securer and key ring, J. P. Tuck..
Dough, machine for sheeting, O. B. Full Eaves trough, P. F. Kiblinger
Embalming fuld, W. E. Chenowet
Engine, rotary, P. Worrall...
Engines, frame for horizontal, W. Wright. Engine reversing mechanism, G. W. Bisho vator, D. Judd.
Eyelet making machinery, w. R. Landfear, Fabrics, disintegrating, M. Marshall. Feather duster, C L. W. Baker Fire arm, revolving, D. Williamson Fire extinguisher, G. Booth
Fire water pipe, T. Miller... Fire place, W. Hoyland........................... Food, preserving, W. G. Barbee.. Furnace, cvaporating, M. L. Keen.
Furnace, blast for boller, R. Gigod Game table, R. R. Crawford...
Garment, under, O. P. Flynt. Gas dip pipe, sealing. E.

```
Generator, carbonic acid, F. W. Wiesebrock
```

Glove, T. G. Foster.
Grain a1stributer, rotary, A. D. Foote
Grain dryer, A. Soper.
Gums, etc., treating, D. M. Lam
Harn ss saddle, G. Stac
Harvester, binder attachment, H. Porter
Harvester, binder attachment, T. Urdah1
Harvester, cotton, W. H. Pedric
Harvester rake, E. Lippoldt....
Heating apparatus, W.C. Baker
Hinge for vault doors, H. Gross.
Horses, heel boot for, W. Mathis
Hub boring machine, F. Jonas .......
Hydrocarbo s, burning, C. H. Cushi
Hydrocarbo s, burnin
Ice house, A. Wilbur

Inking apparatus, He
Insulating compound, Reed \& Phillips rroning machine, G. W.Cotting Kneading board, H.
Knobs, attaching, S. A. Brackett Liquids, drawing effervescent, T. Warker
Lithographic printing form, I. Reynolds Lock, permutation, H. Gross... Loom, narrow ware, R. B. Fowler Loom shuttie, N. D. Chapman.. Looms, take-up mechanism for, C. Gahre Match safe, J. \& A. Helm

## A. Fento

 Meter, fluid, H. A. Desper.................. Mill, guide for rolling, C. H. Perkins.Mill, guide for rolling,. H. Perkins.
Mill, paint, R. Byrne..
Mill, roling, C. H. Perkin
Miner's pick, R. K. Walto
Mower, lawn, W. Allen....
Mug, shaving, Furr \& Knau
Mustache shield. J. J. Greenoug
Mustache mosuito, T. M. Prentiss..........
Oils, etc., purifying, D. M. Lamb
Ore stamp
Ores, separating metals from, S. W. Kir
Organ action, reed, W. N. Mannin
Overshoe, G. Watkinson....
Overshoe, G. Watkinson..............
Pantaloons stretcher, J. D. Ryan.
Pantaloons stretcher, J. D. Ryan..................
Pantaloons, steaming and drying, E. B. Viets. Paper to fix marks, treating, H. M. Johnston..
Paper holder, shelf, G. F. Hawkins............. Pavement, W. H. De Valin..... Pavements, treating brick for, W. H. De Valin.
Photograph negatives, retouching, D. H. Wright. Picture frame, J.A. Burch.
Picture frame and exhibiter, B. Anyan
Pipe joint, J. Demares
Planter, corn, L. Sipe
Planter, corn, A. Springsteen
Planter, cotton, C. H. Nixon
Planter, cotton, C. H. Nixon
Planter, cotton seed, D. P. F
Planter, hand corn, E. Rogers
Plow. E. Bourne
Plow, J. S. Hell
Plow, J.Oliver.
Plow, Shipp, Peterson, \& McLurd.
Plow, draft attachment for, N. Westoott.
Plug and faucet oonnection, tap, J. F. Ka
Pocket attachment, safety, R.L. Russell..
Polishing tool, H. Cottrell.
Postal card, H. M. Johnston.....
Press, cotton, T. D. Leoneard:


2,844-W. A. Telling and Samuel Johnson, Wood Green, Midalesex county. Eng. Improvement on gas meters,
called 4 The Imperial Dry Gas Meter," Nov, 13,1372



, $846 .-\mathrm{J}$. K. Ho He, Almonte, Lanark county P. Q. Im
provements on patterns for pipe 1 .
swift to form miter joints of elbow pipes at variou angles, called " $J$.H.Holmes'Patterns for Pipe Elbows."
Nov. 13,1873 .

 | on cult |
| :---: |
| in73. |
| 2.84. |

2.848, -D. C. Baker, Fulton, N. Y., U. S. . Bolt holders
for railroad rails called " for railroad rails, called "Baker's Railroad Bolt Hola
er.", Nov. $13,183 \mathrm{l}$
2,849.-S. Rue, Philadelphia, U. S. S. Improvements on in
jectors for steam generators, called "Rue's
Little Giant Injector." Nov. 13, 1873.

 in mixing machines, called " stock well's Improved Mi
ing Ing Machine." Nov. 13, 1873,
$2,852 . \mathrm{SS}$. B. Munson, Jr., Chice on freproof shutters, called "Munson's Fire , s5s.-G. W. Cottingham, St. Mary's, Texas, U. S. Ma

on plano stools, called ora, ontario. Improvementa Plano Stool Back." Nov. 13,1873 .

Pump." Nov. 13, 1873.
2,856.-N. C. Locke, Saiem, Mass., U. s. Improvement
on pressure regulators for steam or water, calle
"Lockes Pressure Regulator for Steam or Water. Nov. $13,1873$.
2,S57. -M. Merrick, Oswego, U. S., assignee of H. THiden,
Philidelphia, U. S. Improvements on gas machine
 Patent No. \&41, for improvements in brewing. Nov
 Borden, South East, Putnam county, N. Y., U. S. Im
provements on the manufacture or product of con densed of m,
duct of Condensed Milk." Nov. 14, 1873.
 Borden, South East, Putnam county, N. Y.. U.
Process of preserving and condensing milk, calle
(rod
"Borden Milk." Nov. 14, 1873 .
2,861.-W. G. Dunn. Hamilton, ontario. Movable self
feed attachment for coal cooking stoves, called feed attachment for coal cooking stoves, called
"Dunn's Removable Selffeeding Attachment for "Dunn's Removable Self.feeding
Cooking Stoves." Nov. 11,1873 .
2,662.-T. O. Kemp, Clinton, Lincoln country, Ontario
A boiler attachment for removing scum and other m Aboiner attachment for removing scum and other im.
purities rom moiliers of steam engines, and also for
Dreventing called "Kemp's Patent Boiler Attachment." Nov. 15 ,
1873.
$\underset{\text { 2,863.-E. C. Filint, Belleville, ontario, assignee of E. P. }}{\text { 2. }}$ Needham, New York city, U. S. Key for musical In-
strument, called " Needham's Improved Key for Musical Instruments." Nov. 15, 1873.
2.864. J. R. Finley, Delphi, Ind., U. on nat
1873.
2865.
$2,865-\mathrm{C}$. Kendall, Beloit, Wis, U. S. Machine for reno.
vating Feather Renovator." Nov. 15, 1873.
reed or mans. called " Puryett,s Im. s. Improvement in
 2,867.-J. C. Ford and A. D. Cable, Montreal. Improve,
ment on attachment tor seceuring horses, called "Ford's
 and H. Lateur, Yamaska, P. Q. Composition of mat
ter for the manufacture of artificial stone and for oth er purposes, called Cement." Nov. 18, 1878 ,
Montreal. Composition of marto, and J. B. Steele called "Henry' Fire Kinder." Mov. 21, 1873 .
2,880.-J. West, Maldstone, Kent county, Eng. Method of manufacturing gas and theapparatus to be employed

 salite Wasming Machine. Nov. 21, 187 ,
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 U. S. Improved door be
Door Bell."
Nov, 21, 1873

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$2875 .-\mathrm{H}$. Brewer
Esst
2,875.-H. Brewer, EEast Parsonfield, York county, U. S.
Improvement on wagon brakes, called "Tne Brewer Improvement on wagon brake
Wagon Brake." Nov. 121,1873 .
 cases for cabinet organs, called "Soren
Case and Slliding Fall." Nov. 21, 1873.
2,877.-W. R. Peck, Chatham, Kent county, Ontarlo. Machine or moinang the frame work of vessels, ships and
other material called "Peck's Adjustable Frame

2,878. - C. B. Hunt, Springrille, Susquehana county, Pa.,
U. s. Improvenent in drills, called "Hunt's Ham.

2,879.- H. Gregory, Rockland, Maine, U.S. I. Improvement
on elastic rriction bands for booms of vessels, called
"CGeg
"Gregory's Elastic Friction Band for Booms of Ves-
2,880.-H. Hinds, ottawa, Ontario, assignee of H. Johnson of same place. Improvement on drum heaters for
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283.-C. Carpenter. Hamllton, Went worth county, Onta-
rio. Attachments or door knons and spindles. rio. Attachments for door knobs and spindes, called
"Carpenter's Door Knob and Spindie Attachments."
 breech loading fire arms, called "Duval Thayer Breech
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