a WeEkly Journal of practical information, art, science, mechanics, CHEMISTRY, and Manufactures.

## IMPROVED GRINDER FOR CASTINGS.

$\rightarrow$ The invention herewith illustrated consists in a large cylindrical vessel rotated by improved mechanism, and adap ted to hold quite large castinge, stove plates, sinks, and hollow ware, for example, in order to give the same the requisite cleaning and polishing. The colinder is made with two heavy wooden or metallic heads, and with alagging'of heary heavy wooden or metalicic plank or metal forming its
sides, in the shape of a sides, in the shape of a
number of plane sections. Two or more of these sec. tions are removable in order to admit of the introduction, into theinterior of the receptacle, of castings regardless of size or form. In our engraving one of the sections is shown de the sections lach shown de tached and placed upon the floor. Through the opening thus left will be seen a flange, $A$, which runs around the circumferences of both cylinder heains. The sections to be removed are provided with suitable handles; and in order to detach them from the grinder, the bolts, $B$, are slacked up by unscrewing the nuts, C. The ends of the planes are then readily slipped from under the flanges, $A$, which, it will thus be seen, braces the sections against the outward pressure of the heavy contents of the machine. Whon the latter is filled, the covers are replaced, the nuts, C, tight ened, and the various pur tions are at once firmly bound together. The sec cions are provided with suitably beveled edges in order to secure close joints, and those not intended to be removable are perma
nently secured in place.
The reader has doubtless already remarked that the me chanism for rotating the cylinders differs from that employed in the ordinary rumble. In the present case, the edges of the heads rest and revolve upon four flanged rollers, $D$. Upon the shafts of the latter, which have their bearings in heavy framework, are two gear wheels, E, which mesh with the pinion, $F$, which is on the sameshaft as the driving pulley. It is obvious that the motion of the latter is imparted to the rollers and by these to the cylinder, the weight in the latter, of course, contributing to increase the traction between the surfaces.
The manufacturers inform us that they have had in use one of these machines, 5 feet in diameter by 5 feet in length, and find that it requires but few repairs, while doing its work with much efficiency. The apparatus has been in operation in their foundery since 1869 , and three more have recently been added. From 500 to 1,000 pounds of bugs (small scraps of iron from the bottom of the cupola) are put in with the castings, the quantity varying with the size of the machines. The manufac he size of the machines the turers also state, in order to show the small amount of power required to drive
the apparatus, that they run three grinders, two full of castings and bugs (in di mensiuns about $2 \neq$ by 3 feet) and the other with facing, a 14 inch emery wheel, and a drill, with 100 feet of 2 inch shafting with a $1 \frac{1}{2}$ inch double belt traveling 600 feet per minute. This device is covered by
quo patents granted to George Miller, of Providence, R. I., and a third patent to the same inventor relates to the application of the plan to water wheels. The cylinder in this instance is the wheel, overshot or otherwise from which power is transmitted to the friction rollers, and thence to the pulleys, in reverse direction, in short, to the hammer above described. The wheel thus arranged, it is claimed, admits of cheaper construction than when the cen-
take the strainer out to be cleaned. If the joint be not perfectly tight, the water gradually escapes down through tho bolt holes and causes an annoying leak.
To obviate this trouble, the invention represented in the annexed engraving is proposed. $\mathbf{A}$ is the strainer (Fig. 1), secured to the funnel in an annular space, as shown. The outlet or nosela, B, to the fmnalia caat to the aink's bettom and on the thick portion of the latter are formed lugs, C. D is a gland, also pro vided with lugs, which en able it to be secured to lugs, C, outside the funnel, by a nut and bolt, as shown in Fig. 2. The space between the gland, $D$, and the noz zle, B, receives the soft metal waste pipe, $E$, the end of which is turned over as a flange into the enlarged upper portion, F. It will be observed that, instead of al lowing the screws, $G$, which hold the strainer, A, to the funnel bottom, to pass clear through the latter, they merely enter into the thick portion, so that of course no water can escape by the means before referred to. These screws referred to. These scrows are made of coming rusted in their seats, and consequently are easily removable. A rib or truss, $H_{\text {, is constructed across the }}$ center of the under side of the strainer, to back up the thin metal of the latter againat injuries and to stif fen the casting in the sif ration of molding.
As a point of advantage claimed, it may be noted that the fastening of pipe to the nozzle is entirely in dependent of the attach ments of the strainer. The latter, while being so bolted as to be quickly taken out

## ILLER'S IMPROVED GRINDER FOR CASTINGS



## MILLER'S IMPROVED SINK.

 throw filth, crdown the sink. essening friction. Further particulars regarding the grinder when necessary, is, from the fact of its being thus secured, may be obtained by addressing the Miller Iron Company, Pro vidence, R. I. not liable to be lifted from its place by servants, in order to throw filth, crumbs, or matters likely to clog the pipes,

Patented December 2, 1873, by Henry Miller. The manu-
A prominent objection to many forms of sink in common facturers, who may be addressed for further information relative to sale of rights, etc., are the Miller Iron Company, Providence, R. I.

Novel Way of Exporting Bone Dust. The immense trade in Australian canned meats, now carried on, has had the effect of causing a great accumulation of bones in Melbourne, Australia, where the putting up is done. The sale of the bones is now growing into a remunerative branch of export trade as bone dust manure ; and an Austra lian paper, speaking of the subject, gives an account of the manner of its exportation. It says that a recent vessel, bound for London, has on board a shipment of one hundred tuns of bone dust, prepared for expor tation in an altogether novel manner, and one which promises to come into extenaive use. To facilitate this trade, an apparatus has been contrived for compressing bone dust into half its original compass, reducing it at the same time into a form very conve nient for shipment. By means of strong pressure the crushed bones are molded into cakes of six inches square and three inches thick, something like flooring tiles, each cake weighing a little over four pounds. These bone dust tiles are just adhesive enough to admit their being handled freely employment is that the strainer inside and the flange of -thrown about like bricks, if necessary-and are yet firm the waste pipe outside are secured to the sink by screws which, passing directly through all portions, are set up by nuts. The disadvantage is, that two extra holes are thus made in the bottom of the sink, which require constant packing to render them watertight, which packing must be removed and re-adjusted whenever it becomes necessary to
-thrown about like bricks, if necessary-and are yet firm ; and when required for use, they can readily be crushed. or
melted by the application of a little hot water. A tun weight melted by the application of a little hot water. A tun weight
of the manure measures 26 cubic feet, and contains 252 of the cakes. The manufacture of bone dust for fertilizing is a large and rapidly increasing industry in this country, and this Australian method might be profitably adopted here.

## Yrientific Ammericam.

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## PROPOSED LAW FOR CASTING8.

Mr. Sumner has introduced the following bill (No. 119) into the Senate:
Be it enacted, etc. That no person shall counterfeit or make a facsimile of any metal casting, by using such casting as a pattern in molding, unless by the written consent of the casting was made; and any person who shall counterfeit or make a facsimile of any metal casting, either in whole or in part, by the means aforesaid, without the consent of the owner, shall be liable to such producer or owner of the original pattern in the amount of the ordinary wholesale profits upon the articles so produced, recoverable, with costs, by
bill in equity, in any circuit court of the United States, and the court may restrain by injunction, and may order that all counterfeit metal patterns, and the metal products therefrom, shall be delivered to the complainant or be destroyed by the marshal, and may pass such further orders and decrees as may be meet in the premises.

This has been read twice, ordered to be printed, and referred to the committee on patents. We hope it will rest there. The patent laws already provide in the most comprehensive manner for the protection of original work ; and if Congress goes further still and attempts to establish an espionage over the details of every man's shop, the result can only be injurious to manufacturers of all kinds of castings. No doubt injustice is now done enterprizing men by imitators who make use of designs which have cost a great deal of money to get up. But if there is no invention in these designs, we do not see how the Government can interfere to prevent it; and we decidedly think that it ought not to interfere. The effect of espionage, such as this bill would call forth, is to be seen in the scandals which the operations of revenue informers have lately produced in some of the best known business houses in this country. There is a loud outcry against the contin uation of laws which permit cases of such undoubted in justice to be increased in number, and we doubt if this bill would receive the support of the manufacturing community. We have pointed to the notorious 'revenue cases' as an example of what would be the probable result of passing this law, and we will add that the firms which have suffered most seriously by the operations of informers are not those small and weak concerns which might be supposed to be the surest victims of the law, but they are among the most prominent and powerful houses in the country. The bill under consideration is probably the work of some ' leading' manufacturers, who think to protect themselves against piracy. Unless this law forms an exception to others of its kind, it is precisely the leading ing men among manufacturers who would probably feel its risors."-Engineering and Mining Journal.
The foregoing remarks seem to us well founded, and to the protest of our cotemporary we can add our own against such unnecessary tinkering with the protective power of the Government. The above measure virtually prevents a farmer from re-casting his plow point; it prevents the printer from duplicating his type pages by electrotyping or stereotyping. We might continue and cite other instances where the sole ef fect of the law will be simply oppression and a retardation of industry, in lieu of a furtherance of its best interests. The act is a legitimate outgrowth of the misconception regarding the nature of our patent laws, which is now so prevalent, and which seems even to have extended to the eminent senator from Massachusetts. As we have repeatedly urged, our patent system is not devised for the purpose of compelling the community to pour their cash into the pock. ets of one class of individuals or manufacturers. Nothing is further from the spirit of our patent laws. To encourage industry and to promote the progress of the useful arts,
to open new fields of employment in which all the people may freely enter, and thus to lead to greater matarial prosperity for the whole nation, is the sole aim of the existing statutes, and the substantiality of this foundatio
by the results of their operation during the past.
A man's best efforts are owing to his country, in entire abnegation of self and without fee or reward; so indeed are his goods and even his life. But while the people may, in times of need, take the latter and benefit by them, they have no means, however pressing the necessity, of forcing a person to invent; while, on the other hand, there are not many individuals who will give their time, labor, and ideas voluntarily, to the country, out of deference either to principle or patriotism, considered apart from other motives. Hence a stronger incentive is necessary; and this, out of expediency pure and simple, the law supplies in granting a limited monopoly. It cannot force people to invent, but it can bribe them; it can induce the individual to benefit the entire nation, by giving him a little extra emolument for himself; in brief, it uses the offer of a protected right, for a certain period, merely as a bait to produce inventions which are to be the free property of the public. The amounts realizedaby individuals for new ideas, though in some cases large, are insignificantly small in comparison with the value of the benefits conferred upon mankind by the origination.
Just so long as the notion is held that certain special manufacturers are the object of the solicitude of our system, and not the people, so long will such enactments as that of Mr. Sumner periodically make their appearance. If a manufacturer makes a casting of some new device, or casts son. ething that has never been cast before, or even casts in an original and peculiar manner, he can submit his ideas to the proper authorities, have them passed upon, and, if they are suitable, obtain a patent which protects him in their enjoyment. Here there is evidently, for the reasons above given, an advantage gained for the community. But under Mr. Sumner's law, any man is to be secured in perpet uity in the right of any mere casting, not because it is specially beneficial or useful to the people, but simply because he wants the Government to help fill his pockers by bolstering him up in a monopoly against everybody else. The
is neither justice, expediency, nor reason in the measure.

## THE AUTOPSY ON THE SIAMESE TWINS.

The report of the autopsy on the bodies of the Siamese twins has been made public through the New York Times and so far as the dissection has progressed, it reveals som remarkable and unlooked for conditions in the physical contitution of the strange phenomenon.
The feature of greatest interest is connected with the igament, which is about four inches long and eight inches in circumference, and a section of which is shown in the an nexed diagram. There is a union at the two ensiform car tilages, which are joined at a point very near the median line of the band (dotted lines, A). Eng's process was much the more robust of the two, though neither cartilage was ossified. Besides this were three very curious pouches, the lower one of which, B, is only separated from the skin by a very delicate layer of tissue, and passes from the abdomen of
Chang, and is lost in the duplicature of the suspensory liga Chang, and is lost in the duplicature of the suspensory liga

ment of the liver of Eng. Above this is a second and simi lar pouch, C, belonging to Eng, and between this and the under surface of the ensiform conjunction, $A$, is the thire and largest pouch, D , also prolonged from Chang's abdo men until it fairly reaches the peritoneal cavity of Eng, but is not continuous with it. Thus Chang had two pouche and Eng one. At $E$ was found a connecting band between
the livers, through which the plaster injection, used to fill the vessels, passed freely from the portal vein of Chang into the body of Eng. It is believed that the large upper pouch, D, belonging to Chang was once filled with true liver tissue, which at maturity became amaller, and ultimately left an ompty space. At E is shown the connection between the livers, F F,
each body.
Chang's side of the band-on the right of our engraving -is the weakest, doubtless owing to the fact of his having been almost a constant invalid. Eng's portion is, however well nourished and healthy. The peritoneum, it is found, is unquestionably prolonged into the ligament. Without entering further into the technical details of the dissection, the general result seems to point to the fact that a division of the twins would have been a very dangerous, if not fatal operation, The two portal circulations were connected, and the peritoneal processes extended across the ligament hus presenting great difficulties to the use of the knife. Chang, it is believed, died of an attack of cerebral paraly

Jet been determined; and a further report, regarding these organs as well as the lungs, will probably complete the in vestigation.

## THE INDUSTRIAL USES OF BISULPHIDE OF CARBON.

Up to the year 1850, the sole industrial application of bi ulphide of carion was in the vulcanization and dissolution of caoutchouc; but since later invention has found means of producing the material at low price, it has been applied to a multiplicity of uses in a large number of the arts. The extraction of oils from grains, the wholesale removal of fatty matter trom wool, the treatment of spices to obtain the same in solulle form, the fabrication of prussiate of potash by the Géles process, and of sulphocyanide of ammonium for the preparation of the toys called Pharaoh's serpents, the purification of crude paraffin, the manufacture of liquid fire for incendiary projectiles, and as a means of destruction of vermin, are a tew of the principal employments of bisulphide of carbon, many of which have already been fully explained in these columns.
As respects magnitude, however, and future influence upon manufactures, its adaptation to the utilization of waste residues is of major importance, and is fast forming the ground work of a new and distinct industry. The credit of first extracting the fatty matters from these refuse products, is due to M. Deiss, of Belgium, and by the aid of the bisulphide, the former are obtained in quantities sufficient to serve for lubrication of machinery or the fabrication of soaps and candles.
In order to show the rapidly increasing value of this uso ul substance, we have gathered from foreign contempora ries quite a number of its most recent as well as most im portant applications, and are thus enabled to present a fair view of the various refuse matters, in connection with which it is now employed. In the manufacture of fatty acids, brown compact deposits are precipitated. These,mixed with sawdust in order to facilitate the action of the bisulphide, and treated with the latter yield, up to twenty per cent of acids, which otherwise would go to waste. The pasty mass of metal filings, dirt, grease, etc., taken from car and wagon axles, is first treated with hot sulphuric acid, then with bi sulphide, and, lastly, washed and dried. This isolates the grease in a saponified state. Cotton waste, employed in or about machinery, is freed from its grease by bisulphide and is again available for use. Residues of the manufacture of beeswax, which formerly found no sale except as manure, selling at about two dollars a hundredweight in France, are now subjected to the action of bisulphide and an excellent yellow wax is extracted; the final residue is still useful as a fertilizer.
Sawdust which has served to filter oils purified by sul phuric acid yields after pressure 15 per cent of oil; again, 50 per cent of oil is obtained from the muddy deposits due to he mingling of oils with sulphuric acid. These are washed n boiling water, dried, mixed with sawdust, and lastly treated with disulphide. Balls of oleaginous grain, when they cannot be used as food for cattle, yield fatty matters; and their residue is an excellent fertilizer, as it contains large proportions of nitrogenized substances and phosphates. Bisulphide is also used to extract the grease from olives after they have been pressed, and from residues of tallow nd suet after melting and pressure, also from the residues of the manufacture of cocoa. Bone fragmente, when treated with bisulphide at $104^{\circ}$ Fah., yield 12 per cent of grease, they are subsequently unfit for the manufacture of gelatin but answer excellently for the fabrication of bone black. The cleanings of wool cards, when acted upon by bisulphide,give about 30 per cent of fatty substances, utilizable for the manu facture of soaps.
It is evident from the great number of waste products, and the abundance of some of them, that a very considerable amount of greasy and oleaginous matter can be returned to the various industries through the new processes involving he use of bisulphide. The material has also been success fully employed in the scouring of wool and in the extraction of bitumen from schists and bituminiferous sandstones. In the latter case, the quantity of bitumen obtained is from 4 to 5 per cent superior to that furnished by distillation, which only gives in all from 7 to 8 per cent. MM. VanHaecht, Emile, \& Co., of Belgium, exhibited in the Vienna Exposiion a number of improved machines for carrying on these processes, and in which all species of fatty residues could be treated. The price of manufacture does not exceed, for cerain purposes $\$ 2.40$ per ton; about half a tun per hour can e treated. The loss of bisulphide is reduced to barely $\frac{1}{2}$ per cent.

## TELEGRAPHIC PROGRESS IN 1873

A submarine cable has been extended along the eastern coast of South America, uniting Para, Pernambuco, Bahia and Rio. The inauguration of this line was celebrated in the presence of the Emperor of Brazil, on the 23d of last December. In a short time, the wire will be prolonged to Montevideo, and then both American continents, from Canada o the south of Brazi., will be in telegraphic connection with Europe. A fourth cable was successfully laid between Eng. and and the United States during the month of July. In Africa, owing to the Ashantee war undertaken by Great Britain, the telegraph has been introduced to a limited ex tent. In Australia, considerable progress has been made in orecting lines between Queensland and the western portion of the continent. It is proposed to connect New Zealand and Australia with a donble cable, also extending from Queensland to India.
The use of the duplex system has become wide both in England and in our own country. We note a curious inven-
ion oy Mr. Viquier, of Shanghai, China, by which dispatches are sent not only in the Chinese language but printed in its intricate characters. The automatic plan in the United States is proving quite successful, and in public tests has accomplished some remarkable feats in rapid telegraphing. With regard to batteries, in spite of the improvements in those of Grove, Bunsen, Leclanché, May, Davy, and others, it seems that we as yet have none that is absolutely constant though it may be that future modifications of the secondary batteries,of Planté will lead to such a result.
Sir Richard Glass, Sir Francis Ronalds, and Auguste De la Rive, all prominent in the history of telegraphy, have died during the past year.

## bobert l. thurbton.

We notice with sincere regret the death of Mr. Robert L Thurston, one of the oldest manufacturers of Providence, R. I., and father of Professor R. H. Thurston, of the Stevens Institute. Mr. Thurston began as a machinist,at a very early age, and had but attained his majority when he became in terested with John Babcock, Sr., in the building of an ex perimental engine and a tubular boiler, which were placed in a small ferry boat used near Fall River. The performance of this craft induced her builders to conetruct two more vessels, the Babcock and the Rushlight, which, plying berween Providence and New York, created a sensation equalled only by that occasioned by Fulton's Clermont. In 1830 Mr . Thurston embarked in business in Providence, R. I., and, after several changes of firm, ultimately formed the well known concern of Thurston, Greene, \& Co., the first manufacturers who ever built a standard form of ex pansive steam engine. Mr. Thurston was not fortunate in monetary matters, and at the begining of the war incurred heavy losses, which, coupled with his advancing age, led to his retir
of 1863 .
The subject of this brief sketch ${ }^{\text {? }}$ will be widely lamented, not only by the large number of work people with whom, during his long and useful life, he has been brought in contact, and who have experienced his uniform kindness and benevolence, but by all generally, as one of those repre sentative men whose name will always be linked with the material growth and prosperity of the country.

## stearin candles.

The hard white stearin candle of today is quite a different article from the tallow dip that our grandmothers used to make, and which was then a vast improvement over the pine knot of the preceding generation. Tallow dips were made directly from the tallow, which was obtained by melting beef suet and straining it to remove animal fiber and impurities. Stearin candles are also made from tallow; but in thio case it is first separated into its constituents, some of which are solids and others liquids, and only those melting at a temperature above the ordinary summer heat are employed.
Tallow is a mixture of stearin, palmatin, and olein, compounds of glycerin with stearic, palmitic and oleic acids respectively. Oleic acid and glycerin are both liquids at ordinary temperatures, and hence it is desirable to remove them from the tallow before employing it in the manufacthem from the tallow before employing it in the manufac-
ture of candles. To accomplish this, several methods are in ture of candles. To accomplish this, several methods are in
use. The simplest and one of the best is that invented by Wright and Fouché, and consists in decomposing the fat with superheated steam.
The apparatus employed is called a digester, and consists of two copper boilers, placed one above the other and connected by two pipes, one of which reaches nearly to the bottom of the lower vessel and ends at the bottom of the upper one. The other is fised to the cover of the lower one and enters the upper one near the top. The melted fat mixed with an equal quantity of water is run into the digester, which is not completely filled and is heated for 15 hours under a pressure of eleven atmospheres. By the end of that time the glycerin becomes separated from the fatty acids, and is dissolved in the water. The contents of the digester are then blown into large vats where they are allowed to settle, and the fatty acids, being specifically lighter, rise to the top, the glycerin water settling to the bottom. As soon as this has taken place, the glycerin water is drawn off into a tank below and heated by a steam coil to evaporate the water, the evap. oration being kept up until the glycerin acquires a specific gravity of $25^{\circ}$. At the proper moment, when all the glycerin water has been drawn off,the mixed fatty acids are run into large lead-lined vats. Here they are mixed with a amall quan. tity of oil of vitriol to purify them, and heated by a steam
coil. Then the liquid flows into a much larger vat beneath, coil. Thon the liquid flows into a much larger vat beneath,
from which it is run into pans, about 10 inches wide by 18 long from which it is run into pans,about 10 inches wide by 18 long
and resembling huge cakes of chocolate. These pans are and resembling huge cakes of chocolate. These pans are
arranged on racks and the acids allowed to crystalize. The fat now solidities, but it still has distributed through it the oleic acid. To remove this, the cakes are wrapped in strong cloth, usually hair cloth, and submitted to the action of a powerful hydraulic prese, whereby a large proportion of the oil is squeezed out.
When no more oil can be pressed out, the pressed cakes are taken directly from this press and, without being unwrapped, are placed in a horizontal press between plates of iron and heated by steam pipes, where still more of the oleic acid is removed. The pressed cakes, although nearly pure, are again melted, treated with dilute sulphuric acid, and aub jected a second time to hot pressure. This furnishes a very solid, perfectly white substance, consisting principaly o
stearic acid, improperly called stearin, with some palmitic stearic acid, improperly called stearin, with some palmitic
acid. From this, the candles are molded in the usual man-

The oil which is pressed out consists of oleic acid holding n solution more or less of the solid acids, which it is desirable to save. For this reason, it is taken back to the tanks where the acids are melted, and mixed with them to be worked over again. It is finally sold for washing wool, oftening leather, or making soap.
Another method of separating stearic acid from the glyerin and oleic acid, formerly much used, consists in saponification by means of lime. When lime is added to melted tallow and heated, the fatty acids combine with it to form an insoluble lime soap. the glycerin remaining in solution. The lime soap thus formed is decomposed with sulphuric acid, sulphate of lime being precipitated, and the melted fatty acids rise to the surface. The later are transferred to lead-lined tanks, treated with oil of vitriol, drawn off, cooled, and pressed cold and hot, as in the other processes. If superheated steam is employed, a much smaller quantity of lime is required. At a pressure of ten atmospheres, with 2 or 3 per cent of lime, saponification and decomposition are complete in seven hours. This process, invented by De Milly, is a combination of both the above, and effects a
saving in time over the first, and a saving in lime and acid saving in time o
A fourth method, quite different from any of the above was introduced by Dubrunfaut in 1841. Unlike the other processes, it can be employed to decompose very impure ats from slaughter houses, bone and marrow fats, vitriol is added to the molten fat, a moderate heat applied and the mass stirred for 15 or 20 hours. The neutral fat is thus converted into a mixture of sulpho-fatty acids and sulpho glyceric acid. These are decomposed by running them into large wooden tanks lined with lead and one third filled with water, and heating to $212^{\circ}$ Fah. After the fatty acids separate, they are purified with water; the water evap orated, and the acids carefully distilled by means of super heated steam, at a temperature of $500^{\circ}$ Fah. to $650^{\circ}$ Fah According to De Milly's new process, the tallow is heated to $248^{\circ}$ along with 6 per cent of oil of vitriol, and the action limited to 2 or 3 hours. It is thereby possible to obtain 80 per cent of the solid fatty acids in a condition at once fit for
making candles without redistilation, only 20 per cent having to be distilled.

## scientific and practical information.

## black phosphorus.

M. Ritter considers that the color of the variety of phos phorus known as black is due solely to the presence of met als or foreign metalloids. Arsenic in commercial phosphor us causes the appearance of the phenomenon, on account of separation of
oll spots on finished goode
It is an exceedingly aggravating occurrence to find a piece of cloth, perfect in every other respect, ruined by oil spote. They are most frequently due to sheer carelessness and neg. ect of cleanliness in oiling the machinery. Workmen should beinstructed to watch for them, and, as soon as on is discovered, to hunt up the cause and remedy it forthwith Cloth thus injured should not be left in folds, or, if such disposition is absolutely necessary, pieces of thick paper should be placed between to prevent multiplication of the defect by the oil spots coming in contact with the clean portions.
The American Textile Manufacturer says that the simplest and surest process for extracting oil spots is to saturate the spot with benzine, then place two pieces of very soft blotting paper under and two upon it, and press well; in some cases a hot iron is necessary; in others a high pressure, say 100 lbs. per inch, without heat is sufficient. By this means the fat is dissolved and entirely absorbed by the paper. To rub the oil spot with a sponge saturated with turpentine or ben zine only spreads the grease.
a hoge aerolite.
A correspondent of the Chicago Times says that an enorm ous aerolite recently fell in the vicinity of Farmersville, Livingston county, Mo. The shock of its impact with the ground is stated to have been like an earthquake, and th molten mass is described as fully twenty feet high above the soil, and some twenty. five feet in diameter. It present the usual appearance of such bodies, being a black, shining ass of meteoric iron. Its size is unprecedented.
rumpord's determination of the mechanical equitalent of heat.
Professor R. H. Thurston recently submitted a note to the American Society of Civil Engineers, in which he presente a résumé of the history of thermodynamics as given by Pro fessor Tait in his work on the subject. In this, Professor Tait places the services of Count Rumford as second in importance to those of Davy, as well as in the actual influence upon the growth of the science, and does not apparently consider them comparable to those of Joule.
Professor Thurston considers that, as it is well known among engineers that the ordinary unit of measurement of horse power is much too high for application in estimates of animal power, it would be more correct to consider the horse power of Rumford as 25,000 instead of 30,000 foot pounds per minute. In such case the mechanical equivalent, as deduced by the latter, would be $782 \cdot 8$, differing by only 1.5 per cent fiom the value now accepted, as determined by Joule half a century later, which is nearer the probably correct value than the result of any other investigation, and even far more accurate than many results obtained by Joule himself. Professor Thurston thinks that we may claim
for Benjamin Thompson, of Concord, N. H. commonly
known as Count Rumford: 1. That he was the first to prove the immateriality of heat and to indicate that it is a form of energy, publishing his conclusions a year before Davy. 2. That he first, and nearly a half century before Joule, determined, with almost perfect accuracy, the mechanical equivalent of heat ; and 3 , that he is entinled to the sole credit of the experimental discovery of the true nature of heat.
hydrate of chloral as a preserving agent.
M. Personne reports that, beside the strong alkalies, all the weak ones, magnesia, the alkaline salts, including borax and phosphate of soda, all the animal alkaline liquids, such as blood and white of egg, transform chloral into chloroform when the mixture is heated to $104^{\circ}$ Fah. Fresh blood to which chloral has been added, and which is retained at normal temperature, coagulates completely, keeping its red color, and remains without alteration. A piece of muscle plunged in a chloral solution of 10 per cent, became alightly pale in tinge and deposited a sediment; but after a few hours immersion, it dried rapidly and became sufficiently friable to be pulverized.
It is believed that chloral solution of the above strength may be used for preserving the most alterable animal matters. The author states that he has thus kept a cerebellum for more than a month in perfect condition. He recommends he addition of glycerin to the solution, to prevent the articles preserved from becoming rigid and dry.
the chil international exposition.
The Republic of Chili has, through its representative, formally notified our government that an international exposition will be held at Santiago, to open in September 16, 1875. Some valuable general concessions are to be made to exhibtors at the exposition. There will be a reduction of fifty per cent in the price of freight from Valparaiso to Santiago and on lines belonging to the government. Articles, excepting uch as relate to dress fabrics, furniture, house decoration, jewelry, glass, earthenware, and similar products of manufacture, together with those of mining industry, will be adwitted free of duty. Those excepted will not be charged in case they are reshipped. Forty dollars will be allowed for the payment of the passage of any special workman or mechanic in charge of, conducting, or directing exhibited machines or industries, such workmen to be duly accredited with passports certified by the Chilian Consul at the port of their embarkation. A reduction is also to be made on the freight of goods on the way to the exhibition from the differen lines of steamers running to Valparaiso, the amount of which will be made known shortly.

## a bomer explogion.

A correspondent, G. F. A., writes from Peoria, Ill., en. closing a newspaper slip which describes a disastrous boiler explosion at that place, on January 31. The boiler was new, having just been completed, and was undergoing a test by team pressure. It had no safety valve, nor any means of elieving the pressure other than by a rupture. A steam gage was attached; and when this indicated a pressure of 139 pounds per square inch, the boiler exploded, killing one of the bystanders and severely scalding another, the person who was killed being completely dismembered. The boiler was broken into fragments, which were thrown to great disances. It appears that the correctness of the gage was doubtful, so that it was impossible to tell what was the ac-
tual pressure when the boiler exploded. Judging from the above facts, this was a case of reckless engineering, calling or the sternest censure.
We are greatly obliged to our correspondent for sending us an account of the expl ssion, as we believe that giving publicity to proceedings of this kind is one of the surest means of inaugurating more careful management. Will not our readers in all sections send us information on mat ters of this kind, enclosing extracts from the local papers? In this way they will render us valuable assistance in our en deavors to bring about a more enlightened system among
those who are entrusted with the care of steam machinery.

## TO NEW SUBSCRIBERS.

All subscriptions to the Scientific American will be commenced with the year, unless persons, at the time of remitting, request to the contrary. Nearly all subscribers preserve their numbers for binding ; and in most cases where subscriptions are received during the first quarter of the year, if the back numbers are not sent, they are subsequently ordered. To save both the subscribers and ourselves trouble, the back numbers from January 1 will be forwarded, unless we are advised to the contrary. This course will be pur sued till April 1, after which date the paper will be sent from the time of receipt of remittance; but subscription. may commence at any time, at the request of the subscriber, The above regulation applies only to those who give no instructions, at the time of remitting, as to when they de ire to commence.

Death of Three Eminent Sclentists.
Max Schultze, the great German professor of anatomy is dead. He was in the prime of life, and had just experi onced the satisfaction of seeing his laboratory at Bonn, the most ample and elegently constructed in Europe, finished under his immediate sapervision. His death is a great loss o biological science.
We regret to learn the premature death of M. Fernand Papillon, to whose interesting papers on phenomena of life (in Revue des Deux Mondes and other journals) we have re peatedly directed attention. The death is also announced of Dr. Legros, of Paris, who was poisoned in the course of his histological researches.


## THE ALBANY RAILROAD BRIDGE.

The large and handsome engraving which we publish on another page is an excellent view of one of the finest pieces of civil engineering work existing in this country. It is the largest double track iron railway bridge in the United States, and extends across the Hudson river at Albany, N. Y. Messrs. Clarke, Reeves \& Co., the designers of the proposed iron centennial tower, were the constructors.
The total length of the structure is 1,740 feet,or nearly one third of a mile, and it consists altogether of fifteen spans, of which one is a draw span 274 feet in length. The superstructure is entirely of wrought iron, and the main girders are proportioned to carry a rolling load of $6,000 \mathrm{lbs}$. per lineal foot of bridge, in addition to the weight of the fabric itself. The turntable is operated by a steam engine, and is so constructed, that if any part wears out, it may be replaced whitout interrupting the use of the swing bridge; and suitable lever turning gear is also provided, so that, should it become necessary, the swing bridge may be operated by hand.
The engine and boiler, and all the machinery required to actuate the draw span, are situated within the turntable and are out of sight. The draw span can be opened and closed very quickly. When being swung, the weight is car ried by the center and amounts to about 350 tuns, but the equilibrium is so accurate that it can be readily moved by two men.
The floor system of the bridge is rather stronger than is usually made in this country, and the system of construc tion generally was based on the plan followed at the Phoenixville works, which provides that the bridge does not fail to return to its original camber without readjustment after testing. To allow for expansion, one end of each girder is fixed to the pier, while the other end is carried upon rollers formed of lengths of $1 \frac{1}{4}$ inches cold rolled shafting, mounted in wrought iron frames.
The weight of iron in the fabric is 1,750 tuns, and the total cost, including machinery, sidewalks, etc., was about $\$ 320,000$. Our view is taken from the Albany side, at which point a new and finely arranged depot has recently been constructed.

## a New Idea about comets.

A paper was read before the Hackney Scientific Association on January 13, by Mr. Reeves, advancing an entirely new theory with regard to comets; and by the use of diagrams, he showed that the part of the comet termed the tail, being al ways in a direction from the sun and therefore as often in advance as behind the nucleus, is not really a tail. That as comets are transparent, and all matter is known to be either solid, liquid, or gaseous, comets must be the latter, for solids and liquids are opaque. That the only known power by which this gaseous matter can be held together is gravity, which must necessarily have a center, and, every part of the body being free to move, resolvesitself into a sphere, the center of which is in many cases exceedingly dense, gradually attenuating towards the circumference. That the rays of the san are refracted in their passage through the spherical comet, thus luminating the portion beyond the center or nucleus, which illumination forms the tail. He then explained how all the various and peculiar phenomena of comets, such as their shapes, colors, horns, nuclei, as well as their being with and without tails, etc., arise; and that they are entirely in accordance with the universal laws of Nature.

Preserving Cut Bunches of Grapes.
A correspondent of The Garden recommends the use of the ingenious little device depicted in our engraving, for preserving bunches of grapes in water, after they are cut from the vines. Any plumber can make the tin tubes for a few cents each, and they should be hung up, with the bunches, in the vinery; but a separate small house or hot frame, to which the heat could be turned on when necessary, would be an improvement. The house or frame should be well ventilated and free from damp and
dust; and it would be useful for young vines in pots, cucumbers and melons.

## IMPROVED FISH GRAPPLING SPEAR.

This invention, the object of which is indicated by its title, is an improvement of considerable merit over the oldfashioned fish spear. It is also excellently adapted as a substitute for the gaff, as its action is much more certain, while it requires less skill to manage. The grappling arms are easily and quickly set by ingenious mechanism leading to the handle, while there seems little about the apparatus to get out of order and so impede its working. Our engraving represents the device with its claws open ('Fig. 1) and closed (Fig. 2), and also (Fig. 3) show the tripping arrangements in the handle.
The spear hooks are jointed together, as shown, and provided with springs, A, which are bent when the hooks are opened and so held by the toggle joint at B. The springs are arranged in a clip, C, and not permanently attached, so that the hooks way be released to facilitate their opening and setting. D and E are sliding sleeves upon the handle with which the rock lever, $F$, is connected by a chain, wire, or cord, $G$, which passes up over a pulley near the end of the stock. The rock lever comnunicates with the spear hooks by a wire, H, so that, by sliding the sleever along the
handle toward the hooks, the lever will be turned to the position shown in Fig. 1 , to open and reset the hooks ; and sition shown in Fig. 1, to open and reset the hooks; and
by moving the sleeves in the opposite direction, it will be turned back again (as 'shown in Fig. 2 and the dotted lines in Fig. 1), by sliding the swivel stud, I, back upon it to free the connecting rod, H , so that the latter will allow the jaws to close when tripped. The same operation subjects the springs to the required tension for actuating the hooks, by means of the cam, J, pivoted to the clip. A set screw is provided in connection with the cam for producing and varying the tension of the springs; and the clip is made ad justable on the stock and along the springs for the same purpose.


Generally the hooks are tripped by striking them against the back of the fish at the joint; but as, in case of striking a stone or other hard subetance, the points might be injured, a wire, K , is connected to one of the pronga near the joint, and extends up to a small trip lever shown in Fig. 3. This lever, worked by the finger, pulls the joint hack, and so trips the hooks.
Patented through the Scientific American Patent Agency October 28,1873. For further particulars address the inven tor, Mr. Jonah W. Knapp, Cross Rivers, Westchester county, N. Y.

## ABTRONOMICAL NOTES.

Obeeryatory of Vabsar College.
For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to studente
M.M.

Positions of Planets for March, 1874. Mercury.
On the 1 st of March, Mercury rises at 7 h . 12 m . A. M., and sets at $7 \mathrm{~h} .20 \mathrm{~m} . \mathrm{P} . \mathrm{M}$. On the 31st, Mercury rises at 4h. 59 m . A. M., and sets at 4 h .37 m . P. M.
Mercury should be looked for soon after sunset; early in March, some degrees north of the sun's place. Mercury and Venus pass the meridian or south at nearly the same time on the 14th, Mercury being, however, $6^{\circ}$ north of Venus in declination.

Venus.
On the 1st of March, Venus rises at 6 h .50 m . A. M., and ets at 5 h .50 m. P. M. On the 31 st , Venus rises at 6 h .14 m . A. M., and sets at 7h. 4m. P. M.

The moon and Venus will be in conjunction on the 18th. Mars.
On the 1 st , Mars rises at 7 h . 58 m . A. M., and sets at 8 h . 1 m . P.M. On the 31 st, Mars rises at 6 h .52 m . A. M., and sets at 8 h .35 m . P. M. It will be seen that Mars is very un favorably situated for observations.

## Jupiter.

Jupiter rises on the 1st at 7 h .12 m . P. M., and sets a 7 h .30 m . A. M. On the 31 st , it rises at 4 h .54 m . P. M., and sets at 5 h .18 m . the next morning.
All through March Jupiter is in excellent position for ob-
nearly at midnight for the whole month. Its altitude, too n our latitude, is above $50^{\circ}$, and it can be studied to great advantage. Every person who has a telescope, even a small one, should watch the varied phenomena of its moons, es pecially on the evenings of the 7th and 18th. On the 7th, the largest of its moons will disappear by eclipse, passing into Jupiter's shadow, and the smallest will disappear by ransit, coming between us and Jupiter, and being lost to iew while projected on Jupiter's disk.
Jupiter and the moon are in conjunction on the 31st, when the moon is nearly full.

On the 1st of March, Saturn rises at 5 h .19 m. A. M., and ets at $3 \mathrm{~h} .1 \mathrm{~m} . \mathrm{P}$. M. On the 31 st , Saturn riees at 3 b .30 m . A. M., and sets at 1 h .18 m . P. M. As this planet comes to the meridian in the forenoon and is far south in declination, it is not well situated for observation.

## Uranus.

Uranus is in good position for observations, but needs a good telescope. On the 1st it rises at 2 h .48 m . P. M., comes to meridian at $10 \mathrm{P} . \mathrm{M}_{\text {., and sets at } 5 \mathrm{~h} .12 \mathrm{~m} \text {. the next morn- }}$ ing. On the 31st Uranus rises at 0 h .46 m . P. M., and sets at 3 h .12 m . A. M. the next morning. It is still among the small stars of Cancer, a iew degrees south of $\gamma$ C'ancri.

## Neptune.

On the 1 st , Neptune rises at 8 h .32 m . A. M., and sets at 9 h .34 m . P. M. On the 31 st , it rises at 6 h .37 m . A. M., and sets at 7h. 42 m . P. M. Even with good telescopes, no good observations can be made on Neptune at present.

## Sun Spots.

The record is from January 20 to February 14 inclusive, and, though much broken by cloudy days, is yet regular enough to indicate that in the spots individually there has been no marked change, no sudden appearance or disappear ance. On the 24th, spots appeared on the eastern limb which proved to be the advance of a large group, the whole of which was on the disk by the 26th. Phocographs of the 29th and 30th showed the group still entire, and on these days the largest portion of it was seen with the naked eye. Observations were then interrupted until Fobruary 6, when what was probably the last of it was just within the western limb. On the 6th there was a small circular spot " coming on," that is, near the eastern limb, which was still seen on the 14th, having been carried during the interval to the opposite side of the disk, still maintaining its original shape Five other small spots, on the 14th, extended east of the circular one, nearly in the line of the horizontal diameter There were facalæ on the 10 th and 14 th .

## zodiacal Light.

This was seen, early in the evening, on the 4th, 5th:, 11th, and 14th, stretching from the western horizon towards the Pleiades.

## Barometer and Thermometer

The meteorological journal from January 17 to February 13 gives the highest barometer, February 2, $30 \cdot 63$; the lowest barometer, Januaty 28, $29 \cdot 62$; the highest thermometer January 23, at 2 P. M., 56'; the lowest thermometer, Febru ary 9 , at 7 A. M., $-11^{\circ}$.

The rain which fell during the morning of January 28 mounted to 0.12 inckes.
The rain which fell between the afternoon of February 13 and the morning of February 14, amounted to 0.13 inches. Patent Calf Feeder.
In these days, when the successful rearing of cattle is an important item of farm management, a wide difference may be seen in the appearance of two calvea-the one fed by a painstaking hand, and the other allowed to gulp down its food without time for admixture with the saliva. This is a very important matter, seeing that success or failure fre quently depends upon it. Of course, the nearer the process of feeding is approximated to the slow natural action of sucking, the better for the young animal. The implement shown in our illustration, for which we are indebted to the Ironmonger, if properly cleansed from time to time, feeds in the most natural man ner and renders it impossible for the calf to gorge itself. It is a vessel of galvanized iron, shaped like a milk can, having upright sides and concave bottom, with an iron bale handle and a splayed hoop foot, which causes it to stand firmly on the ground. Midway in the vessel is a fixed ledge, into which a self-locking cover closely fits. This cover has a vulcanized india rubber teat, fixed in its center and communicating with an india rubber tube extending to the bottom of he vessel, the concave nature of which allows of the calf making a clean meal. The vessel holds about five quarts, and can be readily cleaned by removing the cover. The new feeder entirely dispenses with the unpleasant and dan gerous practice of feeding with the finger, and the food is not so liable to be wasted.

To Tan Skins.-The following method is recommended by a correspondent: Take equal parts salt, alum, and Glauber's salt, and half a part saltpeter; pulverize and mix. Hanber's salt, and half a part saltpeter; pulverize and mix. Han-
dle the skins and rub the mixture in well three or four times a day, the oftener the better. If there is not moisture nough in the skin to dissolve the salte, put a little water into the latter. We are assured that no moth will attack into the latter. We are assured that no moth will
furs, the felts of which have been thus prepared.

## Chatespyoudeuce.

## Mr. Richard A. Proctor and the Million Dollar Telescope. <br> To the Editor of the Scientific American:

Mr. R. A. Proctor, whose most interesting and instructive course of lectures has just closed in this city, was inclined to doubt the possibility of making a telescope much superior to Lord Rosse's. He also stated, in the lecture of January 19, in regard to Mr. Lick's Rocky Mountain Observatory, that "the proposed magnifying power of 8,000 ,to bring the moon within 30 miles, was impossible." $(240,000 \div 8,000=30$.) Now Lord Rosse, an accurate and conscientious observer, permitted himself to record an observation made with a power of 6,000 diameters, that is, he made out the object nearly as well as if he had used a lower power. In this same way, the power of one hundred diameters for each inch of aperture, instead of fifty diameters, may be applied to a good objective during the 100 hours, or thereabrout, of suitable weather which occur during the year. Mr. Proctor, having been informed more fully with regard to the million dollar telescope scheme, and having been requested by us to give his views on certain matters of intorest connected with the subject, on the 20th inst., made the following graceful compliment to the world's most skilled optician, and to the magnificent project which bids fair to be realized at no distant date :
" And here let me mention the superiority of the refractor at Cambridge to the Rosse telescope; and let me allude aleo to the possibilities of great future discoveries by means of a telescope, to be five feet in aperture, which, it is said, your optician Alvan Clark proposes to make, at a cost, I believe,
of $\$ 1,000,000$. That amount will be wanted. It seems a considerable sum. But if any one can do it, it is Clark, for he is unrivaled as an optician. Mr. Cooke, of England, was the only optician comparable with him, but he is dead. I have never had an opportunity of making any comparison have never had an opportunity of making any comparison
between the great telescope of Cooke, 25 inches in diameter, between the great telescope of Cooke, which is used in an inferior atmosphere, and clark. The telescope at Washington is 26 inches in aperture. But now that Cooke is away, Clark is the greatest of living opticians; and if a telescope is to be made, it is to be hoped he may be spared to make it." Mr. Clark informed me last summer that he did not expect to live long enough to finish such a work, but both he and his son Alvan expressed a willingness to undertake the construction of a million dollar equatorial, if the money were raised for the purpose, the object glass to if the money were raised for the purpose, the object glass to
be 5 feet $6 \frac{1}{2}$ inches clear aperture, and focus 75 feet. The flint and crown disks would be made by Messrs. Chance, of Birmingham, England, or specially in the United States. It will not be found difficult to make large glass disks of homogeneous " metal," if the proper materials are used with the requisite care.
The common glass crucible is built up gradually in rings of about two inches in hight, the clay being constantly mixed and trodden by the naked feet of the workman. The fabrication of the melting pot thus requires an entire year. The cation of the melting por thus to same care should be devoted to materials to be placed same care should be devoted to the materials the best quality, free from inside. Optical glass of the very best quality, free from
streaks, should be selected and crushed. Fragments of uniform specific gravity should then be sorted out by the hydraulic bucket or an equivalent mining appliance for the separation of ores. These glass fragments, of uniform quality and size, should be charged into the crucible, and melted in the most intense heat attainable in a Siemens' gas furnace, then cooled as slowly as possible, and the central part of the mass sawn sut. This mass of perfect glass may part of the mass sawn sut. The usual disk mold, to soften be reheated if necessary in the usual disk mold, to soften
and flow by its own weight into the requisite shape. Mr. Clark says that the flexure due to the weight of a large object glass does not appear sufficient to disturb its corrections. A reflector, however, such as the 4 foot at Melbourne, can hardly be prevented, by the mont elaborate system of counterpoise levers, from bending so much as to distort the image.
Dr. Draper's fine lunar photographs, although taken with a $15 \frac{1}{2}$ inches Newtonian silvered glass mirror, supported on an india rubber air cushion, the eyepiece driven by a clepsan india rubber air cushion, the eyepiece driven by a cleps-
hydra, are hardly as sharp in definition as those of Mr. hydra, are hardly as sharp in definition as those of Mr.
Rutherford. The latter were taken with an 11 inch refractor Rutherford. The latter were taken with an 11 inch refractor
with a second fint lens in front of the object glass, corrected by continual trial photographs of stars until the combination converged actinic rays to the same focus. The equatorial is driven by a Bond spring governor clock. At present Dr. Draper's 28 inch silvered glass reflector and Mr. Rutherford's 13 inch triple photographic objective may be regarded as typical specimens of their respective kinds. I infer, therefore, that while the silvered glass reflector is cheap and
possesses no chromatic aberration, yet the achromatic is by possesses no chromatic aberration
far the best for accurate work.
European opticians (so Messrs. Merz \& Steinheil assured me, in Munich) generally try to get an absolutely homogeneous glass, to work in spherical curves, according to the formula of Gaups. Mr. Clark, choosing simple curves, and the best glass he can get from Messra. Chance, excels all others in the exquisite delicacy of his local corrections for slight want of homogeneity in the glass,incorrect figuring,etc. You described his method of recorrection, as applied to the Pittsburgh 13 inches telescope, in the Scientific American of September 20, 1873. Mr. Clark was formerly a portrait painter, and gained, in the practice of his profession, the sensitive touch and correct eye necessary for the work endorsed by such critics as the late Rev. Mr. Dawes and Dr. Huggins. Dawes' double star work was accomplished mainly with a seven inch glass by Clark, and Huggins
splendid researches, on the spectral character and composition of stars and nebulæ, were prosecuted with an eight inch by the same maker.
All observers are not aware that, when a perfectly corrected object glass is uncovered to the sky, it must be allowed to radiate heat for about half an hour before the spherical aberration becomes zero.
I read that Mr. Lick has entrusted Colonel Von Schmidt, an eminent engineer, with the location of the Rocky Mountain Observatory. This task I regard as almost equally onerous and important with that of the optician.
The splendid 18 inches, belonging to the Dearborn Observatory at Chicago, is almost utterly useless (or was when I saw it), being perched in a high, ill ventilated tower halfway up the College building, in currents of heated air, and subject to unequal radiation from surrounding objects. and subject to unequal radiation from surrounding objects.
Professor Safford informed me that he intended to Professor Safford iniormed me that he intended to
have the equatorial removed from its perch and placed on the ground, where it could be used, if possible.
Mr. McCormick ordered a 26 inch equatorial, a duplicate of the one at the Naval Observatory, to be made at the same time with the latter. It is now being completed.
The principle of interchangeable parts, found so advantageous in the construction of smaller machines, has thus been applied on the largest scale to the mounting of great equatorials. This wholesale construction of giant telescopes is of course of great importance in an economical point of is of c.

The Scientific American million dollar teleacope may therefore be constructed at the same time as Mr. Lick's, to
the great advantage of both projects, and the advancement the great advantage of both projects, and the advancement
of astronomy, the queen of sciences, whose domain includes all others.
New York city.
S. H. Mead, Jr.

## Utllizing Coal Dust.

To the Editor of the Scientific American:
Many efforts have been made, directed towards utilizing the coal dust screenings, which are now the waste products of most mines. So e have proposed to saturate them with coal oil; others have invented machines for compressing them into blocks; while a late correspondent has proposed mixing them with corn, that the compound might be burned. I think that, for steam purposes, none of those processes are necessary, at least with the bituminous coal dust such as is produced from the coal mines of Illinois. On examination, it, will be found that the dust, or slack, from bituminous coal is better in quality, being less adulterated with sulphur and pyrites than lump coal. When furnaces for steam boilers or other purposes are properly arranged, and the dust is not too wet from rain or snow, it will burn freely by itself, without any preparation or admixture whatever, as the facts below narrated will fully show :
In 1868 it became necessary to remove, from the Home Woolen Mills, of Jacksonville, Ill., of which I was the manager, sectional boilers (patent) of one hundred horse power, and replace them with new ones. I resolved to put in ordinary cylinder boilers, having five internal flues and rated at eighty horse power. At all the coal mines of that section could then be found immense heaps of the coal dust, or slack as it is there called, abandoned as worthless, and in almost all cases continually burning from spontaneous com-
bustion. I resolved to set the new boilers and construct the furnace with the view of using this waste product ex clusively for fuel. Before starting the fires, I made a contract for all the slack (in case I succeeded in using it) the mill would need, the same to be delivered on board the cars at twenty-five cents per tun. The experiment proved succesful; and from that date, until the burning of the mills in 1873, that fuel was used exclusively, with the exception of a few months one summer (when solittle coal was being mined that slack could not be had), and an occasional car load of coal when the other failed to arrive. With this as fuel, an engine of 75 horse power was run, driving the ma-
chinery of a four set woolen mill; and direct steam was also chinery of a four set woolen mill; and direct steam was also
supplied to dye honse, dresser, wool and cloth drying machines, and in cold weather to the heating pipes necessary to heat the entire building, containing 38,000 square feet of flooring. In use, the slack was found nearly as effective as coal; and from that long experience in its consumption, it was fully established to be only about twenty per cent inferior to the best lump coal, tun for tun, for equal amounts of steam. After this mill commenced burning it, the su-
perintendent of the mines found that the cars could not be perintendent of the mines found that the cars could not be
loaded at the price originally named, and fifty cents per tun (delivered on board cars) was agreed upon as the price: and that price, and no more, was paid to the mines for the four years of its use. During the same time, lump coal on board cars at the mines ranged from two dollars and a half to three dollars per tun. Under the new boilers, much less of this dust was used for fuel than had been previously used of the best lump coal under the sectional boilers, although the mount of machinery was considerably increased.
After the economical use of this fuel had been established in the Home Mills, the proprietors of other mills examined into the manner of using it, and also alopted it. For the past two years, another woolen mill at Jacksonville, and one at Springfield, Ill., each using seventy horse power engines, and direct steam for other purposes, have been utilizing coal dust in their furnaces. Others in the same section of the State have adopted it, and it is now established beyond all question that it can be successfully burned in the manner above stated. Even in starting fires, no other fuel is necessary, except a few handfuls of kindling wood, such as used with lump coal.
To arrange for burning the coal dust, no considerable
change in furnaces from ordinary construction is necessary What is true for the proper burning of lump coal is absolutely indispensable for the dust. The rules are simple and easily understood: A large supply of air in the furnace, re. gular feeding, open fires, and a good draft. When black amoke is seen coming from the chimney, these requisites are not all present. In fact, no more black smoke should ever be seen coming from a furnace burning either dust or lump coal than from one burning wood, and no coal-burning furnace is properly constructed for its work which emits, for more than a half minute at a time, sufficient smoke to be observed without very close inspection. In the case of the Home Mills, although the chimney was but fifty-four feet high, it was rarely that any smoke whatever could be seen. T'he enginear in charge understood his business thoroughly, was reliable, and always saw that the furnace was in proper order. That, indeed, was one of the principal causes of continued success, and will always be found to be all impor. tant.
The
The use of slack under steam boilers alone bas been adverted to, but it can be used for almost any other like purpose. Those persons using considerable amounts of coal, who can obtain dust at low rates, need have no fear that they will fail if they will follow the above suggestions. No compression into blocks, admixture with coal oil, or adulteration with corn is necessary. A faithful fireman to shovel in small and regular supplies, an open fire, and a good draft, will never fail to make as fierce and effective fire as lump coal, with a very large saving in cost.
Columbus, Ga.
Joun Hill.

## Asphalt Pavements.

To the Editor of the Scientific American:
It is suggested that some mixture or mode of laying down asphalt pavements must be found,for obviating the tendency to greasiness. This greasiness is the cause of the slippery character of such pavements when wet or damp. Another great objection to them is the disposition to wash away with
rain, to soften in the sun, and to crack on drying. These atter faults are caused by the want of an absorbent element to hold the volatile portions from evaporation and softening in the sun. This absorbert must be of a character that will not arack of itself, if mixed with water to a thin consistency and dried at slow heat. Sand, clay, ground slate, talc, Grafton mineral, lime, etc., are used at present for admixture in such compositions, but they do not possess the absorbent and non-cracking qualities. The mineral known as fuller's earth is, I believe, the best thing for this purpose. The peculiarities of fuller's earth, among similar minerals, are its powerful affinity for greasy matters, its finely comminuted character (it is an unpalpable powder when crushed, which is evinced by the readiness which a piece takes polish from the friction of the finger nail,) and its peculiarity of drying, rapidly or slowly, without cracking. These render it invaluable for really good and lasting pavement made from asphalt, coal tar, or other bituminous matters.
Two parts of fuller's earth, with one part of a mixture of asphalt and coal tar, or the asphalt alone, make a good compound for the purpose. Investigator.

## The Preservation of Timber.

To the Editor of the Scientific American:
I came here 30 years since, and began clearing land and building houses with hewn logs and boards split from the ree. After several years' residence I noticed, very often that pieces of the same kind of timber decayed more quickly than others; and after much thought and observation, I came to he conclusion that timber felled after the leaf was fully rown lasted the longest. I noticed that timber felled when the leaf first commenced to grow rotted the sap off very quickly, but the heart remained sound ; that timber felled fter the fall of the leaf rotted in the heart, even when ap parently sound on the outside. When fire wood cut in the winter, was put on the fire, the sap came out of the heart but when cut in the summer, the sap came out of the sap wood and next the bark. I noticed also that all our lasting wood had but little sap at any time in the heart: such as cedar, mulberry, sassafras, and cypress.
A cypress post cut in the summer of 1838 is still sound, although exposed to all weathers, while one of the same kind of timber, cut in the winter of 1856 and painted, has rotted in the heart. I saw yesterday a piece of gum plank, which I sawed in the summer of 1859, that has lain exposed ever since, and is perfectly sound; while oak timber that was felled in the winter beforesis now entirely rotten.
My conclusion then is: Cut timber after full leaf, say in July and August, to get the most last from it. The sap goes into the heart of the tree after leaf fall, and causes decay.

## Arkansas.

James A. Moore.
Fish in the Hot Springs of Nevada.

To the Editor of the Scientific American:
About 80 miles north of this place, on the north slope of Bull Run Mountain, which never loses its massive banks of snow, rises a small stream, formed by springs that furnish the purest and coldest water I ever drank. The stream,after running a distance of half a mile, is about 2 feet deep and about 6 feet wide on an average ; at this point a succession of hot springs rise on the banks, and flow into the stream, increasing the volume of water about one third. The water of these springs is so intensely hot that less than three seconds are consumed in boilingeggs in it. The creek above and below this point swarms with fine brook trout; and strange as it may appear, to persons standing on the banks where the hot water is discharged into the brook and looking
through the rising vapor, you can see hundreds of the fish wimming to and fro in the boiling element with as much in difference as though there were no hot water near.
This letter, if unaccompanied by an explanation, would undoubtedly pass for a Nevada fish story; but to satisfy the incredulous, I will give the result of my investigation, it being July when I visited the place. I took a common ther mometer with me, which only registered to $130^{\circ}$ Fahrenheit. A test of the water above the hot springs showed a mean temperature of $42^{\circ}$; fastening my thermometer to a pole, I mmersed it above the influx of hot water; and keeping it a near the bottom as possible, I moved it gradually down stream. The result was a very low temperature at the bot tom, gradually rising to $65^{\circ}$ until I reached a point (a fourth of a mile down the stream) where the temperature became uniform throughout. This, it will be seen, shows that the hot water, having a specific gravity much less than the cold, retains its place on the surface, forming an upper intensely hot stratum, and leaving the lower water with its finny tribe undisturbed, and to all appearances swimming to and fro in one of Nature's caldrons.
This stream is one of the many that form the head water of the Columbia River; and to this point, over eighteen hun dred miles from its mouth, in the spring and fall, the salt e in hundreds to spawn.

## Elko. Nev.

G. A. F.

## The Spider's Web

To the Editor of the Scientific American:
It is commonly believed that spiders are able to projec their webs to distant objects, thus bridging over the inter vening space; but how this is done, I have never seen explained. Once I saw a small spider upon some projecting object above a table, before an open window, briskly engaged in trying to do something, without seeming to accom plish his object. I therefore watched him, and saw that, af ter attaching his thread to the projecting object, he spun down four or five inches, and then commenced climbing his thread, carrying the same with him, or, rather, winding it up into a ball. Having reached his point of support, he de. scended again, and wound up the thread as before. This he did three or four times, till his ball was nearly as large as the head of a pin. Then taking his position upon the top of his projection, he remained apparently motionless for half a minute, at the end of which time his ball had disappeared, and there was seen a delicate line, a foot or more in length flying in the wind. He was evidently trying to attach his thread to a lamp standing in the center of the table; but he had miscalculated the direction of the wind. I then care fully broke off the flying thread, when, finding that he had failed to reach the lamp, he repeated the attempt, going through precisely the same movements as before. This he did four or five times, when, doubtless concluding that the fates were against him or that some one was interfering with his operations, he left for parts unknown.
Whether he projected his ball of silk, as the sailor does his coil of rope, or whether he merely unwound it, letting the free end fly in the breeza, I could not make out; but it is very certain that when the fying thread appeared, the ball beneath his feet had disappeared.
J. H. P.

Franklin, N. Y.

## The Curious Ways of Plants.

Who can account for the ways of plants, or explain why a certain species will grow in one place, and will not in another exactly similar, so far as human intelligence can determine?

The American aloe is a hundred years in getting ready to flower, whereas the gourd grows like Jack's bean stalk. Some wild flowers disappear on the advance of civilization; while, on the other hand, the plantain, if the truth is told, goes wherever Europeans go; and in this country was unknown until after the English came, following so closely on their tracks that the Indians gave it the name of "white man's foot.'
Some varieties, as above intimated, may be found in a particular locality, and nowhere else within half a dozen miles. There is, for example, in this neighborhood, in central New England, one spot where are a few shrubs of the mountain laurel (" spoon wood") in a little patch by the roadside; and although this would seem the natural country for it, it can be discovered in no other place anywhere about.
Then there is the fringed gentian, which has been seen bside a secluded road some six miles away; but, with that oxception, appears wholly unknown in the vicinity: yet the closed gentian is abundant. Another of the perversely disappointing flowers is the dog tooth violet; not, however, more capricious than the yellow violet and the noble liverwort (hepatica triloba), which, in certain dry maple woods, in the one case, and in open knoll-covered pastures, in the other; grow in great abundance; still, one might search acres of similar woods and pastures for them, all to no purpose. Another case, somewhat in point, is the holly-indigenous, or at least one variety, to moist woods along the east orn border of New England; but so partaking of the afore named eccentricity, that he may count himself a happy man who can find it, and prove his succesa by great armfuls of it wherewith to deck his house at Christmas. One gets glimpses of it while riding through some swampy tract on Cape Ann; the bright berries and evergreen leaves, so sug.
gestive of English good cheer, betraying it. There, too, in summer, by searching diligently, one may find a species of magnolia, that being about its northern limit.
No common New England flower is so little to be depended upon as the trailing arbutus. It is difficult to deternine
side, and thrives on the very edge of pasture bogs, and in
the shade of woods; and yet, with all this versatility, there the shade of woods; and yet, with all this versatility, there are many towns where it is never found, and where, though ransplanted and tended with care, it cannot be made to live Quite opposite, in these respects, is the "cardinal flower," whose hnme is by the water side, the only place where it
grows naturally, although the kind of water is not of immi grows naturally, although the kind of water is not of imminent consequence, for it will do just as well in a dark nnok
under the up-heaved root of a willow, on the edge of a mill pond, in the muddiest coze, as in the cleanest sand along iver's bank, its chief requirement seeming to be that it shal not be crowded; one stalk always standing by itself, inde pendent of its kind, and not in clese neighborhood to othe plants. It is so adaptive that it will bear removal to a garden, taking kindly to its new conditions; and there it wil come up, year after year, flaming out in live scarlet, in one glorious blood red," as if nothing had happened to it. There are other facts, more singular, as to the ways of rowth and "hows" of blooming. One can understand that grape vine may hold to its support by means of a tendril while an ivy or a Virginia creeper secures itself by thrusting its rootlets into a crevice of a wall or in the bark of a tree but why should a honeysuckle and a bean vine wind in op posite directions, the one going to the left and the other to the right? and either will swing on the wind, or sprawl over he ground, rather than turn the other way.
The ketmia opens at nine o'clock in the morning, and shuts at ten, as if it had a visual weakness; while a bed of portu laccas never expands unless the sun is out; and the hotte he shines, the wider they spread themselves; and the even ing primrose waits until he has gone down, and then come pen with a snap, like a subdued kind of fire cracker.
But most unacconntable of all, perhaps, is the night blooming jasmin. You see a simple tree-like plant, with plain style of leaf, at the base of which grows a spray of yellowish green tubes, like lilac buds, suggesting, more than anything else, a string of sunall candles. You look at them in the middle of the day, and they are "only that and noth. ng more;" and you might, if you did not know their ways, forget all about them; but when evening comes, forgetting is impossible. The room is full of fragrance, rich as orang flowers, and almost as subtle as violets; and lo, your little candles are all lighted; and from somewhere about them comes that perfume which is so delicious and so mysteriou as to its source. The next morning, they begin to contract by noon, the five points are all close packed, and there is no scent to them or about them at all till night comes on again and so they continue, scentless through daylight, but of ex quisite sweetness when darkness appears.-A. B. Harris, in the Christian Weekly.

## Machinery as applied to the Manufacture of

## Watches.

That our American cousins have gone far ahead of us in the application of labor saving machinery is a truism which has become almost stale by repetition, and is capable of proo by reference to their very complete " Patent Office Reports, or to the pages of their scientific and technical journals. Scarcely can we find a department of trade in which some automatic machine does not supply the place of dear skilled labor. But in no branch of manufacture has automatic machinery proved such a thorough success es in the production of watches. In the manufacture of small arms the application of machinery to the making of interchangeable locks and stocks revolutionised the trade, and to this manufacture are
the Americans indebted for a system which has supplied them the A mericans indebted for a system which has supplied them
with a home-made watch, for a system. which is ultimately to become the leading one alikein England, France, and Switzerland. It is useless for English watch manufacturers to say 'the thing cannot be done; the machine-made watch cannot beat the hand-made English lever in the home market." To their own cost the record of the past proves the fallacy of such argument. Twenty years ago America was supplied with her better class of lever watches almost wholly by Coventry and Liverpool, the demand for a common article being met by a large importation of movements of Swiss and French make. To-day these latter countries supply still the enormous demand of the States for cheap work, but more than 90 per cent of the good lever watches are now of American make. The machine made watch has supplanted not only the product of the skilled Frenck operative, but that of his more highly skilled English brother.

The reasons which have led to this resuit are diverse. National pride may have had something to do with this, but the protective tariff, so often put forward by the watch trade as the leading reason, has had positively nothing to do with the defeat of the hand workers, who gave up the contest ingloriously. The truth is that the American watch companies have never yet known anything of trade competition, have never yet been able to keep pace with the demand for their products, and the main portion of their success must be attributed to their machinery-to the fact which is becoming more and more evident daily, that machines planned by brains at once scientific and practical must beat the simply practical rale-of thumb workman, and the arms and muscles of iron will outwork and outlast mere flesh and bone. At the present moment the watchmakers of England are unable to supply the home demand for their products, and it may therefore be apropos to draw attention for a few minutes to the machine ystem as applied in the United States. As is generally known, the English system divides the manufacture into a vast number of branches, in each of which the work is performed by hand, or by the use of very simple lathes, driven by manual or foot power. In only three instances in England duction of watches, and in one instanceonly is duplicating
achinery used, and then only in the production of the plated or the rough movements. The American system subdivided he manufacture into a much larger number of details, and portions a machine to the perfection of almost each opera ion leaving not more than 10 per cent of work to the skilled orkmen.
Not only do we find an advantage in respect of the watch making tools proper; we find also very great superiority in he appliances for making these tools. The use of labor-sav ing contrivances in America in all the avenues of trade has iving rise to especial machinery for their production, and bis is very noticeable in the watch factory machine shop. The screwing and sliding lathes are made to meet more varied equirements than are the English articles. Planers, tool are capable of adjustments which are not attainable, except n very expensive machines, in England; and in small form, with a 4 inch or 6 inch stroke, we have as yet failed to find the machine. Another most useful tool, which is an abso ute necessity to the watch machine shop, is the universal milling tool; and indeed no machinist can afford to be withou t, if he has once used it. Yet we can find in England no tool which can take its place, or which combines such a multipli city of operations. It is adaptable not only for ordinary milling, but it can be used to cut straight or spiral reamers, drills, and mills. It can be arranged to cut spur or beveled ears, and it can also be used to cut straight or spiral cones. The movement and feed of the tool carriage is automatic, and it is provided with adjustments for any desired angle. Such machine cannot but be a favorite with close workmen on fine work. A machine wholly unknown outside the watch factory is the parallel and cone grinder,a modification of cours of the grinding tools now replacing the file in so many shops. This machine reduces to absolute truth and fit the hardened steel spindles and bearings which are the specialty of watch making machines. By it any taper given to the spindle may be reproduced in the bearing, sleeve, or collar, and the fit is at once removed from the region of doubt. Any desired degree f finish, too, may be attained, that usually preferred being by the use of diamond laps. So it will beseen that, while the ools for the manufacture of watch machinery are very fine, here is no lack or means for the production of highly finished and perfect work
The picture of this American machinery teems with lessons the Englishman. To the machine manufacturer it speak very loudly. We must all bear witness to the marvelous beauty and finish of some of our English lathes, with their ingenious compound rests, for the turning, etc., of shapedsur aces. But nownere in England can we see such lathes as wo ind mounted on the jenches of the watch factory ; nowhere on his side of the Atlantic can we see tools so well made and closely fitted or provided with such multiplicity of adjustments ion of errors resulting fro or othe wise. This state of things is due alike to the lathes and me of the machine shop, for the system has most certainly pro duced a set of workmen who are second to none as prartical machinists, and, in all probability, cannot be equaled.-The Engineer.

Railroading at a High Elevation.
The Buenos Ayres Standard lately contained the following ccount of a trip made in a construction train from Arequipa ver the Andes. Among other places reached was Vilcomayo 4,533 feet above the level of the sea. The newspaper man has reached these high altitudes. "As I write," sdys the tourist, "there lie before me copies of El Ciudadano, a newspaper published at Puno. and of El Heraldo, a newspape published at Cusco, both of them being well printed and well written sheets, and both of them being published more than 12,000 feet above the level of the sea. Nor is either of these the champion climbist of the newsparer world. At Cerro de Pasco they issue a very clever gazetio devoted to mining and the muses; and Cerro de Pasco is fourteen thousand feet above tide water. Of Vilcomayo, the writer says: "Here, amid the supreme desolation of the Andes, at a hight at which man in Europe does not dream of living, was a genuine railway village. There was an 'American hotel' two stories high, with a piazza, and some forty or fifty rooms for the accommodation of the railway people. There were all the buildinge, station houses, machine shop, engine houses, coal yards, required for a large road. There were the cabins of the laborers employed on the work, many hundreds of men, Chilians (the Yankees of South America), Bolivians, Peruvians, whites, ladinos, Indians,-a motley multitude, but superior, both in respect to capacity and conduct, to the average navvies of Europe and the United States. With the early morning a further run of an hour at good speed brought us to the actual summit of the road, at 14,586 feet above the sea level, and we then began to descond the Atlantic slope.'

## Improvement in Tanning.

M. B. Picard reports a new system of tanning skins which is carried through without acid and in a much shorter time than is required by ordinary processes. He first boils the tan down in water, making a complete extract, and then frees the decoction by decantation from all residue and forign substances. The strength of the essence thus obained is regulated according to the quality, thickness, etc., of the hides to be treated, weakening it when necessary with pure water. It is placed in the pits in a cold state, and the kins are immediately thrown in. The latter are lifted and heir positions changed three times during both the first and second days, twice during the third, and once a day afterwards. Ordinarily, eigbt days suffices to complete the ope, 77 pounds of extract to 220 pounds of skins gives excellent results.

## IMPROVED SAW GUMMER.

This is a convenient and simple little implement, which may be readily attached to circular or other saws, and operated without necessitating the removal of the same from the arbors or attachments. It is readily adjusted, self-feeding, easily operated, and, according to the inventor, causes a large saving of labor and files, while materially economizing the power required to run the saw.
Fig. 1 is a perspective, and Fig. 2, a plan Fig. 1 is a perspective, and Fig. 2, a plan
view. $A$ is a curved slotted piece of metal, in view. A is a curved slotted piece of metal, in
which the saw to be gummed is rigidly confined by the set screws, B. The position of the blade is controlled by the adjustable gages, C. D is a mandrel, supported by the curved frame, $\mathbf{E}$, which is pivoted to the piece, A, at F. Through one side of this frame the mandrel works with a screw thread, and consequently it has a longitudinal motion while it is being revolved by means of the cranks, $G$, on its ends. Near its middle is formed the cutting cylinder, into dovetail sbaped grooves in which are fitted the cutters, I, which, from the movement of the mandrel, are compelled to give a drawing stroke. By this means the cutters are prevented from heating, and hence losing their temper. Confined between the cranks, $G$, is a bail, J, which moves back and forth with the longitudinal movement of the mandrel, and upon which is a wedge, $K$, which operates between the two rollers, $L$, one being on the bed piece, A, and the other on the frame, E. The effect is to force the cutting cylinder unE. The effect is to force the cutting cylinder un-
der the tooth of the saw as the mandrel moves der the tooth of the saw as the mandrel moves
along. The screw nut, through which the latter works, is made in two parts, one being a clamp, M , hinged to the frame, E , fastened by the set screw, and constructed as clearly shown in Fig. 1. Through the dovetailed and tapering form of the grooves in the cutting cylinder, the cutters, while operating, are forced into their sockets, and hence are not liable to become loosened. They can, however, be easily removed when worn out, or can beground when dull without taking them from the cylinder, by simply unshipping the mandrel for the purpose. In operation, the device renders the usually tedious process of gumming the saw easy, expeditious, and perfect.
Patented through the Scientific American Patent Agency, by Mr. David Boyd, whom address for further particulars, at Ghent, Ky.

## Australian Stupidity.

Nothing,however preposterous, if propounded as a specific for disease, is too absurd for people to believe in. A member of the Victoria Legislative Assembly recently seriously asked the Colonial Government to appropriate $\$ 25,000$ to buy a diphtheria remedy from a man named Greathead. The latter remarkable person asserted that diphtheria is caused by "insects which breed in millions in a few days under a film which they make,which swells up in the throat and completely which they make, which swells up in the throat and completely
stops respiration," and he prescribes some drops of sulstops respiration," and he prescribes some drops of sul-
phuric acid in water. And this is the remedy for which the appropriation of $\$ 25,000$ is asked.

## IMPROVED ELECTRIC AND VAPOR CHAIR.

The invention herewithillustrated consists in a chair lined with metal and padded with sponge, so as to contain medi-

cated liquids for curative purposes. In connection with the metal portions, a portable electric battery is arranged ; and by suitable apparatus, as shown by our engraving, vapor is conducted tothe body for opening the pores of the skin, etc. The patient, it is claimed, can receive through the saturated sponges the full charge through the system in the lighteet or heaviest foice, the device being alike capable of adjustment for either strong or weak subjects.

Fig. 1 shows the invention as adapted for the use of elecricity alone. The base is made hollow, and its top of metal is perforated. The inside of the arms and back are lined with plates in order that one conductor of the battery, A, which is placed inside the base chamber, may be applied thereto, while the other is held by the patient, or else applied to some part of the cbair, in order to be directed through the to some part of the chair, in order to be directed through the
desired portion of the body. The feet are placed in a trough

## THE 'LITTLE GIANT SAW GUMMER.

or rest, which is also lined with metal, and, with the remainder of the chair, as above noted, is covered with sponge. By a ratchet mechanism, the hight of the rest is readily adjusted.
In Fig. 2 the adaptation of the chair to the administerin

of vapors in connection with electricity is shown. The bat tery is located as before described, and the vapor is conduct ed, into the base by a tube from the generator, $B$. It then rises through the perforations in the seat, becomes charged with the chemicals with which the sponges are saturated, and thus acts upon the body. To confine the vapor, a case shown broken away, may be employed, which incloses the chair and patient. There is an opening in its upper part to allow the head to protrude, and a flexible cape may be applied around the neck of the person to more fully close the opening. . The chair is employed in cases of rheumatism paralysis, inc:purities of the blood, colds, skin diseases, or for other medical operations whenever available.
Patented by Mary A. Hayward, September 26, 1871. For further particulars, address C. B. Townsend, sole agent, 242 Cumberland street, Brooklyn, N. Y.

## Preventing Damage from Boller Explosions.

A correspondent, Mr. George Mann, proposes to preven the broken fragments of a boiler, from being hurled through space, and doing more injury even than the ruptured or ex ploded boiler will do by the emission of steam at the time He suggests surrounding the boiler with a short link iron chain, winding it around the boiler continuously from one end to the other. The chain is to be drawn just so as not to hang loose, and to touch the boiler all round. There will be sufficient slack, so that the chain will not be strained over sight when the boiler is fully expanded to its utmost limit by heat. It is not intended to add strength to the boiler; but when the explosion comes, the chain is to hold the boiler in statu quo,allowing free escape to the steam only while the broken fragments are prevented from flying round
like so many cannon balls. The only damage which can occur would be the scalding of persons near by the steam. Mr. Mann claims this invention as his own, and hopes no one will try to steal his thunder.

New Improvement in Photo-Lithography.
M. Paul announces in Les Mondes a new process for transfarring the photographic image to the stone. The ordinary process, we may remark, consists in producing a positive image on gelatinized paper, treated with bichromate of potash. After exposure, the whole is covered with lithographic ink, and washing with hot water follows in order to remove the non modified gelatin. The image remains with its covering of ink, and by simplemeans is transferred to the stone. The outlines thus obtained, however, M. Paul considers, fail in clearness because the hot water produces a swelling of the undissolved gelatin and softens the lithographic ink; and he states that, in the transfer, which requires pressure, the parts thus affected produce blurs. To avoid this, M. Paul substitutes albumen for gelatin, so that the washing can be done in cold water. The unaltered albumen after insolation is removed with a fine sponge. Very clean and sharp images, it is said, are thus produced.
The statement above made, to the effect that the bichromatized gelatin process is incapable of yielding fine lines, is incorrect. The Osborn process, used for several years in this city by the American Photo-Lithographic Company, yields prints of such perfection that only a practiced eye can detect any differences from the original in the finest lines.

## New Galvanometer.

Dr. Friedrich Müller describes, in Poggendorff's Annalen, a new form of galvanometer with improved reading and deadening arrangements. The needle is immersed in giycerin diluted with one pighth of water, and above it there is a horizontal tube of glaes in rigid connection with it, to which the suspending thread is attached. Platinum wires bent vertically upwards from the ends of the tube are in a plane with the suspending thread. And the zero point of a ecale, seen beyond, is in a line with these. three parts when the needle is in its normal state of rest.

## THE VICTOR CHORN DASHER.

The object of the improved dasher herewith illustrated is to increase the efficiency of the old fashioned up and down churn. It is a simple and inexpensive device, but the inventor claims that it saves nearly one half the labor through the thorough agitation which it gives to the cream.
To the lower end of the dasher handle are attached the centers of two crossbars, A, which are arranged at right an gles with and halved to each other, as shown in the sectiona view, Fig. 2. The two arms of each bar are beveled in opposite directions, so that, as will be seen from Fig. 1, adja cent edges may both incline upward and toward each other, or both downward and from each other. $B$ is a band at tached to the outer ends of the blades, and so formed that the part which is opposite the faces of the arms which incline upward may slope inward and upward, and the part opposite the downwardly tending faces may incline downward and inward. By this construction, it is claimed, as the dasher is worked, four strong currents will be formed, two following outward towards the wall of the churn, and two following

Fiq. 1

nward toward its center. The effect of this is to cause a very strong commotion in the milk, bringing the butter in a short time. One or more of these dashers may be attached to the handle, as may be desired, or as may be rendered necessary by the size of the churn.
Patented through the Scientific American Patent Agency, by Mr. David Boyd, of Vevay, Ind., December 30, 1878. For further particulars address David Boyd, Ghent, Ky.

THE VICTORIA REGIA HOUSE AT CHATSWORTH, ENG. The celebrated residence of the Duke of Devonshire, at Chatsworth, owes its renown to the grand scale on which the science of horticulture is there carried on. The credit of the formation of the gardens, as they at present exist, is due to Mr., afterwards Sir Joseph, Paxton, whose ingenious system of ridge and furrow glasshouse building, first designed by him for the Duke's hot houses, was carried out on a very large scale in the structure for the Great Exhibition of 1851, which is now the Sydenham Crystal Palace. The vineries, pineries, strawberry beds, and vegetable gardens at Chatsworth are such as only the highest taste and skill, supplemented by great wealth, could organize and maintain.

We present herewith a riew of the hot house in which the Victoria Regia, which the Victoria Regia,
the superb water lily of the the superb water lily of the
Amazons, is to be seen in Amazons, is to be seen in
its greatestluxuriance. The large tank, seen in the center, says like Garden, to which we are indebted for the illustration, contains another tank, 16 feet in diam etor, and considerable deep eter, and considerable deepor than the outer portion
this contains the soil in this contains the soil in
which the Victoria lily is which the Victoria lily is
planted. The walls of the planted. The walls of the
tanks are built of brick, and the bottom is paved with stone; the tancs are lined with lead throughout, and ihe two inch hot water pipes which supply them are also made of lead.
While the plant is growing, a little wheel, in the form of an overshot mill wheel, is fixed near the edge of the tank, and continually kept in motion by a small jet of water from a tap immediately over it; thus the
surface of the water is always rippled. The Victoria Regia, being an annual, dies in November, when the water in the tank is drained off, and the soil contained in the inner part removed. The lilies in the angular tanks, being also out of season, are, about the same time, mostly cleared away and stored in troughs filled with water in the cucumber house. The aquarium, thus stripped of its summer occupants, is filled in winter with large chrysanthemums for furnishing cut blooms. As the Victoria lily annually produces and ripens a good stock of seeds, these are preserved in vessels of water unttl sowing time comes round, which is generally about the middle of December, or between that and January. The plants are potted singly, and re-potted as they advance in growth, until they have attained sufficient strength, when the best plant is planted out in a heap of fresh soil. At Chatsworth this lily luxuriates better and flowers more freely than it does in any other place in England, the largest leaves in summer measuring as much as $7 \pm$ feet in diameter.

## Nickeling.

by s. P. Bharples, masbachusetts btate absater
In answer to numerous inquiries, I again give a brief description of the process of nickeling. The patent is still before the courts, and no decision has been reached in regard to it.
The double sulphate of nickel and ammonium, which is the salt that is generally used, may how be had in commerce almost pure. It is manufactured on a large scale by Joseph Wharton, of Camden, N. J., who controls the nickel market in this country. Cast nickel plates for anodes may be obtained from the same source. The anodes should considerably exceed in size the articles to be covered with nickel. Any common form of battery may be used. Three Daniell's or Smee's cells, or two Bunsen's, connected for intensity, will be found to be sufficient. The battery power must not be too strong, or the deposited nickel will be black. A strong solution of the sulphate is made and placed in any suitable vessel: a glazed stoneware pot answers very well if the articles to be covered are small. Across the top of this are placed two heavy copper wires, to one of which the articles to be covered are suspended, to the other the anode. The wire leading from the zinc of the battery must then be connected with the wire from which the articles are suspended, the other battery wire being connected with the a node
In order to prepare the articles for coating, they must be well cleaned by first scrubbing them with caustic soda or potash, to remove any grease, and then dipping them for an instant in aque regin and afterwards washing thoronghly with water, taking care that the hand does not come in contact with any part of them. This is accomplished by fastening a flexible copper wire around them, and handling them by means of it. The wire serves afterwards to suspend them in the bath.
If the articles are made of iron or steel, they must be first covered with a thin coat of copper. This is best done by the cyanide bath, which is,prepared by disoolving precipitated
oxide of copper in cyanide of potassium. A copper plate is
used as an anode. After they are removed from the copper used as an anode. After they are removed from the copper
bath, they must be washed quickly with water and placed in the nickel bath; if allowed to dry or become tarnished, the nickel will not adhere.
Great care must bis used through the whole process to keep all grease, dust, or other dirt from the articles to be covered, or else the result will be unsatisfactory. The whole process is one of the most difficult that is used in the arts, process is one of the most
it being far easier to gild, plate, or copper an article than to


## THE VICTORIA REGIA HOUSE AT CHATSWORTH. ENGLAND.

boats propelled by a screw and driven by powerful springs, and a year later exhibiting his plans in London, and seeking dates rary jis public-if so we may term it-life, and contemporary journals now come to our aid in preparing this brie chanics Magazine is be an in chanics Magazine is before us, and in its pages, now yellow with time, we find the reports of the earliest trials of the
then novel mode of propulsion. Let us here remark that then novel mode of propulsion. Let us here remark that
to the subject of our sketch is not due the credit of inventing the screw propeller; for as early as 1727, one Duquet, a Frenchman, proposed to force a "vessel up a river against the current by means of screwa," and there are no less than fifteen mentions of applications of the principleincluding two American patents for "screw propelling wheels to boats," and for "a screw or spiral lever for propelling vessels"-of prior date to the patent of Sir Francis; but to him, however, is to be ascribed the honor of first succersfully demonstrating the practicability of the plan by devising a means and proving its value by direct experiment. The patent of Sir Francis is dated May 31, 1836, and it claims " a propeller, whether arranged singsingly in an open space in the dead wood, one on each side of the same, or more forward or more aft, higher up or lower down, completely or partially immersed." This was afterwards modified to make the screw of a single tliread, a double thread, or of a thread of two turns, located singly in the center of the dead wood. On obtaining his letters, Sir Francis constructed a small steamboat of 10 tuns burden
nickel it ; but if due care be taken, the results will amply pay for the trouble.-Boston Journal of Chemistry.

## SIR FRANCIS PETTIT SMITH.

Sir Francis Pettit Smith, an inventor whose celebrity in connection with the development of screw propulsion and its introduction into steam navigation is worldwide, recently died in England. We publish herewith a portrait of this eminent man.
Like many others to whom mankind is indebted for great inventions, he began life as a farmer, a calling which gave little promise of leading him to the conceptions which have

terminated in such priceless results. Possessed of a strong taste for meshanics, however, he soon abandoned agricultural pursuits to prosecute his favored study, and to carry on investigations and experiments in the subject which, from an early date, engrossed almost his entire thoughts. In 1834, at twenty-six years of age, wo find him trying models of
and six horse angine power, which he tried on the Paddington canal and on the Thames river with satisfactory results. During the following year she was put to sea, visiting points along the coast, and proving so completely successful that the Lords of the Admiralty directed further investigation into the invention, with a view of its introduction into the Royal Navy. Mr. Smith, aided by the Messrs. Rennie, engineers, then constructed a larger vessel, the Archimedes, a ship 155 feet long, of 237 tuns burden, and ninety horse power engines. The old periodicals before us contain numerous reports of this boat's performances, but there is a vein of dubiousness running through all the comments, that shows that the editor had little faith in the new fangled idea.


In 1839, however, he published a cut of the new vessel, a portion of which, showing the screw, we reproduce in facsimile. A, the blade of the propeller, forms an angle of about $40^{\circ}$ with the shaft, and is made of iron plates. $B$ is the frame in the dead wood of the vessel. The diameters of the screws used were 5 and 7 feet, and their lengths $7 \frac{1}{2}$ and 8 feet. It is curious, at this day, to read the remarks made upon the invention, in the article accompanying the engraving: "It has, altogether, great defects, which will prevent it from competing with the common paddle wheel, both in point of economy and of power:" "Useless, on account of the impracticability of keeping the whole screw under water:" " Engines and boilers will requirs the whole space up to the deck:" are examples in point. In a number of the same journal, of later date, is a most elaborate treatise on the subject, in which the author completely demonstrates the screw to be absolutely worthless; but despite this wholesale condemnation, the inventor calmly continued his experiments, built more vessels, and ended by proving bis device so unequivocal a success that the Government began to apply it to naval ships. In 1842 H. M. S. Rattler was constructed, and a series of investigations made by Mr. Smith and Mr. Brunel to determine the best proportions of the screw; while, at the same time, another craft, the Alecto, was built on precisely the same lines as the Rattler, but with paddle wheels, in order to institute a comparative test. The superiority of the Rattler was so evident that the Admiralty at once ordered the Queen's yacht Fairy and twenty other vessels to be built for screw propulsion under Mr. Smith's direction.

The subsequent rise and progress of the system is within the memory of most of our readers. Before 1850, when Sir Francis retired from the business, more than a bundred
vessels of all classes were built or in process of construction. At the present day, by far the majority of steamships in the world are propellers, and but a single side-wheel vessel is to be found among the great lines which ply across the Atlantic.

Some three years ago Mr. Smith was krighted, in recognition of his eminent services; and for a considerable period he held the post of Curator of the Patent Office Museum at South Kensington, England. The Admiralty purchased his patent right for $\$ 100,000$.

## New Imitation of Silve

In the Scientific American of January 24, is described a patented process for obtaining a metallic alloy which resembles silver better than any substance jet known, with respect to color, specific gravity, malleability, ductility, sound and other characteristics. The new alloy is a compound of copper, nickel, tin, zinc, cobalt and iron. If this new metal is as periect as represented, there may be a good chance for coin counterfeiters, etc., to start a flourishing business in making trade dollars, halves, quarters, etc. We had a call this week from a distinguished personage in this city, whose authority and influence is well known to members of our community. He thinks the metal referred to should not be made, and has therefore issued the following
PROCLAMATION:

Fearing that the granting of a patent for the imitation of silver, such as mentioned in the Scientific American of the 24th day of January, 1874, may lead to endless frauds in the silver currency of the country, nmo, therefore, we, Norton I, Dei Gratia Emperor of the United States and Protector of Mexico, do hereby command the Commissioner of Patents to cancel the said patent, and declare the manufacture of such a metal a penal offence.

Norton I.
Given in San Francisco, Cal., this 3d day of February, 1874.-Mining and Scientific Press.

## Dr. Hall and the Scientific American

It is not often that we copy what others say of us, but the following comes from one whose opinions are so generally respected that we select it from a multitude of other testimonials, and give itplace:
"Scientific American. Weekly. $\$ 3$ a year. Now in its 30th year. It is one of the best' conducted newspapers in the country, and in its line it has not an equal in ability in the world. It is not only adapted to the wants of mechanics, inventors, and scholars, but, as a family paper, giving most valuable information of a domestic character and about home life, it merits very general patronage. Moral, reliable, and self.respecting."-Hall's Journal of Health.

Reports of the Franklin Institute Committee on the Mode of Determining the Horse Power Steam Boilers.-As may be learned from our advertising columns, the reports of this committee, which contain the results of much research, of value to engineers. are now printed in pamphlet form and for sale at the Institute.

## importance of advertising.

The value of advertising ts so well understood by old established business firms that a hint to them is unnecessary; but to persons esta blishing a new business, or having for sale a new article, or wishing to sell a patent, or find tance of advertising. The next thing to be considered ts the medium through which to do 1
ranc mall, dicrellan determine that papers or magazines having the largest circulation, among be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the vendors of any new article in the mechanical line, we belleve there is no other source from which the adverScientific American.

## We do not make these suggestions merely to increase our advertising

 The Scientific Ambrican has a circulation of more than 42,000 cop per week, which is probably greater than the combined circulation of a the other papers of its kind published in the world.
## PATENT OFFICE DECISIONS.

## United States Circuit Court--District of Massachu-

 setts. [In Equity.-Before Shepley, Judge.-Dectided January 1, 1874.]
an original patent for a apint for ships, bottom, "copper ore in



 Fithout it, and to add earthy ingred lents which retard the solution of the
coppergkestion contained in a prior patent for purifying of of turpentine
and





Supreme Court of the United States.
 trict of Illinols.-October Term, 1873.]


$\mathfrak{c c c}$

in our judgment the patent tn this case is void for wantof novelty in the
aliegea inventingi. The decree, therefore, muat be aflimed a and it is af
firmed accordingly.
Supreme Court of the United States.
 PLAINTIFFs in trib
William e. Dodge.
In error to the Clrcuit Court of the United States for the Southern Dis trict of New York.-October Term, 1873.]



##  <br> sot <br> $\mathfrak{c}$




## NEW BOOKS AND PUBLICATIONS.

Physical Geographi. $\underset{\text { F. By John Young, M.D., F.G.S. }}{\text { M. }}$ F.R.C.S.E., etc. $\$ 1.50$. New York : G. P. Putnam's Sons corner of Fourth avenue \& 23d street.
This book will prove a welcome addition to educational itterature, from the fact that it collates, In compact form, the most recent knowledge re-
garding the physical condition of our planet. In discussing formation, the writer draws largely upon the teachings of geology, and in some degree upon those of astronomy, in every instance in which these sclences border upon his subject. Ethnological and archæological information of value is aso incorporated, so that the work, as a whole, is a comprehensive and sclence. A few llustration are interspersed, and a coptons inder in added. As its title indicates, the book is a reprint, and ls designed by the
the american Historical Record, and Repertory of Notes and Queries concerning the History and Antiqui-
ties of America, etc. Edited by Benson J. Lossing, LL.D.
$\$ 4$ per annum. Philadelphia: John E. Potter \& Co., 617 Sansom street
This valuable publication is still chlefly occupled in searching out and wheserving information concerning the early history of our country, a work
which is vitally necessary to our future historians, and which could carcely be in abler hands than those of the eminent scholar and archæologlat who edits it. Among the many pabitations which reating.
none that is more worthy of close and attentive readin

The Portable Atlas, consisting of Sixteen Maps. Con structed and Engraved by John Bartholomew, F.R.G.S.
Price $\$ 1$. New York: G. P. Putnam's Sons, corner of Price $\$ 1$. New York: G. P.
This is a reprint of an English work, and hence the majority of the maps elate to countries under British rule. The plates, however, are finels exe
cuted and printed, and are valuabie in that they show the resits of rece cated and printed, and are valuable in that they show the results of recen
explorations. This is espectally the case in the map of Africa, in which the ocalites now inseparable from the name of Livingstone are accurately Surcharged and Retaining Walls. By James S. Tate C. E. Also, Treatise on the Compound Steam Engine. By John Turnbull, Jr. Nos. 7 and 8 of Science Series. Each 50 cents. New York: D. Van Nostrand 23 Murray and 27 Warren streets.
These useral little pablications deserve the attention of practical men
The book on the compound steam engine contains much valuable informa.
The British Journal Photographic almanac, and PhoTOGRAPHER's Datiy Companion For 1874. Edited by J. T. Taylor. London: H. Greenwood.
E. \& H. T. Anthony \& Co., 591 Broadway.

A handy book of reference, excellently gotten up, and lssued by the con Actors of the Britiah Jour
well known to our readers.
The Birth of Chemistry. By G. F. Rodwell, F.R.A.S., F.C.S Price $\$ 1.25$. New York: Macmillan \& Co., 38 Bleecker This ilttle work is a valuable resume of all that is known of the origin
nd history of the chlef of the sclences. Mr. Rodwell's contributions to ontemporary knowledge all bear the mark or much thought and original $y$, and deserve to be produced in a form more permaneut than the page ag wook to the list of their Nature Series.
Eviry Saturday contains the cream of the English itterary periodicals and should be in the hands of ress-one by Thomas Hardy, a riting English novelist to whom critic have accorded a position little inferior to that of George Ellot. A new ditorial department, occupylng the last two pages of each number, ha been added; a change which cannot fail to render the journal even more acceptable, from the fact of its thus assuming an indivainty which poblishers, Messrs. Hurd \& Houghton, 13 Astor Place, New York, ofie Enery Saturday and the Atlantic Monthly together for $\$ 8$ per annum, or Every Saturday, mingly, for 85 .
Inventions Patented in England by Americans. Complied from the Commlisiloners of Patents' Journal.]
Bottle Stoppre. - N. Thompson (of Brooklyn, N. Y.), London, England. Compound Strai Emanis.-T. L. Jones, Natchez, Mise.

elizctric Annusolator.-L. Finger, Boaton, Ma
Electric Machine.-H. J. Smith, Boston, Mass.
Elrotric Machink.-H. J. Smith, Bobton, Masb.
Electric Triegrape--W. E. Sawyer, Wabhington, D. C
Elfctric Trlegeaph.-J. B. Stearns (Boston, Mabs.), London, Eng.,etal Horst. - W. Hart, Philadelphia, Pa.
Indicator.-S. D. Tillmann, Jersey clty, N.
Kaleidoscopz.-J.Colltcott, Boston, Mass.
Lamp.-C. H. Leighton, Lowell, Mass.
LAMP.-T. S. Wiliams et al., Boston, Mass.
Mode of Complot -D. T. Casement Palnesylle, ohio.
Redjoina Fubnack.-J. Willon, Dover, N.
Regenterative Furnaog.-T. s. Blait, Pitteburga, Pa
Ribbon Loom, btc.-E. P. Chapin, Prorldence, R. I
otary Engine and Pump. - W. R. Manley, New York city.
awing machine Cabinet.-H. R. Tracy et al., New York city

## zerent 2 mericau and fortign equtents.

Improved Pneumatic Station Indicator
James P. Kealey and Joseph Rigney, Bridgeport, Conn.-A case contains a roller and a chain of name plates. The roller is turned the width of one race at each station to present the plates having names of the stations in ront of the sight opening, and the name plate chain cannot be carried eyse the car should be run beyond its route on another section or division andit is held ready for running back on its own roate. Springs are employed to allow the roller to turn in case the mechanism for turning it is kept in operation after passing beyond the terminal station, and to pull the roller back each time. This will be found desirable in case the car should get coupled in a train for a road or station to which it does not belong, with
cars having annunclators for that road, so that its annunclators would of necessity be coupled with the others, and so have to be worked that the others may be.
Improved Finger Bar for Harvesters. Victor N. Collins, Dixon, Cal.-The bar is formed with a top sloping backear side. The fingers are formed unt upper edge, and with flanges on the of the bar, and are frmly secured so that they cannot turn out of place. The top plate for the bar is made of a wide thin strip of fron folded back on gulde for the carrier ; and sald plate ts bolted to the finger bar. There is an upward inclination of the top plate at one end to cover the end of the endess carrier as it rises up over the pulley at that end on which the carrirr work. A spring lo atcached to pald plate athe other end to gulde sal rain carrler down under the upper gaide.

## Improved Car Coupling.

Willam B. Morgan, Shelby City, Ky., and Henry D. Wallen, Jr., Gran Raplds, Mich.-The forward ends or faces of the bumper heads are rounded
off: they are made oblong or elliptical in thetrgeneral form. In the face of the bumper heads is formed a high and narrow opening, with stralght ends and curved or concaved sides. The coupling hook has in one end an eye to er heads to pivot the said hook to sald bumper heads. The parts of the bolts that pass through the slots of the sald bumper heads are flattened, so hat the said bolts cannot tarn to work the nuts screwed upon them loose The boits may be ralsed and lowered, to adjast the position of the hook to he bumper the sdjacent car. In the forward lower part of the moath of orward en heads are formed or secured inclined plates for the beveled forward e
together.
Improved Carriage Seat.
John A. Althouse, New Harmony, Ind.-This invention consists in mak Ing a seat adjustable so as to ft wagons of different widths, and also in th
manner of fastening the seat to the sides of the box, and in the arrange ment of the seat springs. The seat conslsts of a plece of board provided with bed pleces, which are rabbeted, so that, when they rest apon the top edges of the wagon box, the joints are covered by flanges. The springa are made of sheet steel, and are secured to adjusting plates attached to the seat by screws, which pass $t$ hrough the slots. These slots allow the plate ing the seat to wagon boxes of any ordinary width. The ends of the ing the seat to wagon boxes of any ordinary width. The ends of the
springs are attached to the bed pleces. Clamplngscrew hoors pass throug the bed pleces and hook to the inner sides of the side boards, and are ightened thereto by means of the lever nuts on the outside.


 spiltting the samc. In the case of the egg carrier are arranged, tin tiers placed one above the other, the cells for the exgs, which are formed of
purallel strips of one serles, and interlacing strips of the other series ver tically to them. The first strips are provided with silts cut from each edge to ward the center under right angles to it , lcaviog the central part undivided. The second strips are provided with a central slit, of the same width
as the uncut part of the first strips, together w!th a narrow V shaped aperas the uncut part of the first strips, together w!th a narrow $V$ shaped aper-
turc, stamped out, through which the first strips are, by bending them, introduced and adjusted, so as to interlock and form a tier of cells, which may be easily lifted from the case without detaching from each other. The top of the case is provided with two side strips. which slip along the side of the
case and rest on the side strips of the same. The top is connected to the case by merely slipping springs down, till they interlock with metallic
bands, forming a frm and safe antachment of top and case, and obtaining a


Improved One Wheeled Three Horse Riding Plow.
Robert C. Alrey, Highland, Ill.- The short axle may be adjusted to set Robert C. Arrey, Highland, Ill.-The shortaxle may be adjusted to set the
wheel, and at an angle to the beam ; and by sultable means the line of Wheel, and at an angle to the beam; and by saitable means the line of lat ed. The plow beam is hinged to the cross beam, so that the plow may
be swung out and in, as desired. The forward end of the beam may be be swung out and in, as desired. The forward end of the beam may be
raised and lowered to cause the jlow to run out of and into the groand, as desired, and the seat
Improved Buckie.
George H. Lefevre, Winneccnne, Wis., assignor of one half his rigit to with a metallic is provided with one or more holes to recelve prap. The other end of the stra, is passed through the buckle and then through the loop, thas orowd-
ing the end of the strap upon the ping, and holding it there. The buckle ti ing the end of the strap upon the pins, and holding it there. The buckle is
readlly detached by reversing this operation. With this loop a broken strap readily detached by reversing this oper
can be attached to a buckla with ease.
lmproved Fruit Jar.
Thomas Hale and Henry Hale, Wales, N. Y.-The upper part of the can s made in the form of a wrench section, so that such an instrument can be
fitted over it. On the cap, which screws to the neck of the can in the usual manner, is formed a ball through which two holes are made on oppo-
site sides. A rod is placed through these apertures, and by it, as a lever,the cap is easily unscrewed or

Improved Needle Sharpener for Sewing Machines. John L. Woodruft, Easton, Pa.-This invention consists of a curved arm Which is attached by a set screw to the sewing machine table, and which
carries at its upper end a rubber wheel, connected to the fly wheel of the machine, through which the needle is passed to be sharpened by asmal whetstone

## Improved Registeri Valve for Water Heatere

 George H. Tucker, Mllwaukee, Wis., assignor to himself and James CRicketson, of same place.-This invention relates to valve mechanism fo egulating the admision or water to a boiler feeder. The wateris supplled to the heater through a plpe connecting with a shell. Sald shell is essen-
t lailly globular in form, and has a diaphragm joining its dlagonally opposite aides, and forming, intermediaiely, a fiat seat for a disk valve. The valv the valve. A spiral spring encircles the stem, bears on the valve, and it arranged or fitted in a circular recess in the plug, at its opposite end. A screw passes through the side of the shell, and bears against the short gulde stem of the valve, to prevent the pressure of water in the plpe above from
holding the valve. The means of operating the valve is a float working in a olding the valve. The means of operating the valve is a float working in
a tank which communicates with the heater. To relleve the foat of undue friction, rollers are employed. The connection between float and valve it by extension rod and arm, the lattcr being fixed to the valve stem. When
the water rises or falls in the heater, it rises or falls correspondingly in the tank. The float will have a like and simultaneous movement, and hence
the valve will be turned one way or the other, as required, to admit or shat the valve will
off the water.
Improved Lever Motor.
John Stone, Millgrove, Mo.-This invention relates to imparting mechancal power to a drive shaft through the pendulum movement, and consiats in the mode of combining the pendulum with the crank pitman and an ctuating lev
Improved Fountain Pen.
William E. Thomas, Queenstown, Md.-THis invention relates to that oserve as an ink reservoir; and it has for its object to improve the conos serve as an ink reservoir; and it has for its object to improve the con-
truction of said pens, so as to render the same more conventent in use and effective in operation than others heretofore constructed.

## Improved Water Meter.

John Waterhouse, Chicago, IIl.-This invention relates to apparatus de signed for measuring water from service pipes as it is dellvered to the consumer. The waterfrom the induction plpe runs into and fllis one compart.
ment, forctng the air contained theren through an and plip into the other ter in one compartment descends to a certain depth, a float will follow and pull the long arm of a lever oul
ward, which releases a short arm, and allow a welght to fall. A the same ward, which releases a short arm, and allow a welght to fall. A the same
time, a welght in the other compartment, which is submerged in water ascends and catches on the short end of the lever, which operation change tubs, whencc it pasies through the front of the meter in a watertight packing, and terminates in a
approved regiatering apparatus.

## Improved Suspender.

Franklin 0 . Painter, Middletown, Ct.-The button straps and the shoul-
der straps are pivoted to a pivot plece of sheet metal, their ends belng provided with a metallic plate, so that they readily turn on the pivot, and The back button straps are also tipped with metallic plates attered The back button straps are also tipped with metallic plates attached by and adjust themselves to the position of the button on the pants. The front button straps are also provided with metallic plates, attached as hereto-
fore described, and connected with theshoulder straps by a plvot. These fore described, and connected with the shoulder straps by a plvot. These
straps render freely on the pivot, and are allowed to adjust themselves to straps render freely on the pivot, and are allowed to adjust themselves to
the position of the front buttons of the pants. By connecting the pants with pivots, self-adj
twist in putting on.

Improved Gas Burner.
Cornellus Bogert and Helry Medinn, New York city.-This invention consists in arranging a plug centrally in the discharge aperture of a burner to cause the gas to pass out in thin vertical sheets, thereby exposing more sur-
face to the air, becoming thus more completely oxydized, and therefore giving its maximum of illumination

Improved Oil Tank.
sburgh, Pa., assignor to
hat
Hazen Titus, St. Petersburgh, ea., assignor to.himself and Thomas Cush Ing, same place.-This inventlon has for its oblect to furnish ofl tanks or
reservors, take place, the exploded gases may escape freely, and the cank may be the oll. The invention consists in oll tanks provided with a number of
openings, closed with hinged covers, to allow the exploded gases to escape freely without injury to the tanks. The covers are so arranged that they
will fall back by their own weight as soon as the pressure is removed, and will fall back by their own weight as soon as the pressure is removed, and
lightiy close the tank, smothering the fire and preventing the oil from

Improved Dental Impression Cup.
George shindler Fouke, Westminster, Md.-This invention ap for taking impressions for dental plates, so constructed an improved rect manipulative pressure to be applied to the soft parts of the roof of the mouth after the ordinary pressure has been applied. By this means parts of the arch of the moath, rather than upon the hard parts, thus distributing the pressure, and securing a better fit and a more effective atmospheric plate. The invention consists in an impression cup that is pro-
vided with a flexible lining on the inside, and with "cut-outs" or apertures ided with a flexible lining on the inside, and with " cut
hat expose the ascending sides of the alveolar arch.

## Improved Heating Range.

## $\underset{\text { ran }}{\text { I }}$

 nges, and consists in several improvements whereby it is contemplated economize the fuel used in the warm seasons of the year and utllize the In raising the temperature and comfortably warming other apartments of Improved Wash Boiler.am was, Plach detachable combines the advantages of a steam cleaning and bleaching apparatus. It consists in a novel arrangement of hot water passages and side air cham-
bers, together with valve connections for the circulation of the bolling water. By means of hinge connections of the sides and the bottom, the Washer may easily be inserted Into any form of boller of suffictent size, thc
bottom belng also provided with a central parttion bottom belng also provided with a central partition for producing the
separate action of each half of the washer. The invention further consists in applying to the botcom of the washer a chamber or receptacle to hold acids or other chemicals for removing stains or bleaching the clothes.
Improved Elevator.
Charles F. Stewart and Milton Stewart, Muncte,
ates to apparatus for holsting bricks to different parts of a building in rocess of erection, which may be adjusted to various hights and easily pplied to the aldes of the building. The supporting frame of the apparatus is made of timber, and the lower ends of its side pleces are plvoted to
shoes of a strong lateral plece, which again turns by a central bolt in a stable base part of strong timber. The base part rests on the ground, and remains firmly in position thereon, while the main frame mas be swang into
any any direction and inclination required. For the purpose of transporting the elevator from one place to another the base part and plece are brought
under the frame, so that the whole takes up less space. The main frame is extended to different hights by the silding frames, which are sultably
guided and are of different widths, one belng narrower than the other, the gulded and are of difterent widths, one belng narrower than the other, the
wider one forming the support and guide for the narrower. By a suitable arrangement of rollers and ropes connected with a crank, the extension frames are hofsted to the hight required by the state of the bullding. The
buckets are of a size large enough to take up one brick at a time, and are trached to an endless belt which passes over drums which are rotated. The bricks are deposited by the buckets in a chate which is inclined, down hlch they sllde

Improved Automatic Gate
Jacob Grobb, Clinton, Can.-This gate is opened and closed by means of e confined to the ground, so that it may freely vitrate back and forth from an upright position. The top of the frame is connected with a slid-
ing bar, which communcates with the fastening spring of the gate. When ing bar, which communicates with the fastening spring of the gate. When
the gate is closed, the frame is inclined and stands at an angle with the surface of the ground of about thirty degrees. One end of the cord is attached to one leg of the frame, and then extends to an upright standard, Where it passes through three more tackle blocks, the same as before,from Which blocks it is returned, and its other end is fastened to the other leg
of the frame. When the cord is drawn, the frame will commence to rise, of the frame. When the cord 18 drawn, the frame will commence to rise,
and in dolng so will draw on the sllding bar, and thereby draw back the astening spring and unfasten the gate. Theframe will be drawn to an upight position when the gate is abont half open, or at an angle with the
oad of about forty-five degrees. A continued pull opens the gate entirely, and inclines the frame in the opposite direction, and to about the same angle at which it stood when the gate was closed. The gate is closed by
pulling the cord in an opposite direction, and the same effect ts produced pulling the cor
on the frame.
Improved Stock Feeder.
Ulyses Borel, Sue City, Mo.-A rectangular inclosure is designed to conain the hay or feed for.the stock. Racks are applied to its outer side, below
openings therenn, whicl
atter are closed by doors ecuredtit the sides of the he doors are opened or lowered, they are supported on the racks by meen of the links. The inner stdes of the doors are thus turned outward, and
form upward continuations of the racks, enlarging their capacity, and aldform upward continuations of the racks, enlarging their capacity,
ing in preventing the hay from falling over them on the ground.
$\xrightarrow{\text { Improved }}$ Burglar Alarm. ne operated by an escapement and scape wheel, and the other by a con necting rod and crank, the crank and the scape wheel belng turned by a
wheel on a drum, containing a clock spring, which revolves sald drum, when it is tripped and let free to turn by disengaging the lug on it from a stop lever. In order to cause this stop lever to trip the drum, a cam lever
is conuected with the window or door by a wire, to be moved one way by the pulling of the wire by the ralsing of the window or opening of the door. The cam lever is also connected with a spring pulling in the of tho
site way to trip the drum, by pulling the cam lever in that direction tn site way to trip the drum, by pulling the cam lever in that direction in
case the wire is cut or detached from the door or window, and thus is provided an alarm which, it is claimed, cannot be evaded by cutting or detiaed an alarm which, wires, which has been done to other alarms of this character
taching thening
before opening the window or door. by means of instruments inserted in before opening the window or door. by means of instruments inserted in
the cracks or by cutting away the casing. Suitable mechanism is arranged the cracks or by cutting away the casing. Sultable mechanism is arranged
for tripping a hammer which, striking a cap, IIghts a fuse and a candle.

## Improved Eaves Trough Support.

Thornton F. Morrison, Findley, O.-The roof bracket is a simple strap of metal, slotted at one end to recelve the hanger, and perforated at the other
to recelvenalls for fastening to the roof. The cross tie is made triangular in cross section. The hangers are made in two pleces, which are passed
directly through the thes and then hooked under the bottom. The tie is made of two pleces, soldered together. and soldered to the eaves trough at each end. The upper end of the hanger passes through a alot, and is
clasped around the edges of the bracket. When the hangers are attached clasped around the edges of the bracket. When the hangers are attached
to the thes and to the bracket in this manner they do not get loose, but

Improved Car Coupling.
oux City. Iowa.-The cavity of
Frankin Thorpe, Sloux City. Iowa.-The cavity of the bumper is madein Frankm of arectangular chamber, to the rear end of which are attached vertical plates, the upper sides of which are inclined or curved. In the
erward part of this chamber is placed a block having two fnclined nlates projecting from its rear side. Upon the upper part of the forward, side of the block is formed a lip which, when pushed forward, supports the coup.
ling pln. The lip profects over the fnner end of the link, and holds sald cent car. A triangular bar, which crosses the chamber of the bumper, rests upon the inclined edges of the plates. To the bar is attached a rod,
which passes down through a hole in the lower side of the bumper, so that Which passes down through a hole in the lower side of the bumper, so that
a weight may be attached to it to draw the bar down with sumflent force to push the block forward when the coupling pin is withdrawn. By this
construction, when the coupling pin is withdrawn, the bar pushes the block construction, when the coupling pin is withdrawn, the bar pushes the block
forward, so that the coupling pin may rest upon the lip. As the cars are run together, the entering link pushes the block back, allowing the coupling pin to drop through the link, coupling the cars.

Improved Stone Tool.
on, Pa.-The object of thisin
Thomas Joyce, Scranton, Pa.-Fine
points, so that a number of different bits may be alternately inserted, as re

Improved Seed Planter.
William C. Plerce, Pushmataha, Ala., assignor to Knighton \& Willi s,same
place.-This invention consists in a frame hinged to the beam of the planter, supported by a wheel at its lower end, and having a hopper plv and down. This motion is given to the hopper by a bar, which is struck by pins attached to a small wheel whichengages with the supporting whee first mentioned. The hopper sildes upon an adjustable plate at 1 ts forwar end, which has a hole formed through it, through which, when the hopper
rises, the seed escapes and drops to the ground. The side of the hole through the plate is regulated by a slide, placed upon tis rear side, Which passes up through the silt in the cross bar. To the rear side of the
silde, a little a bove the discharge hole, Is attached a bar. which projects forward and downward, to prevent the seeds from scattering, and to gulde them downward into the furrow. A gate sildes up and down in grooves in
the sides of the hopper, and in its lower edge fs formed a notch, so that, by the sides of the hopper, and in Its lower edge is formed a notch, so that, by
ratsing or lowertng the gate, more or less seed may pass back and escape ralsing or lowering the gate, more or less seed may pass back and escape
through the plate and silde. The forward end of the bottom of the hopper is cut a way, and in the opening thus formed are placed two or more rods in place by a screw, which passes through a slot in the false bottom, and screws into the hopper bottom. With this construction for planting corn
and other seeds in hills, the gate and plate are adjusted so that, by each revolution of the large wheel, the desired number of kernels may be
dropped to the ground. For planting small seeds in drills, the space through which the seedspass is partially closed by adjusting the plate, and per in constant motion.
Improved Stock Feeder.
James M. Collins and William A. Mlles. Atlanta, Mo.-To posts are at
tached slats to form the crib. The. Inner sides of the middle posts are tached slats to form the crib. The Inner sides of the middle posts are
grooved longitullinally to recelve the edges of the board, to divide the crib grooved longituilinally to recelve the edges of the board, to divide the crib
into compartments, so that it may contan corn in the ear in one part and into compartments, so that it may contain corn in the ear in one part and
shelled corn or oata in another part. The floo of the crib, which rests upon strips, has an upwardly projecting flange attached to tis outer edge grain is admugh for the stock to eat from, into which the corn or other attached to the posts. To the latter also are attached strips which sup. port a floor made inclined, so that it may ve self-cleaning, in the pro-
jecting parts of which,that form the bottom of the feed troughs, are formed jecting parts of which,that form the bottom of the feed troughs, are formed
trap doors, which rasa be opened and the refuse from sald troughs pushed into the hog house ben erib, Just above the slidftg doors, and flare outward. To the middle parts of their upper edges are hooked braces, the inner ends of which are secured
Harbert K. Forbis, Danville, Ky., assignor to himself
same for making mortises by bortng into the wood, and at the same time cut ting edges along the sides formed by say, two grooves extending from the cutting end along each side to the shank, and vanishing in the surface thereat. There are also cuttlig bits formed on the end by a deep notch made between sald bits, which project on each side of the notch. The bits
bore into the wood, while the cutting edges form the mortise laterally.

Improved Safety Attachment for Pockets.
Willey Henry Calrns, Petrolia City, Pa.-This invention has for its object to furnish an improved gaard for atiachment to pocket books to prevent
the posibillity of their belng drawn from the pocket without the owner's liso to the of the pocket book. The other end ed to two bars at a little distance from their outer ends, which said outer ends project at the side edpes of the pocket book, and have rubber blocks attached to them to nrevent them from cutting or tearing the pocket. The
other or inner ends of the nass in nivoted to each other and to the end of a short sllding bar which passes through a keeper attached to the side of other or freeend. By this construction, by drawtng the allding bar up ward, the projecting ends of the bars woll be drawn inward, allowing the pocket book to be readily removed from or inserted in the pockct. By
puitable construction, when the silding bar is released, $a$ spring causes the rubber-tipped ends of the bars to project and rest against the pocket, and witheut the the pocket book

## Improved Truss Brideg.

John A. Patterson and Andrew J. Sprague, Toledo, o.-This inventien consists of modifcations and improvements in the construction of the Howe truss bridge. It is proposed to omit the end posta and pler panels
commonly employed at the ends, mainly for making a finish thereat, and for a finish to apply metal façades of any ornamental construction, at tachng them to the upper ends of the first diagonal braces, and the beam
connecting the top chords. The angle blocks for the foot rests of the proper angle for being at right angles to the braces which rest on them with end plates and middle plates for strengthening them, projecting downWard from the lower sides to rest on the floor timbers. These plates are
slotted to straddle the coupling pin. which is suspended on vertical sus. pending rods, which pass through slots in the plates of the angle block. These plates terminate at the lower edges sufflclently higher than the plane them to the pin, whereon they are suspended. The fioor tmbers are sus. pended from these coupling plns by short rods and the foot platef, the rods having an eye in the upper end, through which the pins pass, and pass
through the foot plates at the lower end, and receive a nut, by which to through the foot plates at the lower end, and receive a nut, by which to
hold the plate. To connect the horizontal brace rods of the lower chord to the floor beams, the flat wrought fron plates with oblique holes are emIn making the angle blocks, it is proposed to cast the under sides and the plates on metal chills, to make them sufficlently smooth and complete to be put in place wilhout having to be finished.

## Improved Permutation Lock.

Wilhelm Koch, Cincinnati. O.-For opening the lock, a dial knob is turned n ane direction till the pin of a driving wheel engages the tongue of a first tombler, the pin of the first tumbler the tongue of the second, and so on
untll all the tumblers are in motion. The dial plate is then set with the first letter selected to the index mark, carried thence in opposite direction to the second letter, and so on alternately in oppoitte directions till the
tumblers are in position for admitting the fence of the fence lever. The driving wheel is then set so that a pendulum rests upon cross pins ; then lifting, by a return motion of the knob, the pendulum lever and releasing
the fence lever, which engages the driving wheel and rotates the boit lever the fence lever, which engages the driving wheel and rotates the bolt lever
and bolt, bringing the recess of the face disk into position to recelve the bolt of the safe door. The lock may be set to any combination of letters on the dial plate by placing the tumblers into their position, as described, by using, Instead of the index mark, which is vertically above the dial
plate, the side mark, which brings the recesses of the tumblers under the spring rings in position for the action of the wedge lever, and allows the entering of the wedge teeth and the changing of the tumblers to any dclock opened on the index mark.

Improved Selcoiling Bolster.
John D. Wells, Jr., Putnam, Conn.-This invention consists of an ofl
chamber in the hub of the ear, which runs on bobbln; there is a small passage fromic the bottom of the chamber to the hole through the wheel for the bolster; and a slot is made in the latter to the spindle, by which the ofl supply is carrited from sald chamber
and delivered to the bolster only while running. From the bolster the ofl ands its way through the slot to the spindle, in a manner calculated to la bricate the parts efflctently, and at the same time economize the ofl. The oll passage from the oll chamber to the bolster hole of the gear prevents
the waste of oll while the machine is not running, in consequence of being the waste of oll whille the machine is not running, In consequence of being
so small that the of nly fow when thoparts are in motion.

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List rree. Goodnow Wightman, ${ }^{2}$ Cornhlll, Boston,Ms.

W. W. S. can inprove his bottled beer by
pollowing the directions on p. 107, vol. 29.-W. G. F. wil

 directions on p. 3 so, vol. 26.-J. B. B. R. \& Co. Will And a
rectpe for Babbitt metal on p. 122, vol. 28. - H. W. C. will nd directionsfor making transfer or impression pape
 he papier mache decorations are desertibed on p. 16, vol.
 fully described on p. 119, vol. 30 .-L. C. will find a good
 ries, by Henry Dircks, C. F.
R. G. asks: " To one gallon of gasoline, add
one tablespoonful of sait, one tablespoonful sal soda, pounded fine,and $a$ plece of alkanet root one tinch long. Is this a rectpe for a safe onl? A. These bodiles do not
dimintish the danger of burning very llght and cheap olls diminish the danger of burning very 1 IIght and cheap onlis
in kerosene lamps, and fatal accidents happen every day
L. D. C. asks: Which is the best treatise on
 $\xrightarrow[\text { H. W. C. asks: Will you give me a recipe }]{\text { Hiser }}$

J. W. R. asks: How can I make a paste that
WIIIstick paper rimp tonew bright tit? A. Mixa ta. biespoonnule
four paste.
T. asks: Where can I procure a work on
steum heating? A. Box on "Heat" 18 a standard anthority. Se
addreses.
J. J. asks: 1 . What will make plue remain
sott and elastic atter it is dried on cloth tion of caoutchouc debcribed on p. 251, vol. 29 witlil per. haps serve your purpose. 2. How is em
ery cloth? A. The best glue is used.
 in water.
S. asks
S. asks: Can you give me a recipe for ma-
king an Imatitato of roseroot without the use of nitric
 ver a quick fre. Use this on a groundwork atalned
R. H. asks: 1 . How are red and green fires
made? A. Red llght 1 s a maxture of nitrate of stron tia, sulphur,and chlorate of potash. Green 11ght 18 a mix-
ture of carbonate of baryta with sulphur and chlorate
 ourning these Ares, constist? A. The smoke 18 a mix.
ture of the sulphides of barlum, strontium, and potas. ture of the sulphides of barlum, strontum, and potas-
summ, with zulpharetted hydrogen, ponitric acta, carbontc actd, hypochlortc and chlorong
actds,and the chlorides of sulphur and potassium. All these bodies monld be unpleasant and some very in.
jurions to breathe. s. A young man burnt his hand by Igntitng these; what is his best remedy? A. The burned hands should have been wrapped in strips of soft llinen
or muslin, which were covered over with a mixture of equal parts of 11 neeed and sweet oll.
G. S. T. asks: 1. What is the most simple
form of anemometer? A. A good one is described on Yorm or anemometer? A. A good one 18 described on
p. 246 , rol. 28, and another on p. 23s, rol. 2e. 2.
can I Where

C. S. asks: How can Iobtain the frosted ap-
 mode will be to experiment with muriatic, nitric, and other acclas ant1 you get the desired results. 2.
ingredients are used as a paint for fancy gildin The metal mas be gill by ualing a solution made by dis. 201ving as much gold in aqua regta as it will take ap.
Fine linen rega dred, and afterwards burnt to tinder. The sabstance to be gllt must be well polished ; a plece of cork 18 frst dipped Into a solution of common salt in water, and ar
terwardisinto the tinder, which is well rubbed on the terwards into the tinder, which 18 well rubbed on the
metal to be gill, and the gold appears with its proper
C. R. asks: How can I make fumigating
 of cloves. Powder the frist four and mix by Biftting
Add the ottos, and also 2 ozs. of niter which hat been


A. M.T. says: 1. I have constructed the tel-
escone described on p . 7 , vol. 30 and $I$ have had perfect satisfacton so far in seetng the mountalna and crater of the moon, which were visible very platnly. In have Impossible to do so wthout different arrangements. How can I look at the sun with the above named tele-
scope? A. Put as many pleces of red glass between scope? A. Put as many pleces of red glass betwen
the eypeptece and the eye as will enable you to look a part of the heasens can I find the How and in wha Nautitcal Alimanacas glvee the position for every alay and
hour during the year. See our Astronomical Notes, hour during the year. See ore Astronomtcal Notes,
published monthy., Where can I find the nebule?
$\underset{\text { M. W. W. M.-A }}{ }$ preliminary be examination ton packing. See our advertisement in this 18sue.
C. T. S.- Such a trap could be constructed J. W. B. asks: Does pure hydrant or other
non-stagnant water contain animalcule? If power of microscope is required for detectitg them
A. Pure hydrant water should not contain animalcule.


 pearance? A. Kalsomine has no glaze. It should have
been so mixed that it would nave been titn enough to work well, without belng too $t$
to your other questlon No
C. E. W. says: We have recently introduced
a new system for makking gas from petroleum ; and for safety's aake, we use only olls that have all volatile gas es, such as naphtha, rhlgoline, benzIne, etc., driven of
by heat or otherwise. The only objectlonable teature

 uefing gardily auy pressure. What is the cause of the
 Yortheitrperfect combustion. In a Alshatil burner, the gas at the moment of combuation is in contact with the
air only on the outstde of the flame. Youn mast use
some torm on interlorof the flame.
E. B. S., F. C. R., F. E. P., A. F. S. C. H. J. .

W. J. S. asks: Is the Walter printing press
sed in this country? A . The Walter press is is use in M. asks: 1. I have a plunger pump attached tlons ner minute. Thls pump has the full stroko of en.
gine. The dellivery plpe and suction pipe are of the same size ; and when the engline runs fast, the check valve thumps dreadfully. I cannot nee the pump when she 18
running fast ; but when running siow, it works very Well. There is an alr chamber on the dellvery valve.
Now w whs you would tell me what is the cause of this. Ithnk that, when running fast, the plunger leaves the water. A. Probably the plunger rung faster than the
water can flow into the pump. 2 . What do you call
 lowing the steam to expand without performing work.
3. Does it make any difference in leading the steam to a
 of the man who fros tivented the thermometer? A. It refers to the thermometric scale graduated by Fahren.
hett. The thermometer was not invented by Fahren. hetit, but he irst made mercurtal thermometers. 5 .
What tis the greateest perpenduccalar higat to whic a
Leet. D. S. asks: 1. Are there any rules for L. D. S. asks: 1. Are there any rules for
Anding the ditatance and vanishling polnts from Nature? An Englleh work says there are none.
A. No. Noneare needed.
To sketch from Nature, one must learn to see correctiy, and this must be acquired
by practice. In drawing itieal pictures, the distance
 Who pablishes the best book of instruction on pencil and Inda Ink drawlings? A. We know of none that we
can recommend. Many are published, however. We do not belleve that free hand drawing can be learned
rom books. s . What kind of palint are used for palnt. $g$ plectures on the glass sildes used in magic lanterns?
C. asks: : What sized boilers shall I require
giveme steam enough to do the followng work: To seep dryitg chambers, so feet in deptli, with end and ne
ery 4 feet, and with total front of 36 feet, neated by one tnch collisteam plpe at a temperature of $156{ }^{\circ}$ Fah.
nght and day. To supplysteam at 60 lbs. pressure to an a 12220 engine for 6 hours per day. To supply steam
 tineer.
T. C. H. asks: How can I make transfer pa-

E. H. B. asks: : Why does pork, when it is
siled fithe wane of the moon, shrink from the bone W. T. Mc.L asks: Who was the scientist
Nuttail? He seems to have been one of our most thor ough naturalists in botany and ornithology. A. An En-
gllsh naturallst who resided for some years in this counry. He explored nearly all the States of the Union; nd was, from 1822 to 1834 , Professor of Natural History
A. R. G. asks: Would a turbine gain any
ower by having two splral flanger or buckets run up the sbast to the top of the penstock? A. No. There
18 a certaln proportion of the hight of the penstock to Which the splal flanges can be extended with economy.
But puttug such flanges all the way up only distributes
W. G. B. asks: When patent claims are even tit it be for the same purpose, is not insertung them
he same thing as trying to get several patents by mere. paying for one? In reality, is not the combtnation the only thnng patented? A. The patent relates to one nust be put in a separate application.
$\underset{\text { W. . A. M. . . Asks. How can I make corn }}{\text { A. In }}$ rain is steeped in water for some days till the saccharine porilion ferments and the starch granules become
reee from glutinous matter. The sour liquor is then what hat passes through is allowed to eettle, the 11 lquid
galin drawn off, and the starch washed from the flimy water. Itts then dratined in perforated boxes, and dried y exposure to the heat or to the air. In treating corn,
bout 200 grains of alkall, in the form of caukllc soda, are added to each gallon of tlquid to facilt ate the sepF. C. asks: Is there a chemical compound
which, applited to paper, will be decomposed bv an electric current passing on a write in contact with it, so as
to leave a permanent mark? A. Yes. Prussiate of
G. P. H. asks: How many feet of gas does
ne burner burn in one hour? A. It depends on the size of the orifice asf the burner. The larger the orifice. the more gasescapes. Street gas burnera are generally
bored to burn three feet of gas per hour. Five feet
W. W. H. asks: Is there any danger of in-
furtng the enan e elon one's teeth by cleaning with an or dinary brush and water twice a day? A. No. The dangel but the entire eanstance of the teeth will sooner
ent
M. C. M. asks: 1. . How can I find the con-
enta of a cylldrical cosel or drum that samall be equal
 of a cylllder? A. Find the a rea or the base of the cyl-
indrical vesel, and divide the contents of the box by hat area. The quotlent will be the hight. Or if the IIght 18 given, divide the contents of the box by that, a caveat for a patent have to undergo the same exam-
ination as an application for a patent?
A. No examinaHon is required in filling a caveat. In applying for a paent afterwards, the eame regulations must be complied
With asif you had not taken out a caveat. G. C. H. asks: How can I construct a simof disease? A. The magneto-electric machlne is the
one generally used for the admintis ration of electricty
 siven, elther to the whole body or to the particular pet, or an electromagnet, for which a battery must be
ned ased, is employed on generate a seconary current in a
long coll of fine wrre. Consult some good phystclan as G. T. P. asks: How can I make a leather
cement? ${ }_{\text {A. }}^{\text {D. Dissolve } 1 \text { part caoutchouc in } 3 \text { parts chlo }}$.
H. E. R. asks: 1. What solution is used in plating with nckel, and how can I make it? A. The
nckel salt used in plating is the doable sulphate of nckel and ammonia. It will probably save you time, trouble, and expense to purchase th1s 8alt already made
romthe manufacturers who oupply the nickel platers In New York. 2. Is there any aubstance which, if added
to the eolution, will cause the plating to appear bright, will thave to appear burnished? A. You can pollsh
P. D. asks: 1 . What is the quantity of cy-
ande of
potasesum required to preciptate 5
penny meights gold from the nitro-mariatic solution? if too nuch cyanide be used, how can I recover the gold that
nas been disoolved by cyanide tin the acld solution? A. About1 pennywelght 16 graing. You cannot dissolve the cyandide of gold by cyandde of potassium in the actd
solution. 2. What are the proportions ased to make a gold solution (about 1 quart) so as to get a good yellow. bright color on chatins? A. Agitate ether with a solu-
tion of perchlorde of gold for some time, allow it to epose, and decant the supernatant portion. 3. What tis
 trade mark or brand of some kind of tallow. 4. How
can I braze thin sheets of copper and biass for cooking
 and po edered borax made tnto a paste wth w er. The Whole 18 then allowed to dry, and arterwards exposed in
aclear tre to heat suffletenty to melt the solder. Spelter the commerel
the plumber.
A. B. asks: 1. What ingredients are used
in the manuacture of Pharoan's serpents' egre? Pharonh's erpents are sald to consist princtpally of the
sulphocyantde of mercury, whitch we would not adrise yon to attempt to make, but to apply to a chemtist, and then to be carefulin using. 2 . What win remove su-
perfuous halrfrom the head and not injure the skin les or balr removers. We do not advise you to use How can I eepare more of les8 indurlous to health. 9 . without injuring it for drinking purnoses ? A . If you
istill your home made alcohol, obtatning a klnd of brandy, and only water will
 ground up with a litlte gum water. $A$ cheap gold tink is
made with what is called mosalc gold, the blaulphnre
as
E. R. McC. asks: Can a patent be attached
a debt of the sinventor? or a debt of the Inventor? A. No. An injunction
might be granted in a proper case, preventigg its trans.
C. R. M. says: Kainit, as suaally sold, conper cent sulphate of nat masesia, 4 to 5 per cent chloride
5 of magnesia, 35 to 40 per cent chloride of sudum, and 10 to 12 per cent sulphate ol llme. I want to use it as as substute for ashes (Whtch I cannot get), as a manure
for onlons. What Is its probable eflcacy?
The potash and ealt are good, but is the sulphate or magnestia
likely to be injurious? A . The large proportlon or pot. sh in kanint should render it superior to ashes as a fer tillzing agent, and we do not believe tha
will materially affect it in this respect.
H. A. S. says: 1 . On page 27, current vol-
me. in your answer to M. w. per minute is recommended as the proper speed for the
ims of circular saws of all sizes. I think that, other things detng equal, the speed of the rim should be in he ilttle foot power saw by compound proportion thus: If a saw with teeth one inch apart, ruming with six horse po ver, cutting nine inch lumber, requires a peed of 9, coo feet per minute, what should be the speed a a saw wher and reeth wifth and
 ust the right speed for a foot power saw, but I think it would be correct if 9,000 is just right for the supposed
six horse power saw. The smaller saw might, however be made to saw smoothly by running at a higher speed think the resson that your correspondent's saw did ess work at the nigher speed was that more power wa required to cut the sawdust finer, and more was lost in economizing friction. A. Your theory does not agree with the results obtained by experiment. 2. Not long the temper of steel. Is it true? As the temper depends on the internal structure of the steel, and the oll can reaci only the surface, I do not see why the tempe should be injured throughout. A. You are right. 3. A wrat speed should a power drill run? A. In wrough
ron, the speed of the drill should be about 12 feet a minute.
R. C. says, in reply to S. G. F., who asked about filtering water: if he can dig a trench, paralle
with the stream, arrange a filtering gallery and filter the Water through the bottom of his gallery, perha
would help him out and give no further trouble.
W. S. D. says, in reply to J. M., who asked If a check wall under the back end of a steam boile
will save fuel: Bulld a bridge wall just 1 foot forward

of the back cud of the boller. up to 4 inches from the bottom of the boller, and then another wall just at the walls, to hang down 8 or 10 nnches below the top of the ridge wall. Let the second wall come close up to the
boller. You will save fuel eaclis day enough to pay you for your trouble and expen
cape into the smoke stack.
G. S. D. savs, in reply to A. M., who asked now to find the welght of a person's head without cut
ing It off: Attach to the person, as high up as conve atent, an ordinary rubber bag or Ilfe preserver with tube and stop cock. Immerse the apparatus in water, and
force air into the bag until the head is entirely above he surface. Secure the bag of air in any suitable ves the vessel with water, andiweigh. The difference be ween these two weights will equal the weight of the T. V. says, in reply to T. J. McM.'s quessquare of one of the parts may bs double the square o the other? Let ab be the given line. Draw ac, ma rigt a right angle with A B, and draw B C, making $3 /$ right angle with sane line; at the angle C, draw C D
a right angles to $C$. Then the square on $D$ B is double

What would become or a body dropped tuto a hoestion pass ing through the earth's center? This question has bee By the prodistous mione following opinions given: By the prodigtous momentum acquired in falling, th
body would pass out at the opposite side into space. That it would move to the opposite surface, return $t$ the starting point,and viorate for ever from side to slde.
3. Tbat these vibrations would lessen and the body fin ally rest at the center. I hold that none of tnese opin ons are correct, but that the body would fall to the ce one. In general, the momentum or inertia of a moving
body is represented by the product of its velocity and weight, and may be formulated thus: $m=\nabla \times w$. When th body reacaes the center of gravity, belng attracte equally in all directlons, it has no welght; and the form
ula becomes $m=v \times 0=0$. That is, the momentum of falling body ceases at the center of gravity. Nothing then remains to cause it to pass that point. Will some mathematician calculate the culininating points of the
velocity and momentum in the descent of a falling veloclty and momentum in the descent of a falling
body? I opine the former is much nearer the
M. J. M. says, in reply to R. T. and others $\underset{\text { who asked for a recipe for wood filling: Take s ibs. corn }}{\text { M. J. M. . }}$ starch or silver white, 1 lb . pulverized pumicestone,
pint bolled ofl ; add Japan varnish enough to dry the ofi,and turpentine to make it the consistency of thit to turn white, then commence rubbing with a cotto cloth, always in a circle and against the grain of the wood. For cleaning the filling out of carving, make a brush of halr cloth by removing the thread from the hair, leavitg the halr about an inch long; rollitt tight
and fasten with tacbs. Set the wood aside for one day to dry. After it has become dry take seven parts of
bofled ofl, one part of naphtha, and oll the work with it clean with cotion cloth. You will find that the wood will be very white before a pplying

Minerals, $\operatorname{mTC}$.-Specimens have been received ?rom the following correspondents, and xamined with the results stated
G. L. E.-Your specimen consists of dark colored inamalinein quartz. Tourmaline is a silicate N. M.-These spectmens are iron pyrites, and are of 11 value at the present time.
A.-The mineral sent is graphte or plumbago: which, ou know, is co
races of iron.

## COMMUNICATIONS RECEIVED.

The Editor of the Scientific American cknowledges, with much pleasure, the re cipt of original papers and contributions pon the following subjects :

On Death Statistics. By S. B.
On Ventilation. By S. W. and by W. S Jr On the Art of Tanning. By D. S.
On the Duration of Brain Impressions and Memory. By D. S. T
On the Use of Petroleum in Steam Boilers. On J. B. W.
On Canal Navigation in Winter. By C. P On the Cow Milk Tree. By C. L.
lso enquiries from the following:
H. W.-N. T. W.-C. A. M.-F. L. R.-J. H

Correspondents in different parts of the country ask Who furnishes small castings of a low grade of steel Where can infusorial silica be obtained in large quanties? Who makes feed water heaters? Who makes fil not explode when the water gets low Whe oring machine, sultable for hubs for setting boxes, ove Where can asbestos be obtained? Makers of the dvertising, in reply, in the Sorientifio Amenicas. Correspondents who write to ask the address of certann anufacure, artners, should send with thetr communications an mount sufflecent to cover the cost of publication under he head of "Business and Personal," which is spectally
evoted to such enquirles.

## Index of Inventions FOR WHICH <br> Letters Patent of the United States February 3, 1874, <br> and each bearing that date. <br> [Those marked (r) are relssued patents.]

## Allgnment instrument Artist's kit, T. Campe

Awning. D. C. Bamper
Bale tie, c. Driscoll
Bale tite, o. R. MeClean
Bale tue, C. H. Schnelle
Barrels and kegs, washing, L. Langguth
Bedstead, wardrobe, J. L. Ferguson.....
Reehive, Bobo \& Joh
Beehive. A. Canniff..
Bench and step ladder. comblned, C. Hood
Blacking box. C. W. Beebee...
Boa and muff comblned, J. Rt
oa and muff combined, J. Ring.
Bonler feed and regulator,
Boller, wash, $\mathbf{c}$. H. Strumb.
oot pac, Weaver \& Hawkin
Boot and shoe inner sole, J. P. Doty.
Boot soles, stamping figures on, L. G. Swett
Bot turned seam, S. W. Shorey (r).
outifener, A. H. Willoughby
Bottle stopper, P. Hayes.....
Box, packing, W. D. Woodruf
racelet fastening, H. Stone.
Buckle, S. S. Hartsh
Building, freproof, P. H. Jackson.....
Batton hole cutter guide, A. W. Web
Calsson, portable, J. Brown
akes, making, D. B. Fulle
Car brake, G. Westinghouse
Car coupling, Gates \& Root.
Car coupling, O. and W. Roc
Car coupliag, C. P. Russell..
ar door, street, J. Stephenson
Car, refrigerator, J. J. Bate.
Car, safety, J.T. Worley....
Car seat, head rest for, W.
Car spring, G. F' Godley
Car starter, E. Ames...
Car starter, D. Warren
Cars, pedestal for rallroad,
Carpet cleaner, H. S.Allison
Carpet fastener, G. Gerardi
Carrlage door, G. Kellner.
Casting mold boerd, J. Ollve
Casting mold board, J. olve
hain, P. Kaurman................
Chain for necklaces, etc., 1 . Cottle
Cair, folding, Little \& Prindle
Clothes line attachment, D. W. Smith
Clothes wringer, roller for, S. Ellis....
Column, wrought iron, C. H. Kellogg
orn cutter, green, B. Merritt.
Cornices, etc., comp
Cradles, apparatus for rocktng, D. Nash
Cultivator, Risley \& Rogers.
Cartain fixtare, Buckley \&
Cartain fixture, C. Fisher

## Dental apparatus, E. O. Smith. Derrick, Setton \& Jones..... Dispensing effer

## Dispensing effervescent 11quilds,

 Dredgers, grappler for, A. T. Morris (r)... Dyeng cotton, A. Keller. Engine, rotary rectprocating, T. A. Risher ngine feed water heater, J. Vandevelde Englne variable exhaust, S. J. Dampman. qualizer, draft,B. D. Morton. Evaporator in vacuo, F. O. Mat
Ese glass, L. A. Berteling...... Faucet, pumping, J. G. L. Boett
Feather duster, J. L. Little..... Fertilizing compound, R. Birdsall. Felt fabrics, finlshing, J. E. Pollar
Felted fabric, J. E. pollard Files, etc., tempering, C. Engel Fruit jar fastening, J. Koeberle.
Furnace ix, Nelison \& McNeff.
Furnace inx, Nelson \& McNeff...............
Furnace, reverberatory, E. Helligendorf Furnace, reverberatory, E. Heligendorfe Furnace for steam boflers, D. T. Casen
Furnace, reverberatory, J. Ostrander. Furnace alr distributing pipe, A. Ra wso
Furnace, combustion in, D. Casemení. Gage and ruler, marking, E. Church Gate, farm, W. Bowman...................
Gear, pawl and ratchet, J. M. Rosebrook Grain decortcator, J. Hollingsworth. Grate, J.D. Silchter.............. Hair plcking machine, J. Doylc............
Haster fastener and cattle tie, G. Russell Harness hame, P. Hayden.

## Harness pad, J. Engelke.

## Harness saddle, P. Burns.

Harvester, J. W. Webster..
Heater feed water, I.P. Magoon
Heater. feed water, I. P. Magoon..
Heater, feed water, J. Vandevelde
Hoe, sulth C ,
Hoop machine, J. Penney...........
Horses, detaching, I. L. Landis.
Horses, detaching, I. L. Landis.
Hose coupling, Bannt. Le \& Per
nkstand, H. P. Andrews.
roning Doard, J. B. \& D. H.
rroning Doard, J. B. \& D. H. Horne
roning board, J. B. \& D. H. Horne
Jack, lifting, J. N. Crosoy.
Jack,
Ifting, J. T. Guthrie
Jeweler's ring gage, F. E. Alle
Jewelry, etc., jolnts for, G. H. Fuller
Knife. fork, and spoon, S. W. Francls. Lamp fonts, collar for, W. N.
Lamp, hanglng, J. Retnhold.
Lantern, pocket, J. J. \& W. M. Walton.
Lathe for turning wood, J. B
Lathe feed adjusting device, L. P. Sherman.
Leather, spiltting, G. Reynolds.
Leather, etc., cutter for, A. De
Level, grading, J. Thornley
Loading lumber, etc., J. D. Sm
Lock, seal, H. Ahrend.........
Locomotive draft, G. Wingate
Loom shuttle, E. G. Spalding
Loom shuttie, W. Murkland.............
Loom let off, J. B. Fuller........
Loom weft stop, s. Scholield.
Loom weft stop, S. Scholfe
Marble, etc., molding, R. Ardrey.....
Marble, rotary cutter for, R. Ardrey.
Match boxes, catch for, C. Buckley.
Medical compound, E. C. Jurgensen.............
Mold factng compound, B. Kane.....
Molding composition, W. E. Brock.
Moldings, gluing, J. H. Browa.......
Movement, throttle valve, E. Nich
Mowing machine. J. Carmean.....
Nut lock, w. M. Spacht.
Oill, paint, A. B. Lahgshor
Oiler, hand, A. W. Elmer.
Oller, hand, A. W. Elmer.
Organ, reed, c. w. Vogel
Organ stop action, reed, c. W. Vogel
Panels, etc., composition for, W. E. Brock
Paper folding machine, s. C. Forsaith
Pavement, C. C. F. Otto.......................
Perfuming upholstered furniture, A. Pitma Photographic head rest, G. B. Ayres. Pipe coupling, J. Dohmer
Pltman, L. Dederick..
Planter, corn, S. B. Davis
Planter, hand corn, W. C.
Planter, seed, G. Owen...
Planter, seed, G. Owen........
Plated ware, base for, J. Gepso
Plow, H. Blue
Plow, sulky, R. Newton
Pocket book, J. G. Alb
Press, Y. F. Wright.....................
Projectle for ordnance, A. Wright.
Propulsion of canal boats, w. A. Kirby
Pruning sheers, $W$. H. Collige Pruning sheers, W. H. Collings
Pump, double acting force, D. Pump rod attachment, D. Bly. Pump valve, W. D. Hooker.....
Pumplng apparatus, B. Dutton Pumpling apparatus, B. Dutton
Railway signal, C. Sammons.....
Rallway switch stand, R. A. Rash Rallway tlme signal, D. S. Neal
Rake, horse hay, E. W. Tucker. Rake, horse hay, E.
Range, A. Deaerick.
Renge, A. Deaerick........................ Roofng tile, S. S. Perr
Roofing tile, G. Manvel..
Sash fastener, W. H. Jon
Sash fastener, W. H. Jones..
Sash holder, R. B. Hugunin.
saw gum
Saw mill dog, I. W. Pool.
Saw mills, log turner for, G. H. ...........
Saw teeth blanks, etc., rolling, N. Johnson
Screw caps, scoring, F. W. Perry..
Screw driver, G. P. Loomis.
Sewing machine, W. Muir,
Sewing machine, w. Muir,

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| :--- |
| 147,180 |

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Sewing machinc caster, G. W. Eddy............. 146,997 Sewing machine caster, G. W. Eddy.............. 146,997
Sewing machine table, Marchand \& Hutchinson. 147,14 Sewing machine lamp. Church \& Driscoll.......... 146,988
Sewing machine treadie, N. \& C. Dubrul....... 146,994 Shoe fore part tron R S. Bubb. Dubrul Skate, J. Forbes (r)...
Skirt, felt, J. E. Yollar
Skylight, G. Hayes ...
Skrlight bar, G. Hayes
Slate frames, dressing, T. W. Parry
Spading machine, J. Glles....
Sploning wheel, F. Voegtil..
Splaning wheel, F. Voegt11.
Spring door, A. A. Stlmson.
Spring, furniture, w. T. Doremus..............
Squares, marking corpenters', H. К. Jones
Stage machinery, W. Hyland.......
Steel, manufacture of, T. Brooks.
Ster
Stove leg, J. Blegler
Stove and hot arr furnace, T. J. Whtehead
Telegraph insulator, P. Eby
Telegraph register, Morse, J. E. Smit
Telegraph, printing, J. E. Smith.
Thelli tuph, printing, J. E. Smith
Tool, N. K. Ellsworth...
Top prop block. W. N. Barn
Track hifter, W. H. Penrose
Toy whistle, H.J. Wade
Toy whistle, H.J. Wade .........
Trap, antmal cage, Beach \& Jo
Trap, insect, F. Defranceschint
Truck, J. M. \& J. L. Jones..
Truck, A. V. Smith ........
Trunk lld support, R. W. Vannem
Tunnellng, art of, D. C. Haskins.
Twine box, O.F. Fogelstrand.
Valve, balance slide, E. Heyde..
Valve, globe, R. Nutty...............
Vehtcle head block. P. M. Gutches.
Ventlator, F. Brenzinger......
Wagon brake, Brown \& Groze.
Wagons, runntug gear uf skeleton, E. P. Carter
Wall protector and toilet rack, H. Borchardt...
Washing ma'chine, N. Denny...
Washlng machlne. J. B. Stonet
Washlng machine. J. B. Stoner...
Well tube clamp, Sha \& Beatty
Whiffletree, L.H. Webb.
Windmill, L. L. Ray...
Windmill, P. A. Splcer
Windmill, W.H. Wheeler
Window cap 3, forming, R. A. Smith.
Winnower, rotary, T. H. Dr....
Wire wheel, G. D. Dudley.....
APPLICATIONS FOR EXTENSION:
Applications have beenduly fled, and are now pending
for the extension of the following Letters Patent. Heartigs upon the respective applicationa are appointed for the days heretnafter mentioned:
28,108.-Lentier Finishing Machine.-W. P. Martin.
or, Aprill 15.

April 15.
28,139.-Sewing Machine.-G. B. Arnold. April 22.

$$
\begin{aligned}
& 28,174 .- \text { PIcT } \\
& \text { April } 22 .
\end{aligned}
$$

28,181.-Blenishing Boot Soles.-E.T.Ingalls. April
28,184.-Cemient Pipe Mold.-H. Kntght
 28,193.-Cclltivator Teetu.-D. B. Rogers. April 22.
$28,24$. -Ruffle.-G. B. Aruold. April 22. 28,314.-Water Wheel.-A. M. Swain. April 29.
28,470.-SLiver Machine.-F. T. G.ant. May 13. EXTENSIONS GRANTED. 27,CS4.-Harverter.-J. Butter.
27,743.-Umbrila Stand lock.-A. m. Foote.

## DESIGNS PATENTED.

7,148.-Sililld.-G. W..Dauth, Reading, Pa.
7,149.-Sirup CuP Plate.-J. Jepson, West Meriden, Ct 7,150.-SLEIGH. - F. D. Kenuedy. Albany, N. I
$7,151 .-$ SLEIGH.-J. Lodewick, Troy, N.Y.

 7,157.-Labels.-S. Ward, Boston, Mas

## TRADE MARKS REGISTERED

## 1,611.-Cigars.-J. H. Battis, Salem, Mass. $1,612 .-$ Oils.-J. A. Bostwick \& Co., New Sork city.

 town, Md.
$1,615 \& 1,616$.

1,618.-Floub.-J. stabler, Baltimore, Md.
1,619.- BIscuir.-Thurston \& Co., Cambridgeport, Mass.
1,620.-SAWs. The Wheeler \& Co. Manufacturing Coum pany, Middletown,N. Y:
sCHEDULE OF PATENT FEES.
On each Caveat......
On each Trade Mark.
On flling each appitication for a Pa
On lisgulng each original Patent...
on appeal to Examiners-In-Chief.......
on appeal to Commisioner of Patente
On application for Retssue.
On granting the Exteus
On filng a Disclaimer....................
Ou an application for Design ( $3 / 2$ yeara
On application for Design (i years)...
On application for Deatgn (14 years)..
LSpectally reported for the Sclentific Ame
CANADIAN PATENTS.
List of Patents Granted in Canada,

$$
\text { Februaity } 11,18 \% 4 .
$$

3,095.-J. P. Manton, G. H. Remington and B. D. Thayer
Providence, R. I., U. S. Improvements on ship's Providence, R. I., U. S. Improvements on ship's
windlasses, called "Improved Pump Brake Windlasses windlasses, called "Improve.
for Vessels." Feb. 11, 18i4.
3,096.-H. Hills, G. W. Mills and Wm. Mc. Lockwood.
Highland, Oakland county Mich inghland,Oaksand count, yinch., U.S. mprovements Feb. $11,1874$.
097. - F. W. Rhinelander, N. Y., U. S. Improvements 3,097.-F. W. Rhtnelander, N. Y., U. S. Improvements
on boot and shoe tups, called " Rhinelander's Enam-.098.-W. H. Lunt, Cambridge, Mass, U. S. Improve-
ment in ilters, called " The Lunt Filter." Feb. 11,
s.099.-E. Smart, Brockville, Leeds county, Ontario
Improveme Molasses and Oll Gate." Feb. 11, 1874.
on a signal lamp, called "Hannaford's Stationary SI nal Lamp.". Feb. 11, 1874. s,101.-H. A. Holmes. Epsom, Merrimack county, N. H. Doards, called " Holmes' Clapboard Machine. Feb. 11, 8,182.-Wm. Fuller, Montreal, P. Q. Composition of plastic mater
Feb. 11, 1874.
3,103.- Wm. X. Stevens, Brook field, Worcester county
Mass., U. S. Improvements on shears forcatting bar and rods of fron or other metal or material, "called "Stevens' Improved Bar Shears." Feb. 11, 1874.
3,104.-C. E. Blake, San Franclsco, San Francisco county sisting in a means of ents on dentistry, the same con gold fllling for teeth, whereby sald filling is also ren dered more durabie, and also of an improved metallit foll for dental purposes, called " Blake's Improved
Flutng for Teeth." Feb. 11, 1874. 3,105.-G. J. Wilson, Ottawa, Ontario. Improvement on
a machine for drying clothes, called " Wilson's Eure ka Clothes Rack." Feb. 11, 1874. ,106.-G. Young, Oshawa, Ontario county, Ontario called " Young's Improved Shuttle." Feb. 11, 1874 . 3,107.-F. Culham, Widder Station, Bosanquet, Lamb-
ton county, Ontario. Improvements on nut fasteners ton county, Ontario. Improvements on nut fasteners
of rallroad rails, called "Culham's Patent Nut Fastener of Rallroad Ralls." Feb. 11, 1874.
Improvements on pumps, called '" Munstinger's Im proved Pump." ${ }^{\text {on }}$ Feb. 11, 1874 .
3,109.-W. H. Cutler, Buffalo, Erie countr, N. Y., U. S.
Improvements in portaole inhaling tubes, called "CutImprovements in portable inhaling the
ler's Inhalling Tube." Feb. 11, 1874 . Improvements in carccuplings,
Car Coupler., Feb. 11, 1874.
s,111.-H. McKenzie, Marquette, Marquette county,
Mich., U. S. Improvements on apparatus for leaching Mich., U. S. Improvements on apparatus for leaching,
called "McKenzie's Perpetual Leach." Feb. 11.1874 . "Cheminee Portative." A portable chimnes. 3,113.-A. Anderson, London, Middlesex count 5 . Ontario.
Improvements on coupling for rallroad Improvements on coupling for rallroad cars, called Comblncd." Feb. 11, 1874.

## HOW TO OBTAIN

## Patents and larvalts

 IN CANADA.PATENTS are now granted to inventors In Canada, without distinction as to the nation-
ality of the applicant. The proceedings to obtain patents in Canada are nearly the same as in the ish a model, with specification and drawings in duplicate. It is also necessary for him to sign and make
affldavit to the origluality or the invention.
The total expense, in ordinary cases, to apply for a The total expense, in ordinary cases, to apply for a
Canadian patent, is $875, \mathrm{U}$. s . currency. This includes Canadian patent, is 875 , U. S. currency. This includes
the government fees for the first five years, and also our
( Munn \& Co, B ) charges for preparing drawings, spectif. slunn and ans and prepang drawings, specia The holderof the patent 18 entitled to two extensions of the pat
all the rights of the inventor.
A small working model must be furnished, made to any conventent scale. The dimensions of , the model
should not exceed twelve inches. If the invention consists of a composition of matter, gredients, must be furntshed.
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Practical Hints to Inventors.


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and others, who have amased Immense fortunes from their inventions, are well known. And there are thousands of others who ha More than Fiptr Triousard in inentors have aval
$\left\lvert\, \begin{aligned} & \text { TWENTY-SIX years they have acted as sollcitors and } \\ & \text { Publishers of the Soirntirio Amcrions. They stand at }\end{aligned}\right.$ the head in this class of business ; and their large corps of assistants, mostly selected from the ranka of the Patent Offle: men capable of rendering the best service while examiners in the experience pracucally obtalin Co. to do everything appertaining to patents BETTRB han any other reliable agency.
HOW T0
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ry letter, describing some invention which comes to the
nflce. a complete application for a a onten be had by presenting of Patents. An application consists of a Model, Drawings, Petitlon, Oath, and full Specification. Various effictarts of the inventor to do must also be observed. The efrorts of the inventor to do all this business himself are
generally without success. After great perplexity and delay, he is usually glad to. seak the aid of persons expe-
rienced in patent business, and have and rienced in patent business, and have all the work done
over again. The best plan is to sollcit proper site over again. The best plan is to solicit proper advice at
the beginning. If the parties consulted are honorable the beginning. If the partles consulted are honorable
men, the inventor may safely confide his ideas to them they will advise whether the improvement is probably
pat patentable, and will give him all the directions needfal To
To Make an Application for a Patent his applicant for a patent should furnish a model of it may be dispensed with; or, if the invention be a chem ical productlon, he must furnish samples of the ingredients of which hls compostition consists. These should
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addressed to addressed to MONN \& Co., 37 Park Row, together with a description of its operation and merts. On recelpt
thereot, they will examine the invention carefully, and advise you as to its patentablity, free of charge. Or, if you have not time, or the means at hand, to construct a
model, make as good a pen and ink sketch of the im provement as possible and send by mall. An answer as che prospect of a patent will be recelved, usually, br
return of mall. It is sometimes best to have a searct made at the Patent Offlce; such a measure often saves

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In order to have such search, make out a written description of the invention, in your own words, and a
pencll, or pen and ink, sketch. Send these, with the fee of 85, by mall, addressed to MUNN \& Co., 37 Park Row, there in due you will recetve an acknowledgmen thereof, followed by a written report in regard to the
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