a WeEkly JOURN L 0F PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

## IMPROVED NAPPING MACHINE.

Our engravings illustrate an improved machine for rais Our engravings illustrate an improved machine for rais.
ing the pile or nap on woolen and cotton fabrics. It appears to be well calculated for the intended purpose, and is undoubtediy a very ingenious invention.
In Fig. 1 is given a perspective view of the machine, which is intended to be run by steam or other power. It will be reen to consist essentially of a central cylinder and four sys tems of rollers, all of which are operated by the one driving riphery the cards
or teasles by means of which the pile is raised. Each system of rollers performs rollers perforws the duties of carrying in the cloth, presenting it to the operation of the napping cylinder, and carry: ing it away again to a fitting receptacle, as shown in the engraving. It follows, therefore, that as many pieces of cloth may be napped as thereare systems of rollers; and theirnumber may of course be in. of course be in-
creased or dicreased or
minisbed accord. ming to accord. ivg to conve-
nience. As the nience. As the operation of the machine is complete in each system, an explanation of one will explainthewhole, and the rtader will now, therefore, please refer chavirm of the machine are shown in detail. ment, by a contrivance similar to that 1 y which the movement of the arms is circum scribed. To the napping cylinder, C , is at tachtd the inner gear, D. They both run loose on the shaft, $A$, and an intermittent revolving movement is produced in them by the action of the gear, B. The roll, E , which is run by a hand and pulley on the further $\&$ nd of the shaft, $A$, is arranged for keeping the napping cards, etc., clear. We will now examine the system of rollers The roller, F, is carried by the arm, G, th: further end of which is slotted and engages with the shaft of the roller, h, in the nerindicated by the dotted lines. The driv. ing arm of this system (which is broken of in the engraving) has a rod, as shown, which passes through the slot, I, in the arm, G. The outer $\epsilon$ nd of this rod is provided with a pivoted arm, J, which is adjustably attached to a lever, the oth $\epsilon$ end of which
carries a spring pawl, which latter actuates
carries a spring pawl, which latter actuates a ratch $t$ wheel attached to the shaft of the roller, H. This ratchet actuating mechanism which is partly shown and indicated by dotted lines in Fig 2, is so fully shown in Fig. 1 as to require no further explanation, and it will readily be seen, on inspection thereof, how the outward movement of the rod results in a partial revolution of the roller, $H$. The two rollers geared to H , of course, make corresponding movements in the opposite direction. At K is the cloth to be napped; it passes from the recess in which it lies round the
lower roller, between that and the roller, H , round the roller $F$, and thence between the roller, $H$, and the one above it whence it passes over a small outside guiding roller into a suitable receptacle.
In the operation of the machine, on each revolution of the driving shaft. the napping cylinder is moved forward slightly in its revolution and brought again to a stand, while the roller, F, which presents the cloth to the napping cards, is moved eccentrically away from and then towards the cards; at the same time the action of the ratchet device causes a partial revolution of the roller, H , and the cloth is conse-
shaft. The central, or napping cylinder, carries on its peto Fig. 2, in which one system of rollers and the driving me-

A is the driving shaft. To it is attached the eccentric shown, by means of which the four arms which operate the four systems of rollers are actuated and made to oscillate and to advance and recede alternately; their motion is circumscribed by a fifth arm, which siides on a fixed bearing at the lower part of the machine, as delineated. On the shaft, A, behind the eccentric shown is placed a second eccentric, by which the gear wheel, B, is worked. This wheel, B, is linited to an upward and downward and oscillating move-


LADD'S INPRUVES NAPPING MACHINE. the upper to the same extent. In this way evtry portion of new material is not likely to surpass the price of fine plaster the surface of the cloth is presented to the nappers, and the of Paris
By adjusting the ratchet mecbanism suitably, the roller, $F$, can be made to approach the napping cylindermore or less, as may be desired, and by this means the thickness of the layer of fabric raised into pile can be precisely determined, which makes the machine of peculiar value in the manufac ture of canton flannels, where the strength of the flannel is frequently jeopardized by the depth of the nap.


The process of manipulation remains the same; no novel ty of apparatus or handling requires to be introduced, whether the material be worked by an artist, by a skilled or common workman, and it is all th $\rightarrow$ se qualities combined wh ch render it of such very great importance as a substilute ior plaster of Paris for all arvistic works.
Another application of the same kind deservesmention, for it also possesses a high impor:ance. Any objoct whatsoever by the Cinque Centisti in the 16 th century, and was subse quently unfortunately lost.".
Like plaster of Paris, it may bo used for casts. It hardens slowly, and the artist hereby has all the time he requires Dry, it become very hard, and no longer receives stains. Even oil dropped on it then does not discolo it. And it can be cleaned and washed witheu in any way injur ing the most mi details.
Its color is transparent snow white, dull, or lus trous, if so want ed; for any part of the surface is sus ceptible, by sim ule friction, of as -uming a kind of crystalline enam el. Mixed with ordinary colors it retains all the pro perties above de The price of this
of plaster of Paris dipped into a bath of the composition comes out covered with a kind of enamel, the mostminute details remaining uninjured. The solution in the bath, which is called liquid enamel, has the following properties:
It preserves and cleans plaster of Paris ob jects without altrring, affecting, or injuring their minutest details; it gives them a beautiful transparency, and they may be left dull or made lustrous at will. It has no smell, and is not affected by exposure to great heat.

## An Engineoring Triumph

There is a German printing office in this city where the employees have adopted an ingenious method to gratify their Teutonic proclivity for good lager. The composing room is situated a good way up in the skies, far above sublunary things, indicating a cor responding intellectual elevation. It migh be supposed that under these cireamstances

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 might receive a check. The reverse in the case. The back door of a saloon and bar room opens into a yard near the printing office. A good stout telegraph wire has been stretched from a post in the yard to a window of the room where the intellectual "comps" perform their arduous labors. When a supply of the stimulant is required, the tiskling of a bell arrests the attention of the bar keeper, and a set of tins or buckets, filled with the sparkling beverage are drawn along the wire, and safely landed at the window.

Among the advantages claimed for this machine are the small space it occupies, the non-liability to get out of order and the facilities it gives for inspecting the work as it is performed. Should the fabric not be sufficiently napped on passing one set of rolls, it may readily be subjected to the action of another set before leaving the machine; and if it is designed to nap both sides of the cloth at one operation, he object is easily accomplished by passing it through a second set of rolls in reversed order. Piece after piece of
cloth may be carried through the machine by simply sewing he end of one piece to that of the next
The $d \rightarrow$ vice is patented, and further information in regard P. Ladd, of the Ridgewood Works, Bloomield, N. J.

## A New Molding Material.

Colonel Muratori. an Italian inventor, has recently discov ered a new composition corresponding to the gesso duro, stue co duro (hard plaster of Paris, hard stucco), which was used

It has been well said that necessity is the mother of invention, and thisis an apt illustration of the saying.-SS. Louis Republican.

The Manufacture of Textile Fabrics at Pompeli. Some interesting particulars of the ancient method of cleansing and finishing woven fabrics, as revealed by the ruins of Pompeii, are given by M. Beulé who inspected the remains of a fulling and bleaching establishment in the buried city. The house in question was unearthed some time back, but the descriptions of its contents seem to have been conifined to the pictures.
The largest and best executed paintings representative of the art were discovered in 1820, in the house of a fuller, opening on one side on the street of Mercury, and on the other on a street called, after him, Fullonica. In the couri, a pyillar covered with pictures was standing alongside a fount ain. This pillar has been removed and deposited in the Na ples Museum. In the lowest division, a woman, sitting, hands a piece of cloth to a little female slave. A workman, whose tunic is closely tied around the body, is looking at them, while at the same time carding a white cloak with a purple border, suspended from a stick. Aninther wortman is in the act of sitting down alongwide a crate of wicker work on which the cloth is to be spread out; in one hand he holds a vase on which sulphur thrown on burning charcoal will develop a gas cupablt of bleaching the cloth. This is the same method, says M. Beulé, which is used to day. On another face of the pillar, arched niches contain large vats where the goods are soaked. Slaves stanaing in those vats trample the fabric with their bare feet in the sime manuer as Arabiau women wash their linen by tramoling .them againss the rocky bed of a stream; this is what the ancients called "the fuller's dince" (saltus fullonicus). The artist lias painted with the same care the proas with its two $u_{F}-$ rights, its two enormous screws, which were turoed by means of cranks in order fo flatten the cloth beneath the planks which imparted the necessary finish. Finally, the drying chamber is shown by long sticks hanging on chains from the cciling. The linen is spread out on them; a slave hauds to a young woman an open fabric, while the wife of Uhe fuller makes a note of it on her tablets. I have visited with particular curiosity the houses in Pompeii where these pictures had been gathered. I counted there in a court trenty-two tanks constructed of stone, and at different levlg, so that the water could run from one into the other Little benches in front of them served for the reception of the goods. At the other end of the court, seven smaller
tanks served for fulling. The store room, with traces of tanks served for fulling. The store room, ${ }_{4}$ with traces of
the planks, which were laid like rays radiating from a cen the planks, which were laid like rays radiating from a cen-
ter, the heartbs, the drying chamber, may still be recognized In other fullers' establishments, I have seen very thick sheet lead lining the interior of vats made of cement Sometimes, also, we find jars full of greasy earth, which must be the fuller's earth of which Pliny speaks, and which contributed as much to the whiteness of th $\theta$ goods as th fumigation with sulphur or the urine which was collected in vases placed at the corners of the streets. Thus, deepite th differences of time and processes, it has been established, to our surprise, that moderns are but little inventive, rather, lial, rasional, and suited to the requirements of the art

## Hints for the Country.

In preparing grounds, it should be remembered, says th Crardener's Monthly, that grass and trees are not only re quired to grow therein, but that they must grow well. Th top soil of the lot is often covered by the soil from the exca vations, trusting to heavy manuring to promote fertility. But this is a too slow and expensive process. The top surface soil should, in all cases, be saved, and replaced over the base the top soil should be saved to place over again. The depth of the soil is an importan matter, both for the trees and the lawn. It should be at least cightcen inches deep. In shallow soils, grass will burn out under a few days of hot sua In a soil eighteen inches deep, a lawn will be green in the driest weather. For the sake of the trees, also, the ground hould be not only deep, but rich. If from thirty to forty loads of stable manure to the a rere could be appropriated, it
would be money well fyent. Life is too short for it to be an object to wait too long for trees to grow, and planting layge ores is an expensive as well as unatisfactory busi nees. A tree in a rich and deep soil will grow as much in one year as in five in a poor one. So in preparing a lawn, it is fortunate that, while aiming at the beat effects, we are helping our trees also. It is generally betier to sow for a lawn than to sed, where much of it has to be done. The aeatly rated oad must, of course, be sonded, and the balance mployed in seading is a disputed point, and it will, no doubt, depend in a great measure on the locality. In Pisiladel whia aud northward, the perennial rye grass is excmilent. It commences to grow very early, aud has a peculiar lively shining green, South of Philadelphia, it is very liable to get busned out in summer, and the Kentucky blue grass would be wuch better. It is much the best to have but one kind of grass for a lawn, provided it is suited to the locality. A mixture of kinds is apt to give a spotted and variegated
character, not at all pleasing. Some people like to see white character, not at all pleasing. Some people like to see white
clover growing thickly in a lawn and others object to anything but green. However, if a good grasa rake is employed freely in summer time, the heads of these fiowers may be kept from expanding. Where there is a prospsct of a month of growing weather, lawns may still be sown with grass seed, the clover, where used, to be kept for sowing in April
or March next. A small quantity of rye should be thinly sown with the grass, which, by the shade it affords, will pre vent the grass from being thrown out by the frost. The rye must, of course, be close
the grass to get ahead of it.

## Hilgard's Magnetic Survey.

It is a fact well understood by the unlearned as well as the learned that, in determining the true norte line, surveyors and civil engineer; are accustomed to make certain allow. ances for what is called "the variation of the magnetic needle," or in other words, it is well known that the mag. netic needle does not point due north. The extent of this variation differs with different periods of time, and also in different localities on the earth's surface.
Another well known fact connected with the operation of the magnetic needle is that, when suspended upon a pivot, instead of assuming an exact horizontal posi tion, it has a slight dip toward the north, and that the extent of this dip likewise varies with the time and place. In view of these well known facts, it $b$ comes a subject of great practical importance, as well as a matter of great interest to science, to determine the true north line of different points of the earth's surface, in order to know to what extent the needle varies from the true north course, and a!so to see what ext nt the needle dips at different localities.
When the true north line is once established at ciffer points, it will then be an easy matter to note, from time to time, the sli htest diffrence, either by why of increase or dimiatition, of the variation of the needile from this true line from year to year. The true north line is found by an asronomic observation, and the process of ascertaining the rue meridian line and measuring the intensity of the mag netic force which controls the variation and dip of the needle is called a magnetic survey.
Such a surver of the United Sates, says the St. Louis Reublican, is now being made by Dr.1. C. Hilgard, under the auspices of the American Academy of Science. Dr. H. has established a station at Compton Hill, St. Louis, and is locating stations in other parts of the country. The variation as well as intensity of the magnetic force is determined by means of a tabular magnet, horizontally poised on a-stirrup, which is suspended by a single cocoon fibre in line with the optic axis of the theodolite, to which a magnetometer box is clamped; the optic arrangement on a position sideways is perceiv $d$ on the scale of the magnet. This is tffected by aving a microscopic scale at one end, placed in the focus o lens at the other end of the magnet, causing all the rays f a mark to proceed parallel, but at an angle with the paral lel rays of every one respectively. The angle or "dip" of
nclination is found by placing the axles of a delicate mag inclinasion is found by placing the axles of a delicate mag in the center of the graduated vertical or "dip" circle, and ot the magnetic meridian. In order to remove eccentricities of axis, imperfections and irregularities in the distribution of magaetism, etc., two different needles are used, and both xles as well as reversed circle, making sixty-four readings on record in all. This gives a very precise means, by elimi nating all the inevitable inequalities or instrumental imper fections. The Smithsonian Institute will publish the result of these surveys for the general benefit of the commnnity.

Lima and Oroya Rallway in Peru
This road, which is to master the altitudes of the And an chain, is building for $27,000,000$ reals, by Henry L. Meiggs. Commencing at Callao, on the coast, it will cross an altitude f over 15,000 feet, and terminate at Oroya, 12,200 feet above the ocean. The center of supplies is at Yauli, at 14,000 feet altitude. Grading has been finished 18 miles, and the work nas, wing the crest of the Andes has begun from boo will be 3,000 feet long, and elevated higher than the summit of Mont Blanc. It is distant from the western terminus on the Pacific only 60 miles. The gradient for the railroad is 11 feet per mile-called there a four per cent grade. Forty miles from Callao, it has been necessary to resort to a V urntable and switch, where the rallroad takes an up grade in reverse direction for several miles, and again retuens, orming almost a figure 8 . The mule trail, by which mate rials are carried over, passes an alticude of 16,500 feet, ami a cluster of peaks covered with perpetual snow. It is hoped by this road to develop the silver wealth of the Cordilleras
Vith the exception of some coal, rudely taken out and trans Vitt the exception of some coal, rudely taken out and tran
ported on the backs of llamas, at $\$ 25$ per tun, notbing can b btained for fuel except dried turf, " buffulo chips," ( 25 cent sack), and dried llama dung. Such items will enable those bis work is one of the greatest events of thes age

Nitrosethanmen New Substance.
By the action of ethylic iodide upon argentic nitrite, Meyer nd Stubar have obtained a new substance isomeric with thylic nitrite. When ethylic indide is poured upon argen ic nitrite, violent ebullition ensues. To complete the re ction, the mix ure may be heated for some hourd with a re versed condenser. On distillation, a mixture of ethyli odide and nitrite passes over at first; afterward the now sub stance, which boils at $111^{\circ}$ or $113^{\circ} \mathrm{C}$. The authors give tinis
body the name of nitro-than. It is a perfectly co orless body the name of nitro-than. It is a perfectly co orless
clear liquid of a peculiar agreeable, etherial odor. It densiclear liquid of a peculiar agreeable, etherial odor. Its densi
ty at $13^{\circ} \mathrm{C}$. is $1 \cdot 0582$ (iaken with reference to water at th same temperature; ) it is iusoluble in water, does not explod on heating, and burns with a pale flame. When nitro ethan is heated with iron filings and acetic acid, a violent reaction ensues, which must be moderated by plunging the flask int
cold water so that the liquid does not boil. On anheqequent distillation with caustic potash, ethylamin passes over, in large quantity and in a state of great purity. Hence it appears that nitro.ethan corresponds to the aromatic nitro-compounds. A solution of caustic potash dissolves nitro-ethan which appears to possess weak acid properties. Sodium actacks it with evolution of gas and formation
powder, which explodes on beating.

## Intelligent monkey

Professor Cope describes a monkey in his possession. He is an admirable catcher, seldom missing anything, from a large brush to a grain, using two hands or one. His cage dgoris fastened by two hooks, and these are kept in their places by nails driven in behind them. He generally finds means sooner or later to draw out the nails, unhook the hooks and get free. He then occupies bimalelf in breaking up various objects and examining thair interior appearances, no doubt, in search of food. To prevent his escape, Professor Cope fastened him by a strap to the side of the cage,tbut he soon untied the knot, and then relieved himself of he strap by cutling and drawing out the threads that held the fiap for the buctle. He then used the strap in a novel way. He was accustomed to catch his food (bread, potatoes, fruit, etc.,) with his hands, when thrown to him. Sometimes the pieces fell short three or four fyet. One day he se:zed his strap and began to throw it at the food, retaining his hold of one end He took pretty correct aim, and tinully drew tue pieces to within reach of his hand. This performance he constantly repiat., hooking and pulling the articles to bim in turns and loops of the strap. Sometimes he loses his holit of the strap If the poker is handed him, ue uses that with some skill, for the recovery of the strap. Whan this is drawn in, he secure his food as before. Here is an act of intelligence which must have been originated by some monkey, since no lowe or ancestral type of mammais possess the hands neces ary for its accomplishment. Whether originated by Jack, or by some ancestor of the forert who use
After a punishment, the animal would only exert himsel in this way when not watched ; as soon as a eye was directed to him, he would cease. In this he displayed distrust. He also usually exhibiced the disposition to accumulate to be quite superior to lunger. Thus he always appropriated all the food within reach before beginning to eat. When diff:I ent pieces were offered to him, he transferred the first to hi hind feet to make room for more; then filled his mouth and hands, and concealed portions behind him. With a large piece in his hands, he would pick the hand of his maste clean before using his own, which he was sure of.

## Photographs of the Freckied.

Concerning the photographing of treckled or discolored aces, so as to hide such ble mishes: while bromised collodion may be a very excellent thing, there is something else tha ought to have a place in the dressing room attached to every tudio. I allude not to the puff box, but to a kind of white quid cosmetic much used by the fair sex when dressing for he opera, a ball, or an evening party. I was on one occasion order to say how it could be prepared. I made a mixture of a very similar kind by rubbing up a little oxide of zinc with glycerin, and thinning it with rose water until it was of glycerin, and thinning it with rose water until it was of
creamy consistency. I know of nothing better that this fo applying to a lady's face previous to photographing her; for, when properly applied by means of a bit of sponge, it leave the face of a delicate white color, and masks the freckles an other discolorations. Its value will be properly appreciated if a portrait of a lady with well developed freckles be taken first with the face in its natural state, and again after th ponge, moistened with the above cosmetic, has been passe all over it.-British Journal of Phoio Jraphy.

## Snuf nippiug Factory Girls

The Lowell (Mass.) Courier says: "There is a good deal of snuff dipping going on in Lowell, especially amoog one class of our mill operatives. A woman, who ca?led at a house where severai of these girls lived the other night, found the occupants sitting around the room with rags saturated with nuff, which were occasionally rubbed on the teeth and gums, and seemed to produce a kind of exhilaration or subdued intosication. The visitor was socially off red a rag, but she declined. I' is said that the 'dipping' may be seen at some places in the mills, and suuff selling is an important branch f busiuess with some traders." This practice has long been known to exist in the large manufacturing cities in Eabland and in Lawrance, Laweli, aud Fall Rivar, i; has been incro ducea principally by the foreigu hands.
ALDOL, -Wurtz has obrained a new polymer of aldehyde having the formula $\mathrm{C}_{4} \mathrm{H}_{8} \mathrm{O}_{2}$, to which he gives the name of aldol. It is a perfectly colorless liquid, which after cooling becomes thick iike a pure solution of sugar. It is so viscid t $0^{\circ}$ that the tube containing it m*y bo inverted without any fow of liquid. When gently heaied, it becomes as fluid as wat or, but it regains its viacid character only some hours
atter coling. Its density at $0^{\circ}$ is 11208 : it has a strong after ceoling. Its density at $0^{\circ}$ is 11208 : it has a strong
aromatic aad bicter tasts, and mixes in ali proportions with water and a coohol. When heated to $135^{\circ}$, aldol is resolved into crotonic aldeinyde and water.
The Panama Sta: and Herald records the first arrival, on April 2, at Pauama, on its annual eastern migration, of the beautiful sphinx moth (Urania leilus). The immens filghts of this moth, and the extreme regularity of their recurrence ear by year, have repeatedly bean dwolt upon by the s:ar, and ultimate destinstion.

## RECIPES AND EXPERIMENTS.

The following recipes and experiments have not been practically terted by the edi or of the Scientific American, but are published for the benefit of readers who may desirs to try them. Tue e ititor would be glad to be informed of the rekults of such trials.
A New Hygrometer made by G. Smith in Paris, consists of strips of paper dipped in a cobalt salt solution containing common ealt and gum arabic. In dry weather, it is blue, and in wet, rose red.
Noninflammable Fabrics.-Carteron and Rimmel have taken out a patent in England for the use of acetate of lime and chloride of calcium for rendering goods non combustible. Equal weights of each are dissolved in twice their weight of hot water.
an Economical Fire Kindling is made in Paris by dipping corn cob
$g$ at $100^{\circ} \mathrm{C}$.
Pure Ammonfa Gas is obtained by adding 2 parts caugtic poiassa to one part liquid caustic ammonia.
A Protective Varnish for zincography is made by melting together equal parts of asphalt, wax and resin, and dis solving the mass in hot oil of turp\&ntine.
To Prevent Gloe becoming Sodr and Moldy.-The addition of a quantity of carbolate of soda, just sufficient to give a strong smell to the glue, will accomplish the desired result.
Liquid India Ink.-Dissolva the powdered ink in hot water and, when deep black, add one tenth its volame of glycerin, and shake well together.
Antidotes to Carbolic Acid-Fatty oil, wood oil and almond oil are recommended by Dr. G. Calvert. Dr. Husemann advises the use of saccharate of lime, made by dissolving 16 parts of loaf sugar in 40 parts of water, "aciding to this 5 parts good slaked lime, digesting the mixture with frequent stirring for three days, filtering and evaporating the filtrate to dryness at $100^{\circ} \mathrm{C}$.
To Clean Gold Ceains.-Put the chain in a small glass bottle, with warm water, a little tooth powder, and some soap. Cork the bottle, and shake it for a minute violently. The friction against the glass polishes the gold and the soap and chalk + xtiact every particle of grease and dirt from the inter stices of a chain of the most intricate pattern; rinse it in
clear cold water, wipe with a towel, and the polish will surprise you.

A Usefol Hint-By rubbing chalk on the side of a carpenter's square, the figures may be more readily seen. Near sighted persons will do well to remember this.
Electricity is developed in metallic wires by merely bending th $\leftarrow \mathrm{m}$, and the development appears to be independent of any thermic action.
To Mend Rubber or other Hose.-Cut the hose apart where it is defective; obtain a piece of iron pipe, ten or twelve inches long; twist the hose over it until the ends meet, and wrap with strong twine, well waxed.
Borax - One bulf a pound will drive the cockroaches out of any house. A large handful of the powder to ten gallons of water will effect a saving of fifty per cent in soap. It is an excellent dentiirice and the best material for cleansing the scalp.
To Make Old Butter Fresh-Knead with lime water or
very diluted solution of washing soda. Simply washing in a very diluted solution of washing soda. Simply washing in water is often perfectly efficacious.
To Bronze Brass Objects - First warm them, and then wash over with a hot solution of amrooxium chloride (sal a momoniac), then place over night in a diluted solution of two parts vercigris and one part ammonium chloride in six parts of vinegar. In the morning, remove and wash.
To Empty Large Bottles of Liquid-By imparting a mot on of rotaiion to the contents of an inverted bottle, the water or other liquid will issue in the form"of a tube, the air entering up the center without impeding its passage. bottle can thus be emptied in one half the usual tinne
artificial Parchment.-The Germans are applying the paper tissue known as arificial parchment for the manufac ture of artificial sausage skins-a novel but highl
istic idea. This membrane is rather indigestible.
Lacing for Sewing Machine Belts.-An old k!d glove makes excelient lacing for securing small belts on sewing and other machines. Cut the gloves into strips half an inch wice, and roll them up tight.
To Japan Old Tea Trays.-First clean them thoroughly with soap and water and a littje rottenstone; then dry them by wiping and exposure at the fire. Now get some good copal varnish, mix with it some bronze powder, and apply with a brush to the denuded parts. Atter which, varnish is dry. Two coats will make it equal to new.
ALLOY for Jounnal Boxes.-24 pounds of copper, ALLOY FOR JOURNAL Boxes.- 24 pounds of copper, 24
pouids of tin and 8 pounds of antimony. Melt the copper poulds of tin and 8 pounds of antimony. Melt the copper
first, then add the tin and lartly the antimony. It should ke first, then add the tin and lastly the antimony. It should ke
first run into ingots, then melted and cast in the form refirst run into ingcts,
quired for the boxes.

The Academy of Sciences in Bologna has announced that a prize of 1,200 lire ( $\$ 240$ ), the " Aldini Prize," will be awarda prize of 1,200 lire ( $\$ 240$ ), the "Aldini Prize," will be award-
ed to the author of the best scientific experimental essay on galvanism or dynsmic electricity. Essays int nded for the competition must be sent in between July 1, 1872, and June 30, 1874, and must be written in Italian, Latin, or French. They must be either written or printed; but, in the latter case, must not have been published previously to the two years above mentioned. Each essay is to bear a motto, and to be accompanied with an envelope stating the name of the author. Th $\in \mathrm{y}$ must be addressed to the Perpetual Secretary of the Academy of Sciences of the Bologna Institution.

Service upon Atlantic Cable Business
If there is one thing more surpising than the fact that it is possible to transmit intelligence be:eath the water. of the broad Atlantic, it is the cllerity with which that business is pe formed. In the average time upon each message trans-
mitted between New York and London, the servics is barely mitted betweea $N \in w$ York and London, the servics is barely
equaled by the best managed circuits wholly upon the land. equaled by the brst managed circuits wholly upon the land. For the seven days endiog July 20, 1872, the actual time averaged upon messages exchang +d between N 9 m York and London was 13 minutes and $59 \frac{1}{2}$ seconds. That is to say that a telfgram addressed to London, leaving New York at A. M, New York time, reached its destination at a fraction ed, the $9: 14$ of same time. When the distance is consider -at Placter the message has to be rewritten four times asd that this is the average upon the whole business for the week, and not the time upon any one message-it speaks w $\epsilon$ ek, and not the time upon any one message-it speaks
volumes for the business management and the skill of the volumes for the bu
operators engaged.
Tbat the average time of this weetk wás not exceptional we bave ample proof upon the examination of the record. An exact record is kept of every massaze by each of the com panies engaged in its transmission, the precixe time of its re ception at each office is taken, and from this a daily and a weekly average is made In this average, press and gov ernment despatches are included, which from their much greater length than ordinary business messages, serve to place the average time so newhat grtater than is rally occu pied in the transmistion of business for the gene al public. Messagas betwen New York and London pass over the wires of four Companies-the Western Uaion, to Piaister Cove; the New York, Newfoundland and London, from Plaister Cove to Heart's Content; the Anglo American from Heart's Content to Valentia, and from Valentia to London by the British lines.
On one of the seven तays given above, the average time of transmission between New York and London was actually only six minutes and thirty.five seconds: and the shortest
average time for messages for the entire day over one of the average time for messages for the entire day
four lines was one minute and four seconds.
It is difficult to see wherein this service can be improved, and yet efforts are being made to that end. Mr. H. H. Ward, Superintendent of the New York, Newfoundland and Landon Telegraph Company, and Mr. Siearns, the inventor of the improved duplex instrument, have left for Piaister Cove and Hearc's Content to introduce the double transmitter upon the wires between those points, and the Western Union Compa ny have under consideration the advisability of placing them also to place Heart's Content in direct communication with New York, thus avoiding one rewriting. When these improvements take place, the average time of transmission betwen New York and London will be reduced to a minimum. -Journal of the Telegraph.

## The Cloud surst

Many persons confound the waterspout with what is com monly bnown as the cloud burst, yet a moment's consideration will show them the difference. Waterspouts are fre quently seen on the ocean or upon the broad lakes, and proceed from a whirl sind gathering the water and whirling it upward in a heavy column to clouds. These can be seen at a long distance, clearly defined, carried in the direction trav. eled by the wind, and are decidedly dangerous customers to come in contact with. Many a good ship, mizsing and never more heard from, doubtless has fallen victim to some over whelming waterspout. It is said that they can be broken at a distance by a lucky cannon shot, but if the spout is broken by the ship iteelf, sure and speedy destruction must follow. Whirlwinds produce a similar effect on land, and out on the deererts to the east of here are frequently to be seen huge columnsows sand thus whirled upward, reaching from the plain to the clouds above. Cloud bursts occur in the summer season during heavy thunderstorms, and are simply rain showers of sudden and extraordinary violence.
Some over-laden cloud sailing over a mountainous locality merely turns its watery contents loose, and it comes streaming down, flooding the hillsider, from whence the water flows in sheets into the ravines. So sudden is the flood that, where not a drop of water has been seen for weeks or month a large turbulent, overwhelming torrent comes pouring dowa carrying away trees, rocks, and everything else before it,
washing away railrozds, bridges, toll roads, houses; in fact everything in its way. One of these flocds, thus pouring down a steep, dry mountain cañon, frequently shows an advancing front of logs, bushes, huge boulders, and similar debris, twelve or fifteen feet high. Woe to any unlucky teamster who happens to be passing with his loaded wagn along the bed of the cinnon! Those who understand matters are able to guard against the impending calamity by getting their wagnns out of the ravine and up on the hillside as far as possible; or, if they have no time for that, they will un oitch their animals and give them a chance to escape. In atances are known where one of these cloud bursts has occurred on some broad slope where, having no raviue to carry off the water, it has plowed and torn a channel for itself of great depth and extent. This is the proper season of the year for cloud burste, and as one of greater or lesser magni tude visits Gold Hill or Virginia neaily every season, one may be expected before long.-Gold Hill (Nevada) Neios.
Among the patented contrivances for stopping runaway horses, one consists of a pair of nose stoppers, attached to a bit, and which are closed over the nasal openings of the animal by means of a cord, which the driver pulls if th 3 horse attempts
to run. Auother consists of a pair of blinders, by which the driver, on pulling a cord, instantly bliadfolds the pony.

Hardness of Minerals and Metals.
We say in general that one body is harser than another if it can scratch it. In mineralagy, hardnees is an important property, and a scale was establisbed by Mohs, running from one to ten, which is adopted by all writers of tha present day. It is as follows:
Ggpsum.. of lime. $\qquad$ Folspar
Fiuor spar.

## r...

$\qquad$ Quariz.
Topaz.. Opatite. .
 Coruodum $\qquad$ ${ }^{6}$
...${ }^{7}$Wecinstantly see it said, in scientific works, " the hardness is 6,7 or 8 ," and by refereace to the above table we at once comprehend the exgression. The following list may serve to impress the subject on the mind:

## Diamond Ruby...

10 Turquoise.
Ruby...
9 Lapis. lazu
.......
Tymophane.
8.5 Felspar. $\qquad$
Topaz..................... 8 Amphibole...................... $8_{5} 5$
Spinell..................... 8 Phosphorite................... 8

$\begin{array}{ll}\text { Garnet.................. } 75 \\ \text { Dicroite................... } 75 & \text { Colestine................... } 35 \\ \text { Barytes................... } 3.5\end{array}$

Peridote...
Mics....
Gyp:um.
Tourmaline
Cblorite.
Opal..
Taic.
The hardness of metals ia usually estimated by the resist ance offered by wires of equal aiameter and same temperature when drawn through a bole of given siza. The following is the order in which a few of the metals are ranged :


According to Thomson, the order of hardness of metals is as follows: steel, iron, platinum, copper, silver, gold, tin, an timony, lead.-Journal? of Applifd Chemistry.

## Auguste inrantz.

We regret, says the Journal of Applied Chemistry, to have o record the death of Dr. Auguste Kraatz, of Bonn on the Rhine, which took place from an attaciz of erysinelas, during a visit to Betlin, on the 6 ih of April last. D:. Kranz was a scientific merchant in rocks, fossils and minerals, one who not only knew accurately the commercial value of his collec. tions, but was intimately acquainted with the scitntific worth of every specimen which passed through his hands. His agents explored every mineral locality in the world; and, by a system of exchanges and the establishment of correspond ents. he was able to obtain the choicest specimens from the most remote regions. It has often been remarked by scientific men that in order to obtain a complete suite of the minerals of the United States, it would be necessary to send to Dr, Krantz, in Bonn. There is prohably not a museum of any size, in any part of the globe, that is not enriched from his collections. He was, if nct the oldest, by far the most extensive, dealer in minerals in the world, and he leaves an immense and valuable collection, both of minerals and fossils the results of the la bors of a long life devoted to their accumulation. No scientific man ever passed througb Bonn without going to visit the museum of Dr. Krantz, and evtry stranger was received with polite attention, although he was often imposed upon by tourists who really had no claims upon his time. He was trely a scientific merchant, and his death will be severely felt at every institution of learning in all parts of the world. We believe it is the intention of Madame Krantz to carry on her husband's business,with which she is well acquainted.

## What is Dirt ?

Old Dr Cooper, of South Carolina, used to say to his students: " Don't be afraid of dirt, young gentlemen. What is dirt? Why. nothing at ail offen ive, when chemically viewed. Rub a little alkali upon the dirty grease spot on your coat, and it undergoes a chemicsl change and becomes soap; now rub it with a little water and it disappears. It is neither grease, soap, water nor dirt. That is not a very ofiorous pile of dirt you see yonder; well, scatter a little gypsum over it and it is no longer dirty. Everything like dirt is worthy cur notice as students of chemistry. Aualyze it; it will separate into very clean elemeats. Dirt makes corn, corn makesbread and meat, and that makes a very sweet young lady, that I saw one of you kifsing last nigit. So afier ell, you were Iresing dirt, particularly if she whitenm her face with chalk or fuller's ear h; though I may say toat rubbing such sion upoa the beautiful skin of a young lady is a diriy pracice. Pearl powder I think is made of bismuth, nothing bat dirt. Lord Palmerston's fine defiuition of dirt is 'ratter in the wrong place.' Put it in the right place aud we cease to think of it as dirt."

Tanning with Glycerin.-The properiy of glycerin to preserve leatior has been known fir a long time; it is now proposed to employ it in tanning, to increase the elanticity and resistance of the leather. This system of tanning is par ticularly adapted o straps and belts of machimery, as it keeps them from drying and cracking. It is only necessary to im merse the leather, tanned in the $u$ ual manner, in a bath of glycerin, and to leave it for several weeks, when the ports will be impregnated with the greasy substance, and the leather will be found to be much more elastic and tenacious.

## MOLD FOR CASTING AND CHILLING SLEIGH SHOES.

The improvement now illustrated is designed to save the time and expense involved in grinding and polishing sleigh shoes, by giving them smooth and hard faces in the casting, without, at the same time, materially iojuring their strength or incurring liability to loss in the process.
A, in the figures, is the lower part or nowel of the flask. the bed of which is cast in one piece and of a shape to conform to the face of the shoe intended to be cast. The sidea, B, are cast separate and are fastened to the bed by means of bolts. The ends, C, are made detachable, being hooked on to the bed casting in the manner shown in Fig. 1. This is doue to preserve the flasks, as, if they are made in one piece with the bed, they are apt to crack off. At $D$ are shown the patterns, which are placed upon the bed of the nowel and kept in place by dowels. The latter serve also the purpose of core prints. When sand has been placed in the nowel, as seen in cross section in Fig. 4, and the patterns have been with. drawn, a connecting chamber is formed at one und thereof, in the manner shown in the plan view, Fig. manner shown in the plan view, Fig.
8. The cope, E , which is a wooden 8. The cope, E , which is a wooden irame with transverse ribs, and which is provided with handles at its ends, is then applied to the top of the nowel, as shown in section in Fig. 2, and the process of casting is carried out. The metal is chilled as it comes in contact with the smooth surface of the bed, and the shoes are withdrawn from the mold̂ ready for service. The nowel is mounted on wheels for convenience in moving it.
It is claimed that shoes produced in this way are superio to the old ones and command a bigher price, while there is a saving aitending the use of the new mold.
Patented through the Scientific American Patent Agency for Volney A. Butman, of Ironton, Wis.. June 11, 1872. Fur ther information may be had by addressing V. L. Benjamin Fond du Lac, Wis.

## HOW TO MAKE A CHEAP HYDROGEN LAMP

The principle on which the hydrogen lamp is based is the property of platinum sponge to absorb large quantities o oxygen, so that, when a jet of hydrogen is directed upon it, a rapid combination of the gases ensues, attended by the evolution of intense heat and faint light. The lamp is usefu not as a means of illumination but for supplying the place of matches, or other means of obtaining fire whenever a quick light is required.

Our figure represents the ordinary form of construction. A is a glass vase, B a bottomless glass vessel attached to the metal cover $\mathrm{D}, \mathrm{C}$ is a cylindrical piece of zinc suspended by a wire from the pended by a wire from the over, by a stop cock kept closed by a spring and readily opened by the pressure of the finger. Fis a metal capsule, in which is placed a small portion of platinum sponge. To set the instrument in operation, a weak solution of sulphuric acid and water is poured into A. This attacks the zinc, causing bydrog +n gas to be evolved, which fills the space in B and forcess out the water. Thestop cock should be kept open until the atmos pheric air is entirely out of the receptacle. As soon as the pure hydrogen issues, the jet, should be directed upon the platinum sponge, which will immediately become incande scent and ignite the hydrogen which will burn with a pale b.ue fiame. When the hydrogen in $B$ is exhausted, the ligh bue fiame. When the hydrogen in B is exhausted, the light will be extinguished, the solution in the outer jar will again enter to its proper level, again attacking the zinc, when the same process will be repeated. Such a lamp will remain in working order until the power of the acid is exhausted or the
zinc destroyed. It generally stays in good condition, giving zinc destroyed. It generally stays in good con
fire immediately, for from two to three werks.
fire immediately, for from two to three werks.
As we have lately received several queries of how to con struct this lamp cheaply, we add the following method, the materials being the least expensive and the easiest attaina ble that we can suggest. The outer vase may be made from a good sized preserve jar by cutting off the upper portion by means of a woolen string moistened with turpentine. Fo the inner tube, B , an ordinary lamp chimney will answer. The cover, D , can be made from sheet brass and the chimney at tached to it by some good cement. The stop cock can be turned by a metal worker, from whom also the piece of zinc may be obtained; or the pewter cock from the top of a seltzer or mineral water fiaek that can be readily bought from any drugrist may be employed, bending the tube used for the druggist, mad be bion exitl hole An mall hole. An empty metalic carting case will do for The platinum sponge can be purchasod irom any dealer in chemicals at a small cost. The proportions of water and
acid used are about one ounce of the acid to a pint of water

## New Sugar Dryer.

C. H. Hersey, of South Boston, Mass., is the inventor of new machine for drying sugar and other substances, which is said to be simple and effective. The machine consists of an outer cylinder from five to six feet in diameter and twenty five feet long, inside of which is a steam cylinder about three feet in diameter and twenty feet long. The sugar is carried around in the outer cylinder by ledges on the inside of the cylinder, and is dropped in a continuous shower upon the outside of the steam cylinder, both cylinders being connected together and revolving at the same time; the sugar slides off
rod, theinventor provides the following simple and ingenious arrangement:
The arm, C, is attached in the manner shown in Fig. 2 to one of the rods which connect with the cranks; in a hole made through the opposite sword is placed the pusher, D and to the protecting rod is affixed the arm, E. A spira spring is connected at one end with E , and the other end is carried by the socket of the pusher, D, as delineated in Fig. . The device is brought into action by the downward move ment of the crank, which takes place at the same time that the shuttle is driven into one of the boxes. This downwar movement forces the arm, C, against the pusher, D , which (hat ressure, the arm, E ; the effect of which is to force the upper arm of the rod, B, against the binding levers, A, and thereby retain the huttle in whichever of the boxes it may happen to be in, until the crank rises enough to carry the arm, C, away frem the pusber. As soon as this occurs, the device ceases to operate, and the rod is turned by pring (which may be seen in Fig. 2) so as to throw the arms, B , awa from the levers, $A$, and release th huttle just in time for it to be thrown.
The inventor claims that with this binder the shuttle is prevented fly ing out of, or turning in, the box nd the cops do not break on th huttle spindle. It renders needles the usual springs on the binding levers, and effects eaving in power and supplits, while its own first cos a mero trifie.
Patenced through the Scientific MOLD FOR CASTING AND CHILLING SLEIGH SHOES.
and so that the sagar going in at one into a radually worked forward to ths other, where it fall rades of coarse and fine sugar. The capacity of the ma hine exceeds thirty barrels per hour.

## LAW'S SHUTTLE BINDER.

The invention weillustrate in the annexed engravings con ists in an improved method of actuating the mechanism by which sht.ttle binders are operated.


Fig. 1 represents a portion of the lathe of a loom, showing part of one sword, one rod connecting the lathe with the rank, and the device attached. Fig. 2 is a detail sectional view of the same.


The shuttle boxes are situated at the ends of the lathe eam and the shuttle binding levers, $A$, are pivoted in the ides of the boxes in the ordinary way. The protecting rod is provided with arms for operating the levers, shown at B,

American Patent Agency, Jure 11
872, by Mr. Henry H. Law, of Gloucester, Camden Co., N. J of whom further information may be obtain $\in d$.

## Apparatus for Testing Lubricators.

A is a friction drum or pulley of cast iron, about 3 inches diamett $r$, keyed on a shaft B. C and $\mathrm{C}^{\prime}$ aze two clips or saddes of brass, each extending nearly half round the circum ference of the drum, and pressed to it with a constant press re by means of the two weighted jevers, D D'. E is a ther mometer fixed on the top saddle or clip C, and serves to in dicate the heat caused by the friction of the drum revolving between the two saddles, C C'. The method of using is as follows: The shaft, B, and pulley, A, are made to revolve a spetd of 1,800 or 2,000 revolutions per mirute, the numbe of revolutions being shown by a counting machine indicating up to one million, but which is not shown on the sketch to avoid complication. It will be evident that this velocity continued several minutes, will generate considerable heat, and that this heat is raised by a less number of revolution when a bad oil is used than when an oil of superior lubrica ing power is used. For instance, if it requires 50 revolutions to raise 1 degree of heat in one oil, and 100 revolutions

n another, it is evident that the quality of the first will only be half as good as the second. Before starting the machine, the temptrature at which the thermometer stands is noted; this, of course, will be the temperature of the room or work shop. A portion of the oil or grease to be tested is poured or smeared on the friction pulley, and the saddles, with their weighted levers, allowed to press on the drum. The ma chme is then started and allowed to run till the thermomete i dicates a temperature of $200^{\circ}$ Fah. When it is stopped, and the number of revolutions it has made is taken from the "counter," then the number of revolutions, divided by the number of degrees of beat that the thermometer has been raised, will show its lubricating power. After the first trial the machine is allowed to rest twenty four bours, and then it is started again without adding any more oil, and without breaking the contact of the sadoles with tbe drum. The number of revolutions of the drum is again taken, and divided by the number of degrees of heat raised in this second trial; and if the ressult is not more than from 10 to 20 per trial; and if the resirt is not more than from 10 to 20 per
cent less than the first trial, the oil may be considered good. cent less than the first trial, the oil may be considered good.
Ia very bad oile, the saddles are found to be so fast glued to I a very bad oils, the saddles are found to be so fast glued to the drum that the machime cannot be started a second time, and in some casts it requires considerable force to brak the contact or adhesion between the drum and the brass saddles. This apparatus is the design of Jno. Bailey \& Co., of Eng land, and is said to operate extremely well.

At the recent exhibition of the Royal Agricultural Society, ngland, some of the portable farm steam engines wer fitted with the electrical indicator which shows upon a dia the temperature of the water contained in the boiler.

Copying from the Microscope.
One of the latest inventions for renderivg the copying of an object as seen in the microscope both accurate and easy was recently described, by Mr. Isaac Roberts, F. G. S., to the Royal Microscopical Society, and an illustration was pub lished in their Journal. The instrument consists essentially of two parallelograms, having their major and minor sides and angles respectively proportioned in all positions in which the instrument can be placed. The major and minor sides rotate freely about the common center or fulcrum, which is fixed to the eyepiece of the microscope in the focus of the pye-lens. A pencil is attached to the major end joint of the instrument, and a small glass disk, ruled with a mi crometer-lin $\epsilon$ cross, is attached to the minor, or eyepiece end joint, in the position where pointers are placed. To see both cross and object at the same time, similar focussing is necersary to that which is employed to see an object and a pointer. When drawing, the hand merely moves a pencil over the paper, and at the same time and by the same action guides the micrometer cross lines over the field where the object appears in the microscone. The drawing paper

should, of course, be laid on an inclıned table capable of ad iustment to the hight of the microscope employed, the top peing also made movable to suit the angle at which the micro cope is being used. In the illustration Fig. 1 represents the micro-pantograph, and Fig. 2 the form and approximate position of the slit into which the minor end of the micropan tograph and its support, shown at the top of Fig. 1, are inserted. In Fig. 1, E is a glass disk with micrometer cross lines ruled upon it. It is cemented over a small hole drilled through the center of the rivet forming the joint of the minor extremity. A is a center, or fulcrum around which the parts of the instrument freely move $N$ is a holder for drawing pencil; placed over a hole drilled through the a drawing pencil, placed over a hole drilled through the rivet forming the joint of the major end of the instrument. In Fig. 2, M s a slit for the insertion of the minor end of the micropantogra h, with its support shown behind E A in
Fig 1. The instrument being firmly fixed in position in the Fig 1. The instrument being firmly fixed in position in the
eyepiece to draw any object, it is only necessary to place the eyepiece to draw any object, it is only necessary to place the
eyepiece in the microscope, adjust the drawing table to the hight and inclination of the plane of the pantograph, and with the righthand forefinger and thumb guide the pencil with alight pressure over the paper, at the same time look ing through the eyepiece at the object and guiding the cen ter of the micrometer cross lines over the respective parts of it; an accurate drawing of the object will thus be traced upon the paper. For those, however, who may desire to make for themselves, it is only necessary to say that the the length of the minor sides of the parallelogram within the eyepiece is $\frac{1}{2}$ inch; of the major sides $5 \frac{8}{4}$ inches, the in strume

Fool's Gold and How we may Know it The following story is going the rounds of the paper and would be decidedly rich if it were only true
A verdant looking Vermonter appeared at the office of a chemist with a large bundle in a yellow bandanna, and open ing it exclaimed: "There, doctor, look at that." "Well," said the doctor, "I see it." "What do you call that, doctor?" " I call it iron pyrites." " What, isn't that gold ?" "No," said the doctor, and putting some over the fire, it evaporated up the chimney. "Well," said the poor fellow with a woe begone look, "there's a widder woman up in our town has a whole hill of that, and I've been and married her!"
That the poor fellow had married the widow for the sake of the hill of pyrites is very probably true, but that the py rites evaporated up the chimney is simply impossible, and such a stat $t$ ment is to be regretted because the inexperienced may be led to believe that, if a bright, yellow metallic look ng mineral does not evaporate when strongly heated, it must be gold. There are several minerals which are sometime mistaken for gold, but the two which are most apt to give
rise to deception in this matter are pyrites and mica, an hence they are sometimes called fool's gold. The method of distinguishing between $t h \in m$ and gold is very simple, and is, it can be beaten out into thin leaves under the hammer is, it can be beaten out into thin leaves under the hammer,
while the others crumble to powder. Moreover, gold is easiwhile the others crumble to powder. Moreover, gold is easily cut with a knife, while if we attempt to cut pyrites it breaks up $_{1}$ and mica separates into thin fiakes. It is when mica is
in fine powder, however, that it most resembles gold, and in in fine powder, however, that it most resembles gold, and in
such cases, its weight betray its character. Gold is nearly uch cases, its weight betrayd its character. Gold is neary we can tell that lead is much heavier than mica.

Estimation of Sulphur in Organic Compounds. Chemists have always experienced more or less difficulty n ascertaining, with exactitude, the amount of sulphur con iained in organic compounds, the usual methods and agent employed for that purpose being slow and uncertain in re sults. W. S. Mixter, of the Yale Scientific School, has de vised an effective apparatus by which heわurns the sulphur ous substar ces in oxygen and condenses the sulphur in the form of sulphuric acid. This method presents an easy meth od of effecting the separation and permits the estimation of the sulphur with much exactnees
The following results, ob:ained by the author, in the order they are given, shows the applicability of the method, while some of the details mentioned may help to explain the use of the apparatus.

| 1. Iroh pyrites (mixed with carbon). $0 \cdot 0658$ | $51 \cdot 20$ |
| :---: | :---: |
| 2." " ${ }^{\text {c................. } 0.0597}$ | $51 \cdot 26$ |
| 3. Sulphur....................... . 0.2070 | 99.76 |
| 4. ". ..................... 0.2807 | 9992 |
| 5. " $\quad$...................... 04951 | 99.93 |
|  | 10002 |
| 7. Carbon disulphide............. $0 \cdot 7725$ | $84 \cdot 12$ |
| 8. " ، $\ldots$........... 04598 | 8416 |
| 9. Bituminous coal................ 0.6640 | 2.97 |
| 10. " "............... 0.7860 | 299 |
| 11. Wool............................ $0 \cdot 4640$ | 344 |
| 12. " ........................... 044675 | $3 \cdot 46$ |
| 13. Tobacco........................ 20720 | 0.37 |
| 14. « ....................... 21370 | $0 \cdot 36$ |

## Manufacture of Enveiopes.

One of the most interesting mechanical novelties to be seen at the International Exhibition in London, is the en velope machine of Fenner and Co. of that city. All the manual labor, that is required in attending to the machine, is limited'to the supply from time to time of a pile of envelope blanks, and the occasional removal and bauding of the fin ished envelopes. Thus the entire and various processes, of feeding, gumming, stamping, folding, delivery, and collecfeeding, gumming, stamping, folding, delies of mechanical operations devised with the utmost ingenuity and carried out in perfection; the machine withal being excessively com pact and well arranged.
The pile of envelope blanks being placed in position on a plate at one end of the machine, which may be done either at rest or in motion, the feeding process is effected by the simple aid of intermittent suction. An elastic tube has a trumpet-shaped brass mouthpiece which descends on the uppermost blank, and at the moment of contact the air is exhausted by a stroke of the air pump, when the mouthpiece rises with the blauk attached, the suction being maintained just sufficiently long to enable the arm and grippers, rapidly projected from the other side of the machine, to seize the blank, when the attachment to the mouthpiece ceases and he arm shoots back, drawing the blank into position over the folding box and there rapialy releasing it. At this moment, the stamping is effected by the action of a hammer and die, and the gum is applied in due place on the edges of the side flaps, whereupon a plunger head, of the rectangular orm and size of the envelope, descends, carrying the blank down into the folding box; the flaps, thus raised into a verti cal position, are then enclosed and folded down in proper sequence by slides working in the thickness of the folding box; and finally the bottom of the box rises and completes the operation by pressing the whole against the slides, so that the edges are made sharp and the adhesion is effected and secured. The slides are then withdrawn, and the bottom of the folding box drops, allowing the envelope to drop in a virtical position into the delivery trough underneath, run ning across the machine, wherein, by a simple contrivance and combination of guides, holders, and pressers, the envelopes as they drop from the folding box are successively, uniform y, and regularly arranged, and worked along the trough ready for removal and banding by the attendant.
These manifold operations are successively and success fully wrought with such speed, and almost simultaneity, tha the finished envelopes are turned out complete at the rate o 50 per minute or 3,000 per hour.

## A New Quicksilver Ore

Professor J. D. Whitney has discovered a new ore of mer cury in California, which, according to an analyeis made by G E Moore, consists of sulphide of mercury 9892 per cent sulphide of iron 0.83 and quartz 0.25 ; its color is black, stresk black, specific gravity $7 \cdot 70$, and no trace of crystallization. I apprars to be identical with the amorphous modifications of ulphide of mercury. It is proposed to call it meta-cinnabar The associated minerals are usually copper and iron pyrites, and a few crystals of cinnabar. The occurrence of the cinnabar has hitherto escaped notice, as it has been mistaken fo of crystalline form, in its black streak and lighter specific
gravity. It promises to become an important orein the quick silver mines of California and some of the other Western States.

## Couregpandeme.

The Editors
spondenis.

## To the Editor of the Scientific American:

The question "With what force does a falling body strike?" has been frequently repeated in the Scientific American for-the last 25 years, and has generally been answered by the batch of dynamical terms used in colleges and styled "sci entific." The answers have invariably made the problem more obscure. Each one generally says that "the problem is very simple," and he pretends to understand the subject perfectly. I am one of those pretenders, and propose to an wer the question in my own way, reterence being made to the accompanying figure.
Let us assume the case of driving a nail into a pisce of wood by the aid of a lever whose fulcrum is at $C$. The ap plied force is represented by the weight, $w$, acting on the lever L. Let $R$ denote the force of resistance in the wood, ex pressed by the same unit of weight as that of 2 , say pounds. The weight, $w$, acts on the long lever, $L$, and the resistance $R$, on the short lever, $l$. Then

```
R: w=L:l, and R=\frac{vL}{l}
```

That is to fay, the force of resistance in the wood is to the weight or force, $w$, as the long lever, L , is to the short lever,


Let $h$ represent the vertical hight which the weight, 20 , moved, and $d$ the distance which the nail was driven into the wood. Then

$$
\mathrm{R} \cdot w=h: d, \text { and } \mathrm{R}=\frac{20 h}{d .}
$$

That is to say: the force of resistance in the wood is to the orce or weight, $w$, as the hight, $h$, is to the distance $d$.
Now let the same weight, $\sim$, fall from an equal hight, $h$, di rectly upon the head of the nail, and the latter will be driven into the wood the same distance as by the aid of the lever Therefore: the force with which the falling body acted upon the nail is to the weight of the falling body as the hight of fall is to the distance the nail is driven into the wood. The force of the falling body is equal to its weigh multiplied by its hight of fall, and the product divided by the distance which the nail is driven into the wood.

John W. Nistrom
Philadelphia, Pa.

## Fast emall side Wheel St

To the Editor of the Scienti fic American
I have read J. A. G.'s communication entitled "Smal Fast Steam Propellers Again," in your issue of August 0, 1872, with much interest, for the reason that J. A. G.' frst communication was shown to a gentleman of our city, who wished just such a boat to solicit his various ustomers living on the many navigable waters of the West. After giving the subject some attention, he arrived at the onclusion that a propeller would not answer his purpose, as he desired an extraordinarily fast and light steamer; hunc he contracted with the well known hull builder, Mr D. S Barmore, of Jeffersonville, Ind., for a hull of the following dimensions: Length 70 feet, beam 15 feet, depth of hold, eet; of an easy model, but with displacing lines very full ust above light water line, so that, in going very fast, sh would not bury
This bull is propelled by two side wheels placed amid hips, with outer ends of shaft inclined aft ten degrees on a parallel line with keel. The wheels are 12 feet in diamete nd with 6 feet buckets, the bucket blades or paddles being corrugated, and a right angled face riveted on to make them have an additional hold on the water, as the angle plate will revent a splash of water to the center of the wheel. Each wheel is driven by a separate engine, each 10 inches $\times 36$ inches. Balanced oscillating slide valves are used. The boiler is my own patent, and as I have " boiler on the brain, do not wast a very large gratuitous advertisement, but would modestly say: It is a wrought iron sectional safety boiler, the firebor enclosed with tubes filled with water, the ame as used on my portable and traction engines; in some respects, it resembles a Root boiler.
 be refoy ou September 1st, The owner bashad from variou buide:s and ruechanics an estimate of the speed that she will develop; and these estimates have been from 4 to 20 mils per hour. We wish you would give us an opinion of ihe realt tiat should be obrained when using 120 lb . steam, with engives wide open; you have a fair chance to be a pro phet, as many expert mechanics and prominent men bave befn invited to acempary her on hertrial trip, whica will be madt durivg the houisvilie exposition. Should sue perform well, a second triai may be made to Cincianati.
Her builders contract to make but 9 miles against the current of the Ohio river, and she will trim up upon 16 inch es with water in the boilers.

Mirclean N. Lifn. New Albary. Ind.

## Steam Rngineering in the Mahoning and Shenanso

To the ELditor of the Scientific American:
Tre veileys of Mahoning and Shenango are situated about 15 miles aymat, the former being in the county of tios same nazue in the State of Onio, and the latter in Lawrence county Per.nsylvania. Both valleys are largely occupied by iron works and coal mines, there being 40 blast furnaces and roll ing mills in operation, and coal mines large 10 to 500 horse nowr are in use, all on the high pres ura principle, the poppet valve system being in great repute. This form is much uved on stem boats on the Ohio and Mississippi rivers. Itte beilers sencrally approved in these districts are cyiindrical in shaze, of the double return tlue design; the diamoter
 40 eet. The thickuess of the plates generaily used is three
sixteenths or one quarter of an inch, the heads of the boilers bring fire eighths thick. The boilers are generally set up from two to six in a battery, enclosed in a reverberatory fur nace ; and they are worked at a pressure ranging from 60 to 110 peunds on the inch.
These works, however, are generally in anything but a thriving condition, and the cause is the scarcity of educated evgineers, posted in the theory as well as the practice of their profersion. But who is to blame for the incompetence of the botches and inexperts? Both the employers and the engiveers themselves. The former employ incapable men bfcause of the somewhat higher wages which a properly in structed mechanic rightly demands, although the ultimate work well and efficiently at first. I propose to give an illus wow well and efficiently at first. I propose to give an illus
tration or two ot the losses and waste caused by incompetent tration or two ot the losses and waste caused by ing.
The moat obvious lows is in running the engines and ma chinery. The former soon become out of order; the pistons get to be loose and leaky, the valves are improperly set. so that there is no lead on the exhaust side of the poppet valve et:give. Tie latter fault causes a waste of power which an expe ritcced engineer only can rightly appreciate. Fuzther losses are occasioned by loose pins, journals and bearings, and by the engines being out of line; the slide valves are sometimes very badly fitted at first, and then get more out of shape for want of an occasional facing. Esternal corrosion on boilers is caused by leaky joints, and steam is conveyed long dis tances in pipes no covered with any non-conducting material. Ther are many other faulte, which are probably in the rec ollections of such of your readers as have been in anill-man ayed engize azd boiler house

I have aiready stated that the incompetence of the engincers is the cause of this state of things, and I know no other rea Sun tor the employment of such men but the b forementioned
oue of economy. But as a general thing, our oue of economy. But as a general thing, our employers do nst have ouch to say to us. I camot account for bis, unless it is owing to an idea that wh might not continue to recog as their authority, or that wo might ask for higher remu necration if our posi ions were inproved and our knowledge apirechated. But l admit that many of as are such as to jus iisy the incilference of their employers, which, however, leane to the degrading of the man of abiliit
to the level of the botch and the inexpert.
It irequently happeas that we have to replace an old engibe by a new one, aud the owner will go to a nachise shop nibd order at eggine in some suph wrds as these: "I wan
 neagese wifle a tint inch oflinder and a six feet stok way might suffice, but generally the shops here in the We th cannot properiy fill an order on sucn insiractious as these; and the result is a badiy built misproportioned enginc, of which
 by a compecent builder, wid ramings should be given to the moker when it is orderad. As good an engine as i ev.r sa,w was built on tivis aysem in a second class sbop in Pitsaurgh and lam sure thatevery engikeer who has charge of en ghues and machinery should be a draftsman. But this, probstby, would not suit some employers whose ouly notion or an barn door. Another pint in which emplogers do not recog nizes $t$ value of a cspable engineer is in the economical use of steam.

As ironmasters and workers of iron, many capitalista in this district deserve great credit. Many of them have secased valuable patents for improved processes. But so long as the ability of some engineers is not recognized by them, and the workmen themselyes are hardly recognizod as mechanics,
what use is it for any youth to study for a period of ten o welve years? The consequence is that the men, who should reacers of scientifis books and should have the means to
urchase them, are generally wanting in instruction and be urchase them, are generally wanting in instruction and
ome ialle, and in some cases, intemperate and immoral.
Gentlemen employers, have you ever once given it a thought that your wealth and property are in the hands of these careless ignorant men? If you paid more attention to these subjects, you would find out what you lose in cost $\cdot 0$ nning and deterioration of machinery; and you would ought.

Engineer.
Youngstown, Ohio.

## To Detect sulphuric Acid in Vinegar.

## The Editor of the Scientific American:

The method to detect the sulphuric acid cheat in vinegar iven by the American Journal of Pharmacy and repub ished in your paper on page 120, is the most glaring piece of upidity which I have had the mar to encounter for long time, and the editors of the American Journal of Phar macy sbould know better than to publizh such nonsense You ase perfectly right in wishing that some of yo
migit suggest an easier meihod for this purpose.
Thigh suggest an easicr method for this puppose.
The adation of the alcohol is not made in order to take up the free suiphuric acin to the exclusion of the sulphates, s the druggist's circular states, bui to destroy the acetic acid by changing it into acetic ether; the mixture of acetic acid, aicohol, and sulphuric acid, and afterwards evaporating or disilling the same, is exactly th. resular method for mating the volatile acetic ether, which will be the vapor or the product of the distillation; in this way the acetic acid is disposed of with the alcohol, und the free sulphuric acid and the sulphates are left; pure vingar must neither contain the one nor the other, and if adulterated with sulphuricacid, it will mostly contrin traces of sulphates also. The addition of a solution of chloride of barium will, in any vinegar, without prinus unnecessary preparacion, at once demonstrate th ir xistence by a white heavy precipitate, which is sulphate of arytes or beavy spar; while pure vinegar will not show this precipitate, simply because acetate of baryta is soluble in water, and not insoluble, as the sulphate. The advice o preparatory treatment, therefore, with alcohol, heating, etc. is absolutely unnecessary, and simply a specimen of as gross ignorance as is the attempt at explanation.
The sole purpose of my dilating upon this matter is for the mount of chemical instruction it conveys.
Now the simple test of detecting sulphuric acid in vinegar is this: Make a solution of caloride of barium, pour a little in the suspected vinegar; if it remains clear, there is no adul teration with sulphuric acid; if a white cloud shows itself there is adultration.
Even the quantity of the adulteration may be determingd in this way; when gradually so much culoride of barium has been added to, say, on $\rightarrow$ pint of vinegar till no more precipi te is formed, and this precipitate is then collected by filtra tion and dried, every three parts of the precipitate will indi cate very nearly one pari of sulphuric acid a fultaration.

New York city.
P. H. Vander Wefde, M.D

## To the Editor of the Scientific American:

Perhaps, after the recent disastrous failure, the laboring men will listen to a few words from a brother laborer. I will start with the proposition that all strikes, whatever their termination, are injurious to the working man. Take; for exampla, the no called succes of the shoemakers and coal miners during the late war. The former, according to their letter writers, obtained an average rise of five per cent, and we will concede as much to the latter. The strike lainted some six weeks, more or less, at an average expense of about one hundred dollars per man; how long did it take them to make np this loss? The price of coal nearly doubled in a few months, and foot gear took some very long atrides up ward; and who reaped the profits? Why, speculators and holders of stocks, of course.
Now, brother workmen, as you do not seem to see it, I wil tell you where the laugh comes in. It is when the Crispin pays a double price for his winter's coal, and the miner paps the same increased rate for bis boots and shoes; and although the curreacy had something to do with the rise of the too monities in question, I venture to say that the strike, so $x$ as it affected the rise, put forty-five cents into the pocket speculators waere it put five into those of miaers or shot Portland, Me.

## The New Type writer

To the Eiditor of the Scientific American:
A.s the original projector and ose of the inventors and paten ees of the type writer, wish jou have so well illustrated on the ficst page of your issue of Aagust 10th, I must take ex potion to and prorest arainst any inferancu, therein con veyed, that Mr. C. L. Sholes, of Milmaukee, Wia, is the sol
inventor thereof.
Carlos Glidden. Ventor thereof.
Milwankee, Wis
The Cohoes Ratlroad bringe - $1 \mathrm{~h} \%$ new railroad bridge spanming the Mohatok riverat Cohoes N. Y., is to be 704 fee ong and 18 feet wide, and is to consist of four spans of 140 eet each and one of 135 feet. Two spans are already fin shed, the ordinary combination tuss (wood aad iron) being mployed. T'be progress of this work has been seriously re arded by the throwing lown of one of the piers by the pow ful current in the river. A force of workmen is now engag
ed in repairing the damage. The structure is being built ed in repairing the damage. The structure is being built
under the supervision of the State engineers.

A Shower of Aerolites.
On the 9 th of June, 186, a remarkanle fall of aerolites took place in the County Unghvär, in Hungary, which was witnessed by a large number of persons. A violent detona ion was first heard, like the discharge of a cannon, making the glass rattle; this was followed by several more feeble sounds, accompanied by a noise like that of a heavy wagon olling along the pavements. Attention having been attract d by the noise, a small cloud was seen in the distant heav ens, which moved rapisly, having about ten times tha appa ent magritude of the sun, and which emitted rays of smose Persons at a considerabie distance off saw a red, incandes cent, pear-shaped body, surrounded by a blue light, and which approached the earth at an angle of thirty to thirty five degrees with great velocity, leaving behind it a train of vapor. One of the observers affirmed that this red body con inually emitted incandes ent particles, and separated int wo parts in its course, and that the two globes of fire fell eparately upon the earth. The phenomenon is said to hare lasted four or five minutes, while the smoke emitted by the olide remained visible for ten minutes afterwards. Som persors even professod that they perceived a decided smel of burning sulpbur; and one of those who picked up a frag ment a little time after its fall said that it was not free from he odor for three days after. The number of stoues that ell on this occasion was quit considerable, two of them bo ing much larger than orhers, one weighing nearly 600 pounds and the other about 80 pounds. At least a thousano frag ments were picked up, being scattered over a surface o about 6,600 feet in length by 2,500 feet in width. The larg st mass penetrated the eartin to a depth of 11 feet, and the smaller to that of about two feet,

Nicholson or suk blue on wool
Thia dye diffrs from all cther aniline colors in the fact hat it is not, like magenta, aniline violet, atc., the soluble silt of a base insoluble in water, but a base soluble in ater of itself, yet capable of forming, in union with acids, olored and insoluble salts. The base is in itself colorless, or very pale. To obtain a dye, the base already fixed on he fiber must be united with an acid. This is effected y passing the dyed wool through an acid bath. Thus for 10 lbs . of wool, a very dilute solution is prepared by boiling 1 to $1 \frac{1}{2}$ ounce of the dye in pure water; a colo bath is next prepared at a hand heat, in which $1 \frac{1}{2}$ to ounces of boras must be dissolved. An equivalent quantit of the carbonate of potash or soda may be used instead. The boras serves to neutralizs any trace of acid existing in the water or the wool to by dytd (possibly also to prevent the working on of certain impurities which may be present in the dye). The solution of Nicholson blue, previously well filtered, is next asded. The goods, previously saturated with water, are next entered and kept constantly in motion, while the temperature of the bath is very gradually raised to the boiling point. They are then taksin out, worked well in water at a hand heat, and passed into the acid bath, which for 10 lbs . of wool, should contain 10 ounces of sulphuric acid. Here they are worked till the color is fully developed. The Nicholson, or alkali, blue is the most permanent of al he aniline colors hitherto obtgined.

## Dispersion of Electricity in Gases

The gradual loss of electricity by charged conductors, sup ported by solid insulators and surrounded by air, is due, ac ording to Coulomb, to two causss: first, the imperfect in sulating power of the supports, and second, the action of the tmosphere, inasmuch as the small particles that are in con act with the conductor are electrified and driven away, giv ng place to fresta unelectrified particles, which are iafluenced their turn similarly.
Coulomb found that charges which did not exceed a cer ain limit of electric density were perfectly insulated by the better insulators; this limit varied according to the insula ing power of the substance used. For lower densities, the loss of electricity took place only by the atmosphere; and he ound that the time in which the charge was reduced to a liquot part of its amount has a constant value.
The dispersion is found to be uearly the same in dry ca onic acid and atmospheric air; in hydrogen, only about alif as great as in these gases
Moist air does not give a much greater dispersion than dry air.
The dispersion of positive and that of negative electricity ake place at the same rate.
Pnedmatic Coal Minivg Macurnery.-Pneumatic coal mining machines are now employed with much success i several of the British coul mines. The machines are provid ed with cutting wheels 3 feet 6 inches in diameter, which cut their way into the coal soams withgreat facility. A fac of 120 yards in length has been cut in one night. The cut ers are operaied by air, waich is compressed by means of uitable pumpas located $u$ pon the surface of the ground, and ond ucted in iron pipes down the shati, aloag the roadway and by rubber hose pipes iato the machines

By a recent amendment to the general railway law in Maszachusetts, all railways connected with Boseo are re quired to run a six o'clock anomiar and eveuing train, and iscue tickets therefors at a rate aot excoeding three dollar permile per year, for distances not exceading fifteen miles he object of the law is to provide chuap traesportation io orking people. The rate of fare just established capears to e less than the actnal cost. The Legislature ought to have cone a step further and ordered the companies to run a free rain. As it is, the amount allowed is hardly worth collect ing, so some of the companies thint.
team on the Canals, --whe Reward of One Hundred Thousand Doilars ©ffered by the state of
New York, New Korkin-M
Tests Required.
At a meering of the commission appointed by chapter 868 of the lawn of 1871, held at the office of the State Engineer and Surveyor, at Albaay, N. Y , on the 6th and 7th days of August, 1872, the following members were present: Van R. Rickmond, chsirman, George Geddes, Erastus S. Prosser, Gtorge W. Chapman, John D. Fay, Willis S. Nelson, Wm. W. Wright.
$V$ arioue persons were heard by the commissioners in regard o the preliminary tests heretofore required, and certain modifications were made, as will appear by the following pream. ble and resolution, that were passed and crdered to be pubiished:
WHereas, It is the opinion of the commission that the
intent of the law in regard to the sped intent of the law, in regard to the speed required of competing boats, is that the same shall be determined by the rate of movement through the levels of the canal, not including objects of the preliminary tests required will be secured by therefore, it is
Resolved, That the first and second resolutions, adopted by this board July 10, 1871, relating to preliminary tests, which Resolved, That
the law, this commission will require, among out the intent of made, that the several competitors sinall make not less than three round trips, from New sork to Buffalo or Oswego; each boat to be loaded with not less than 200 tuns of cargo etch way; the trips to be commenced as soon as any party is ready, and all completed in the least practicable time.
For the purpose of determining the time consumed by each
and all the trips, the clearance must show the day of the 2nd all the trips, the clearance must show the day of the or's office; certified copies thereof to be furnished to the commission. In order to obtain information in regard to the practical working of the several devices in competition, as $M$ Greene of Troy, will inspect the same from time to time M. Greene, of Troy, will inspect the same from time to time,
as in his judgment may be necessary, and report the facts obtained to this commission.
Resolved, That competiors are hereby notified that for the purpose of carrying out the intent of the law, though it is desirable that the three consecutive round trips from Buffalo or Oswego to New York be made at the earliest time practicable, the whole of the year 1872 will be allowed to will not be made until the close of navigation in that year," will not be made until the close of navigation in that year,", following resolution:
Resolved, That boats making the three round trips from Butfalo or Oswego to the Hudson river and return, as heretofore required by this commission for the purpose of deter-
mining the rate of speed of said boats, will not be required mining the rate of speed of said boats, will not be required to continue the trips to New York city, nor to carry more
than one hundred tuns of cargo going west, and that deducthan one hundred tuns of cargo going west, and that deduc-
tions from the time consumed in navigating the canals will be made for passing the locks, equal to twenty hours for each round trip from Buffalo, and proportional allowance
will be made if the trial is from Oswego. In case of delays wrowing out of obstructions to navigation, In case of delays by breaks in the canals or injuries to the structures or sunk en boats, or such as detain boats drawn by horses, the time lost will also be allowed for in computing speed.
The commission adjourned to meet at tbe office of the ber 1st, 1872, at 3 o'clock, P. M

Recent Patent Decisions.
United States Circuit Court-Southern District of Louisiana. A suit at law upon letters patent for an improvement in 2 , 1858 . Mary Frances.Mcha and James Jennings Mc Comb, plaintiffs; and George Brodie, defendant

The Law of Infringement-The Law of Damages. Woods, Circuit Judge.
There may be a claim for two inventions in the same patent if they both relate to the same machine or structure oue of these separate inventions when claimed as separate and distinct in their character.
Where plaintiff's patent covered three different features of
invention, but suit was broueht on one clain invention, but suit was brought on one claim only, the jury were instructed to conside

## The third claim of Coo

ok's patent of March, 1858, for cotton cut in a buckle, which without the cut would be a closed buckle, so as to allow the end of the tie or hoop to be slippe sidewise underneath the bar through which the slot is cut. If a party uses the open slot for passing the end of a cotton whether such end is in the form of a loop or not, if the re sult attained is that the end of the tie has been "slipped sidewise through the slot naderneath the bar, so as to effect
the fastening with greater rapidity than by passing the tie the fastening with

A man cannot have two patents for the same process be cause for different purposes.
the patentee is entitled to the excluganization are patented cal organization, device, or means, for all the uses and pur poses to which it can be applied, without regard to the pur-
poses to which he supposed, originally, it was most applicaposes
poses t
ble.
To

To constitute infringement the contrivances must be sub comprehends the application of the principle of the which tion.
If a
If a party adopts a different mode of carrying the same
principle into effect, and the principle admits of different principle into effect, and the principle admits of different
forms, there is an identity of principle though not of mode;
and it makes no difference wiat additions to and it makes no difference wiat additions to or modifications of a patentee's invention a defendant may have made; if he though with his improvement the original machine or devic may be much more useful.
All $m$ ©d, however changed in form, but which act on the some principle and effect the same end, are within the patent of ordinary mechanical skill.

Therule of damages at law is not what the defendant has by the plaintiff by reason of the infringement.
If plaintiff was ready to supply the market with his patented goods, and his business was hindered or interfered with by the competition of defendant, plaintiff's damage will be the amoun
interference.
If a plaintiff neglects to prove that his patented article was stamped, or that he gave to the infringtr the notice required by section 38 of the patent act of
award him more than nominal damages.
W. M. Randolph, C. Roselius, J. A. Campbeil, and S. Fisher, for plaintiffs; Semmes and Mott, for defendant.

United States Circuit Court, District of Massachusetts. WOODWARD vs. MORRISON et al.
This was a suit in equity, brought against Louis P. Morison and Genrge G. Noah by Joseph Woodward, for an ant, February 20, 1866, for an improved prepared paste for book binders.
frringement upon Articles of Mandfacture-Infkingement of Chemical Processes-Chemical Equiv-alents-Construction of Patents.

Shepley, Circuit Judge
The invention patented to Joseph Woodward, February 20, 1866 , for an improved paste, consisted in the dikcovery that the use of a very minute quantity of corrosive sublimate would arrest the tendency to fermentation in tye paste, without imparting to it any poisonous proper ties; also, that an
improved result was effected by the addition of chloride of mproved result was effected by the addition of chloride o of corrosive subliwate.
A paste in which corrosive sublimate is used in proper
quantity to prevent decomposition without makivg the com quantity to prevent decomposition without making the compound poisonous and unsafe to handle, held not to be antici pated by a paste in which the same ingredient is purposely
used in such quantity as to make the compound poisonous and destructive of animal life.
Semble, that where the patented invention is an entirely new article of manufacture it might be sufficient to find that the defendant makes substantially the same thing, whether y the same or a different process.
Patents are infringed by the substitution of chemical The use of well as of mechanical equivalents.
en if in some respects they are improvements on the Tol process patented.
To constitute an infringement of a chemical process, it is ot necessary that the substituted ingredient be the equivalent in every respect aud for every purpose of that in place ticular process, contributing to produce the same: compositicular process, contributing io produce the same composi Where the patentee of an improved paste used the chloride of sodium mainly for increasing the solubility of the antisepic agent employed and assisting in its diffusion through the mass of the paste: Held, that the use of the chloride of zinc, which in the particular process produced practically the same esult, was as ivfringement
with the general facts of the mechanical or chemical science involved in the invention; and the specification of the parts is a specification to ordinary skillful mechanics or chemists of the well known mechanical or chemical equivalents.
If there are equivalents, mechanical or chemical, existi If there are equivalents, mechanical or chenical, existing, but previously unknown to ordinarily skillful mechanics of
chemists, these are nct iucluded in the specification of a patent unless specially stated therein. They are new discoveries in themselves, and may be used by all without in fringing the patent.
pective spective formulas of manufacture, as stated in the respective patents, are as follows


James B. Robb, for complainant.
H. G. Farler and B. C. Moulto
Electric Illumination of Lighthouses.-The follow ing is a list of the electric lights : $n$ Eugland and France with he dates at which they were erected: Dungeness, January 862; Cape La Heve, France, South Light, December, 1863, 1869; Souter Point, England, January, 1871; South Foreland England two lighte, January, 1872. It is interesting to see says Nature, that England took the lead in this matter of the daptation of electric illumisation to lighthouse purposes ad it must also be remembered that although the first elec ic light was only erected in 1862, yet in 1859 experi Far day, which were very successful. [We believe that in the United $\mathrm{S}_{\mathrm{i}}$ ates there is no ligh house in which the electric light is employed.-EDs.]
A Sprotting Snaike.-Proíessor Cope states that he had or sometiwe a specimen of Cyclophis astivus, received from Fort Macon, N. C. The slender form of this snake and its beautiful green and yellow colors, show that it is of arbor 4 al or busk-loving habitas. Ì never exinibited such in confinement, it livta mostly under of climbing over the caladia, ferns, eic jecting its head avd two or three inches of its body ubove the round, and holding th $\leftarrow \mathrm{m}$ for hours rigidly in a fixed atti ude. In this position it resembled very ciosely a sprout or mistaken for such by omall asimals.
An acorn suspended by a piece of thread within half an rich of the surface of water in a hyacinth glase, will, in a ew months, burst and throw a root down into the water, and hoot upwards its straight and tapering stem, with beautiru hitle green leaves. A young oak tree, growing in this way on the mantelshelf of a room, is a very elegant and inter
esting object.

## MANUFACTURE OF PINS.

A recent visit to the works of the Enpire Pin Company, situated in Cohoes, N Y., afforded us an opportunity to witpess the entire process of pin making. The wire for this parpose is rectived in large coils, and the first proceeding is ing a long from kinks and fring and united to make an almost doan clater, our artention was directed to a coil of wire which had just been placed on a revolving spindle. The end was passed through an appes. a revolving spindle. The end was passed through an apye-
ratus co taining several small rollers, and then allowed to ratus containing several small rollers, and then allowed to
wind around a large wheel some two feet in diameter. From this wheel the coil is cut off in sufficient lengtias. We now pass to the pin making apparatus proper, that is, the numerous mall machines which spitefully seizs the wir ojag it along under cutters, bite off arnall pleces, then suppig ach of the several bits with a head and sharp point, and finally throw them info a receptacle as nearly finisued pins at the rate of hundreds per minute. We say "nearly fin. ished," because, to all appearances, a handful of pins in their present condition appear to be all ready for use. But they far frogh, they are still of yellow brass, and their points are far from smooth. We are now shown two revolving ba rels Here they are rolled until perfectly smooth, when they are removed and treated to a boiling for four hours in a solution of cream of tartar and water, from which bath they emerce literally as "clean as a new pin," and, besides, thoroughly whitened.
Next they must be sorted. Pins of every siza, some siont, others long, must be separated, and each length placed in distinct boxes. To effect this, they are thrown on an inclined tray; down they slide, ranging themselves side by side. Now they pass over a piece of steel, in the edges of which indentations are cut of varying depths. Each pin keeps on its journey until it reaches a point at which one of the indentations makes a passage sufficiently wide for it to pass through lengthwise when it falls into its proper box.
The pins being now sorted, the next process is to place them in their papers. Being heaped upou a horizontal tray, they are sent, by a sweep of the attendant's hand, traveling down an inclined plane of steel, in which slots have been cut. Each slot is made of such a width as to allow the body mans pin through but not the head. There as pins sliding down range themselves in an even line at the foot of the plane. Meanwhile a continuous roll of paper has foot of the plane. Meanwhile a continuous roll of paper has
been attached to the machine from usderneath. This, as been attached to the machine from usderneath. This, as into a die, which forms crosswise creases in it. The pins are then forced down through these creases, the paper leaves the die, and is rolled along; another row of pins falls into place, and the operation is repeated. The paper, when filled, is cut off into proper lengths, and sent to girls to supply missing pins. As each paper is completed, it is folded and then packed in bundles of a dozen each, marked, labeled, and sent o the market.
There is another auxiliary machine connected with this manufacture by which the pios which are crooked and which fall thruugh the last described apparatus are separat d from the straight pins which become mixed with them. Tnis is done by causing the pins to fall upon a number of andless leather belts. The crooked ones remain steady, and are car ried along the belts and dropped into a receptacle at the end of the machine. The straight pins, however, in faling upon the belts do not rest upon them, but, receiving by this means a vibratory motion, roll off between the belte and are caught in a box underneath. The great rapidity of this work can be judged from the fact that some 650 paikage. of
pins, each package containing a dozen papers, are daily turned out at the works of the Empire Company.

Carbonic Acid from the Lungs.-It is customary to show the presence of carbowic acid from the luags by breathing in to lime water, and as the experiment is usually performed, it is necessary to blow through the water for a considerable time. Dr. Krebs recommends the simple device of holding the nostrils when making the expiration; it is then possible, by drawing a long breath, to obtain a cousiderable precipitate in lime water in one expiration. The difficulty has been that nearly all of the carbonic acid escaped through the nestrils, and hence the erroneous impression that only a small quan. tity was given off from the lungs.

Value of Poultry Mandris.-From actual experiment it as been found that the droppings from four Brahmas fo one night weighed in one case exactly 1 lb ., and in anorher
more than $\frac{g}{f}$ lo, an average of nearly 4 ounces each bird. By drying, this was reduced to not quite $1 \frac{1}{2}$ ounce. Other breed make less; but, allowing only 1 ounce per bird daily of dry dung, fifty fowls will make, in their roos ing house alone, 10 cwt . Der annum of the best manure in the world. Hence $\frac{1}{n}$ a acre of pouliry will make more than enough manure for plied per acre, and poultry manure being even richer than guano in ammonia and fertilizing salt. No other stock will give an equal return in this way; and these figures demand arefulattention from the large farmer. The manure, before using, should be mixed with twice its bulk of earth, and then llowed to stand in a heap covercd with afewinches of eart till decomposed throughout, when it makes the very best manure which can be had.

The Union Mill Company, of Fall River, Mass., make prin cloth, and they pay dividends of 140 per cent annually on the
stock of the corporation.

## SPRING POWER FOR SEWING MACHINES*

On page 247 of the previous volume, we laid before our readers the results of the investigations made by the Massa chusetts $S$ 'ate Board of Health into the injurious effects up on the health of women emploped in running sewing machines by foot power. The facts were established that among such operatives certain diseases exist in a greater proportion than with other females, and that they result from excessive work in propelling the machine by the feet. It was shown, further, that what proved excessive labor in one form might be far from excessive in another, and that the number of hours these operatives work daily would not injure them if the machines were run by steam or other power.
$\mathrm{t}_{\text {bis power, wbich is patented in this country and in Europe }}$ through the Scitntific American Patent Agency. Further information may be obtained of the United States Combination Spring Power Company, 97 Spring street, New York.

## Chinese Wheelbarrows

Crossing some uncultivated chalky downs in the province of Honan, where the roads were good, Mr. Oxenham came upon large numbers of wheelbarrows; and in one place where the country was unusually high and open, and where a strong wind was blowing in tbeir favor, all of them set up a sail to ascist them in their journey. The men wbo use these cumbrous and loud shrieking vehicles contrive to make about 20 miles a day, and in the $\epsilon$ vent of a favorable wind, often 30 One man generally manages the whetlbarrow, though he
within. When the lamp is in an upright position, the extinguisher is supported by the ring, on which its arms rest, and is placed sufficiertly far down on the wick tube for the latter to be on a level with or project slightly above it. Under these conditions, which are represented in the sectional view, Fig. 2, the light is free to burn, but upon the weight being swung, or the lamp being caused to deviate from its vertical position, one or other of the sides of the ring is thrown upward and carries with it one of the arms of the extinguisher; by which means the latter is thrust beyond the wick tube and over the wick, and the light is extinguished. The latter conditions are shown in Fig 1, and indicated by the dotted lines in Fic. 2. By bending upward the sides of the ring, the parts may be adjusted so that a very slight tilting of the lamp suffices to put the light out.


CAYCE'S SPRING POWER FOR SEWING MACHINES.

The invention we now illustrate appears to meet the re quirements of the case by furnishing a simple and economic motor which can conveniently be applied to any form of the sewing machine. It consints of a spring power, mounted in a neat frame, to the top of which the table of the machine is attached.
Fig. 1 shows the apparatus, uncovered so that the driving mechanism may be seen; and Fig. 2 shows the same applied to a machine of a different manufacture, and castd. The motive power consists of eight coiled springs which are mounted on sleeves on parallel shafts, four on each shaft, as shown in Fig. 1. Each of these shafts is grooved longitudi nally oo as to carry a sliding key which is worked by a slid. ing collar on the outer end of the shaft. By means of this key, the sleeve of either of the springs can be locked with its shaft so as to allow of its being wonnd up by the rotation of the pame. Both shafts are connected by gearing with a cen tral one, and the winaing up is done by means of a detachable hand wheel or windlass placed on the latter, as in Fig. 1, or by means of a crank handle such as is seen at foot of Fig. 2. In winding up, one spring on each shaft, upper and lower, may be locked and wourd simultaneously. The power developed by the recoil of the eprings is communicated through gears to a central shaft, as in Fig. 1, from which it is transmitted by appropriate gearing and a pulley and belt to the driving shaft of the sewing machine. A brake, represented in both figures, is attached to the apparatus, and by its means the machine is started or stopped, and its speed regulated. The treadle shown in the engravings is employed solely to operate this brakw while at work; and by its use the speed may be slackened or allowed to start up again, etc., with great nicety and ease. The b ake is also further adjustable by means of a spring lever and tbumb screw, which are connected therewith and are placed for operation on the top of the machine table, as represented. A still furon a adjustment of the apparatus is provided for in the ther adjustment of the apparatus is provided for in the shape of an attachmed the springs, as desired, may be locked off and prevented operating on the central shaft. We may remark, also, that the windisg up can, by the construction, be done while the machine is running, if required.
Two sizes of the spring power are at present manufactured, the larger of which is calculated to run for one hour and the omaller for half an hour, the spred in each case being one third faster tban that obtained in working a sewing machine by foot power. We are informed that a man can wind up the whole eight springs of the larger size in one minute, using the arank handle; and that a lady, using the hand wheel of large diameter, would accomplish the same in less tban five minutes. Thus, in a day of ten hours, less than an hour would be occupifd in winding up springs, and over nine hours would remain for mere sewing unac companied by hurtful exertion; while the work accomplished would be more than could be done in the ordinary manner on account of the extra speed. It is stated that a boy of on account of the extra speed. It is stated that a boy of ty machines going.
Mr. John M. Cayce, of Franklin, Tenn., is the inventor of
sometimes avails himself of the services of his son, bis wife,
or his donkey. No laborer in the United States or Europe probably undergoes an equal physical strain to the Chinese barrowman, who seldom reaches the age of 40 years.

## GOODRIDGE'S AUTOMATIC LAMP EXTINGUISHER.

The accompanying engraving represents a neat and inge nious device for attachment to kerosene lamp burners, by the automatic operation of which the extinguisbment of the light is immediately effected in the event of the accidental falling or tilting of the lamp.


Fig. 1 gives a perspective view of a burner with the ex tinguisher attached. Part of the outward sbell of the bur ner is broken out to show the ring and bent wire, A. The ring which, it will be observed, entirely surrounds tbe wick tube is pivoted to the shell, on the further side, by a pin which enters ove of its perforations; on the nearer side, the bent wire, wbich passes through another perforation, also acts on a pivot. On the lower end of the wire hangs a leaden weight, the tendency of which is always to keep the wire in a vertical, and the ring, consequently, in a horizontal, position. At $B$ is shown the extinguisher proper, which consists of a short piece of tube which is placed on the end of the wick tube and slides easily thereon. It is provided with the two projecting arms seen in the engraving, where it is represented with a hole in one side to show the tube and wick

In the provision thus made for extinguishing the lights before the oil in the lamp has time to escape and becomeignited, appears to lie a safeguard against many of the disas trous results hitherto attending lamp accidents.
Patented March 12, 1872, by John M. Goodridge, of Nor folk, Va., of whom further intormation can be obtained.

## Instrument for Measuring the Transparency of the Sea.

A correspondent of the New York Herald, accompanying Professor Agassiz' expedition on the coast survey steamer Hassler, gives a brief but interesting account of an apparatus for determining the relative transparency of the sea at different places, which has already been employed by the expe. dition at Barbadoes and about the Galapagos Islands. A strip of board, about four inches wide and four feet long, divided into a scale of ten equal intervals, is painted a dark lead color at one end, fading into white at the other. A large white board having been fastened parallel to it, and at a white board having bten fastened paraled distance below it, the whole arrangement is lowered horizontally into the sea. At the da•k end, tbe upper ered horizontally into the sea. At the da. $k$ end, tbe upper
board appears the darker, but at the white $\in$ nd, the lower board appears the darker, but at the white $\in$ nd, the lower
board, beivg seen through a greater depth of water, gives board, beivg seen through a greater depth of water, gives
the darker appearance, and, of course, at some intermediate the darker appearance, and, of course, at some intermediate
division, the two boards appear to be of the same shade. At division, the two boards appear to be of the same shade. At
that division the relative whiteness of the boards is evidently that division the relative whiteness of the boards is evidently
a measure of the percentage of light absorbed while going a measure of the percentage of light absorbed while going
down and up again through the distance by which the boards are separated. Tbis relative whiteness is readily $\epsilon$ stimated at night in the cabin by placing the boards at unequal disrances from a candle so as to make them of the same apparent shade at the given division of the scale.
The illuminating powers are to each other as the squares of the distancts of the boards from the light. Having once ascertained what percentage of light goes through a fathom, the proportion of daylight which reaches any given depth in the sea can be readily'calculated. Suppose, for example, rhat one half the light penetrates one fathom; then one quarter goes down two fathoms, one eighth, three fathoms, and so on indtfinitely.
This apparatus is the invention of Dr. Hill, who regards it as still in a crude form, and capable of much improvement

Professor Palmieri records a singular observation on the recent remarkable eruption of Mount Vesuvius. The vaporous emanations alone were observed to be cbarged with positive el ctricity, while the aslues alone were charged with nagative electricity. Hence electric effects resulte.d from the collision of the clouds of ashes with those of vapor, thunder and lightning being produced as in an ordinary storm.

THE brewers in this country are considerably exercised by an attempt, on the part of the holders of William Marr's patent of 1867 , to collect damages for the use of bisulphite of lime, which is employed to arrest the fermentation during the brewing operation. The grant of this patent appears to have been a blunder on the part of the Patent Office, as bisulphite of lime has been so employed for many years.

# Srintifir gmoxical. 

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## TERRESTBIAL MAGNETISM

The old notion that the farth possessed, near its north pole or in its interior, strovg magnets which attracted the poles of the compass needle has long ago given place to the theory that our whole plavet must be considered as a large magnet and to the later hypothesis that this magnetism is caused by electric currents running east and wast through its crust and in regard to which the compass needle behaves as i does to all +lectric currents, namely: it places itself at righ angles to the same, according to the law discovered by Orr sted in 1829. By this theory the declination of the compas needle from the geographical north is simply explained by the fact that there is no cause which should compel these currents to run exactly east and west; on the contrary, by the irregular formation of the earth's crust, it cannot be expected otherwise than that these currents, which always follow the path of least resistance, should not coincide with the geo graphic parallels, and that consequently the direction of the compass needle, which must be at right angles to these cur rents, cannot coincide with the geographic meridians. This being the case, it is evident that the magnetic pole cannot coincide with the geographic pole, and in fact observations in high northern latitudes on this hemisphere have decided that, at present, the magnetic north pole, that is the point towards which the compass needle points, is situated in the arctic archipelago north of the American continent, in lon gitude of very near $100^{\circ}$ west of Greenwicb, and a latitude of $73^{\circ} \mathrm{N}$. The magnetic south pole, in regard to latitude, is very near to the antipodes of this point, being in $74^{\circ} \mathrm{S}$., but in regard to longitude, this is not the case; the antipodal point of $100^{\circ} \mathrm{W}$. longitude lays in the meridian of $80^{\circ}$ east of Greenwich; but the fact is that the magnetic south pole is at present at $140^{\circ}$ east of Greenwich.

We can, of course, draw lines on the globe through those places where the compass needle points to the magnetic pole: in other words, when we travel from any place on earth and follow the direction of the compass needle till we reach the magnetic pole, and draw the line traveled over on the globe, we shall have a magnetic meridian. Those magnetic meri dians can, of course, nowhere concide with the geographical mericians, but must intersect them continuelly. Other sys
tems of magnetic curves have been drawn; for instance, those tems of magnetic curves have been drawn; for instance, those
of equal declination, that is, such curves as unite points where the declination of the compass needle from the geographic pole is the same. Those lines are quite irregular, much more so than the magnetic meridians, and even exhibit a great complexity. The line without declination runs from the magnetic north pole, south through Hudkon's Bay and Lake Erie to Virginia, and enters the ocean in North Carolina; it skirts the Antilles and crosses the eastern point of South America. East of this line, the compass needle points north towards the west, and west of this line, it points north towards the east; and it generally deviates more in propor clination; so while at present in Maine the declination is rome $20^{\circ}$ west, and in California, $20^{\circ}$ east, it is in Newfound land $40^{\circ}$ west, and in northern Alaska, $40^{\circ}$ east.
The reader will have noticed that we have used several times the expression "at present." This was by reason of
the singular fact that all these data are continually changing. Observations made since the last three centuries and record
ed on maps, for the years $1600,1700,1800$, and 1870 prove that the magnetic poles are continually shifting their position; and this shifting is taking place regularly from east to west. Thus, in 1600, the magnetic north pole was some where north of Europe, and the line without declination ra throueh the heart of that continent, so that in the west ern European countries the declination was from $5^{\circ}$ to 10 east; then it proved to be moving westward, so that the lin f no declination passed over England some 100 years later when the declination for the whole of Europe became west
and was increasingly so till about 1820 , when it had reached and was increasingly so till about 1820 , when it had reached
about $24^{\circ}$. Since this time, it is diminishing again in degree about $24^{\circ}$. Since this time, it is diminishing again in deres in the Estern States of America it is increasing, so
while that in New York city, where a few years ago it was $6^{\circ}$, it is now more than $7^{\circ} \mathrm{W}$. This points to a regular travel of the magnetic pole around the geographic pole, and, as far as we may conclude from a rather premature estimate, it will tak
a little over 600 years for a complete revolution, so that in the year 2200 it will again have arrived in the north of Europe.
There are two theories in explanation of this surprising phenomenon; one is that a great portion of the earth's mag netism is due to induction from celestial bodies and there fore under their influence, so that the relative position of the p'anets may affect the earth's polarity. The other theory quite recently brought forward, is that the upheaval of con inents and islands and in general all changes in the earth's either the magnetism or the direction of the electric currents which are the causes of the same.
In closing, we cannot forego drawing attention to two sig. ificant facts. One is that the aurora borealis appears to proceed always from the magretic and not from the geo-
graphic pole as a center; the other is that the magnetic pole graphic pole as a center; the other is that the magnetic pole appears to coincide with the point ol greatest cold, and even that the lines of equal mean temperature, or the so called isothermal lines, when drawn on the globe, show such a close relation to the magnetic pole as to give evidence that they re to a great extent governed hv the same fundamental law
THE INTERNATIONAL EXPUSITION AT VIENNA, 1873. In reply to inquiries for the name of the United States Commissioner for the above exhibition, we would state that Thomas B. Van Beuren, Esq., 51 Chambers street, New York, is the proper address. All persons who are desirous of going o the trouble and expense, of shipping their goods to Aus ria for this show, should communicate with the Commission r as above. It is stated that there will be but few American exbibitors. This is not to be wondered at when we consider traders allege, to our taxes a a high tariff-it is not possible for Americans to compete with Europeans in filling order for manufactured goods. It is, therefore, useiess for ou people to go over to Austria to exhibit the products of their skill and ingenuity. The only practical result would be that ur best patterns would be copied without benefit or reward the American maker. He could fill no orders, export no goods, simply because the continental manufacturers can do tbe work much cheaper and underbid his best proposals When prices advance on the other side of the Atlantic, or become reduced here, then will be the time to talk to our people about going abroad to show their goods.
As for the exhibition of new inventions at Vienna, the Austrian patent laws offer but precious little encouragemen and protection for American inventors, as we have heretofor had occasion to explain
TUNNEL UNDER THE HARLEN RIVER, NEW YORK The Park Commissioners of New York city contemplat the construction of a large tunnel at the upper end of the
island, for the purpose of providing a carriage way under island, for the purpose of providing a carriage way unde the Harlem river, from the end of the Seventh avenue drive his is an excellent improvement and we trust communica on between New York city and Westchester county. A the present time, the only avenues of access are the draw bridges, which occasion frequent delays, not only to the general traffic but to the railway trains.
The tunnel will be built of solid masonry, and extend 1,663 fet on the New York side, and 1,078 feet on the Westcheste side of the river. It is contemplated to have the top of the rch 18 feet below high water mark, so that vessels drawing feet can pass over safely. The tide falls about five feet a hat point; and at low tide, vessels drawing less than 13 feet
will be able to pass over in safety. It is proposed to have the tunnel about 2,759 feet long, and 16 feet in hight, to permit persons to stand on top of the highest omnibus, and
34 feet in width; this affords 20 feet of wheeling space and 34 feet in width; this affords 20 feet of wheeling space and
seven feet on each side for foot passengers. The descent will begin at 150th street, and the top of the tunnel will strike the water bed at $155: \mathrm{h}$ st reet, at a point about 200 feet south of the present Macomb's Dam bridge. The descent will no be steeper than many of the roads in the Central Park, and will not inconvenience horses drawing heavy loads. The ex pense is estimated to be about $\$ 1,500.000$. A. W. Grant C. E. is the engineer of this important work.

## WILLIAM BRIDGES ADAMS

We regret to hava to record the decease of this distinguished ivil engineer, inventor and scientific writer, whose name nd works are doubtless familiar to our readers. He died re cently, in Eagland, the land of his birth, at the age of 75 years. Many of his suggestions in respect- to railway im provements have been brought into common use, and among
them is the so called fish joint, for uniting the ends of raits. The employment of light steam cars and carriages is be
coming every day more common. Their practicability was perhaps as completely demonstrated by the late Mr. Adam as by any other one person. We find in Engineering the following particulars concerning the performances of one of the early vehicles of this kind, made by Mr. Adams
The total length of the carriage was 12 ft .6 inches, includ ing machinery, water tank, and seats for seven passengers, all being placed on one frame, which was hung below the axles, and carried on four wheels, 3 ft .4 inches in diameter The floor was within 9 inches of the level of the rails. The engine had two steam cylinders, $3 \frac{1}{2}$ inches in diameter, and 6 inch stroke, acting on a cranked axle. The boiler was ylindrical, placed vertically, and was 1 ft .7 inches in dia eter by 4 ft .3 inches high. It contained a firebox, 16 inche in diameter by 14 inches high, with 38 tubes, 3 ft. 3 inches ong by $1 \frac{1}{2}$ inches in diameter, giving $5 \frac{1}{2} \mathrm{ft}$. of heating arface in the firebox and 38 ft . in the tubes. The wate tank was plàced under the seat, and had a capacity of 40 gallons.
The number of miles run during the half year, ending uly 4 th, 1818 , was 5,526 , the quantity of coke consumed be ing 7 tuns 9 cwt ., or at the rate of 3 lb . per mile. At th ate of this extract, the engine had run altogether about 15 00 miles; the greatest speed attained on the level was 4 miles an hour, the ordinary speed that might be safely cal culated on for a long journey boing 25 miles an hour. She had performed the journey from London to Cambridge, a distance of $57 \frac{1}{2}$ miles in $1 \frac{8}{4}$ hours, being at a rate of nearly 33 miles an hour, with a consumption of coke of $2 \frac{9}{4} \mathrm{lb}$. per mile This carriage was subsequently named the Express, and was ent dowa to Birmingham to be experimented with, wher o the astonishment of some of Mr. Sa muel's friends-who ha lanned the matter-she ascended the Lickey incline of 1 in $3^{\prime \prime}$

## SECURITY AGAINST THIEVES.

A bold bank robbery was commirted not long ago at Ux bridge, Mass. The thieves surrounded the cashie r's house in the dead of the nght , and by mexns of ladders entered the open windows of the second story. They then gagged all the nmates, compelled the teller, on pain of death, to go with them to the bank and open the safe, which they immediately pluudered. Loss, thirteen thousand dollars.

The moral of the affair is," says Appleton's Journal, "'that cashiers and tollers of banks must cease to go to bed with heir chamber windows open, and that banks in the country must resort to some means of defense and protection more e cacious than the locks of a patent saf $\theta$. An armed man and stout dog in the Usbridge bank would have prevented thi obbery, and in the long run, it would be cheaper for country bank to pay for a permanent night watchman than o be robbed, even if only once in a generation. The Ux bridge robbery is one of a series of similar outrages which ave been perpetrated on the banks of New England during he last five years, and their frequency .hows clearly tha banks in the country cannot exist much longer in the old primitive fashion, but must fortify and arm themselves if the would keep their treasures safely.'
We do not quite agree with the Journal. Instead of the dog and watchman, our advice to the banks is to make use of the better and surer meansof protection which our ingenious inventors have provided in the shape of electrical alarms and detectors. For a tithe of the cost of maiataining a sleepy watchman, the Uxbridge bank might have had electric wires attached to its doors and safes and also to the doors and win dows of its cashier's dwelling, so arranged that any attemp of a burglar to enter would have rung an alarm bell and roused the whole town. Entrance through open window may be guarded by the use of a $\forall y$ net to be connected with the wires. Any attempt to pass the net sounds the alarm
With the other forms of window, door, and safe alarms, our caders are familiar We are never very sorry to hear of bank robbery where the owners and offiers have been so parsimonious as to refuse to employ the best electrical bur lar alarms. Many of them turn up their ignorant noses a he idea of usingsuch " patent gimcracks," as they call them, bout their premises. Bat they must either use them or submit to robbery. Some of the h aviest and most as tounding bank robberies have been commitled upon bank that employed special watchmen at great expense, who were overpowered by the thieves, or were absent from their post the critical momeut. But we have yet to hear of a single oxample of baak robbery where the eloctric alarm was pro perly applied.
THE INTERNATIONAL SIACISIICAL CONGRESS.
The International Statistical Congress has opened its ighth session in St. Petersburgh, Russia. The delegate re divided into four sections, to each one of which the fol lowing subjects are a ssigned for consideration and report To the first section, statistics of population, with methods of btaining the same. Under this head, the number, sex trades, and ages of the population of varirus countries wil be discussed, together with the moral, intellectual, and phy sical condition of the people. Comparisons will also be made with reference to determining whether retrogression or pro re:sion has been made from a former state. To the physical development of man will be given considerable promi nence. Investigations on this subject will include the hight, veight, volume, and development of different parts of the ody, the strength, rate of walking, respiration, pulse beating of the heart, and comparative acuteness of the enses.
To the second section, the most important part of the labor of the Congress is assigned. This is the discussion of indus rial statistics. The subject is divided into five classes: Ag riculture, mines and quarries, commerce and fisheries, and
manufactures. These are subdivided so that no detail, how ever amall, will be omitted.
The third section will discuse the statistics of commerce and postal relations. Many difficulties to the accomplish ment of this work are anticipated. The principal is that of fixing a uniform nomenclature for the leading articles of commerce, without which it is almost impo ssible to arrive at satisfactory results, and also that of obtaining the true valuts of merchandise for use as a basis of comparison between aggregates. The fourth section will devote itelf to discus. sions similar to those of the Prison Congress lately held in Englatid-the statistics of criminal justice.
The more than ordinary importance of this Congress will render its proceedings of great interest, and we look for much valuable information from the results of its deliberations.

## A NEW CANAL STEAMER.

We published not long ago illustrations of Captain Goocwin's improvement in canal propulsion, and spoke of it as one of the plans most likely to prove practical and successful. We are gratified to be able to state that a pair of these canal boats have lately been constructed by the inventor, at Buffalo, and in the course of two or three weeks they are to be put on trial on the Erie canal.
The peculiar features of the plan are, first, a floating propelling wheel, extending entirely across the bow of the boat, somewhat like those employed at the sterns of the Western boats. Sccond, cheek pieces extendirig alongside of the bow wherl, bo as to enclose the water in front and cause it to be driven under the bottom of the boat as the latter advances. Third, a peculiar formation of the stern of the vessel, so as to admit of the connection therewith of a train of barge boats, which when united shall form a unity, so far as pro pulsion is concerned.
The two boats just built are each 96 feet long by 17 feet wide, and will have a carrying capacity each of 240 tuns The engine is of 40 horse power, capable of working up to double that power if required. It is expected that the two boats when connected will be propelled with a speed of from four to six miles per hour. Of the actual performances o the vessels, we shall give a report in due time.

## THE NEW RAILWAYS ACROSS THE CONTINENT.

Colonel Thomas A. Scott, the celebrated railway projector and manager, recently made a speech before the wealthy men of New Orleans, inviting them to join in the construc tion of a railway from New Orleans to Shreveport, for the purpose of connerting New Orleans with the Texas \& Pacific Railroad, of which Colonel Scott is president. In the course of his remarks, Colonel Scott stated that the Texa and Pacific Railroad, the construction of which is now rapid ly progressing, will extend from Shreveport, La., to San beginning at Texaskana, and runcing westerly to Fort Worth beginning at Texaskana, and runving westerly to Fort Worth,
in Tarrant county, Texas, where it joins the trunk line. in Tarrant county, Texas, where it joins the trunk line.
Colnnel Scott stated that the entire line from Shreveport to Colnnel Scott stated that the entire line from Shreveport to
San Diego will be finished within six years, and if the citizens of New Orleans now join in the construction of the proposed road from New Orleans to Shreveport, they will be enabled by or before the year 1878 to take the cars in their own city and ride direct to the Pacific ocean. The Texas and Pacific Company expect to have five hundred miles of their road completed within the next two years. The portion of Texas through which it passes is very rich in agricultura and other productions.
Still another new transcontinental railway enterprise is in progress, that of the Atlantic and Pacific Railroad Company, lately incorporated under the authority of the Legislature of Caliornia. The line is to be located south of the snow line so as to avoid the detentions which so seriously interfupt the connect with the Attantic and Pacific Railway of Missouri, a portion of which, over three hurdred and fifty miles in portion of which, over three hurdred and fifty miles in ed that the city of San Francisco will rubscribe heavily to wards this new road, as the citizens have become alarmed by the $\epsilon$ fforts of the Central Pacific Company to concentrate the entire railroad system of the State in their own hands, with the terminus at Goat Island-a project whict, besides estab lishing an immense moncpoly, is claimed to threaten the de struction of the present harbor of San Francisco, and th building of a rival city on the opposite side of the bay.
When these new higaways are completed, we shall have four great railway avenues in operation across the continent to wit, the Union Pacific, the Northern Pacific, the Tera and Pacific, and the Atlantic and Pacitic.

## IMPROVEMENTS THAT ABE MUCH NEEDED.

The steamboat Bristol, one of the large and mag ificen eesels that nevigate Long Island Sund, plying on the Boston route between New York and Fall River, lately collided a Nowport, during a fog, with a sbip lying at anchor. The sailing vessel, which was loaded with railroad iron, was cut down and sank, while the steamer was damaged in the bow and was run ashore to prevent singing. As it was, her hull fllpd. Steam pumps wre sent for, which, in a few ho et the Brisol again atioat ani she was soon repair d.
The Br atol is a noble vessel. She was built at an expense one milhon of dollars, with first class boilers, engine blowers, indicators, hose piper, etc. Her cabins are elegantly
upholstered, adorned with gilt, lighted with gas; her twelve upholstered, adorned with gilt, lighted with gas ; her twelve hundred passengers are entertained, during every trip, by
regularls employed bands of music, are supplied with
good corps of the politest negro waiters. In short, the vesse
tive is a floating palace, sailing with almost every appointmen and luxury that money can supply. But in one most im is sadly deficient.
The o:dinary mechanic, not experienced in navigation, if asked to give his ideas as to the prime requisites for passenger steamboat, would naturally say that the first thing to do was to provide the most ample means possible for keep ng the ship afloat. But it is just bere that owners dis gree with him, and the Bristol is a case in woint. With an perating steam force on board of nearly three thousand horse power, she was unprovided with the means of render-
ing her power available for pumping, and fank ignominiously into the mud
A decent regard for the lives of passengers, to asy nothing of their own property, would seem to make it the .obvious duty of the owners of the Bristol to provide her with pumps equal, at least, to an emergency like that lately encountered Had the accident occurred on the open Sound, instead of near the bank of a river, the vessel would doubtless have gone to the bottom, with loss of many lives.
We are aware that owners are desirous of avoiding the ransport of dead weight,and hence they economize in pumps and other safety apparatus. But, we believe it to be poor conomy. They should place on hoard the most effective means for safety that can be procured, calling upon ingenious people to remedy any defects that experience suggests. The invention of improved means for the flotat.
case of disaster is still urgently demanded.
We trust that some of our readers will investigate thi subject specially, and study out some new and effective method of rendering available for safety, in the hour of need the immense steum force of such vessels as the Bristol. The dimensions of this boat are as follows: Length 373 feet beam 83 feet, depth 16 feet. Measurement, 3,000 tuns. Dia power.

## A NEW SUSPENSION BRIDGE.

The plans for a new suspension bridge over the Harlem river, at the high grounds in the upper part of New York city, have been prepared by the Park Commissioners. The bridge, as laid out on the drawings, will be about 1,800 feet in lenge, as laid out on the drawings, will be about 734 feet will be within the jurisdiction of in length, of which 734 feet will be within the jurisdiction of
New York, and $1,066 \frac{1}{2}$ feet in Westchester county. The roadway will be about 153 feet above high water level, and ex end from the Tenth avenue to the hights on the opposite hore, west of the Croton aqueduct. It will be twenty-three feet higher than the present High Bridge, and form a con venient connection between the elevated lands of both sides of the river, affording favorable ground for foundations for piers and towers, and for anchorage for cables.

THE ELECTRICAL RAILWAY ALARM.
The bell rope commonly used on our railways, while it is very serviceable for short trains, is not of much use on long reight trains, because the weight and friction of a long cord such that the rear portion of the cord may be broken with out moving the forward portion. Thus, if the coupling of he rear cars of a long freight train breaks and the train separates, no alarm will be sounded on the engine gong, because the rear portion of the cord breaks while the front por tion, to which the bell is attached, is not moved. An improvement which overcomes this difficulty consists in placing a magnetic bell hammer upon the engine, together with a small electrical battery, and in providing each car with a se of wires, joined by flexiblejoints, so arranged that while the train remains united all is well; but should any of the car couplings or wires break, the gong on the engine will in stantly commence ringing. The same device may be em ployed by the conductor to give any signals that he may de sire to the engineer, from any part of the train.

## OLD AND NEW STEAM ENGINES.

The engines of the Cunard steamer Scotia, a large and plendid ship which plies betwsen New York and Liverpool re of 5,000 horses power, 100 inch cylinders, 12 feet stroke, very massive, elegant to look at, but of old style, side levers, ontirely out of date, and very expensive to run. The ship burns 160 tuns of coal a day and requires 1,900 tuns for an Atlantic voyage. The new style of compound engines, now used on most of the ocean steamers, effects a saving of more than fifty per cent in fuel. Mr. F. J. Bramwell states that nine years ago, the average consumption of fuel of the best marine engines was $4 \frac{1}{2}$ pounds of coal per boree powar per hour, ard that, the same results are now obtained with a con sumption of a trifle over 2 pounds of coal per horie power per hour. This is a woriderfal improvement. The owner of the Scotia would make money by throwing away their present engines and substituting the new patterns. Tuey
might, thus save 1,000 uns of coal per trip, and add 1,000 tuns might, thus aave 1,000 uns of coal p
to the cargo capacivy of the vessel.

## THE COOLEST PLACE IN NEW YORK.

The coolest place to be found in New York in the rummer time is the Preumatic Underground Railway Tunnel, unaer Broad way, opposite the Ciry Hall Part. When the thermom ter stands at $90^{\circ}$ in the chade on the street, if you go down into the pneumatic tunnel you find a tem erature of only $65^{\circ}$ The projectors of this tunnel enterpriee, which is pretsy enerally admitted to be the best plan for rapid city transit that has been presented, are obliged to wait the sanction of
the State Legislature before proceeding any further with the
work. Meantime that portion of the tunnel which has been constructed under Broad way continuesopen to the public and forms a cool, clean, well lighted promenade, being withal an intereating place to visit. A narrow gage railway track i laid in the middle of the tunnel, in which a comfortabie passenger car sometimes runs, being propelled on the pneu matic plan with much success. The great earth-boring ma chine remains motionless in the south end of the tunnel, wait ing the legislative voice to give it renewed activity.

## PROMOTIONS AT THE PATENT OFFICE.

W. Burke, lately fir t assistant examiner in class 25 Clay and glass manufactures," has been appointed Principal Examiner in class 121, "Steam.
J. Newland, lately first assistant examiner in class 126 Calorifics," has been appointed Principal Examiner in clanse 31 and 98, " Eydraulics and Pneumatics."
Both of these appointments are the result of competitito xaminations which were highly cređitable to the succerssfu candidates. Both are gentlemen of ability, and their appoint ment to the higher position they now occupy gives genera satisfaction. They are woll quaificd, zealous, and industrious officers.

## DIAMONDS IN ARIZONA

Fabulous stories are told in the daily papers concerning the ecent discovery of emeralds and diamonds in Arizona. Large quantities of these precious stones, found by prospecting par ies, have been carried to San Fracisco and put, on ex bibition A great area of the territory where they are found has been secured and several joint companies formed, based on grea expectations in the acquisition of diamond wealth. The rich ness of the new fields is alleged to surpass those of South Africa, ${ }^{\text {and }}$, the famous mines of Golconda are dwarfed into in significance. If the half that is told of the Arizonian discov ories is true, real diamonds are about to become more com mon than the paste article, and the occupation of the artificial manufacturers will soon be gone. One of these companies, by name the San Francisco and New York Mining and Com mercial Company, announces a capital of $\$ 10,000,000$, o which a large proportion has been already taken. Probably a small amount of the stock yet remainsunsold, which those who greatly want it can perhaps obtain, as a special favor immediate application is made
The new diamond fields are located among the foot hills of the Pinal mountains in Arizona. Tie whole country round about is said to be rich in mineral wealth

## WHY IT HAS BEEN SO HOT.

The present summer has been characterized by unusaa eats in almost every part of the Northern world, and al classes of philosophers, the weather wise especially, hav been at theirwits' end to account for it. Professor Tacchin has been making direct enquiries at headquarters, and has received the most satisfactory explanation. By means of spectrum observations and other carefully conducted experiments, he has discovered that for some time past our great uminary, the sun, has been throwing off vimmense and unu sual volumes of magnesium gas from all parts of its surface Magnesium is one of the most inflammableand fiercely burn ing substances in nature, when once set a-going, and the ex lanations of Professor Tacchini settle the whole matter When the thermometer falls, it may safely be concluded hat the supply of magnesium in the sun's atmosphere has diminished.

## THE METEORS OF AUGUST TENTH

The expected shower of meteors, predicted by the astrono mers for August 10th last, did not make its appearance in the ocality of New York. Ws observed few if any mor meteorites on that night than on ordinary occasions; no ave we received reports from any quarter indicating tha the earth went through the tail of any comet. It may be however, that the plunge of our sphere into the cometary maiter took place in the day time, the resultant meteors be ing then invisible.
To Render Metals Electric.-T. Sidot has observed his phenomenon, and found that iron, sil ver, and aluminium if the friction be sufficient, will give off electric sparks. T perform this experiment, take a perfectly dry tube of thick white glass and put in 15 to 20 grammes granulated siiver, and 30 to 40 grammes pure bisulphide of carbon, and seal up th tube. On warming the tube slightly and shaking it in the ark, sparks appear in the interior, their number increasing with the violence of the agitation. The sparks disappear ou mmersing the tube in water.
CAUSTIC Soda-A new meth d of prepariag caustic soda given by M. Tessié du Motay, in Les Mondes. One equiv lent of sulphuret of sodium is mixed and fused with on equivalent each of caustic soda, hyorate of lime, and metallic ron (cast or malleable); when these substances are hated to redness. the sulphuret of sooiium is completely converted into caustic soda, and sulphuret of iron formed. M. du Motay considers that the water of the hydrace of soda or lime is de composed by the iron, which becoming oxitized, hycrogen is et free, oxide of sodium formed, and then sulphuret of iron the soda being separated from the last named substance by isiviation with water. In another process, the sulphuret of odium is first converted into a basic phosehate of seda, and then into caustic soda by means of caustic lime.

The corporation of the city of New York have ordered a portrait of the late Professor Morse to be painted, to ador the grand parlor, or Governor's room, of the City Hall.

## gCIENTIFIC AND PBACTICAL INFOBMATIOM,

## TO ENAMEL COPPER UTENSILS

Finely pulverize 12 paris white fiuor spar, 12 parts unburned gypsum, and 1 part borax, and fuse together in a crucible. When cold, mix with water to a paste, and apply to the interior of the vessel with a paint brush. When dry, the vessel should be thoroughly baked in a muffle or furnace.

## MESMERISM.

Mr. J. E. E., of Pa., says: "About six months ago a mes merizer was pertorming in this place for about a week, Our merizer was pertorming in this place for abote bright child, be nearest neighbor's little daughter, a pretty bright child, be.
came a very interesting subject: and during the stay of the came a very interesting subject: and during the stay of the professor was nightly under his infiuence, sometimes for two
hours. Her mind seemed in a strange way the day after he hours. Her mind seemed in a strange way the day after he left, and in two days she was taken with a severe headache
with darting pains; these terminated in a stupor, and, for with darting pains; these terminated in a stupor, and, for
about six months, she has been under medical treatment. about six months, she has been under medical treatment.
The physicians say she has no disease. The poor child is an object of pity, baving pined away to a skeleton and become perfectly helpless and idiotic. She does not know her own wants; never asks for food, merely opens her mouth when it is touched, and takes it like a young bird.
fireweed fiber.
In reference to this product, described on page 89, current volume, our correspondent, Mr. I. Stauffer, says
"The plan $\bar{z}$ known as fireweed, which springs up in clearings when recently made and burned over, is the Erechthites hieracifolia, Raf. This belongs to the natural order com. positce, and the numerous achenia in the receptacle, provided with a copious pappus of very fine and white hairs, might be compared with the boll of the cotton plant. But the writer says it is called epilsbium; of this we have $\delta$ species: the epilobium angustefolium, L . (great willow herb) attains a hight of from 4 to 7 feet, and is often very abundant in new ly cleared land. This gets fine flowers in a long spike or raseme. The pod is linear, many seeded, each seed with a tuft of long hairs at the end. The epilobium belongs to the natural order onagracers (the evening primrose family). I doubt not but that the fiber of the bark wouid be useful for know thases of "wicks, ropes, yarn, and even paper. with which I have seen neglected fields completely covered, is sutfered to rot as a weed, simply from ignorance of its is suffe,

Water from the bottom of the sea
A German inventor suggests the use of a vessel, lowered by a rope and provided with a wire which, by electrical action, closes the vessel when the required depth has been reached. The idea is simple and appears to be practicable; and some valuable results may be obtained by drawing up water from various depths in the sea.
appearance of foreign grasses in france.
The growth, apparently spontacieous, of several foreign species of grass in middle France, especially in the com munes of Cour and Cheverny, has been explained by M. Vi braye in Les Mondes. It appears that, wherever the cavalry horses had been supplied with forage from Algeria, numerous grasses unknown to the locality were growing, as many as twenty new kinds already having been observed. A gentleman has noticed as many as forty four unknown species in the neighborhood of Angoulême, which all appeared imme. diately after the presence of a cavalry camp in the suburbs. The avidity with which the new plants have taken root has induced the Acaremy of Sciences in Paris to authorize the preparation of a sch me for the systematic introduction of Algerian forage plants into France.

RR FROM PROEESOR II THORSTON.
A flying visitto Chicago," the Cream City," and St. Paul. The St. Louis River and its remarkable characteristics. Important railway engireering. Duluth, its astonishing growth. Houghton and the Lake copper regions.

Houghton, Portage Lake, Mich., July 17, 1872. Leaving St. Louis soon after sunset, we next morning found ourselves rapidly but smoothly riding across the level, treeless prairies of Northern Illinois, the view strongly re minding one of that obtained from a ship's deck in open ocean on a calm day-a monotonous dreary sameness bound ed in every direction by an equally distant line, the apparent line of meeting between heaven and earth.
At eight o'clock A. M. we were landed in Chicago and rode across to the Northweseern depot through a portion of the " burnt districi." We were thus enabied to obtain a glance at the terrible desolation which so suddenly overspread a large portion of this great city, and to ses sometbing of that phoenix like revival which the wonderful energy of the pers ple, assisted by he substantial sympatioy of every civilized countiy, has inaugurated. We must spend more time here on our return ifom the great northern lake.

## MILWAUKEE.

After a anbstantial breaisfast, we again started northward, paszing through Milwakee, one of the most interesting ciiies of the north weat and one which promises to become the seat of extensive manufactures in iron. "The Cream City," as it has been calied, has a fair harbor at the mouth of the
Milwaukee river; extensive waier power is afforded by the Milwaukee river; extensive waier power is afforded by the
river, and lines of steamers and railroads assist in making the city one of great importance and of promising furure. It is scarcely more than twenty years since the city was founded, and, yet, in 1870, it contained 71,464 people.
From Milwaukee, our route took us through a country
which, as we went northward, gradually lost the prairie character and became irregular in surface and more and more wooded ; and as one pleasant scene succeeded another, and as we crossed on 9 fine farm after ansther, we though these Minnesota lands the finest we had yet seen.
ST. paUL.
A day and a night on the rail, and we finally reached St. Paul, the capital of Minnesota, a city of about 25,000 inhabitants, standing upon a high bluff at the head of navigation of the Mississippi river, A quarter of a century ago, there of the Mississippi river, A quarter of a century ago, there the city now stands, perhaps a doz n dwellings, were, where the city now stands, perhaps a doz $\because \mathrm{n}$ dwellings,
whose inhabitants ware trading with the Dakotas or the whose inhabitants ware trading with the Dakotas or the
Chippeways, and hunting and fishing in the neighboring forests and in the beautiful streams fiowing through them. Today, with its 25,000 people and their well built residences and frequently imposing stores and public buildings, its four miles of water front from which steamers can take their car goes without difficulty to New Orleans, 2,060 miles below, and with the lines of railway which radiate in all directions and connect the city with every part of the country, with its healthy climate and surrounded, as it is, with a fine farming country, St. Paul is an excellent place in which to build up a manufacturing industry, and its future should be one of ex ceptional prosperity.
The cities of Minneapolis and St. Anthony are a short dis tance above St. Paul, at the falls, and seem equally prosper ous. They have an additional advantage in the possession of immense and readily utilized water power. The former has already become known as the seat of woollen manufactures and the blan ets woven there are among the very finest in our markets.

## on to dUluth

We made but a phort stay here and then started for Duluth oiá the Lake Superior and Mississippi Reilroad. This road passes, for the greater part of its length, through a rather un interesting country; but, at Thompson, we crossed the St. Louis river, and thence the road was carried along its banks nearly to Duluth.

## difficult railway engineering.

It was during our ride along the banks of the St. Louis hat we saw at once some of the most beautiful scenery and the most difficult engineering that we had met with since leaving home. The rails are carried on oigh trestles across deep ravines, and for long distances along the high bank of the river and at points, the road bed seems almost ready to slide into the stream. The work is, however, well done, and the greatest care is taken in running trains over the more
dangerous portions of the road; there is really very little dangerous portions of the road; there is really very little structions are far less formidable, but where the engineering is less skilfully done

## GREAT WATER POWER.

The river, from Thompson to Fond du Lac, where it enters Lake Superior, presents an almoast uninterrupted succession $f$ falls and rapids.
In the last eight miles, the river falls about 400 feet and, as the rate of flow has been stated to be 290,000 cubic feet per minute. it is not improbable that this stratch of the river offers an available power of not less than 100,000 horses,enough to drive $10,000,000$ spindles, could it be applied to cotton manufacturing. It is a large cotton mill that contains 50,000 spindles; tbis water power is thus capable of supplying 200 large mills. The rocky bed and precipitous banks of the lumber of the adjacent forests, is quite sufficient to support a large industry for an immense length of time. The amount of capital which may be usefully and profitably employed of capital which may be usefully and profitably employed
here can hardly be imagined. The valley must at some future time support a large population, and a beginning has al ready been made at Thompson, where there are several saw mills, railroad shops, and other manufacturing establishments.

## THE " dalles" of the st. LOUIS.

But, as the traveller rides over this eight miles along the "Dalles" of the St. Louis, even although he may be the most bardly, at his first visit, so far control his feelings as to be able to speculate, upon the probable available power of the siream or the value of its slate deposits and bordering forests, while in their actual presence. Nature here presents has none of as is rarely found either at her aboad. I in its wild beauty, in its picturesqueness, and in the variety of its scenery, it can have but few rivals. The Dalles present a collection of atiractions that will repay the lover of Nature for all the fatigue of a journey across a continent. Here, for miles and miles, the river rushes between precipitous banke over its rocisy channel, and rapids and falls and rapids again follow each other in constant succession. Occasionally the banks recede, and the river widens and becomes a wide but shallow and brawling stream; again the banks approach each other and high precipices confine the river in a narrow bed where it roars among craggy slate dykes or xushes over a succession of carcades to a lowel level ; kere it sumes its wild career, and finally lases itself in the calm depths of Lake Superior.

THE NEW CITY OF DULUTH
Duluth, where we were to take a steamer for the lake orts, is one of those typical western "cities" which frequently spring up as if at the command of the slave of Aladdin's lamp. Hardly three years old, it already contains eight churches, two hotels of moderate size, several saw
mills, and a considerable number of stores. An opera house and another hotel are promised. The North Pacific Railroad
is building long lines of wharf in a very good harbor. This has been rendered readily available by cutting a ship canal through Minnesota Point, which stretches out six miles across the bay toward Supenor city, and makes the best possible breakwater. A capacious elevator has been erected at the landing. There are probab!y 4,500 people in the place. This is the terminus, on Lake Superior, of the great North ern Pacific Railroad. Its connection by rail with all parts of the country and its several lines of steamers, which keep it in regular communication with all the ports of the great lakes, are advantages that must rapidly build up the city inl. when land sells, as it has here within a few days, a eighty dollars per frontfoot, heve tiast the youthful The buildings are generally framed structures and of rather The buildings are generally framed structures and of rather
rough construction, as might be exiected. An occasional rough construction, as might be ex, iected. An occasional
brick building and at leastone brown stone front may be seek. brick building and
in the upper town.
This town, springing up as it has, reminds one of those which, during the war, were occasionally built by the army, not only by the rapidity with which this peaceful army has erected its quarters, but, in some places, by the charac ter of the buildings.
through the lakes to ter coppeir regions. After waiting two days at Duluth, the steamer Meteor came into port and we sailed next morning. We had a clear bright day, with a warm sun but a cool air, and enjoyed the sail extremely. By the middle of the afternoon, we were steaming through that beautiful group, the Apostle Islands, and, just before sunset, touchei at Bayfield, a village on the south shore of the lake. As we left the shore again and headed for Isle Royale, we witnessed a magnificent sunset such brilliancy of color and such variety of cloud shapes no Italian sky could surpass.

We arrived, next morning, at Isle Royale, where we took on board a prospecting party returning from an exploration of the copper deposits of the island. These depo its are quite extensiva and are supposed to be at some points ex tremely valuable. They were formerly worked by several companies; they are now nearly all held by a single corporation, and operations which have, for some time, been entirely suspended, will probably, ere long, be resumed. It is not improbable that this island may be fourd to contain an immense amount of mineral wealth, if we may judge by its geological structure and by the evidence afforded by explor tions and workings which have already been commenced. Once more steaming out of harbor, we again headed soath ward, and, at evening, by the light of the full moon, we were skilfully piloted through the long, tortuous entrane to Portage Lake, and late at night came alongside the wharf at Houghton, the principal town of the Lake Superior Copeer Regions. Here we propose spending some days for the purpose of learning something of the character of these depos its, and the methods adopted in "winning" the ores.
R. H. T.

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milled needles, but the processof sw iging makes a needie which i.f far superior to a milled needle-for, in reducing needles by the milling process, all rlor to a milled neene-for, in reducling needles by the milling process, al
of the best of the wire,the outside, is cut off ind wasted, the poorest part o the wire, the core, only being used; while the swaging process, by condensing the particles of metal,
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## 

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Gear Wheels, for Models; also Springs, Screws, Brass Tube Sheet Brass, Steel, \&c. Illistrated Price List free by mail. Goodnow \& Wightman,23 Cornhill, Boston, Mass.
Steam Boiler and Pipe Covering-Economy, Safety, and Durability. Saves from ten to twenty per cent. Chalmers Spence Company foot East 9th Screet, New York-1202 N. 2d Street, St. Louis.
Brick and Mortar Elevator and Distributor-Patent for Sale See description in Scr. Amarican, July 20, 1872. T. Shanks, Lombard and
Sharp Streets, Baltimore, Md.
The Berryman Manf. Co. make a specialty of the economical feeding and safety in working Steam Boilers. Address I. B. Davis \& Co. Hartford, Conn.
The Berryman Heater and Regulator for Steam Boilers-No one using Steam
Hartford, Conn.
Diamonds and Carbon turned and shaped for Philosophical and Mechanical purposes, also Glazier's Diam
set by J. Dickinson, 64 Nassau st.,New York.
Wanted-Melter. Permanent situation, at good wages, to a good, experienced Iron Melter. Address C., Iron Founder, Cleveland, 0 Brown's Coalyard Quarry \& Contractors' Apparatus for hoistin ${ }_{\xi}$ and conveying material by iron cable. W.D.Andrews \& Bro, 144 Water st..N.Y.
For Machinists' Tools and Supplies of every description, address Kelly, Howell \& Ludwig, 917 Market Street, Philadelphia, Pa. Machinery Paint, all shades. Will dry with a fine gloss as soon as put on. 81 to 81.50
Agents, 116 Maiden Lane. Agents, 116 Maiden Lane. Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Bor 1809.
Belting as is Belting-Best Philadelphia Oak Tanned. C. W . Arny, 301 and 303 Cherry Street, Philadelphia, Pa.
Boynton's Lightning Saws. The genuine $\$ 500$ challenge.
will cut five times as fast as an ax. A 6 foot cross cat and buck saw, 86. Will cut five times as fast as an ax. A 6 foot cross cyt and buck
E. M. Boynton, 80 Beekman Street. New York, Sole Proprietor. Better than the Best-Davis' Patent Recording Steam Gauge Simple and Cheap. New York Steam Gauge Co., 46 Cortlandt St., N. Y. For Solid Wrought-iron Beams, etc., see advertisement. Ac dress Dnion Iron Mills, Pittsbargh, Pa., for lithograph, etc.
For hand fire engines,address Rumsey \& Co.,Sneca Falls,N.Y. All kinds of Presses and Dies. Bliss \& Williams, successons to Mays \& Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.
 arv. menhanies, or manaracturere' sunpitise see Manafactarng
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Post paid, \$2.00. Michigan Publishing Company, Battle Creek, Mich. Mining, Wrecking, Pumping, Drainage, or Irrigating Machir - ery. for sale or rent. See advertisement, Andrew's Patent. inside-page. For Hydraulic Jacks and Presses, New or Second Hand, send for circular to E. Lyon, 470 Grand Street, New York.
Peck's Patent Drop Press. For circulars address the sole manurac
For Marble Floor Tile, address G. Barney, Swanton, Vt. Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton, N. Y.
Portable Baths. Address Portable Bath Co., Sag Harbor, N.Y For Steam Fire Engines, address R. J. Gould. Newark, N. J.

## 110teesedqueqies.

[ We present herevoith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but wo
prefer to elicit practical answers from our readers.
1.-Diamonds.-Will some one of your rexders tell me now to detect a alamond, and in what way to test its value?-C. W. P.
2.-Coloring India Rubber.-I would like to enquire if sott rubber can be colored througg
yellow or other color ?-C. L. P.
3.-Papier Mache.-What is the process for making this
ubstance, and what is put in the pulp to hardenit?-W. R. F.
4.-Soldering Lead.-Can any one tell me what is used plumbersinjoining lead? J. C. H.
5.-CEMENT FOR Iron.-Is there any cement, in use in
machine shops, for sticking iron together? It so, how is it made?-J. H. s. 6.-Rottina Siraw.-What cheap chemical must I apply oo straw in stable refuse to rot it quickly? I want something that will no ffect brick or stone work.-C. DE P. F.
7.-Value of Pure Gold.-What is the value in coin of old, 24 carats fine?-S. A. G.
8.-Smelting Lead, Copper, Gold and Silver.-H. s. of Il., desires to know where good morern treatises on the subiect can be
btained. There are several published, but the publishers keep them awas rom our advertising columns as much as possible.
9.-Elimination of Mercuri from Tin Amalqam.-How can I obtain
-J. H. M.
10.-Cement for Meerschaum.-Can anyone tell me how prepare a cement to mend a (colored) meerschaum pipe?-E. S. T 11.-Drilling Holes in Glass.-Can any one give me 12.-Boilinsa Oil.-Can steam be used, to replace a coa coke fire. for boiling oil or other liquids requiring a heat of from $300^{\circ}$ to coke fire. for
13.-India Rubber for Steam Tight Joints.-Can india rubber be exposed to the heat of steam and iron without injury, being used
as a washer or in place of an ordinary valve in immediate connection with as a washer or in place of
a steam boiler?-V. L .
14.-Dyeing Anibine Black.-How is the aniline black the preparation of which is described on page 101, current volume of the
15.-Wooden Railways.-E. O. N., of Tenn., repeats the questions asked by C. M. P., query 17, page 106. Will Mr. J. B. Hulber
16.-The Vienna Exposition.-T. C. P., of Mass., and others enquire who is our government agent for securing space and for warding articles for exhibition at Vienna. If any appointment or arrange
ment has been made, it has hitherto been kept out of the public mind. 17.-Cutting Plate Glass.-I have a plate of glass thre tentbs of an inch thick and two and a half feet wide, which I wish to cut
without risk of breakaze. A light diamond cuts it, but not surely. What Without risk of breakaze. A
means shall I use?-J. P. A.
18.-Preservina the Eyesiaht.- Some years since much was said in relation to preserving the sight in old age by pressing the eye-
balls. If anyone of your readers has received beneft from such treatment he will do a vast amount of good by giving the particulars through your
hen treater paper.-J. H. D.
19.-Water Vermin.-In your issue of August 10, page s4, itid a communicat.on from W. Ward, Cleveland, o., on how to destro wigglers. I am troubled with a similar pest. The cistern water is swarm-
ing with small reddish-colored bugs or lice; they crawl, and are very lively in the water, and are about one thirty-second of an inch in size, and smaller The cistern was cleaned about three and a half months ago, and we have
only noticed them for three weeks past. What can they be, and what only noticed them for three weeks past.
best way to get rid of them?-A. H. R.
20.-Nitro-Glycerin.-Will some one please give mea ormula for making nitro-glycerin?-P. G. s.
21.-Bronzing.-How can I bronze small castings in a imple and effectual manner?-L. H. W.
22.-Preserving Polished Steel Surfaces.-We have seen it stated that carbonate of soda is found to be effective in preserving
poished steel surfaces from oxidation, Can you inform us what solvent is
竍 polished steel surfaces from oxid
used and how appiled? - F. \& N .
23.-Vermin in Dried Fruits.-How can I keep worms out of dried cherries and raspberries?-M. S.
24.-Cement to Resist Water and Alcohol.-Can any of your correspondents furnish me with a recipe for a cement to resist the action of both water and alcohol, which must possess suffl cient elasticity so not to crack and peel off?-F. s.
25.- Whales and Fishes.-I believe the notion prevail among scientific men, as well as among sailors, that the cetacea, an order of
aoimals including whales, po poises, etc., exhibiting a high degree of animal aimals including whales, po poises, etc., exhibiting ahigh degree of animal
heat and exhaling an elastic fuid resembling air, tnough living only in water heat and exhaling an elastic fiuld resembling air, tnough living only in water
are not fishes, but species of mammalia that breathe air like land animais. are not fishes, but species of mammalia that bresthe air lize land animan, havecaught agreat many porpoises ofdifferent varieties ; and thesequestion
have occurred to me: 1. How am Ito account for their sudden appearance and disappearance at long intervals, of ten in vast numbers, sometimes beneath the surface without touchigg it? 2. Can anv one explain the fact tha they never inspire? Their breath is invariably a more or less prolonged
exhalation; while the inhalation of the seal and the turtie is easily distinguished from the short, feeble putt that precedes it. S. How is it that they cannot ilve out of water? In fact, they die sooner than Ashes generally

When they are taken out of water. A dd, like fishes, when deprived of th aner oflocomotion, they will soon die even in the water. Tneir anatom
al structure, I believe, does not admit of that bellows-like motion so nec cal structure, I believe, does not admit of that bellows-like motion so nec
essary to the process of respiration in air breathing animals. 4. What is meant by "warm blooded animals"? Have certain animals a constant fixed degree of animal heat, while allothers are variable accoroing to the
temperature of the surronnding elements in which they live? Or are not all nimals, including fishes, more or less warm blooded? 5. In catchint fish animals, including fishes, more or less warm blooded? 5. In catching fisk,
such as cod, bream, etc., in deep water, say thirty fathonis or more, they usually come to the surface in the condition that fishermen call being poke lown, the abdomen being distended to its utmost capacity, and a portio the viscera protruding from the mouth, the whole fish inflated with som
lastic fuid. Now what is this fuid? And clastic fuid. Now what is this fluid? And how does it get there? Ma
not the explanation of thisphenomenon afford a clue to answer some of th preceding questions?-G. W. G

## Autures to Coxtegumdents.

## sCIAL NOTE.-This column is designed for the general interest and in struction of our readers, not for gratuitous replies to questions of struction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We woill publish such inquiries hovever, when paid for as advertisements at $\$ 1 \cdot 00$ a line, under the head of "'Business and Personal." <br> ll reference to back numbers must be by volume and page.

Bursting of Saws.-G. A. H. is informed that no such ac cldent as he mentions has ever occurred within our knowle ${ }^{\wedge} \mathrm{gee}$,
think it is possible to burst a saw by running it at any velocity.
Toy Balloons.-A one line advertisement would obtain J
F.o.s. the information he seeks. See notice at the head of this column Green Wall Paper.-J. S. G. is informed that the deleterious effects of green wall paper are most noticeable in rooms lined with
flock paper, frocn which particles of wool, with, of course, the oring matter, are constantly getting detached. Green paint is not 80 hurtul, and the idea of varnishing it is a very good one.
Duplicating Drawings.-W. R. F., of Mass., is informed that the sensitized paper mentioned in M. Rénault's process is not photo graphic paper, but a chemically prepared material manufactured, we be lieve, in Paris.
Apparent Diameter of the Planets.-* * *, of Mich sends us a communication with a sketch showing the apparent diameter of the planets, "as asey would appear to the naked eye were the excess
of light removed so as to render their disks visible." Our correspondent of light removed so as to render their disks visible." Our corresponden
appears to be unaware that it is not possible to give a drawing which appears to be unaware that it is not possible to give a drawing which
shall represent the apparent diameter of any body. A drawing of the moon may just as well be 12 feet in diameter as 12 inches; nether of these measurements can give any idea of the size of the moon as it appears to
the eye. In a paintiog of a landscape, there is a proper diameter for th the eye. In a paintiog of a landscape, there is a proper diameter for the sun or moon, as the question of proportion to the trees and other object represented then comes in. But without this opportunity for compar Mildewed SALLs.-H., of N. J., should soap the milde spots, and then rub in powdered chalk. The growth of the mildew fur gus can be prevented by steening the canvas in an aqueous solution of The Weight of the Atmosphere.-If an airtight cham ber is able to hold 500 pounds weight above the water, will it be able to
carry more in case the air be pumped out of the chamber?-s. carry more in case the air be pumped out of the chamber? S . R. An
swer: Yes; the chamber will carry more if exhausted than if filled wit air. Every 100 cubic inches of air, the barometer being at 30 inches an air. Every 100 cubic inches of air, the barometer being at
the thermometer at $59^{\circ}$ Fah., weighs 31 grains avoirdupose
Hair Dye.-To G. H. J., page 106.-Solution No. 1 : Dilute solution of nitrate of silver. Solution No. 2: Solution of sulphide of am
monium or sulphide of potassinm. Comb one solution through the solation of nitrate ofsiver. Solution No. 2: Sol
monium or sulphide of potassinm. Comb one solution through the
beard carefully, and then use the other in the same way. $-E$. H. H., of beard
Mass.
Friction Match Composition.-C. B., page 106.-The fol lowing I have frequently made, and know to be good. I presume you
know the modus operandi in making or mixing. Phosphorus, 34 parts know the modus operandi in making or mixing. Phosphorus, 34 parts
nitrate of potash, 50 parts; chlorate of potash, 26 parts. red lead, 48 parts best glue, 42 parts.-Е. Н. Н., of Mass.
Temperature of Ice House.-J. C. McC., page 106.-The radical fault with your ice house appears to have been the wet sa wdust
it should have been dry sawdust, a very fair nonconductor of heat, where it should have been dry sawdust, a very fair nonconductor of heat, where-
as the wet would infallibly cause the unfortunate result. There shoula as the wet would infallibly cause the unfortunate result. There shoul
be no ventilation whatever, especially at the top. Any water from the melting ice should have a chance to get away, so as not to remai
Spontaneous Comb ustion.-To W. F. C. S., page 106.-The cases you relate were most undoubtedly of spontaneous combustion, and
the college professor must have been lame tably ignorant of commo the college, professor must have been lame ctably ignorant of common
things to have made the statement he appears to have done.-E. H. H. things to
Pure Vinegar.-To J. E. H., page 106.-Most certainly vin egar can be, and is, manufactured perfectly free from the little eels, etc. you speak of. If a vinegar is properly and carefully made-no matte
from what material-it will be perfectly elear, bright, and free from ant malculx. Ifit be thick and muddy. it is owing to careless treatment, and is almost sure. sooner or later, to breed the eels. A perfectly sound
good vinegar can be made in less than forty-eight hours, and better than good vinegar can be made in less than forty-eight hours, and better tha
that generally made to take from seven to nine days in production. - E. that generally made to take from seven to nine days in production.-E.
H., of Mass. Extinction of Cab Lamp on a Locomotive.-To W. F C. s., page 106.-Probably it is caused by the pecullar vibration of th
sir resulting from a particular note produced by your whistie. If you air resulting from a particular note produced by your whistle. If yo sent pitch, very likely the lamp will not be put out. If you try the ex periment, I should like to know the result. I suppose the note or soun may be modified hy increasing or diminishing the aperture through
whi n the steam escapes, or else by attaching a differentcup on top, or Whi h the steam escapes, or else by attaching a different cup on to
perhaps placing something on the present one.-E. H. H., of Mass.
Setting Borlers.-To J.D. H., query 16, page 106.-The cause of your carbon explosions is that you do not admit air enough to burn it as fast as it accumulates. You should leave your ash pit door
more open, and pack your fnel less closely, or admit air throu h a dam more opev, and pack your facl less closely, or admit air throu ha dam per in the fursace coor; if there be no damper in the door, drill a doze
half inch holes or leave it a little open. There is no harm in admittin half inch holes or leave it a ittle open. There is no harm in admioting
more air under the grate unless you wish to burn your fuel in the asi pit. Keep your chimney damper wide open while running.-A. L., of ${ }_{\text {Mass. }}$
Red Ants.-Query 23, page 90.-If J. C. W. will sprinkle finely powdered borax about freely in his cupboard. I think he will not
be troubled in the future with red ants.-J. C. E, of be troubled in the futare with red ants.-J. C. E., of $O$.
Teeth in Wheels for Chain Belt.-M., query 6, page 90 is correct in saying that "different wheels require different spacing fo the same chain," if he spaces from one tooth to the next at one stride of ascertain the precise length of a link between the centers or pivots, and then set your dividers and space around on the piteh line. This being done, rub out every other point ; the remaining points will be the corre centers for the teeth. This rule will be found co
large or small the whels mas be.-G. B. D., ofnl.
zectan samextan amd fortign equtents. Under thats headino we shall publish weekly notes of some of the more promi .

Latr.-Nathan M. Rosinsky, of New York city.-This invention consists
n attaching the heels of such shoes as are known in the trade as turn shoes to the soles before attaching the uppers, and in afterwards securing the uppers, either in whole or around the heel only, by headed nads drive
from the side which becomes the minide of the shoe alter it is turned; where by the ooles are secured very frmly, as the nails have heads at one side and
 the soles better, the na
the ordinary method.
Spixntrxt. Wirze.-James Cochran, Jr. of Cornwallis, Nova ScotlaThis invention provides an improved method of support and fastening for ya position for the operator to either stand or sit, the eame clamp an
swering in either case
Hoppre for bact Holdrrs. Warren Wasson and George W. Dungan, Genoa, Nevad..-This invention consistro in the construction of grain hop ${ }^{\text {pers }}$ wire or other frame; the rawhide or leather is in one ope piece and formed in a wire or other frame; the rawhide or leather is in one piece and formed
the shape of a common wood hopper within the frame, and is provided wit a hole e t the center of the bottom for the eecape of the grain. The hopper
s coated with waterproof paint and varnish, so as to make a smooth hard 8 coated with waterproof paint and varnish, 80 as to make a mmoota
surface and protect it against moisture
 the class of feed cutters whereln the cntter has a compound or planetary
motion. In the preesent arrangement the cutting 18 effected by a circular or disk K biffe, whitch by meanas of suitable gearing is not only rotated on its
iron shaft but is carried round the main shart by an arm it is so adjusted that it pasees before the feed rollers mand does 1 tss work as it descends. The
Pannut Proizrb.-Samuel C. Fewell and George Baars, of Beardstown, Tenn.-The frrst part of this invention relates to breaking off or picking arranged, in close proximity but not in actual contact, that when revolved In opposite directions they fasten npon and force between them the soft
and yielding platte, but cannot so fasten upon and pass the nuts. The and yiedding plants, but cannot so fasten upon and pass the nuts. The
second part relat tes to the final separation or the nuts from the plants arter they are picked off by means of two carrier belts, which are so arranged they come from the picising rollers, and carries and olischarges them at a re. mote point, while the lower belt recelves the nuts at the same time, and
carries and discharges them at a point less remotetn the machine. The carries and dischargees tem
hirld part relates to cleaniog the nuts
Irems dust, leaves, or or broken stems by means of an Inverted ran, by the acmon of which the nuts, 1 nalling int
the chute that discharges them from the machine, are exposed to a stron cerrent of wind.
 an Improvement in the class of brake attachments for elevators wherein
weages are employed. and it consists in the construction following: The brakes are connected by fit steel springs, by means of which they are alis Yorced apart and made to operate. To the centers of the springs are at.
tached rods which are connected with the central lifding block, as are also the brake blocks; by which construction, when the car is raised. the spring are drawn up in the centers, and the brake blocks drawa up to the car
corners. should the supporting chain break, the released epring
 ti.e trame, where they would beceme ately wedged by the weight of the

Bridar.-John Johnson, of Mott Haven, N. Y.-This invention furnishes
an which is simple. convenient, and effective, and enaboles an arch of any de sired span to be formed without previously constructing a form or guide
frame; it consists in supporting the arch in process of construction by two frame, it consists in supporting the arch in process of construction by two
or more palrs of suspended cables, and in combining with the main arch a secondary one, the bl chs of whith are
with the cross beams of the main arch.
 effective. It is so constructed as to bring the machine fully under the con trol of the operator, so that he can easilg regulate the rapldity of the feed
without stopping the machne, and instantly stop the feed wien desired.
 ${ }_{\text {improved tumbler for polisbing forks, etce, which is so constructed as to }}$
 grinding tne ends of the tumbler barrel and the $m$ m
respective seats so as to form perfectiv close joints.
 The invention consists in providing a seeder hopper with a pendent swingin
shoo. whereby the grain and guano are held until said shoe 18 tilted shakei and caused to didstribute tit; In providing the shoe with a leather or othter
tube placed centrally at the convey Icg end so as to place the seed always in the middle of the furrow: and in a plumb,so placed as to enable the operato always to know when he has the shoe at the proper Inclination. This
machine is manufactured by the trm of Gower, Cox and Markley, Greenvilie, s. c.
 tion consists in providing a bag holder with a abank tapering on the rean
side so as to throw the mouth of the bag on a decline toward the front, and with an anxillary stem guide; in providing the Jointed arms with edge
Banges so that one arm may silde within the other, with ratchet and pawl to hold them at different degrees of expa ision; and, tinaliy, in providing the pawl witb
ratchet.
 m. Varney, Burlington, ot.-Tne invention consists 8 a a combination of the
ordinary teeding bands of pickers, and a set of radral arms provided with movable comb pickers- - ald pickers betng advanced and retracted by as
 $\mathbf{a}$ hood to create a current or air in the direction
for the purpose of blowing out rectuse, dust, etc.
Parlor Cooring Stovp.-Edward M. Deey, of New York city.-This 1 m

 ovens, and in an ariangement of fues and dampers therefor tor sultably ap-
plying the heat at will; also for utilizing the ovens for $a$ air heaters. Sec. ond, In an adsptation of the magazine so that it is readill remorved and its seat converted into a cookling top; thirrd, in a p pot-heating attachment to
the horizontal part of the pipe behind the stove; and fourth, in the construction of the top platefor heating pots and other cooking utensils.
BLacrsurrns' Tovas.- -John Woodville, of Washington, Ind.-This in.
vention relates in part to constructing blackemiths' tongs with transersels
 that manner. It also conilis end taken in the hand may be adjnsted, relatively to the other handle, a
needed for holding thick or than pieces hetween the sa ws.
 and discharger by the same operative mechanism, whereby bricks may be made in the most effective and workmanlike manner and at a reduced cosi Br $\mu$ Fivr. - Wirt $\mathbf{F}$. Cunningham, of Midaletown. Ky.-This Invention
furnishese an improved bee hive, which is so constructed as to facilitate the various operations of attending the bees, watching their condition, remor-
ing the comb, keeping out moths, etc. It consists more especially tin clos.
 which is pivoted withon it.
Conbixzd Extreston Sitid and Ladder.-Emanuel B. Feld, of Yonker T.-This invention furnishes an improved extension skid by means on
Fhich barrels of flour and other heavy articles are conventently carried $u$ up alight of stairs to an upper floor or down a fight of stalrs to the basement it may also be adjusted for use as an extension ladder for the use of fremen carpenters, masons, and others. It 18 made in two 1 engths, one of mhich is
made to extend along and beyond the other, and is held securely in any position hy means of pawls and ratchet bars. Various improvements e te into its construction, including a slididing carriage and windlass to operate
AxLe.-Charles Ahrenbeck, of Navasota, Texas.-This invention fur nishes an imprnved iron axis for wagons and other venieles which is
stronger without being hear vis than iron axies made in the ordinary man ner; it consitistst in s ) for forking a bar of the ordinary weight that the metal apet, or forced from each end tow ard the point where the collar is swage
 dge of the Journal is made oblique instead of horizontal, so as to allow the Coytiog on to Ho mack aiong it.
 Hion relates to improvements in combination 1ock 8 , and it consists in a nov For lock1ng and prev $v$ nting the withirawal of the bolt af ter it has been shot. It aliloo consistst in an appllication to the dilsks of an apparatus for return-
them the the true position if they are disarranged after being turne way from the lockłtng position and left in positions indicated by the letter of the word representing the combination on which it is locked. The read-
usting apparatus is also applicable for use in changing the combination. ysting apparatus is also applicable for use in changing the combination oowder, and which, if blown up, destroys the means of moving the bolt and eaves it unmored.
 Fore the bristes, hair, and other matters trom the carcass preparator oiressing 1 It, and it consists in providing a number of furnaces arranged in the inner sides of the furnaces are formed holes through which the flames re driven by a fan lower and made to impioge on the carcass. The car cass is introduced and removed in any convenient manner.
MkDTOLL CoupouxD For Hraling Wownds, rio.-Nicholas W. Gaddy,
of Nichols, s. C.-This Invention and discovery relate to a new and usetui compound to be used as medicine for the cure of diseasese, and to be applied
竍 he distlled ap of dine tratied clarie and sultably prey
Elevator Brit Ttartrank.-Willam Merson, of Danbury, conn.-This Olding it untillaced, and it enabies the ends of the elevator beit to rawn together and laced by a single persoon. To the belt, near one end, 1 s Solted a small plate or lug, to which 18 attached one end of $a$ short rope,
 esquared of to recelve a crank. The o.her end of the belt is secured to
 So that tits handie rests agaise the case and holds the sa ant trom turuing back wille the lacing is being done. When the lace has been secured th

Furnace Gratr Bar.-William h. Setile, of Louisyille, Ey.-This in Vention farnishes an improved grate bar which is so constructed that the silre bar or poker cannot strike against the sides of the separations and
breakk the bar, while at the same time provision is made to protect the oar rom the injurious effects of unsqual expansion and contraction; it con sists in making the bar of a peculiar form by which the poker or silcer is
madeto glance of instead of striking the bar.
Wasinge Machins.- John C. Chase, of Monticello, Minn.-This inven. Fithout iramework to get in the way of the person using it; it consisitu mainly or a large corrugated roller and four small plain ones, whose journa18 revolve e in ead blocks; the lournals from the large one and arms irom
the head block rest in noteches on the upper part of the tuo. The peculiarbe to the work to be doue. Some of them may be used as wringers while the others are doing the washing.
 sides of the same, and more particularly to the application to such an ap.
puratus of the heat from gas flames so that the process can
e rapidls car
 re heated by gas from beneati
 ails of the construction of which would not be understood from a verba description. Among the various improvements effected are an arrange.
nent for regulating the weight of the blow struck and a provision for lu ricating the safty journal, etc.
Tractron Exaine.-Willam H. H. Heydrick, of Chestnut Hill, Pa.-Th nvention relates to improvements in traction engines or the propelling Connecting the front axle with the frame or platiform in a simple and eftce tent manner so as to admit or supporting the platro. mon a s spring placed on Le arle, and for confinng the arle without the use of $a$ king bolt pasing
brough tit, while allowing it the free universal oscillation needed for trav iling over uneven ground. An oscillatiog plate and a housing are pivoted to the under side of the platform and aliso, at the lower side, to two strong
braces. The axle lies scros and within the housing, and between it and the Top wall of the same, which is immediately under the plate, an india rubbe Shor Fs stranin
Shor Fabtrining.-Charles A. Roife, of Uties, N. Y.-Thisinvention proIdes an Improved mode of securing the buttons to ladies, misses', and
children's boots or kaiters, and consitits in an additional strap which run the whole length of the fastening on the inside of the boot; a metallic clasp
gecured to the strap
where each button 1 s to 18 secured to the strap Where eacn button 1s to come by bending projectin ${ }^{\prime}$ portions ofit round the strep. A wire staple win the bottom attached passed thr ugg the boot and through holes in the clasp, after which
are bent down into the clasp by means of suitably formed pliers.
Door Spring.-James Losee, of Peekskill, N. Y., asignor to himself an Joseph L. Cook, of same place.-This Invention frrisishes an mprovement
in the class of springs which are arranged vertically or parallee to toe ployment of a rubber cylinder, a apindie, a notched disk, a curved connect Ing arm or rod, and a screw. which are so arranged that the degree of tor Ton and longitudinal compression of the cylinder 1s governed by adjusting
he difk and screw. By the construction, as the door 18 opened the he dibk and screw. By the construction, as the door is opened the rubbe
cylinder is both cowpresed and twisted, so as, when the door is released crlinder is both compressed and twisted, so as, when the door is released
to close the door by the elastictity of the rubber.
The upward pressure of the rubbberaliog tonds to os oupportthe door, thus relleving the hinges and pre venting the door from sageing.

## Practical Iints to Inreitiors.

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 ed themselves of theif services in procuring patents, and many millions of dollars have accrued to the patentees whose specifications and claims they aveprepared. No discrimination against foreigners; subjects of all coun

## How Can I Obtain a Patent

Is the closing inquiry in nearly every letter, describing some invention con comes to this office. A positive answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An
application consists of a Model, Drawings, Petition, Oath, and full Specivic ion. Various offlecal rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without
suzcess. After great perplexity and delay, he is usually glad to seek the ald azañ. parties consulted are honorable men, the inventor may sately confle his deas to them: they will advise whether the improvement is probably pat
ntable, and will give him all the directions needful to protect his rlghts .

## Hov Oax I Bent secure My Invention

This is an inquiry which one inventor natnrally asks another, who has had ome experience in obtaining patents. His answer generally is as follows

Jonstruct a neat model, not over a foot in any dimension-smanler if pos eme-and send by express, prepan, adNessed to MONA Co., 37 Pari Row eipt thereof the will its patentability, free of charge. or, if you have not time, or the means a and,to construct a model, make as good a pen and ink sketch of the im -
rovement as possible and send by mail. An wer as to the prospect ot satent will be received, usually by return of mail. It 18 sometimes best $t$ ave a search made at the Patent Otfice: such a measure often saves the cos

## Preliminary Examination.

In order to have snch search, make out a written description of the inver ion, in your own words, and a pencil, or pen and ink, sketch. Send thes zith the fee of 85 , by mail, addressed to MUNN \& Co., 37 Park Row, and in
iue time you will receive an acknowledgment thereot. followed by a written report in regard to the patentability of your tmprovement. This specis
search is made with great care, among the models and patents at Washing on, to ascertaln whether the improvement presented is patentable.

## To Make an Application ror a Patent.

The applicant for a patent should furnish a model of his invention it sn
septiole of one, although sometimes it mav be dispensed with; or 11 the in ention be colion of which bis composition consists. These should be securely packed, the s, trom a distance, can often be sent cheaper by mail. The safest way emit money is by a draft, or postal order, on New York, payable to the or isually purchase drafts from their merchants on their New York corre oondents.

## Caveate

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nentiee for a caveat is 810 . A pamphlet of advice regarding applications cor patents and caveats is furnished gratis, on application by mail. Addres Uwin \& Co., 88 Park Row. New York.

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## Index of Inventions

Por which Letters Patent of the United States were granted
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## bearing that date.

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## schedole of patent feks


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APPLICATIONS FOR EXTENSIONS
Applications have been duly filed, and are now pending, for the extension of the following Letters Patent. Hearings upon the respective applications

1.436.- Codeh for Railload Car - F. R. Myers, F. H. Furnisg. Aug. 21, 1872. 21.540.- Hakvester.-A. Sherwood. Aug. 28, 1872.
21.541.-Pin Sticking MAchine.-C. W. Van Vliet.

21,574.-Preventing Nuts from Unscrewing.-S. Noblet. Sept. 4, 1872.

21.879.- Sklf Motsing Hoor.--J. R. Henshaw. Oct, 9, 1872.

22,027.-Printing Press.-C. Montague. Oct. 23. 1872.
$22048 .-$ Loor.-L. Yale, Jr. Oct. 23, 1872.

EXTENSIONS GRANTED
20.999.-Holding Cutters in Planing Machines.-I. Gibb 11,059.-Stram Engine.-H. and F. I. L. Blandy.
11,122.-Treatment of Caoutchouc.-A. G. Day
DISCLAIMER.
20,727.-Cartridger.-G. W. Morse. Filed June 29, 1872
DESIGNS PATENTED.
6,012.-CArprt.-J. Barrett, New York city.
6,013.-Button.-B. Henrich, New York city.
6,013.-D
6.014.-SAToHELE. - J. H. Hitchings, San Francisco, Cal.
6.015-CAMPAGN BADGE-J. P. Perley, Washington, D.
6.015.-CAMPAIGN BAdge.-J. P. Perley, Washington,
6.026.-Toy BANK.-D. A. Stiles, Middetetown, Conn.

TRADE MARKS REGISTERED.
933.-TrUsses.-Bartlett \& Butman, Boston, Mrs8.
934. - Glovrs.-P. and F. G. Conklin. San Francisco, Ca
935. - WHisky.-J. R. Conway \& Son, Baltimore, Md.
935. - Whisky.-J. R. Conway \& Son, Baltimore, Md.
936.-MరgTard.-Farrington, Campbell \& Co., Detroit, Mich.
937.-WRiting PAPER.-B. \& P. Lawrence. New York city.

Inventions Patented in England by Americans. (Compiled from the Commissioners of ratents' Journal. 1

From July 20 to August 1. 1872, Inclusive.
InJeotioxs, ETC.-M. Mattson, New York
Administaring Injeotioxs, etc.-M. Mattson,
Axle Box-W. W. A. Boyde, Harrivburgh, Pa.
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Converting Cabt Iron into Stere.-T. H. Alexander, Washington, D.C. Corset.-H. S. Flood, San Francisco, Cal.
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Raising Water -C. Houghton, Boston, Mase.

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