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NEW YORK, JUNE 22, 1872. $\left\{\begin{array}{c}\text { 83 } \mathbf{~ P e r ~ A n n a m ~} \\ \text { [IN ADVANCE. }\end{array}\right.$

## Air Spring Printing Press.

The old maxim, that " time is money," has never been bet ter exemplified, perhaps, than in the multitude of efforts that ha ve been made, in a variety of devices, to increase the speed of the flat bed cylinder printing press. To achieve this desideratum, it is of the greatest importance that the best system of resistance be employed to overcome the momentum of the bed of the press when in press when in rapid motion. Wire springs have been tried but were found wanting, although for many years they have been employed almost exclusively.

Compressed air, however, has been for a long time universally acknowledged to be the best be the best spring for that purpose, and it is our province here to show some important improvements which have lately been made in its construction.
The airspring heretofore in use was made with a solid or non-yielding plunger which causfd much caused much
inconvenience and not infrequent damage, quent damage,
by carrying in-
to the air chamber any sheet, tape, etc., that might acciden tally have dropped on it. This was attended by the instan stoppage of the press, and vexatious delay and difficulty were incurred in forcing the plunger and its incumbrance from the air chamber; sometimes fracture of the bed and destruction of gearing took place. With the old wire spring, if enough pressure were exerted by it to properly overcome the momentum of the bed, it would be impossible to help it over the centers by hand and start the press; we may therefore infer that the resistance actually offered by it was never



sufficient for the requirements of the press. In running at different speeds, the spring should be regulated to accord with them, which, in the old springs, could not be done with any certainty; and while the press is at rest, it is desirable that
the spring should be inoperative, as without springs there
are no centers. It now remains to describe the improvements $\begin{aligned} & \text { Messrs. Cottrell \& Babcock, at the above address, by whom } \\ & \text { the improved press is extensively manufactured. }\end{aligned}$ and see how they meet the case presented.
The accompanying engraving (Fig. 1) represen ts a press supplied with the improved spring. The bed is provided with two cylinders to engage with the plungers seen at the ends


NOVEL MODE OF SAWING WOOD WITHOUT A SAW.
The dominion so long held unquestioned by ax and saw has been a length invad ed. Electrici ty has been pressed into theserviceand threatens to drive these im plements into plements into whilet a mus whilethemus cularandothe forces which were so large lyexpended in their use are replaced by the action of the galvanic battery in one of its mos simple forms The inven tion we are about to are scribe, and which waspat ented through ented through the Scientific American Pat ent Agency, on the 28thof last May, is that of George Robin son, M.D., of this city.
That gentleman was wel aware that a galvanic current in suffi cientquantity when passed when passed tinum wire tinum wire

## TRELL \& BABCOCK'S AIR SPRING PRINTING PRESS

of the frame, and the hollow rods of these plungers are connected by a pipe running along the lower part of the frame; which pipe is opened or closed by the valve of the governor shown through the opening insthe framework.
Fig. 2 represents a cross section of the plunger, A, which, it will be seen from the engraving, is arranged with springs so as to allow the outside packing to contract and expand it thereby obviates, the inventor says, all difficulty arising from paper, tapes, or other matter falling on the plunger while the press is in motion. Fig. 3 shows a longitudinal section of the plunger, A, its hollow rod, and an automatic valve, B, at its extremity. This valve rises on the return motion of the bed and prevents a vacuum forming in the cylinder, whereby all strain or drag is prevented and power saved.
Fig. 4 represents the governor attached to the connecting Fig. 4 represents the governor attached to the connecting
pipe, with the plug valve, C , which it operates, and two pipe, with the plug valve, C, which it operates, and two
spring gages to indicate the amount of condensation in the spring gages to indicate the amount of condensation in the
cylinders. The valve is shut by the motion of the press cylinders. The valve is shut by the motion of the press
when running at speed, and is, of course, open when the press is at rest. This enables the press to be started at any point without helping it over the centers by hand. The spring gages perform an important function. As they indicate the pressure in the air cylinders, and as this is determined by setting the plungers backward or forward on their rods, there is no difficulty whatever in exactly adjusting the amount of spring to the speed of the press. Every press is furnished with a table showing the gage pressures, indicating the amount of spring required for the different speeds run. All the workman has to do is to adjust the plungers until the gages indicate the pressure laid down in the table As compared with the wire spring it is stated, this spring admits of the press being run quite 25 per cent faster and admits of the press being run quite 25 per cent faster, and without the wear, consequent on the strain caused
wire spring, and the accompanying jar and noise.
wire spring, and the accompanying jar and noise.
Patents were obtained through the Scientific American Patent Agency, May 2, October 17, and December 12, 1871 for the inventor, Mr. C. B. Cottrell, of No. 8, Spruce street
would raiseit
mperature to a red or even white heat. The most importan application of the principle had previously lain in the employ ment of the heated wire in certain surgical operations as a substitute for the knife or red hot iron. It was found that the red hot wire easily cut or rather burnt its way, through the living flesh, and tumors of considerable size were thus removed from the human body. The inventor's attention

being fixed on the fact that sodden, wet flesh was cut through in this way, a little reflection satisfied him that the division of wood, a comparatively dry substance even when green,

This proved to be the case, and on gently pressing pieces of
wood against the red hot platinum wire, especially when aided by a slight sawing movement, the wood was divided in any required direction as by a handsaw, and, of course, with out any effort of skill or appreciable expenditare of muscu lar power. By arranging the wire with handles or other mans, so as to guide it readily, the lumber, whether in trees logs, or planks may be cut easily as desired. There is here therefore, a simple and easily applied force, which, in a child ${ }^{\prime}$ havde, may be employed to fell trees, divide them into logs, and, in short, perform all the operations of the saw and the ax. The surface of the wood where thus divided is, of course slightly charred, but the black layer is very thin, and for many purposes not disadvantageous, as it is known to pre serve timber. The battery employed need only be of the simplest character, as quantiby, and not intensity, of cur rent is required.

## the RaOLin of the united states.

Dr. L9wis Feuchtwanger recently read, before the Poly technic branch of the American Institute, a paper on this sabject, from which we take the following
are deposits in the United States, partiolocurs in ver large deposits in the United States, particularly in South Carolina and Georgia, and its production offers remunerative results for the manufacturers of porcelain, manufacturers of paper and paper hangings, earthen and Rockingkam ware, paint manufacturers, frame makers, molders, and many other
artisans. The paper clay has been mined in South Carolina artisans. The paper clay has been mined in South Carolina
for a number of years, and brought to this market, where it for a number of years, and brought to this market, where it
always finds ready sale. More than 3,000 tuns have been always finds ready sale. More than 3,000 tuns have bee landed here during this year, and 10,000 more are already tioned. But there are many more deposits in that State ca pablo of producing a million of tuns with the most simple modus operandi, consisting of cutting or digging the white clay, which is either directly exposed on the surface or with in a few feet of the alluvial soil, drying the lumps by expo sure to the sun for one or two days, packing into tierces holding about half a tun, and delivering it to the railroad within a mile of the pit. The range of the sand hills in the above States, which contain those extensive clay deposits, is, in a geological point of view, of great importance, for they are all usually found adjacent to the rivers, and more developed near the larger streams than the smaller ones; the sand hills appear to be accumulations of sand, produced by aqueous agency, during the period when the lower boundary of the primitive region constituted an ancient sea beach. The clay strata of various thicknesses are $g$ nerally considered, by geologists, as the results of decomposition of the felspathic rocks, or of felspar, forming a component part of the granitic and gneissoid rocks of the azoic period dur ing their alteration in the cenozoic time by means of Plu tonic agency; while the sand hill formations arising from the decomp ssition of the tertiary and post tertiary rocks, and in cluding the pleocine, miocene, and eocene formation, took place under Noptunic auspices, as the specimens exhibited, gathered in the sand hill regions, clearly prove. The granite is known everywhere to underlie the marl and clay beds,
and we find the same phenomena over an extent of 1,500 and we find the same phenomena over an extent of 1,500
miles, baginning in Vermont, crossing over to New York, torming largo deposits ia New Jersey, Pennsylvania, Dela wary, Muryland, Vrginia, North and South Carolina, and
Georgin. Furthsr, wile ex minigg, in Alabama, the trias Georgin. Furthor, wile exintidg. in Alabama, the trias
sic rocks of the ctac nus podiol, w, are fally convinced tant the gre at supply of ofguic re a tins, the mineral com postion and its ine"p ai in, pe, ve their trae position to be in the gendogic. $p$ riods jus moutional
It is a very romurk ble fa that tie white clay deposits aze moshy fochen $n$th then fite of the earch. But still more remarate is the exintengo of thes large clay depos
its, so peries ly trea fron iocira s laviure, and even of re mais of the thent from which it originated. Analysis of maind of the Indoar from whith it originated. Analysis of
 about the sany composition, with cortain differences in the about the sany conposition, with cortain differences in the
buses. None of the felspar contains over one per cent of water, winie the analysis of the white clay from South Carolina shows the presonce of 12 per cent water, and not a trace of potasi or soda, and ouly 2 per cent lime and magnesia, and the silica and alumina in about equal proportion, namely, 44 per cent silica and 39 per cent alumina. In its physical character, the alteration is just as remarkable.
Neither mica nor quartz can be detected by the eye or the Neither mica nor quartz can be detected by the eye or the touch. New Jersey clays and the English china clay have the same pesuliarity, as proved by their analysis, and a grave question arisos how this metamorphosis took place,
and where have the alkalies of the pre-existing felspar gone, and how have they disappeared and been replaced by water? In looking among the elements for an agency, we find carbonic acid the only element that could have prodnced this metamorphosis: but we are puzzled to know by what process and at what period of decomposition such a change has taken place
The white clay of South Carolina appears to be fully equal in quality to the famous Eaglish china clay, which is largely imported from Cornwall, Eagland, and so extensively used in the arts. But there it is not found in such large masses as in South Carolina, where the writer examined a number
of deposits of acres in extent, and from five to ten feet in of deposits of acres in extent, and from five to ten feet in
depth. Since one yard square yields 300 cwts . of the fine and pure clay, the supply is inexhaustible. The peculiar appearance of a thin crust covering the sand hills is, to the observer, of great interest; for it gives undeniable proof that the transformation of the metamorphic or crystalline rocks,
during the azoic period, took place under volcanic auspices,
and that the result of the decomposition must have unde gone several other alterations
A ferrugivous sandstone, resembling fused masses from a great heat, and assuming thin crusts with fantastical figures, is seen all along the sand hills, just below the alluvial soil and above the sand and clay hills, and I have seen the same crusts of oxide of iron on the railroad from Washington to Baltimor, lying over the sand strata in that neighborbood In Georgia, within the compass of the Blue Ridge, exten ive deposits of blue or fire clay, resembling the New Jersey lue clay, are found, which are accompanied by a brown mioeral, resembling amber, but properly a brown lignite which, when freshly broken, has the odor of petroleum; and
also accompanied by large quantities of oyster (gryphea also accompanied by lats.
The burrstone or millstone grit is also found contiguou to the clay beds, or at the sand hills, where I found a large mass of several hundred pounds, composed all of siliciou shells within the red sand strata
A beautiful sandstone with oxide of manganese in black spots, and which is sometimes called leopardite, from its re embiance to the skin of a leopard, is here presented. It is from the tal stone.
Tho consumption of china clay or white clay is very large and daily increasing; statistics show that during the last six months about 2,000 tuns of English clay have been imported in this port. South Carolina has furnished for the paper makers and stainers in New York, Boston, Philadelphia, and Baltimore 2,000 tuns during the same period. The Trenton (N. J.) potteries consume 20,000 tuas per annum. The Ohio potteries in Liverpool and Cincinnati consume annually over
40,000 tuns. The price of the English clay averages $\$ 30$ gold per tun, while the American can be had for a little ove half that price in currency.
In the following analyses of the English china clay, Stourbridge and German clays, and that from South Carolina, New Jersey, and Missouri, we shall see that the South ern clay is in every respect equal to the Cornwall clay so largely imported into the United Siates:


Professor Roscoe lately delivered the first of four lectures at the Royal Institution on the "Chemical Action of Light." He began by showing how a chemical change in certain gases, liquids, and some few solids will change their colors
and their action upon waves of white light. He said that sometimes an approximation or separation of particles may be set up by mechanical means, as in the case of a mixture of chlorate of potash and sulphur, which gives a series o loud snaps when a little of it is struck with a hammer. It is dangerous to detonate this mixture in any but smal quantities. Heat also will cause explosions in some cases ior instance, when a flame is applied to a mixture of oxygen and hydrogen gases. In like manner light, in some instances, has the power of promoting the approximation or sepa ration of particles. The effeat of light on various bodies is by no means the same, and its action on chemical substance conservation of energy-the energy of the interstellar ether is expended in acting upon the substance molecularly changed.

As an example of a chemical change which could be pro duced by light, he placed a mixture of oxygen and chlorine enclosed in a very thin glass bulb, inside a cylinder of thick glass. The bulb had been filled in the dark, and kept in a dark box until required for the experiment. Then he
placed a glass trough full of water behind the cylinder, and placed a glass trough full of water behind the cylinder, and
burnt some magnesium on the other side of the glass trough so that the rays of light had to pass through the water to get at the bulb. The light caused the mixed gases in the bulb to explode; it was not the heat of the flame which caused the explosion, because the water sifted out all the heat rays, with exception of the very small proportion contained in the visible rays from luminous sources. He said at green light will very slowly decompose a mixture of as the violet end of the spectrum is approached. Strangely enough, there are two points of maximum action in the ckemical part of the spectrum, and between these two points clemical part of the spectrum, and between these
the says have less chemical action on the mixture.

Professor Roscoe next told how the action of light upon nome of silver gave rise to the beautiful and wical phe nomena of photography. Although this chemical action of light was noticed as early as the sixteenth century, it was
not until 1777 that the Swedish chemist, Scheele, explained not until 1777 that the Swedish chemist, Scheele, explained
the philosophy of it, and pointed out that the hydrochloric acid was set free, leaving a black deposit of finely divided silver; he first proved that the action took place in the blue and not in the red portion of the solar spectrum. The lec turer then proved by experiment that chloride of silver was blackened by the blue and not by the red rays.

He said that the decomposition of carbonic acid under the influence of sunlight, by the green coloring matter of leaves was another example of the chemical changes sometimes pro
 the presence of sunligh hat the evolution of oxygen from plants takes place. He took largeinverted vessel full of water charged with carbonic aci and placed a living plant inside; then, in the presence of sun light, bubbles began to form on the leaves of the plant, then to rise to the top of the vessel. On examination the gas thu produced was found to be pure oxygen. Priestley took andle and burnt it in a closed volume of air under a bell ar, until the candle went out after consuming most of the oxygen and liberating carbonic acid. He next placed a frag ment of a growing plant in the jar and exposed it to sun ight; in course of time the air was rendered pure again, so hat another candle could be burnt in it, and the experimen epeated over and over again an indefinite number of times. rofessor Roscoe proved this by ehowing that a taper would burn brightly in a glass jar containing growing musk, though when the musk was first put in the jar, the air had bee made so impure by the burning of a candle in the glass vesse that it would not then support combustion. Priestly tried many of his experiments with mint, and not a few of them with other vegetables; he found spinach to be most effectual in restoring oxygen to air under the influence of light.
The existence of the ultra red rays of the spectrum wa frst demonstrated by Herschel in 1800. The existence of ultra-violet rays was demonstrated later still by Wollaston and others. It was discovered that chloride of silver becam blackened beyond the range of the visible rays of the spec trum. It was found that the lines of the chemical par of the spectrum could be photographed, and that the photo graphs of them, taken by Rutherfurd of New York, agree with the drawings of them made by hand by Kirchoff, al though in a few cases they do not agree in breadth and in intensity. The chemical rays of the spectrum differ from each other solely in wave length and amplitude of vibration

## $\$ 10,000$ Reward for Improved Railway Signals.

An offer of the above amount is made by parties in Boston for the invention of devices that some of our ingenious read ers can certainly supply. The offer is as follows:
To the Editors of the Boston Daily Advertiser:
There are in the United States several millions of persons sick and well, living along the lines of the various railroads and near manufacturing establishments in popalous towns who are disturbed day and nigat by the discordant shriek of the modern steam whistle. Owing to the gradual intro duction of this apparatus, the public has learned to tolerate it, but $w \varepsilon$ venture to assert that if it could have been intro duced suddenly as we hear it to day, no community would have consented to its use. These unearthly sounds are made in manufactories at early dawn, at noon and at night, to call to warn passengers on the highways, and to give notice to o warn passengers on the high ays, and to give notice to to describe them, since they are familiar to all, and all are ance the increasing evil, or cannot a substitute be found which will asweasing evil, or cannot a substitute be found which will answer all the purposes of the steam whistle, without annoy
ance to the public, and with safety to travellers on the ance to the public, and with safety to travellers on the
railroad and on the highway? Believing that such a subrailroad and on the highway? Believing that such a sub-
stitute can be found, and to encourage experiments in that direction, we hereby agree to pay the sum of ten thousand dollars to any one whn shall, within two years from January 1' 1873, invent a system of signals which shall supplant the se of steam whistles on railroads, and which shall be pro nounced hy judges, hereinafter named, to be free from the evils of the present system, and which shall be attended with no discomfort to passengers on the trains, or the high ways, or to residents along the line of the railroads. One fifth of the amount thus pledged shall be paid to the author of such invention at any time within the period specified, whenever its claims shall be substantiated by the said judges, and the balance whenever the invention shall be adopted and used by a majority of the railroad companies in New England, provided suchadoption be previous to January 1, 1877. The judges in these premises shall be the Chairman of the Massachusetts board of railroad commissioners, th resident of the Boston and Albany and Boston and Main railroad corporations, the Professor of civil engineering in the Massachusetts Institute of Technology, and the chie locomotive engineer on the Boston and Albany railroad. If any of the above named gentlemen shall decline to serve
as judges, the donors reserve to themselves the right of as judges, the dono
naming substitutes.
Communications may be addressed to "Committee on Railroad Improvements," care of Boston Daily Advertiser Boston, Mass.

The Brewing Interests of the United States The twelfth annual convention of the chief association of the brewers of the United States was recently held in thi city. From the opening speech of the President, Mr. Henry Clausen, we learn that there are at present three thousand breweries in the country, employing a capital of over one
hundred million dollars and giving employment to thousands hundred million dollars and giving employment to thousand of people. The trade yearly consumes twenty-three million bushels of barley and over eighteen million pounds of hops. The revenue derived by the United States from this indus sand dollars, being an increase of over six million dollars since 1863.

## portable frescoes.

The process of frescoing in oils, invented by Mr. Cbarles T. Kemmer, is a novelty in its way, and, we think, is likely to entirely eupersede the ordinary mode of freacoing. It is designed to do away with the expense and inconvenience al to furnish artistic decorations of a most superior quality and durability,
We may describe the process briefly, as follows: Ordinary sheeting is dipped in soap and water and stretched upon a frame; it is afterward covered with a coating of gelatinous size, and allowed to dry. An oil painting of the nature re. quired is then executed on the prepared sheet, and, after it is thoroughly dried, the gelatinous sizing between it and the sheeting is moistened, and the painting removed, bodily, from the sheeting. The painting is then attached to the plaster by a liquid cement of appropriate character.
In the production of the painting, whether it be merely a plain tint, an ornamental design, or a gilded decoration, about five coats of the best linseed oil fresco paint are used. This produces a tough, tangible film, about the thickness of good writing paper, which will bear washing with soap and water and a sponge as often as may be desired. When ce mented to the plaster, it adheres with a tenacity entirely un known where the paints are laid directly on, as in ordinary frescoes, which are liable to peel off. Cracks occurring in the plaster do not affect the film unless they are of large size.
In the manufacture of this portable fresco, plain tints, etc. are turned out in pieces 20 inches wide and 8 yards long,
ready for attachment to the plaster. Where a ceiling or ready for attachment to the plaster. Where a ceiling or wall is to by covered with a decoration specially designed for the purpose and complete in itself, the painting is executed venient size for cementing to the plaster: as the strips are cuttings from one piece, they of course match so accurately that no join is discoverable
Among the advantages belonging to this process are the facility with which frescoes for distant use may be designed and painted, and the very short time which is necessary to x iliustration of the latter, we may state that the film can be
applied in one day to a cailing which it would take three weeks to fresco in oil in the regular manner.
Mr. Kemmer has received patents for his invention both in his country and in Earope. Further information may be obtained by addressing Charles T. Kemmer \& Co., Passai avenue, East Newark, N. J., or at No 4 Warren st, New York

## A Recent Tornado

Portions of our Western prairie country, by their comparatively level and unobstructed formations, present a fine field for the play of the win is, and for the formation of those.re markable spiral currents known as whirlwinds, from which great damage sometimes results. These spiral currents usually cover a very narrow pathway on the surface of the ground, but they operate with tremendous force, and migh not inaptly be termed pneumatic plowshares. One of these aerial giants made its appearance at Quincy, Logan county Ohio, on the 8th of June
A sultry day was followed by the appearance of a cloud, in he West at 5 o'clock in the evening, which increased in blackness and size with fearful rapidity. A heavy wind soon set in, an int 5.30 o'clock the whirlwind struck the earth five miles from Quincy, moving in a northwesterly direction. The tornado reached Quincy in about five minutes and passed through the town, making a clean sweep or heuses, trees and fences along a path which fortunately was comparative y narrow. In this village 50 or 60 dwellings and stores, two churches, and as many more shops, stables and outbuilding were unroofe 3 , rocked from their foundations and demol ished. The air was literally filled with flying weatherboards furniture, laths and plaster. A parlor stove was caught up by the wind and hurled through the air until it fell upon a woman and crushed her so that she died. The Baptist and Methodist Episcopal churches were completely destroyed.
The tomado on its way to De Graff struck Bogg's flourin The tomado on its way to De Graff struck Bogg's flouring
mill, five stories high, and containing 3,000 bushels of grain mill, five stories high, and containing 3,000 bushels of grain.
The builcing was moved nine inches upon its foundation, The builcing was moved nine inches upon its foundation,
and the roof and the portion of the fifth story were carried and the roof and the portion of the fifth story were carried
away. The storm plowed its way through De Graff. carrying destruction in its path, bu $\uparrow$ injuring fortunately fewer person and a smaller number of buildings. After leaving De Graff it passed several settlements, and finally rose from the earth and was st en for miles, carrying in its funnel shaped form timber, rails, and débris which it had gathered in its destructive march. The newspapers give the names of some fifty pereons killed and wounded by this tornado.

## Car Starter.

William M. Stratton and William E. Stratton, of West Troy, N. Y, heve recently patented an improvement in apparatus for storing up, in a spring or springs, the power expended in arresting the motion of a car, to be used in setting t in motion again; and it consiets in having the drum, which is employed to wind the tension cord of the spring, made with such devices and arranged in such manner that it may be locked and held after being detached from the gearing connected with the axle to wind it up, so that the car may be allowed to run awbile before the power of the spring is applied; thus making the apparatus capable of retaining the power stored up in the spring while the car is going down a descending grade and using it on an ascending grade, the car iunning free between the grades. The invention also consists in certain novel devices, for thus detaching, holding, and locking the winding drum.

## CINCINNATI EXPOSITION.

The commissioners announce in our advertising columns that the third National Industrial Exposition will be opened in Cincinnati, September 4th, next, It will remain open un il October 5th, following.
The aid which such exhibitions afford to business and the advancement of knowledge is of the most important charac ter, and fully entitles them to the interest of tho whole na ter, a
tion.
W.

We would wish to remind intended exhibitors that they e reconmended to make immediate applications for space Extensive arrangements have been made for the transport ation of visitors, at reduced fare, and it is expected that the large attendance of last year will be very much increase this season.

## THE UNIT MEASURE OF ELECTRICAL RESISTANCE.

Since the electric telegraph has been in existence, quite umber of different units of electrical resistance have been proposed, but at the present time nearly all of these units ave been adjusted to one standard, so that one of them may now be considered the basis of all.
Professor Wheatstone proposed, as a unit, one foot of cop per wire weighing one hundred grains.
Professor Jacobi proposed a copper wire one meter lon and one millimeter in diameter.
Professor Matthiesen proposed a copper wire one statute mile in length and one sixteenth of an inch in diameter.
Mr. G. F. Varley's unit is a mile of special copper wir ne sixteenth of an inch in diameter
Dr. Werner Siemens employed a glass tube filled with pure mercury. This tube was one meter in length and con tained a column of mercury baving a trsnsverse section of ne square millimeter.
The German, French, and Swiss telegraphers used a cer tain length of their standard sized iron wire, such as wa used for the construction of overland telegraph lines, as practical unit of measurement
The British Association proposed and adopted a theoretical unit of resistance, in which a certain amount of work or mechanical effect is produced by a given amount of electric ity in a given length of time, and this theoretical resistance is copied or represented by a certain length of wire
This unit is beautiful in theory, put difficult and uncertain in practice. The principal source of difficulty lies in the ac curate measurement of the mechanical effect of the electri current. Since this unit has been adopted by the British Assaciation, some of the most expert continental physicist have, by experiment, arrived at the conclusion that it i about two per cent smaller than the copies distributed by he association.
The objection to the employment of copper wire of vari ous sizes as a standard arises from the fact that no tw specimens of copper, or of any other metal, possess precisely the same specific conducting power, and, therefore, measures of resistance thus defined are liable to vary, and, in fact, do differ from each other very materially.
This objection, however, says the Telegrapher, does not ap ply to mercury, which, in consequence of its fluid nature, is easily rendered chemically pure. In fact, experience has shown that resistances can be produced and reproduced by means of mercury, which do not vary among themselve more than two or three ten thousandths of a unit, or about as near as the finest set of silversmith's scales can be made o balance and weigh alike.
In deciding upon a standard of measurement, the first and nost important consideration is to select one which is leas likely to undergo cbange or variation, so that, when they be come multiplied and brought into general use, one of them will al ways correctly represent another.
If we suppose, for example, that a person should under take to construct a two foot rulet: He first selects a stand ard as nearly correct as possible, and copies it with grea care. Suppose he then destroys the first and makes a thir from the second, and a fourth from the third, and so on un til he has made a thousand, and all of his measures, exce the last one made, bave been destroyed.
Now, we will suppose that anotherperson commenced ma sing two foot rules in the same manner, and using the same original standard to copy his measures from, and in the sam way copied one from another to the number of a thousand If these two persons compared their final measures with eac ther, it is more than probable there would be a considerabl difference-that is, they would not agree one with the other In view of this disagreement, how could it be decided which was the most correct, as the original standard is no longer in
existence? In some such condition would two persons be, each having British Association units of measurement. The cannot get at the original unit, because it never had a pract cal existence.
The mercury unit, on the other hand, has for its basis the meter measure, which is defised as the ten millionth part of the distance of the pole of the earth from its equator, and arly the length of a pendulum that beats seconds.
The British Association unit forms part of a system. The esistance bears the same relation to the other conditions hat distance does in the definition of a horse power. A onse power is that force which will raise 33,000 pounds on foot in one minute. Similarly, a British Association unit is he resistance of the circuit producing a defined mechanical cuantity and intensity defined as units other conditions of quantity and intensity defined as units. As before stated, the great difficulty lies in the correct measurement of this Association made use of a magnetic needle, that is, a magne
held in its position by the magnetism of the earth, which is never in itself constant, and is at all times in a state of per urbation. It results from this that the force requird to move this magnet equally, at different times, will not be the same. In addition to this, the magnet is affected by local causes, and in no two different localitios can it be said to be affected precisely alike. From these and other reasons, Ger man scientists of the highest rank, as the result of their in vestigations, have announced that the British Association nit, as distributed by their committee, does not approxi mate its true value within nearly two per cent
It was after careful consideration of the defects in the dif ferent standards of electrical resistance, and with the desire to adopt the one which was least liable to objection, that the International Convention of Electricians, at Vienna in 1868, adopted the mercury unit as a standard, and all the European countries, with the exception of Great Britain have adjusted their resistance scales to it. Mr. Varley ha defined his unit, or "readjusted it to 25 mercury units."
Mr. Latimer Clark defines the B. A. unit, or Ohm, as "the resistance of a prism of pure mercury one square millimete in section and 1.0486 meters in length at $0^{\circ}$ centigrade," so hat, in reality, the mercury unit is now the basis or standar of all the measures in use
The average resistance of a statute mile of good No. 9 galvanized wire, such as is generally used in this country, is bout 20 mercury units.

## Masonry and Brickwork

However gigantic may be the strides with which engineer ing science has ad vanced during the last few years, it canno be denied that, so far as regards the special art of building masony or brickwork, the present race of architects and ngineers are feoble in conception, timid in execution, and former day
It would be amusing, or more truly perhaps the reverse to note in what manner an average architect or engineer of the present age would deal with some of the problems pre ented to the old masters. for instance, such a one as that uccessfully solved by the Saracenic builder of the justly elebrated tomb of Mabomet at Beejapore, India, which wa allows: Given a building 135 feet square on plan, and 110 feet high, required to cover the same with a circula dome 124 feet in diameter, and weighing some twelve or ourteen thousand tuns. It wou?d be curious to observe how many hundreds of tuns of iron our men would consider it mperative to throw into the work. Th: Saracen, knowin the capabilities of his material, asked for no ironwork, but fearlessly trusted to his masonry, and skillfully corbelled ou the square walls at the top to meet and support the circu lar dome, and to such a bold extent that, at the angles of the building, the projection of the corbelling measured no less than 46 feet.
How infantile appear the greatest exertions of our modern building in comparison with such mammoth works as thes The traditions of the art have bgen lost, and science has pro vided no substitute. Our professors, if they do not avoid the subject altogether, treat it in a perfunctory, ignotum per gnotius, manner, which only serves to make the "darknes more visible," or the " little glooming light"-which may already exist in the student's mind-" more like a shade. We may be taught, for instance, that the line of pressure in an arch must be included in the middle third of its depth, or the arch will tumble down, and we may be treated to many other equally shallow dicta based upon hypotheses evolved from purely theoretical considerations, which the bare existence of huadreds of buildings for hundreds of years conclusively demonstrates to be utterly false and un enable
In recent times, no doubt, the introduction of iron vork has had much to do with the extinction or suppression of nearly all that is true and expressive in the art of building. It i o very easy to multiply the span and divide by the depth, and to perform the other elementary operations incidental to the determination of the strength of an iron girder; and hen, besides, the figures and diagrams look so clever as t induce, in the too often shallow performer, a glow of self con placency, leading him to fervently believe that an enginee ng feat has really been achieved. But if such work const tuted engineering, the schoolmaster in the "Deserted Vil age" would bz an admirable exp onent of the science:

## The village all confessed how much he knew;

Another advantage offered by ironwork as compared with masonry, and oue to indolent or incompetent men peculiarly seductive-is that of shirking responsibility. With iro girders, the designer may devote the few minutes necessar to the conventional calculations, specify iron of a given trength, and so rid himself lightly of any further sense of being responsible. But if, on the other hand, his first consid eration is his client's interest, and not his own ease, he wil often be led to discard ironwork in favor of masonry, and he will find no royal road to learning in that direction, but must honestly and laboriously qualify himself, by theoretical and practical investigation and by comprehensive analyses of works already executed, to form a correct estimate of the ca pabilities of the masonry or brickwork with which he ma dealing, and to shape his design accordingly -Enginecring.

Ozone in the Ageing of Alcoholic Drinks.-On run ing out wine drop by drop through a vessel filled with ozone, the essential oils and other substances which give the wine
a "new" flavor are destroyed, and the wine much improved n quality.-M. Loew.

## NEW MAGNETO-ELECTRIC MACHINE

In all the magneto-electric machines hitherto constructed, only an approximation to a continuous current has been ar rived at, and that either by making each machine a compound one, having several armatures arranged so that, when the current ceased in one, it was taken up by the next, and so on, or, in other machines, by driving the armature or ar matures at a very high velocity, so that the interval between the cessation of one current and the commencement of the next became inappreciable.
In M. Gramme's machine, says the Mechanics' Magazine the current, whether the machine be turned slowly or quick ly, is continuous. Fig. 1 is a theoretical representation of this machine. It consists of a horseshoe magnet, N S, between the poles of which turns an iron ring with an insulated wire wound round it in one continuous length. The inner bends of the turns of this wire are connected with smal studs, ssss, insulated from one another. The edge of the faces of two wheels, wo $w^{\prime}$, press against these studs, as shown, so that as the iron ring with the wire wound around it rotates, three or more of these studs are always in contact with them. In the actual machines, each of the turns, as represented in the engraving, is really a separate coil of several turns of wire, the junctions between the ends of one coil and the next being con nected with the studs; and the iron ring is not necessarily one of round iron, but may be, or rather is, a short and very thick soft iron tube, and the permanent magnet a proportionally broad compound one. The action of the machine may
be explained as follows: Let us regard the turn of wire just above the line, $b a c$, on the left hand side of the ring. The portion of the iron ring above this turn, that is to say, the portion nearest the pole, $\mathbf{N}$, has the same polarity as that pole, while the portion of the ring below the turn has southern polarity. Now as the ring rotates about $a$, the portion of the ring above the line, $b a c$, becomes more strongly north as it approaches $\mathbf{N}$, and the part below less south as it recedes from $S$; and, final ly, when it arrives at N , the polarity on both sides is the same, which is as much as to say there is no magnetism in it. This change causes a current of electricity to be induced in the wire. As the turn now moves on towards $S$, the iron in front becomes a south pole, and that behind a north pole, until it arrives at the line, $b a c$, when the difference of polarity is greatest. This change sends another current through the wire, which, as the turn has become turned over in position, will be in the same direction as the former one, or rather will be a continuation of the first current, so that the turn of wire, in changing from $b$ to $c$, has a continuous current induced in it, as have in like manner all the turns before and after it. As now the turn moves further still, the magnetism becomes less and less, as at first, and finally, when at $S$, disappears, and on going still further becomes reversed as be fore; this causes a current to circulate through it in a reverse direction to the former one, and so also for all the turns before and after it; these currents together pass out through the studs, in contact with the wheel, $w$, and return when the circuit between the two wheels is completed (as they must be of course before any current can flow) through the wheel, $v^{\prime}$, and thus a continuous current is kept up as long as the wheel is kept rotating. The circuits of the machine are precisely similar to two sets of cells joined up for quantity, that is to say, the last zinc plate of one set is joined to the last zinc of the other set, and also the last coppers are joined, as shown in Fig. 2, each cell representing one turn, or in the actual machine one separate coil.
It will be seen that as each wheel always presses against three or more studs, the coils between these studs are short circuited, and do not add their power to the others. The re sistance of the wire in the machine will be the resistance of the length of wire between the stud pressing against the higher part of the wheel, $w$, and the stud pressing agains the higher part of the wheel, $w$, taken parallel with the
length of wire between the studs pressing against the lower part of the wheels, which is equivalent to rather less than a quarter of the resistance of all the wire taken in one length. The resistance is not exactly a quarter, because the coils between the studs pressing on the wheels are in short circuit, and do not add their resistance to the other wire. By con structing the coils of thick wire, a current of great quantity can be obtained, or with a larger length of thin wire, one of greatintensity. The electro-motive force of the current is directly proportional to the rate of rotation of the coilsthat is, when the rotation is not extremely rapid, for the de magnetization of the iron requires a certain time. The ma use for such purposes as electrotyping, the electric light, etc.

Lac Anilines for Staining Paper, Leather, etc.
Springmuhl states that paper has hitherto been stained in two ways: either the material, previous to manufacture, as dyed with a substantive color, or an adjective color was applied to the finished paper. In the former case, a product was obtained colored through and through; in the latter, the color is only on one side. With a compound of resinous matter and aniline colors dissol ved in alcohol, the paper can be rapidly colored at once, on both sides, in the most splendid manner and in an infinite variety of shades. The best resin for the purpose is shellac, to which a little sandarach or turpentine may be added. The resinous aniline solution interpenetrates the whole mass of the paper, giving it a completely even color, and a considerable luster. The two alcoholic solutions of color and of resin may, if needful, be kept separate till required for use.
Every kind of paper, sized as well as unsized, can be pre pared in the same manner. The process is very simple: the sheets of paper are drawn through the solution placed in a


## MAGNETO-ELECTRIC MACHINE

shallow vessel, and afterwards hung up to dry. By wetting one side of the paper, the same result may be produced, if the texture is not too thick. If the paper is thoroughly in terpenetrated with color, it becomes, when dry, so compact and dense that one side can be subsequently treated with a different color. By adding a small quantity of an essence may be treated in the same manner.

## SAFETY KEROSENE LAMP.

Many of the accidents resulting from the use of kerosene arise from the breaking of the glass reservoir when the lamp is overturned by any cause. To obviate this is the intention of the invention we illustrate, and the object appears to $b$ attained by means at once simple and inexpensive.


At A is shown the glass reservoir of the lamp, and at B a ring of india rubber which surrounds its largest circumference. A groove is formed in the glass, into which the rubber ring falls far enough to be kept securely in place, while, at the same time, it projects a sufficient distance from the re servoir to form a protective cushion on every side. Upon the lamp being overturned, the india rubber cushion receives the orce of the concussion and preserves the glass from injury We have upset the lamp from which our cut is made a grea many times, to test its strength, without effecting any damage whatever.
Patented through the Scientific American Patent Agency, April 16, 1872. Further information can be obtained of the inventor, Mr. Adolph Otto, whose present address is 76 Ann street, New York city.

## PENCIL LEADS.

Graphite, clay, and water are the ingredients of the leads used in the ordinary forms of pencil cases sold by jewelers and stationers. The graphite, or blacklead, as it is commonly termed, that is employed for the purpose is of the finest quality. After being ground to a powder, it is mixed with a peculiar dark blue clay, which is imported from Bavaria, and the whole is kneaded with water until it assumes the consisence of putty
The apparatus used in the manufacture consists of an iron ylindrical vessel, which is usually of about seven inches in diameter, and constructed of sufficient strength to withstand heavy-pressure. In the center of the bottom of this vessel, a small round hole is pierced, and inside the cylinder is a closely fitting movable steel plate which also has an aperure in its center, so that, when it is placed on the bottom of the vessel, the two openings coincide. The hole in the plate, however, is the smaller, being of a diameter equal to that of the leads to be madeso that larger or smaller apertures and, consequently, different plates are required for the various sizes of leads.

Into the above mentioned vessel, after the plate on ita bottom is adjusted, the mixture is packed, which, on being forced down by a heavy pressure, is driven out through the hole in long flexible threads. These are received on sheets of metal, and each sheet, as soon as filled is as soon as filled, is placed in an oven. The levgth of time occupied in the baking depends upon whether the leads are to be hard or soft; if the former,
they are kept in the oven for some time, if the latter, a short period suffices. This process completed, the threads are broken up into short pieces and arranged according to their sizes. There are nine of these sizes in the trade, numbered from 1 to 9 according to the ength of the pieces.
The finished leads are sent to the market packed in little boxes. The latter are either turned from wood or else pressed by dies from thin sheets of tin or brass, Large numbers of them are manufactured at Waterbury, Conn.
Leads at wholesale sell at three dollars per gross. The trade which is supplied mostly from manufactories in Philadelphia is, we should judga, of rather limited proportions, as one of the largest dealers in this city informs us that his sales rare. ly exceed three thousand gross per annum.

Scarlet Dyeing on Wool and Silk.-Jegel proposes the following method of dyeing wool and silk scarlet by the simultaneous action of magenta and dinitronaphthol or naphthaline yellow. The less magenta is employed, the better The method is to heat a dilute aqueous solution of naphthaline yellow to near boiling, add so much magenta as amounts to two per cent of the naphthaline yellow, and then dye The dye liquor must not be mixed when cold. If this is done, all the magenta is thrown down in an amorphous flocculent state. If this has taken place, the subsequent appliculent state. If this has taken place, the subsequent application of a boiling temperature does not remedy the mischief,
since a part only of the magenta thus precipitated is redissince a part only of the magenta thus precipitated is redis-
solved, the rest melting together into a greenish golden mass. solved, the rest melting together into a greenish golden mass
In this state, the liquid is quite unfit for dyeing, and even if In this state, the liquid is quite
filtered gives no good shades.

Preparation of pure Indigotine by means of Carbolic Acid.-According to Mehu, carbolic acid, with the aid of heat, has the power of dissolving indigo blue readily. On cooling, the greater portion is deposited in a crystaline state. The cold solution has an intense purple blue color. In orde to prevent the carbolic acid from congealing as it cools, little alcohol may be added, which causes the greater part of the color to be deposited. Instead of alcohol, camphor may be used to the extent of one-fifteenth, or benzine. By using 500 grammes of carbolic acid, we can obtain two grammes of pure indigo blue (indigotin) in crystals which, under the microscope, appear remarkably regular. Mehu em ploys indigo which has been previously washed, first with water, then with very dilute hydrochloric acid, and then repeatedly extracted with boiling alcohol.
Coating Zinc with Iron.-The objects should first be plunged into a hot solution of 160 gms. ferrous sulphate and 90 gms . sal ammoniac in 2,500 c.c. of boiling water. After two minutes' exposure, they should be removed and brushed off in water. This has for its object simply the cleansing of the surface. They are then again placed in the bath and heated, without brushing or washing, until the sal ammonia fumes are gone, then washed, and this operation repeated three or four times, when a coating of iron will be formed Puscher.

Miners' Unions in Prussia.
The oldest associations amongst working men for mutual aid, of which modern trades' unions are the youngest offspring, are unquestionably the "Knappschaften," or miners' unions of Germany. They date back more than 600 years and were established wherever German miners migrated; they had written rules and regulations, and generally received corporate rights from the respective sovereigns who wished to encourage mining enterprise within their own dominions, particularly for the sake of winning precious metals. The German miners' unions exist over all Austria, Russia, Norway, and Sweden, where the art of mining was introduced from Germany ; and the technical terms, still in use by the profession in these countries, bear witness to their German origin, as well as the general mining laws which regulate the acquisition of mining property from the State and the obligations of mining proprietors towards the sovereign, who holds all mineral treasures under regal rights. In no other country but Prussia, miners' unions or " KnappIn no other country but Prussia, miners' unions or "Knapp-
schafften" have been developed with so much care by legisschafften" have been developed with so much care by legis-
lation for the general benefit of the working miners; and lation for the general benefit of the working miners; and
though they are still capable of improvement, they can fairly though they are still capable of improvement, they can fairly
be pointed out as models which are worthy of imitation for be pointed out as models which are worthy of imitation for
the benefit of the other working classes. The report on the miners' unions in Prussia during the year 1870 has lately been published, and we find in it data which may prove of value to the mining interests of this country, where the improvement of the social condition of a large population of miners is just now being eagerly discussed.
The war of 1870 has not failed deeply to affect the condition of the "Knappschaften," as over 30,000 members were forced by it to leave their peaceful calling and to enter the ranks of the army. The direct object of the miners' associations is to render immediate assistance to its members when they are in need of it, so that, if injured by an accident or if taken sick, they receive assistance during the duration of their illness, besides free medical treatment and medicine. If their case should make it desirable, they are received without cost at one of the unions' infirmaries; and in the event of death, the union furnishes the funeral expenses. If, through any accident or through age, they become too infirm to gain any wages by their work, they receive for life a pension out of the common fund; and according to the degree of their infirmity, they are classed as pensioners, or half pensioners, and obtain help accordingly. If a member leaves a widow and children behind him, the former receives a monthly pension until she dies or marries again, while the children are assisted until they are 14 years old, besides free school to the same age. There are two classes of union members, permanent and temporary, the latter only acquiring personal rights, while the former, after 5 years membership, have their rights extended to all the members of their family; but both classes forfeit their rights when they leave their union without permission, or cease to pay their contribution, which as a rule, is $3 \frac{1}{2}$ per cent of wages earned. The property of the union is thus principally derived from contributions of the members, but also to no small extent from voluntary do nations, as well as from contributions of 1 per cent on their incomes, which the mine owners are legally obliged to pay This fund is under the management of a committee of trust ces, "Knappschafts Aelteste," who are freely elected by the members and placed under the control of the Govern ment mining engineer of the district, who is made responsible, to prevent defalcations and to see that members always obtain justice.
On the 1st of January, 1870, the miners' unions comprised 202,562 members, of whom 102,174 were permanent and 100, 388 temporary. The number of persons supported by the unions during the year was 45,057, namely, 9,267 pensioners 277 half pensioners, 13,883 widows, and 21,630 orphans, and school money was paid besides for 45,402 children. The total income of the union was $\$ 1,600,000$. During the year medical assistance was rendered to 117,025 persons, sick wages were paid for $1,436,826$ days, and 9,486 members received, in all difficult cases, free medical treatment at the hospital. Most of these cases were the results of accidents. -Engincering.

Fast Riding.-At Dexter Park, Chicago, recently, Charles Rettiker, " the California Boy," undertook the feat of riding on horseback 200 miles in twelve consecutive hours, being at an average speed of sixteen and two thirds miles per hour. The track used was the circular one, seven eighths of a mile in length. Fresh horses were used for each round. On the the twenty-fifth round, the horse bolted the track and leaped the rail, falling upon its rider, who, however, not being much hurt, remounted and finished the round. On the 198th round the race came to a sudden termination, as the horse again jumped the fence and threw his rider with such force that he was obliged to be taken from the park in a carriage, and he now lies in a very low state, although the physician has some hopes of his recovery. He had made $172 \frac{2}{8}$ miles in nine hours and twenty minutes, and but for the accident would undoubtedly have accomplished the feat.

Galvanic Action on Iron Sifips.-It is an alarming fact in practice says the Engineer, and one that, being so perfectly in accordance with theory, ought to awaken no surprise, that should even a minute piece of copper come into contact and so remain, with the inside bottom of an iron ship then wetted with bilge water, as under the circumstances of the case, it, necessarily must be, active galvanic energy is established between the two metals, and iron being the sacrificial metal of the couple, the bottom will, sooner or laterand sooner rather than later-be eaten through in a hole aomewhat larger than the superimposed copper.

CRYSTALLIZATION OF SILVER, GOLD, AND OTHER METALS.
by dr. John-hall gladstone, f.r.s., f.c.s.
There are few chemical experiments so well known as the growth of the lead tree, a specimen of which is on the table, together with a silver tree that is sxid to have been made by the late Professor Faraday. These carry our minds back to the time of the alchemists, who called the first, arbor Saturni, and the second, arbor Diance; and they may be looked upon as the types of a large number of phenomena. in which

the salt in one metal in solution is decomposed by some other metal. My assistant, Mr. Tribe, and myself have been lately examining these replacements, the metallic crystals which are thus produced, and the forces that act through the liquid.
Our more special attention has heen given to the action of

copper and nitrate of silver. The crystals of silver thus pro duced diffor both in color and form, according to the strength of the solution. If it be very weak-say one per cent-the copper is fringed with black bushes of the metal, which, in growing, change their color to white without any alteration
crystaline form that can be detected by a powerna

croscope. A stronger solution gives white crystals rrom the commencement, which frequently assume the appearance of ern leaves; the analogy between crystals and growing plants a most superficial one, but it is convenient to draw ou

ine growth racher resembling furze bush, while those of 15 per cent or upwards give a steady advance of brilliantly whit moss. In all these cases, however, when the solution in fron
of the growing crystals has been somewhat exhausted, cer ain prominent or well circrmstanced cryatals seem to

nopolize the power, and to push forward through the remain ing portions of the liquid. This gives rise to beautifu
branches, which assume a variety of graceful forms, but, as a general rule, the weak solutions give feathery and pointed
crystals, as in Fig. 1: the moderately strong solutions tend towards jagged forms, as in Fig. 2; while the strongest grow branches that terminate, not in sharp points, but in rounded leaflets, as in Fig. 3. Besides this, there occur all kinds of crystalline combinations, as for iustance, the spray sketched in Fig 4. It is very beautiful to watch the growth of these silver crystals round a piece of copper under the microscope; a blue glass underneath adds to the effect, but they are best seen when they reflect a strong light thrown upon them. If, instead of putting a piece of copper into a drop of nitrate of silver, a piece of zinc be placed in one of terchloride of gold,
there is at once an outgrowth of black gold, there is at once an outgrowth of black gold, which speedily changes to an advancing mass of yellow, or perhaps of purple metal ; and it is very apt to form beautiful fringes, or to shoot its yellow branches rapidly round the margin of the drop. Acetate of thallium yields a forest of thorny crystals; and chloride of tin causes a luxuriant growth of large flat leaflets, or of symmetrical structures resembling fern leaves, except that the smaller fronds are arranged at right angles to one another. The new metal indium gives thick white crystals upon zinc; while bismuth and antimony form black fringes resembling the first action of gold.
The forms assumed by native metals resemble those produced by this process of substitution. In some cases, indeed, it seems almost certain that the deposition of these minerals was effected in the same way, as for instance, the silver which occurs sometimes in tufts, sometimes in large crystals, on the native copper of the Lake Superior district. Gold is frequently found in cubes more or less rolled, but the leaf gold from Transylvania bears a striking likeness to the crystals that form in our laboratory experiments. Silver is often found native as twisted hairs or wires of metal-a form that never occurs in the decomposition of its nitrate by copper, but which can be artificially produced in another way.
There has been noticed a singular tendency in old silver ornaments and coins to become crystalline and friable. Here is an ancient fibula from the Island of Cyprus, supposed to is an ancient fibula from the 1sland of Cyprus, supposed to
be at least 1,500 years old, which, through the greater portion of its substance, presents a fracture something like that of of ist iron, and its specific gravity has been reduced in round
and cast iron, and its specific gravity has been reduced in round
numbers from 10 to 9 . It contains a little copper. This numbers from 10 to 9 . It contains a little copper. This property of certain metals, or their alloys, to change in con-
dition and in volume, is worthy the attention of those whose dition and in volume, is worthy the attention of those whose
duty it is to make our standards. Experiments should be duty it is to make our standards. Experiments should be
instituted for the purpose of learning what metals or combi instituted for the purpose of learning what metals or
nations of metals are least subject to this secular change. These metallic crystals are Nature's first attempt at build ing. The material is the simplest possible-in fact, what chemists look upon as elementary. But how is the building carried on? What are the tools employed? Where are the bearers of burdens that bring the prepared pieces and lay them together according to the plan of the Great Architect? We must try to imagine what is taking place in the transpa rent solution. The silver, of course, existed at first in com bination with the nitric element, and for every particle of silver deposited on the growing tree, an equivalent particle of copper is dissolved from the surface of the plate. The nitric element never ceases to be in combination with a metal but is transferred from the one metal to the other. On the polarization theory, the positive and negative elements of the salt constantly change places and enter into fresh combinations, one consequence of which would be a gradual pass age of the nitric element from the growing silver to the cop per. This actually takes place, and there is a diminution of the salt at the ends of the silver branches, giving rise to an upward current, and a condensation of nitrate of copper against the copper plate, which gives rise to a strong down ward current. These two currents are seen in every reaction of this nature. In the case of silver and copper, however, it has been proved that the crowding of the salt towards the copper plate is more rapid than would follow from the po larization theory. The instrument employed for determin ing this point was a divided cell in which two plates, one of silver and the other of copper, connected together by a wire are immersed each in a solution of its own nitrate, contained in each division of the cell, and separated from one another merely by parchment paper. The crystals of silver deposited on the silver plate in this experiment are very brilliant. There are other indications of the liquid being put into a special condition by the presence of the two metals which touch one another. Thus zinc alone is incapable of decom posing pure water, but if copper or platinum be deposited on the zinc in such a manner that the water can have free ac cess to the junction of the two metals, a decomposition is e fected; oxide of zinc is formed, and hydrogen gas is evolved. At the ordinary temperature, the bubbles of gas rise slow through the liquid, but if the whole be placed in a flask and heated, pure hydrogen is given off in large quantity. W have also found that iron or lead similarly brought into in timate union with a more electro-negative metal, and wel washed, will decompose pure water.
As might be expected, the action of magnesium on water may be greatly enhanced by this method; and a pretty and instructive experiment may be made by placing a coil of magnesium in pure water at the ordinary temperature, when there will be scarcely any effect visible, and then adding a solution of sulphate of copper. The magnesium is instantly covered with a growth of the other metal, and at the same time the liquid seems to boil with the rapid evolution of hydrogen bubbles from the decomposed water.
When, however, the force of the two metals in contact has to traverse a layer of water, the resistance offered by the fluid prevents its decomposition. This must also be an important element in the decomposition of a metallic salt dissoived in water, and, in fact, we have found that the addition of some neutral salt, such as nitrate of potassium, increases the ac-
ion-apparently by diminishing the resistance of the liqui If, too, we increase the quantity of the dissolved metalli salt, we get more than a proportional increase of deposited metal. Thus, in an experiment made with the difforent strengths of nitrate of silver on the table, the following re sults were obtained in ten minutes, all the circumstances be ing the same escept the strength of th solution : 1 per cent solution dissolved 025 grammes copper ; 2 per cent dissolve 078 grammes, and 4 per cent dissolved $\cdot 224$ grammes.
In fact, it had been found that, in solutions not exceeding 5 per cent, twicethe amount of nitrate of silver dissol ved in water gave three times the amount of chemical action; and this was true with other metals also in weak solutian. It is likely that this is not the precise expression of a physical law, bu it agrees at least very closely with the results of experiment The power arising from this action of two metals on a bi-
nary liquid may be carried to a distance and produce similar decompositions there. This is ordinary electrolysis. Metals decompositions there. This is ordinary electrolysis. Metals
have been crystalized from their solutions in this way, and Mr. Braham has made excellent preparations of crystalline Mr. Braham has made excellent preparations of crystalline
silver, gold, copper, tin, platinum, etc., by using poles of the silver, gold, copper, tin, platinum, etc., by using poles of the
same metal as is intended to be deposited upon them. The same metal as is intended to be deposited upon them. The
forms thus obtained are precisely analogous to toose pro forms thus obtained are precisely analogous to taose pro
duced by the simple immersion of one me:al into the soluble salt of another, and illustrate still further the essential uni ty of the force that originates the two classes of phenomena

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The Eazors ar
To the Editor of the Scientific American:
In your issue, dated May 25, I noticed, in an article entitled "How to Conduct Scientific Investigations," this sentence " Not only are physics and mechanics more pleasaat studies than Latin, and chemistry more interesting than Greek grammar, but we assert that a man may make more money by applying a mere superficial knowledge of these sciences, than by a much more profound knowledge ot the dead lan guages." From the above, ons would draw the conclusion that money making was the chief end of man. It that be so perhaps the writer is correct. But man was born for a higher purpose than the simple attainment of wealth. I taintain that every man who comes into the world was pat bere to make humanity batter for his being in it, and not only for his own aggrandizement, Society demands some benefit from all, in order that it may advance. And fine literature will cause this advance ment. I challenge any man to bring forth writings on any scientific subject whatever, chemistry or botany, natural his tory or mineralogy, and in them will be found derivations from the dead languages. Ask any eminen lawyer what advantage he has ganed from the study of Latin und Greek the universal answer will be "almost every thing." Look at his law books, and you will find nearly every alternate word to have derivation in the ancient languajes Although
I do not wish to depreciate Mr. Brgant's translation of I do not wish to depreciate Mr. Brgant's translation of
Homer, yet I assort that no one can fully appreciace the work until he has read the original Greek. A man may have the most "profound knowledge" of any science, and yet it that subject and not make somb stupendous grammatica mistakes, provided he is ignorant of the classics, thereby making himself the laughing stock of the commenity. No long since, a case came under my personal observation, in which a young man who never had looked into an English
grammar, yet had a tolerable knowledge of the classics, was placed in an examination on that subject (Eoglish grammar), with several who knew nothing of Latin or Greeis, but had always studied English; the consequence was that the one understanding Latin passed better than three fourths of the rest. This only goes to prove how utterly dependent our own language is on the classics. When a boy or girl is striving to obtain an education, he or she should not only study what will be of practical utility, but what will prepara the learner for the battle of life. The study of these languages gives the brain a thorough drill that can be obtained in no other manner; it compels the mind to think, and think correctly; to rely on its judgment, not on its memory; whereas latter, which, too often, is fickle. Scep into the Senate cham ber of the United States, count the noses, and you will find that a majority of the members are classical scholars and col lege bred men. From the fordgoing remarks, is reasonable man can fail to see that, while the sciences have tieir used they are still dependent upon language for their elucidation
And granting that more money may be made by their imae diate use, nevertheless the clansics lend intlueace to the "pen,' which rules the world, and which, as all men know, is more "powerful than the sword." In conclusion, aliow me to quote the memorable passage of Cicero: "ldem ego con tends, cum ad naturam eximiam atque illust nescio quid pra tio queddam conformatio doctrinee, tum

## Testing Turbines.

Tro the Editor of the Scientific American
As a well written communication by Mr. A. M. Swain, in the Scientipic Amerioan of June 1st, on the subject of tur bine wheels, pointedly alludes to a short article of miae, on page 228 of the current volume, and somewitit misconstrua
me, I beg to say a few words in reply, not delensive, for my Fimilarly, I assert that when reason adds, to an exceptional s.nd entight ened natura, some system of educ.
there may lie in is unknown.-Eds.]
mpression is that such are not needed, nor co
have not the time even if you had the space
The inference seems to have been formed that the test of which I spoke was made in raising water. I did not intend to say this. I suppose in every test, if its commercial aspect is to rule, the water discharged, time, and the net result, are the elements of calculation. In this case, the head was 110 feet, the water discharged by the hydraulic engine-not a am-about 42 per cent of what the turbine used for the same work in raising a weight. If there is a more simple method, more accurate one than this, I would like to know it. In propose to follow them up as proof. If an ordinary over shot receives pressure earlier than at $45^{\circ}$ away from a verti cal line through its shaft, it discharoes it enough earlier, than t the corresponding angle below the shaft, to render it nex to certain that the full weight of the water utilized cannot e greater than what is due to the capacity of the bucket作ween these points. This quantity would be represented by the $90^{\circ}$ remaining between them, or 50 per cent of the
weight of water the buckets would contain it the whole di weight of water the buckets would contain it the whole di ameter of the wheel were effective. How then could $70^{\circ}$ of the discbarge be raised to its head, even if taken from the mine
There is, doubtless, some "inaccuracy" about the process A parallel holds good as between an overshot wheel, using about $90^{\circ}$ of its cirsumference, and a hydraulic engine. In each, if the instrument is withheld from movement, the power is retained; but with a turbine, a forcible total stop page only checks thow, and power is lost. If in the most pproved turbines, 8 per cent of water under pressure is in entionally freed, is it not done to give the best effect to the blance? And if so, does it not go to show that my use o he word "specalation" was not loosely taken?
This loss by a turbine, I hold to be a fair representation o the disparity between the two systems; but it is very much understated in the 8 per cent; and the 12 per cent is demand $d^{d}$ as a reasonable allowance for other things. Wherever al lowances are asked, that have not bsen, perhaps cannot be proved to be precisely iight, I must etill call them specula tion. Only the weight of the water can be used as power and a turbine does not use the whole. I cannot say that 8 per cent of the power of water upon an overshot wheel ha ot been utilized, but I am incredulous for the reasons stated, even though the buckets were made to trip, after a vertica passage the distance of the diameter of the wheel. Your correspondent, in speaking of the test I suggested, to wit that of forcing back to its head as much water as the power rould raise, has apparently overlooked the allowance I pro posed for every necessary mechanical obstacle. This allow nee need not complicate the process; the difference bet ween the quantity discharged and tbat replaced would measure
the exhaustion of power; then if the " necessary obstacles" the exhaustion of power; then if the "necessary obstacles"
were or could bo measured, and added to the replacement ef ect, raising it to its original condition in the reservoir, $m$ fect, raising it to its original condition in the reservoir, my heels; they are excellent devicas and are doins immens ervice; but I only do not believe that they have ever used he percentage of power claimed
R. H. A.

Baltimore, Md.

## The Cherokee Tribe of Indians--A Subject Interēst

 To the Editor of the Scientific American:If I am correct in memory, it was near twenty years ago when I met with Henry E. Colton in Macon county, North Carolina, and his business seemed to be an inquiry after the ncient relics, as well as traditional history, of the former in habitants of the country, to wit, the Cherokee tribe of Indi ans. Mr. Colton directed one enquiry to m."solf: "Wha could have been the intentions of the Cheromee Indians in building so many large earth mounds that were met with in he low grounds of these mountain vaileys?" My reply wa hat " the Cherokee tribe oí Indians disclaimed all knowledge of the origin of those earth mounds, as well as thy pacposes or which they were built; and, furthermors, that 1 had evi once, been inhabited by some race of people antecedent to their occupancy by the Cherokee Indians; and that this fact I nferred from the wide diversity in form, material and quali y of their pottery, as well as their edged or cutridg uteasils but more particularly as regarded their mode of sepulture but more particularly as regarded their mode of sepulture
which, in all races, is permanently fixed; and ta parsuaduce which, in all races, is permanently fixed; and ua parsuace
of this subject, I related to Mr. Colton the followiog incideut of this subject, I related to Mr. Colton the followiar incideut
After the Cherokee Indians abandoned the wantry in the After the Cherokee Indians abandoned the wantry in the
year 1821, I, in a spirit of romance, becamea small farmer in year 1821, I, in a spirit of romance, beeams a small farmer in
a wild and picturesque valley in the country the Cherokee had left; and while plowing, in a low ground or bottom fielts, pasing over a certain spot the plow produced a rambliog ollow sound, and this led to dirging-rather scraping away the earth-in quest of the cause; at the depth of fourteen inches I met with charcoal, and then a clay slab that had been o hishly indurated by burning that it hal the hardnes of a brick. An effort was made to take this slab up entre, a it was but seven feet in length and four in width; but thi we failed to do, as it broke in turning it over. But what wa ur astonishment to find, on the reverse or uader side, the complete castof a human body, not a vestige of which wa bo found! From all the appearances, the opinions 1 torme that time (and these opinions have not changed) were that at some remote point in the world's human history, some pe uliar race of people inhabited this country, whose mode of sepulture was to piace the body of their dead in a shallow
gravo in a nude state and on its back, with the limbs ex tended at full length, cover it with solt clay mortar, pil
wood upon it and consume the body with fire. Furihermore the problem was suggested: May it not be that this race, s ar back in the history of man, were the mound builders? In my farming, I found but two other of these burnt clay sep ulchres. All of these facts I narrated to Mr. Colton, and bout thirty years after their discovery, and after the abra ion of time and the wear of the plow share in farming my lands had reduced these casts in the clay slabs to fragment For the first time after the delivery of the above narratio Mr. Colton, I met with him at a Cherokee Indian ball play, nd this was in the year 1860 ; and he addressed me, as I the hought, somewhat rudely, in these words: " Mr. McDowell, ome years ago you described to me some peculiar India epulchres you had found in your fieids-have you, since then iscovered any more of these?" My reply was "I have not." He rejoined: "The reason why I now name this subject is his: I published your narration, and archæologists and anti uarians give no credit to your story, because, they say, it ontradictive of all the modes of sepulture yet discovere mong the various tribes of Indians on this continent, and it due to your reputation as a man of truth to find and ex hibit one other of these sepulchres." I was wilted by Mr. Colton's words and manner, because, not knowing for why, elt as though I were half a viliain. I made him, I fear, a nmannerly reply that was more practical than pious, an have not $\ddagger$ een Mr. Henry E. Colton since, nor have I searched or another sepulchre for the purpose of redeeming my los eputation as a man of truth
And yet a kind Providence has saved me, from going down to my grave disgraced, in this way: The 16th day of this month was the recurrence of my seventy-seventh birthday nd a team of oxen were pulling a deep running plow through my field, when the point of the plow struck upon the side o ne of these burnt clay seulchres and rent from it a small portion of an arm. I had the plowing stopped, and the lo ality marked, and it shall remain intact until some scientifi ndivi lual arrives who can supsrintend the delicate process of raising the sepulchral slab without injury to the cast of
the human figure impressed upon it. I have intrusted the procurement of the proper mau to direct this delicate opera tion $\mathrm{t}_{5}$ Colonel C.W.Jenks of St. Louis, now superintending, fo he American Corundum Company, the working of the Cull sajah corundum mines in this count
Franklin, Macon county, N. C
Silas McDowell.
P. S. Since the 25th inst., when Colonel Jeuks and mysel publicly on the above subject, eleven of these sep ulch
S. McD.

## Do Snakes Charm Birds

The Editor of the Scientific American
In taking a morning stroll by a board fence, I discovered cat bird flattering along on the edge of the top board, which was about one inch in thickness; and walking closely up to , say within four or five feet, I discovered a black snake bout four or five feet long, lying well balanced on the edg f the top board. Neither the bird nor his snakeship seemed t all disturbed at my proximity; but the former, cryin and with haging wings, would advance and retreat, eac ine seeming to approach nearer to the glistening eyes of it charmer. My sympathy was at once aroused for the bird and fearing that in its next advance it would be taken cap. tive, 1 took off my hat and hejd it on the rece about two o three feet from the snake's head "to break the charm:" bu to my surprise, as before, here came the bird towards the hat; it flew over it and lit on the fence near to the serpent' tail. I then armed myself with a cudgel about two feet ong, and stepped back about a rod from the parties to observ trategic movements. The bird contiuued the same move ents at the tail which it had done at the head, advancin nd retreating, drawing nearer each time, until finally it lit on the taii, then off ou the fence, still fluttering, chirping and rying. His snakeship did not soem to fancy an attack in he rear, and slowiy Iowered absut one fost of the tail end, and let it hang down the side of the board. The bird, en couraged by this move, again and again lit on the back par of the body toward the tail and once struck it with its bill The snake not being able to tura its head back and keep it balance on so narrow a base, it retreated from the bird, com ing towards me (it seems that I was not worth its notice moving slowly along until it reached the post, passing it fa nough for the middle of its body to rest on the post. I bega think tiat it had given up the chase; bus not so, for, with lithe wisiom of the saroent and the calculations of a civil engiueer, he turned his heai, coubling himself until his ead was within about six inches of the eni of the tail had slighly elevated, and seemed to say: "Now, birdie, come n." Sure eaough, it came, fluttering and crying hs before. dvanced to with about thee feet of the satake, stich in and, ruady for the "clash of arms." The bird approached near before retreating, I feared to let it advance anothe ime, and immediately made battle in its behalf, and so slew he "sarpint" A darkey, witaessing the contlici, took th sake, sayiug: "I will hang him up wid his belly to de clouds to make de rain come." And now I cannot tell whethe or not a snake can charm a bird; can you?
H. L. Eades.

South Union, Ky.

## The Nebular EHypot

To the Editor of the Scientific American
Your comments on the "Nebular Hypothesis," page 345 arrent volume Scientific American, are very interesting, but I diffar from you. I am ennfident that the equatorial oue coled firet and that the wighty farce of that shrinking belt was reisted by no other force. The central mass was
too light and powerless; we cannot rotate an inflated bladder and burst it by the weight of air contained therein, as the sir would escape through the pores of the bladder, but we can burst it by the weight of the bladder itself.
If any portion of the nebule was left behind, it was the lighter portion, which, owing to that irresistible shrink, spir alled to either pole and like smoke from a pipe streamed on the solar orbit. True, the action of gravitation would be greatest at the poles, but the spiral would reduce it to a minimum, as in a jack screw. Nebulous rings could have formed in no other manner; spheres could have been formed by ofrik ing belts.

Tire.

## Paris Green and Potato Burs.

T'o the Editor of the Scientific American:
Much has been said, and a great deal written, concerning the use of Paris green for the destruction of the potato bug. Many advise the use of it dry, mixed with flour. Last year, I tried another way, which I think is safer and cheaper; and it proved very effectual. As it may be a benefit to many, i give it as follows:
Take one large table spoouful of Paris green and mix it with ten table spoonfuls of flour. These must be mixed very thoroughly, till the mass is of one shade ofc olor throughout. Take of this mixture, two table spoonfuls, and put it into a gallon of water. Stir this till it is all well mixed through the water, and stir it occasionally to keep it from settling,for if it is not kept stirred, it will settle. Put the water thus prepared into a sprinkler, and apply when the plants are dry and the larvæ are at work. In a very few minutes, the larvæ will have gone to " that bourne whence no traveler re turns."
The liquid applied this way, twice or three times during the season, will be sufficient, to protect the plants. Used in this way, while it will destroy the insects, there is no danger of its hurting the plants; nor does sufficient go into the ground to do any harm.
X. Perry Mentor. Sans Souci, Ohio

## the new state capitol at albany, $N$. y .

After three yєars labor, and at a cost of two millions of dollars, one third of the new capitol at Albany, the design for which we illustrated on page 243 of Vol. XXIII., may be considered complete. The foundations are laid, and the water table, and four feet of the first story wall ${ }_{s}$, is in position.
The structure covers about three acres of ground, its width being three hundred feet, and its depth, four hundred. The cellar is excavated 26 feet and its floor is covered with a solid bed of concrete tour feet in thickness. On this rest the piers of massive brickwork which, surmounted by groined arches, bear the weight of the structure. Long vaulted passages are thus formed which, intersecting each other, traverse the entire cellar, some leading to apartments in the corners of the building, others to the large hall in its center. The last mentioned division of the cellar is designed for an engine room, and is to contain four large furnaces and two engines, to be used for warming and ventilating the edifice. The ceiling of this apartment is, like those of the passages, formed of groined arches. These are 20 feet high, their spans varying from 11 to 20 feet, and are considered the finest specimens of masonry of their kind ever constructed.
The foundation of the main tower is the heaviest piece of solid हtone work in the building. It is pyramidal in shape, its base being 150 feet, and its top, 80 feet square. It is sunk six feet, below the surface of the cellar, and its extreme strength is necessitated by the immense superincumbent weight of tower which will be constructed entirely of stone
and iron, and will reach a hight fifty feet above that of the and iron, and will reach a hight fift
dome of the Capitol at Washington.
The exterior foundation walls are 20 feet thick; their lower courses are built of a species of blue limestone of great hardoess, obtained in Essex county in this State. The upper portions, which are more liable to be affected by frost, are constructed of Saratoga granite, and the lintels, of a very coarse granite from Fall River. The water table is built entirely of Dix Island granite, the company supplying that stone having had a contract to employ it exclusively in that part of the structure. On the completion of the water table and the consequent expiration of the Dix Island Company's contract, new proposals were invited from other quarries to supply the stone for the rest of the building. Sixteen competitors entered, and, in the end, the work was awarded to a
company in Yarmouth, N. H., who agreed to furnish the company in Yarmouth, N. H., who agreed to furnish the
stone at 75 cents per cubic foot delivered at Albany. It seems, howevtr, and the fact will account for the delay in the progress of the work which the daily press have lately made the subject of unfavorable comment, that the Yar mouth Company failed to carry out their contract, sending only some eighteen or twenty carloads of stone around by land at considerable expense. The Keene quarry, of Keene, N. H., offering to supply their stone at 85 cents per cubic foot, the commissioners have agreed to take the balance of the material from that source.
Of these tbree varieties of granite-the Dix Island, the Yarmouth, and the Keene-the Dix Island is mach the coarsest in texture; the Yarmouth and Keene stones resemble each other very closely, both being white, fine, and hard The Keene, however, is found to be slightly the most brittle under the cutting tool
The stone is quarried in enormous blocks, some weighing as much as thirty tuns. They are so cut as to make all the angles of the building solid, or, in other words, there is no angle on the out.ide of the building where two stones meet and form a joint. The manipulation of these ponderous
manses was, of course, at first a matter of no slight dificulty,
but lately a form of derrick has be on devised by which they can be raised or transported from place to place with the ut.
most facility. The apparatus consists of a heavy platform most facility. The apparatus consists of a heavy platform mounted on trucks and resting on a track, the rails of which are some sixteen feet apart. On this platform is a ponderous crane, secured by strong wooden stays. To the crane, heavy tackles arg attached, the falls leading to a hoisting apparatus worked by a five horse power engine, situ ated on the rear end of the platform. This engine, being geared to the wheels of the latter, suppliss the motive power; so that a stone can be lifted by the crane and the whole machine moved bodily to any desired point.
Siven hundred men are now at wogk upon the building the majority being engaged in casting the stone, which is supplied in the rough, into the maired forms. Two large sheds serve as workshops, movable derricks running on tracks
transporting the stones to any required locality. The work is systematized with the greatest care. Each man is required to work his stone through from beginning to end. The stone is numbered and the work measured, so that it can readily be seen whether the full day's work has been prop erly performed or not. The hands are paid by the hour. They struck some time since on account of some workmen from another State being put to work with them, and a the same time demanded $\$ 4.50$ for eight hours work. A short time had elapse, however, before the union in this city informed them that it could support them no longer, and con sequently they compromised at 45 cents per hour, and signed an agreement to find no more fault either in their wages or in the fact of non-union men being put to work with them When the present excitement commenced, a committee ev deavored by threats and other means to induce another strike, but on the wages being raised to 50 cents per hour, the men eclared themselves satisfied and refused to resort to any urther coercive measures.

## A Monster Cannon.

The Russian government has lately constructed and tested an immense smooth bore cast iron cannon, made after the method of the American Rodman guns. The Engineer say that the weight of this weapon in a finished state is $44 \frac{29}{62}$ tuns. The weight of the projectile to be employed-a cas iron spherical one-is 900 lbs . In trying the gun, in all 313 rounds were fired, the normal charge of prismatic gunpowde ducted on the river Rama, the high oank across the stream serving as a butt, which was at a distance of about 1,400 yards of the gun. The weapon was placed under an iron plated covering of a peculiar construction. On the discharge of the piece, the concussion of the air was so great that in the village of Matoriloro, situated at a distance of one third of a mile, the chimney stacks fell in when the wind was
blowing in that direction. The sound itself: aluhough loud, was not deafening, and persons standing even under the icon plated covering were able to support both the noise and concussion of the air. The iron gun carriage weighs $6 \frac{1}{3}$ tuns. The breech of the gun is elevated and depressed by means of a screw ratchet key. For facilitating the running forward of the gun, a system of cog wheels is introduced, and for the diminution of the recoil and the hoisting of the charge and projectiles, special appliances are provided. Tie moving of this e
men.
After the introduction into the military art of rifled cannon the conviction became established of their unconditional superiority over the smooth bores. As regards guns of small caliber, this opinion may very likely be correct; but with respect to naval guns of the largest calibers, it would be
difficult to give the preference either to the one or the other system. Without going into particulars of the merits or demerits of the one or the other description of weapon, we will point to one important difference in the effect of the spherical projectiles of the smooth bores and the oblong ones of the riffed guns; the latter will lit an iron plated target at a greater distance than the former, and, so to say, pierce it through; on the other hand, the former will pro duce a far greater amount of concussion, shaking loose the the plates and cracking them. Besides the difference in the estructive action of these weapons, there is an enormous difference in the cost of production. Thus, for instance, ac. cording to a statement of Mr. Grasshof, the price of a 20 in . smooth bore grun will be, when produced in quantities, about $\$ 8000$, whereas an 11 in . steel rifled piece corresponding to the same could not be produced under $\$ 30,000$.

## New Fishing Smack.

A marine novelty worthy of attention was lately exhibited in Giasgow. It was a model of a welled fishing craft, 4 ft . long, with 19 in. beam, clinker built and neatly finished The exhibitor was Mr. Dempster, of Kinghorn, who is well known for his advocacy of deep sea fishing, and who proposes to convert ordinary open decked fishing smacks into well decked boats, by laying a well caulked deck or flooring space beneath this at a hight of $2 \frac{1}{2} \mathrm{ft}$. from the keelson, the with sea water from several smsll circular holes in the bottom of the boat. At a kight of 5 ft . or 6 ft . above the well deck there is another deciz, which rises to within a foot of the gunwale, and which, bsing. water tight and confortable, is adapted for the quaxters of the crew. Mr. Dempster has proved the advantages of thin style of fishing craft by actual
results in practice; and he daims for his system the advantage that, no matter what seas the boat may ship, it is impossible for it to be swamped, as the water immediately

New Theory of Atar ospiontc cleptrichty A corre
follows:
"The earth is surrouaded ber an electrical tinn here wisb is subject to the law of gravitation, ani is consequent' more dense near the sarface of the earth, and more rare in the higher regions. All the phanomena of electricity are due to the disturbance of this olecirical abouspaere, in con nection with the resistandia of diffe ent substances to the passage of the elerric fluid. When any subitance has more electricity than another substance near it, it is in a positive or charged condition; when it has less, it is in a negative condition, and the attraction which negative subatunces ex hibit for the positive is only the tendency to restore the equilibrium.
If a bladder be filled with air near the surface of the earth and then elevated to a considerable distance, the confined air will burst the bladder and escape, because the atmosphere which surrounds it in these higizer regions is of less density. So if a metallic bail, having the elec'rical condition natural to the surface of the earth, be suddenly elevated, its natura eiectricity becomes a charge, which may be drawn off by spark. This fact can be demonstrated, on a still day when the air is free from moisture. Now, what better evidence do we want to prove that the earth is surrounded by an electrical atmosphere, more dense near the surface of the earth and that the charge on the ball which was elevated is due to the lesser density of the electrical atmosphere which there surrounds it? When we add to this the chain of evidenc which results from the explanation, of electricity in the clouds, the causes of aurora polaris, the daily variation of the magnetic needle, and every other electrical phenomenon, on this hypothesis, the proof is as positive that the earth is urrounded with an electrical atmosphere as that it is sur rounded with an aerial one. I have spent several years in experiments and observations to demonstrate the truth of this hypothesis, and upon it to establish a theory that shal e applicable to all electrical experiments and phenomena and am astonished at the facility with which all questions pertaining to this subject can be solves."

## Refractory Clays

Bischoff finds that the analysis of a clay gives a distinct in dication as to its power of resisting extreme heats. The tem peratures were measured by keeping the clay at a white hea till wires of iron or platinum were fused. The value of a re ractory clay is found by the proportion of the alumina to the fusible matter, and again by that of the alumina to the silica The more alumina a clay contains in proportion to the fusible atter (iron, alkalies, etc.,) the more refractory is it. Silica, on he contrary, augmentsits fusibility. Of two clays contain ing aiumina and fusible matter in the same proportions, tha which contains least silica is most refractory. Save in cer ain determinate cases, the clays containing alumina, silica and fusible matter in equal proportions have an equal power of resisting fire. If we give to clays the general formula-
$\mathrm{mA} \mathrm{A}^{2} \mathrm{O}^{3}+\mathrm{nSi} \mathrm{O}^{2}+\mathrm{RO}$, the degree of resistance to fire is measured by $\underline{m}$ The higher the value of this fraction, the more refractory the clay

Put up Your Jam while Hot,--It is said that ordinary jam-fruit and sagar which have been boiled togethor for some time-keeps bettor if the pots into which it is poured are tied up while hot. If the paper can act as a strainer, in the same way as cotton wool, it must be as peopla suppose If one pot of jam be allowed to cool before is is tipd down listtle germs will fall upon it from the air, and they will re tain their vitality, because they fall upon a cool substance they will be shut in by the paper, and will soon fall to work decomposing the fruit. If another pot, perfectly similar, b filled with a boiling hot nixture, and immodia eiy coscred over, though, of course, some of tho outside air must be shut in, any germs which are floxing in 4 will bo se.nithe ard in all probability deatroyed, so that ns decomposition cous lade place.



 from a platinum iecra. Tuनise arvai nce may be ar sided by mixing with the flur spar ab utan $q$ gal iv ith af cyp
 retort is found to be of a pasty nature, and is easily yemoved by water.

Father Cleveland-Charles Cleveland, a respected ergyman of Boston, Mass., widely known for his useful and faithtul labors, died receutly in that city, at the remarkable ge et oue hundred years-less sixteen days. He retnined is calties up to the moment of his deats, and connued in the exercise of his peculiar ministrations ad city missiouhe spent forty years in mercantile pursuits. His work for the past forcy years has been remarkable. He devoted his whole time to ministering to the poor, and his labors were highly appreciated.
Stretcming of Chains,-Professor Trowbridge, of Yale College, has stated that at the Novelty works, N. Y., be once made a chain one thoasam feel long, to be used for pulling a load of ten tuns up an incline five hundred feet long an one hundred feet high. In one year he took out, little by little, sixteen feet of slack caused by stretching. The chain got stretched out in time, though, and them did not alter.

## Improved Piano Truck.

The improvement we illustrate consists in making the trucks adjustable in regard to the bed which carries the load, so that they can be fixed at any required distance apart, by which means they may be fitted to stairs of various forms, and used to run pianos, or other heavy goods, up and down them. They are also readily detached from the bed when required, to facilitate loading or unloading.
Our engraving represents the improved truck while conveying a piano up (or down) stairs.
A is the bed, which is furnished at one end with the handle shown, and at the other with two straps, one of which is seen in the engraving. It is also furnished with four cushions, two fixed and two adjustable, on which the piano rests; three of these are partly shown between the bed and the piano. The trucks, B, are provided on both sides with grooved slides, as at C, by means of which they are made to travel on, along, or off the bed, A. They are fixed to the bed in any desired position by the screws, D.
In ascending or descending stairs the trucks are adjusted to the position shown in the drawing, so that, when one pair of truck wheels are snug against the riser of one stair, the other pair are rolling on the tread of another. By this adjustment one pair of wheels is always in position to be raised or lowered to the next stair. When required to put the to the next stair. When required to put the piano into a wagon, the truck is raised by the straps until the handle end touches the ground, the piano resting on the handle; the
upper truck is next slid off the front of the upper truck is next slid off the front of the
bed, which is then let down into the wagon; bed, which is then let down into the wagon;
the other truck is then removed, and the bed the other truck is then removed, and the bed
and piano slid in. In taking it out, the bed is pulled out far enough to have one of the trucks put on it; the inner end is then raised until the outer end rests on the ground, when the other truck is put on; it is then gently lowered until the bed stands on all four wheels. While moving the piano over floors, sidewalks, etc., the spring of the bed between the cushions on which it rests prevents all jar to the instrument.
Altogether this seems to be a very useful as well as an ingenious invention. It is protected by patents issued March 16, 1869, and September 19, 1871. Further information may be obtained of the inventor, Mr. Charles A. French, of Davenport, Iowa.
sawing, Boring, and Planing Machine The invention we illustrate supplies workers in wood with a useful machine that can be readily adjusted for service either as a scroll saw, a circular saw, a planer, or a boring machine, and which may be run by hand or by power, as desired. Its most important feature is a skillful and effective contrivance by which the speed is multiplied and the power conveyed from the driver to the tool.
The machine is represented in Fig. 1, and Fig. 2 shows, in detail, the peculiar arrangements of pulleys and belting for conveying the power, etc. A is the driving pulley or drum. B are belts which pass around it, and around the loose pulleys, C. These belts are drawn inward, on opposite sides, as shown in Fig. 2, so as to surround the shaft or small pulley, D , and communicate motion to the same. The loose pulleys, C, run on a shaft attached to the upper ends of $t$ wo levers, one of which is partly shown in Fig. 2; the lower ends of the levers are connected by a crossbar, to which is attached a strap that admits of being secured to the frame of the machine, as shown in Fig. 1. By this arrangement the tension of the belts is adjusted. The shaft, D, extends across the frame and carries at D, exter end the fly whel, E. this is at its outer end the fly wheel, E; this is attached by a pin to a connecting rod which gives moth a the rock shaft, F, the crank being adjusted so that the revolution of the fly wheel only rocks the shaft. This motion of the rock shaft is conveyed through slides to the scroll saw, causing it to make its downward stroke; the recoil is secured by the band, pulleys, and spiral spring seen at the top of the machine.
To the shaft, D, may be attached a circular saw in the ordinary manner, and to its inner end (not shown in the engraving) a cutter head, suitable for light planing or molding, or a boring tool, may be affixed. The table is provided with gages, and is adjustable to any elevation required by the character of the work. Our fngraving shows both scroll and circular of the work. Our ngraving shows both scroll and che scroll attached to the machine, but, in practice, when the scroll saw is used, all the other tools should be detached from the shaft; and whea either circular saw, planer, or boring tool is employed, the crank pin of the fly wheel should be detached from the connecting rod, and the operation of the scroll saw prevented.
The position of the belts on the pulley or shaft, $D$, puts equal The position of the belts on the pulley or shaft, $D$, puts equal pressures on opposite sides of the same, and does away with all side strain. Almost the entire periphery of the shaft is in contact with the belts, and a very largesurface contact, as compared with the size of the shaft, is obtained. This, and the absence the usual interwedrate belts and pulleys om-
ployed for attaining speed, insure the utilization of the power applied and prevent its waste. We are informed that the hand power machine has been employed to saw three inch hard oak felloes and other carriage work with perfect success. It is mannfactured extensively by the Greenwich Mowing Machine Company, of Greenwich, N. Y., of whom further information may be obtained
Patented through the Scientific American Patent Agency


FRENCH'S PIANO TRUCK.
for the inventor, Mr. William Weaver, October 3d, 1871, and January 30, 1872

## impurities in the Air.

Carbonic acid is not a poison by reason of any action on the blood. When it is present in the atmosphere in large amount, the glottis spasmodically closes, and death ensues from asphyxia. When in small proportion, it is still not taken into the system, but it interferes, to the extent of its presence, with the absorption of oxygen, and the tlimina
tion by respiration of the blood. Essentially tion by respiration of the blood. Essentially, therefore, its action is that of a ligature to the trachœa. Thus I put this mouse into a jar of pure carbonic acid gas, and you observe the at the animal dies in a few seconds. This other I place in an atmosphere containing forty per cent of carbonic acid, and death takes place after a longer interval, but still in essentially the same manner as in the first instance. If, however, as in the next experiment, I remove the animal before death takes place, and expose it to a free current of atmos pheric air, recovery follows very promptly. It is hence ap


WEAVER'S SAWING, BORING, AND PLANING MACHINE.
The Diamond Fields of South Africa.
On the geological questions connected with these diamond fields, Mr. John Paterson has propounded some new views based on a minute and careful examination of the appear ances which presented themselves to him on a visit to the diamond fields. He discredits the theories which would refer the presence of diamonds in Grequaland West to any distant sources, and thinks the evidence incontestable that the marl soil, as he named it, in which the gems are now found, is the true matrix soil of the diamond. This marl soil, he considers to be the metamorphosed carboniferous shales of the country, and the change which has worked upon these shales, by which they have been transformed from the black carboniferous shale into the whitish ashy marl in which the diamonds are found, he attributes to intrusions of greenstone trap, which traverse the country from N.E. to S. W. in continually recurring dykes. Mr. Paterson gave some very interesting details of the extent and richness of the diamond dirgings in South Africa, and in his picture of the Gong.Gong and Delport Diggings as "Great Rushes" in diggers' phrase, resembling in extent and richness Colesberg Kopje, but now nearly worked out, not by the hand of man in a few years, but by the angry waters of the Vaal River through many ages he found much groundwork of hope that the diamond discoveries of South Africa are to be no fleeting passing industry, but a continuous employment, not only for many years but for many ages.

## Testing Burning Fluids.

Pethuel Millspaugh of Kent, Conn., has obtained letters patent for an improved test for burning fluids.
This invention provides an improved in strument for testing kerosene oil and other illuminating fluids, and also for determining the specific gravity of fluids generally. The apparatus consists of an upright glass cylinder which is supported in the top of a chamber formed in the upper part of the base. A lampis placed in the base, the heat from which is transmitted through the chamber to the lower part of the glass cyiinder, and the chamber may be made to contain air, water, etc., as required to regulate its inten sity. The glass cylinder contains a thermo meter, which is fixed therein, and is closed at the top with a brass cover. The burning fluid to be tested is made to completely fills the glass cylinder, so that the thermometer is entirely submerged,and cannot be affected

tance, but that it simply interferes with the performance of removed. provided the animal is not in articulo mortis, respi- by the surrounding atmosphere. An orifice in the bras by the surrounding atmosphere. An orifice in the brass cover is opened to allow the escape of vapor from the fluid under test, and,when necessary, the lamp is lighted. A flame is held over the orifice, and at the moment the evolved
vapor is ignited the temperature of the fluid is corectly indivapor is ignited the temperature of the fluid is corectly indi-
cated by the thermometer. In ascertaining specific gravities cated by the thermometer. In ascertaining specific gravities
by this instrument a hydrometer is also placed within the by this instrument a hydrometer is also placed within the
glass cylinder in such a manner that its scale tube is free to glass cylinder in such a manner that its scale tube is free to
move up or down through a hole in the brass cover. The surface of the fluid tested is plainly visible through the glass cylinder, and the scale may be accurately read.

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## MUNN \& CO., Editors and Proprietors.

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o. d. MUNN.

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VOL. XXVI., No. 26. [New Series.] Twenty-seventh Year.
NEW YORK, SATURDAY, JUNE 22, 1872.


## a new patent law in canada.

We have the pleasure of announcing that the Parliament of the Dominion has just passed a new patent law, which among other judicious provisions, grants to American citizens the privilege of obtaining patents in Canada on very favorable terms.
We hail the passage of this law as an indication of real progress on the part of the people of Canada. Its practica operations can hardly fail to prove advantageous to the mate rial interests of the Dominion.
A valued correspondent in Canada furnishes the following resumé of the provisions of the new law, which goes into effect on the first day of September next:
The law provides that all inventors, or their assigns, may receive patents, provided a foreign patent for the inventionhas not been in existence for more than one year prior to the application being made for the Canadian patent. Improvements on existing patents may also be patented.
The applicant shall, for the purposes of the act, elect his domicile in some known place in Canada-this being a mere formality.

The patent will be issued for five, ten, or fifteen years, at the: option of the applicant ; but, at the expiration of the first five or ten years, the patent may be extended for another term of five years; there is no provision for extension after the fifteenth year.
In case of error or defective description, the patent may be reissued, as is the case in the United States.
In case of an assignment of a patent, such assignment must be registered in the Patent Office.
The law provides for remedy in case of infringement of patents-and also for the impeachment of patents before the courits.

Every patent will be subject to the condition that the patentee shall manufacture the invention in Canada within one year from the date of the patent; and the patent is to be void if, after the expiration of one year from its date, the patentee or owner causes the importation in Canada of the patentee or owner causes the importation
invention for which the patent is granted.

The fees payable to the Patent Office for each patent are at the rate of $\$ 20$ for each period of five years. When the patent is refused, half the fees may be returned to the applicant. This rule is always acted upon.
Inventors may file caveats, to be kept secret and of record for one year.
Patents may be refused when the alleged invention is not patentable in law, or when it is already in the possession of the public, or when there is no novelty or utility in the invention, or when it has been described in a book or printed publication, or when it has already been patented in Canada, or elsewhere by the inventor for more than one year previous to the application.
When a patent has been refused, appeal lies to the Governor in council within six months after notice of such refusal.

In case of interfering applications, the case may be referred to three arbitrators, one to be appointed by each applicant and the third by the Commissioner of Patents-their decision to be final. The fees of arbitrators to be a matter of agreement, except those of the arbitrator appointed by the Commissioner, which are to be paid equally by both parties. Patented articles are to be stamped as such, and a fine of
200 is imposed for false marking. $\$ 200$ is imposed for false marking.
By reference to a card in another column, it will be seen
that Messrs. Munn \& Co. are now ready to receive applications for patents in Canada.

## PROGRESS OF THE EIGHT HOUR STRIKE.

The many acts of violence, to which the workmen support ing the eight hour movement in this city have taken recourse, seem to have culminated in the shooting of James at work in a carpenter and non-society man, wirst avenue. It appears that two of the strikersthreatened him with personal assault if he did not at once quit work and join them in the strike. Fearing that they would carry out their threats, Brownlee left the shop and passed into the street, when one of the men who had followed him drew a revolver and shot him through the cheek, saying at the same time "That's the way we treat such as you are." This atrocity, although promptly disavowed and condemned by many of the organi promptly disavowed and condens, has produced a powerful effect on the community at zations, has produced a powerful effect on the community at
large, and has resulted in a marked diminution of public ympathy for the cause. The threats of abandonment of work, on the part of the men employed at the gas works, have caused, during the past few days, considerable apprehension throughout the city lest the streets at night should be left in darkness, but the danger has been happily averted by the as companies acceding to the terms demanded.
The small number participating in the procession, which was intended to exemplify the great strength of the move ment, has been a source of disappointment to its advocates. The working men forsome reason viewed theidea with disfa vor, so that, instead of an army of thirty thousand men, bare ly twenty five hundred paraded through the streets. Ther was no disturbance along the route, nor any cheering, but imply a lack of enthusiasm which fell like a pall on the sanguine expectations of the strikers. During the remain-
der of the past week, the desertion and returning to work of a large number of employees of Singer's sewing machine factory has rendered the movement still weaker; and al factory has rendered the movement still weaker; at a gengh a considerable number of men stief that it must eventually fail.
Advices from out of the city inform us that the strike is but little felt, and that its effect has been ratter beneficial to manufacturers in other States. The reason is that the better class of workmen who have no sympathy with the move ment find themselves compelled by the action of their trades unions to leave the city and obtain labor elsewhere, while he malcontents throughout the country flock to New York in hopes of getting increased wages.
On the part of the manufacturers, the position adopted in he beginning has been steadfastly maintained. The piano forte makers publish a series of resolutions which clearly and forcibly define the stand they have taken. They state that in case they are forced to raise the price of the goots thirty three per cent, they cannot compete with the makers in ther parts of the country, in whose productions there has been no corresponding advance. Nor, since the trade in the smaller sizes of pianos is mainly local, can they afford to aise the price of their instruments, as the cost of an ordi nary piano would then be so great as to be without the each of a large majority. As far as this branch of manu facture is concerned, it is claimed to be evident that conces sion to the terms demanded by the working men is abso utely impossible; and we have been assured by the leading frms in the city that if they did yield to the exactions of the strike, the result then would be no worse than if they aban doned their business and sought investment for their capita elsewhere.
The carriage makers, although forming no combinations among themselves, agree in substance with the views of the pianoforte men. The proceedings of the workmen from the establishment of Brewster \& Co., of Broome street, are the most incomprehensible of the many vagaries to which the strike has given rise. This manufactory has been car ried on on a coöperative principle; that is, the employees owned an interest in the profits of the business. They were fully represented in the management of the internal econo my of the concern, had a voice in the regulation of thei own pay and hours of labor, and received dividends pro portioned to the amount of wages paid them. Three days before the strike they declared themselves satisied with the existing arrangement, and actually, as we are in formed, refused to vote themselves eight hours as a day work. In spite of all this, suddenly, at the instigation of a few malcontents among their number and intimidated by the trades' unions, they joined the strikers, and, in addition to leaving their work, deliberately forfeited a dividend of several thousand dollars, which was shortly to fall due them.
As to the final result of the movement, we consider that here is but little doubt. Want of support from other cities, the firm front presented by employers, together with the convictions, which are evidently being brought home to the minds of the more intelligent workmen, of the impracticabil It is our belief till end in its abandonment.
It is our belief that coöperation is the most efficient means by which the laboring classes can hope to secure the privil eges which they now claim as rights.

## WEIGHT, PRESSURE, FORCE, POWER, WORK.

The fact that the above words are often confounded together, for the simple reason that their true meaning is not well underatood, bas been the cause of many fruitless attempts at mechanical inventions and improvements. Most searchers for perpetual motion make no distinction between pressure and force, and are under the delusion that mere presaure
can produce work, and we have seen writers on mechanics
and we have even heard lecturers on scientific subjects speak of a force of, say, two tuns weight. Weight alone is not force, neither is pressure equivalent to work; and it may therefore be useful to attempt some clear definitions of the above terms, in order to protect inventive minds against mistakes in mechanical reasoning.
Weight is simply the measure of an amount of matter referred to a certain standard accepted as a unit. This unit may be a gramme, a pound, a tun, or our whole earth, which the astronomers use; but, in either case, it conveys to the mind nothing but the conception of an inert mass, or a certain amount of matter, for the determination of which gravitation gives us the mans of measuring and comparing Therefore we may say: To have "a mass of two tuns," but not " a force of $t$ wo tuns."
Pressure is a result of this gravitation, and a mass of two tuns will exert a pressure of two tuns; in this way, we may estimate the effect of a spring, hydraulic press, or other simestimate the effect of a spring, hydraulic press, or other sim-
ilar contrivance, by saying its pressure (not its power) is ilar contrivance, by saying its pressure (not its power) is equal to two tuns, meaning thereby that it has the effect, cn
the material to be pressed, as if two tuns weight were placed the material to be pressed, as if two tuns weight were placed
upon it; but we have in pressure neither force nor power upon it; but we have in pressure neither force nor power
These conceptions of the latter require other elements, as we These conceptio
shall soon see.
Force is matter in motion, nothing more, nothing less the abstract idea of force without matter is a nonentity all the modern discoveries in science tend to prove this more and more plainly. Without matter, force would have no existence, but it may be hidden in matter as molecular in isible motion in the form of heat, electricity, etc. The team engine, electromagnetic engine, etc., are there to prove how this molecular motion, or hidden force, may be changed into visible force or motion of matter. Inversely he caloric friction machine changes motion into heat; the ordinary and also the Holtz electric machine change motion into electricity. In any case, we are driven to the conclu sion that all force proceeds from motion of matter, and is sion that all force proceeds from motion of matter, and in into molecular motion, generating one of the socalled imponderable forces.
Chemistry has proved since the last century that the mount of matter in the Universe is a constant invariable quantity, and that we cannot create or destroy a single mateial atom, but can only change its form from solid to liquid or gaseous, or vice versâ. So the modern philosophy of me chanics proves that the amount of force (that is, motion of matter) in the Universe is a constant quantity, and that we cannot create or destroy the slightest amount of this force, but can only change it from mass motion to molecular motion hat is, heat, electricity, etc., or vice vers $\hat{a}$.
The measure of force is thus the product of the mass with the distance through which it moves; and as the unit of measure of ordinary masses is the pound, and of distances, the foot, we have adopted the foot-pound as the standard unit of force, meaning "one pound lifted egainst gravitation ne foot," not " one pound moved one foot," as we have seen nd heard it stated, which of course gave rise to the most bsurd calculations in regard to the immense power obtained drive a steamship or railroad train.
If one pound weight is raised one foot, one unit of force is expended; if, inversely, we cause one pound to descend one foot, we obtain a unit of force back, and may transform this into other mass motion, or into molecular motion. We may cause this mass of one pound to be raised slowly if we have ittle power to apply, or rapidly if we have greater power and, inversely, we may cause it to descend slowly, as is done in the weight of a clock, and spend itself gradually during a ong period of time, producing slight effects throughout that time; or we may cause it to descend quickly, as is the case with the blow of a hammer, and spend itself during a very short period of time, almost instantaneous, producing a powerful effect for that short time. So the driving in of a nail, which often the pressure of a tun weight would not accomplish, the blow of a hammer of one pound, last ing a small fraction of a second, will accomplish easily This remark points out forcibly the difference between th weight of masses at rest and of masses in motion, in othe words, the immense difference between mere pressure and force.

## RUBBER GRAPHITE PAINT.

A waterproof paint, for metal roofs, fences, bridges, ships, and every kind of wood structure, which, at the same time, could be relied upon to reduce the corrosive influences of exposure to the atmosphere, is an article for which the demand would appear to be almost without limit. A patent has just been issued, through the Scientific American Patent Agency, to Mr. Samuel F. Mathews, of Harrisburg, Pa., on an invention intended to meet the wants of the community in this respect; and from the ingredients he uses, we think his paint will answer a good purpose.
The rubber graphite paint is a solution of pure india rubber in linseed oil, which is ground with graphite into a thick, elastic, smoothly flowing paint. Compositions of which india rubber forms a part possess in the most eminent degree the quality of resisting the action of moisture and of corrosive gases carried in the air. In the graphite, we have a pure form of carbon; and it appears to be well known that paints containing carbon in any form last longer than other kinds when the other paints are totally destroyed. We do not see why this compound, combining as it does these two valuable elements, should not form a paint of great durability and ighly protective qualities,
All shades of color from black to gray, or cream color and
title of the Rubber Graphite Paint Company has been
formed, and has commenced the manufacture of the article formed, and has
at Harrisburg, Pa

Facts for the Ladies. - Miss S. A. Davis, Berlin, N. Y., has used suipported herself and an invalid mother, whom she also tended, and has saved over $\$ 2,000$; she has been a constant worker by foot power and not sick a day. See the new improvements and Woods' Lock-Stitch Ripper.
Whitcomb's Remedy for Asthma is one of the best medicines in use
$\underset{\text { Facts Worth Knowing. - The New Wilson Under-Feed Shuttle Sew- }}{\text { ing Machine is to- day the simplest, most perfect, most easy operating, best }}$ ing Machine is to-day the simplest, most perfect, most easy operating, best
made, most durable, and, in every way, most valuable Sewing Machine made, most durable, and, in every way, most valuable Sewing Machine
in existence, and it is sold fifteen dollars less than all other first-class main existence, and it is sold fifteen dollars less than all other first-class ma-
chines, on easy terms. Salesroom, 707 Broad way, New York; also for sale chines, on easy terms. Salesroom, 707 B
in all other cities in the United States.

## 110tuesequervie3.

 Dreater or iess general interest. The questions are esmple
preeter to eicicit practicai anssoers trom our yeaders.]
1.-Ocean Cables.-I would like to know if the Atlantic cahle lays on the bottom of the ocean.
down, what keeps it there?-H. F. H.
2.-Lard in Tin Cans.-Is lard injured by being stored in oright tin cans? If so, what is the chemicalaction which causes the injury?
H. $c$.
3.-Plaster Casis from Drad Bodies.-I wish to know how to take a plaster of Parrs cast of a tumor on a face, so as to represent
the face and the tumor? What will give to the plaster a glossy nnish? I can take a very good cast, but fail to get as godd a finish as I have seen.can take aver
J. A. D. Jr.
.
4.-Paint for Iron.-Can any one inform me if there is any substance that can be appled easily, say with a brush or otherwise, in a thin coat to iron, that w
off, or cracking?-E. J.
5.-Cement for Letters on Glass.-How are the gilt such gilt letters do? The painters here do not know how to do it, althoug one of them is a subscriber to the Soirntific American.-J. F.
6.-Separation of Oils.-By mistake one barrel raw linseed onland one barrel West Virginia lubricating oil got mixed in our oil
tark. Is there any means of separating the two oils?-R. K.
7.-Dimensions of Belt.-Can any one of your readers inform me what width of belt 1 require to convey one, two, or three horse power?-W. J.s.
8.-Weevil.-What will prevent the weevil getting into Indian corn? What will exter.uinate it from a lot of corn, shelied and in
bays? How long will the corn keep safe from getting mustr, when stored bass? How long will the corn keep safe from getting mustr, when stored
in open casks or common grain bags in piles, the bags standing on end on floor ? $?$ J. B.
9.-Gold Solution.-Will the gold solution to be applied by brush, mentioned in Scisnmific American, Vol. XXVI. page 280, adhere
on the plating of buggy dash rims or harness mounting, as on iron or steel on the plating of buggy dash rims or harness mounting, as on iron or stee
not so plated? If so, how long willit retain its brilliancy? Will it not soon come off? How are the mountings of harness plated with gold or silver?
Must a battery be necessarily used in such plating, whether white or golden? -J. в.
10.-Test for Zinc.-What is the best test for zinc in wells where galvanized pipes are used? What per cent or how many grains 11.-Slack Coal and Saw Dust.-At our saw milí, coal i used under the boiler; and upon exposure to weather, it slacks and,unavoid-
ably, we havemuch coal dust, and of course we have much saw duot to spare. Is there aay way to utilize them, and so reduce thecost of our fuel? A way that would not be very expensive-all the machinery and parts of
the process being of home manutacture-is needed.-J. F. T. the process being of home manuracture-is needed.-J. F.
12.-Metal Lining in Cast Iron Vessels.-How can I prevent the lining metal in cast iron boxes from becoming loose? After
they have rua some time, the lining becomes loose, and I have to refill them. Would tinning the boxes prevent the metal from getting loose? It so, what would be the best process to tin boxes that are cast on the frame so that
they cannot be removed Tnelining metal used is Babbitt's metal minu the antimony.-W. A.

## Business and dextma

The Chargefor Insertion under this head is One Dollar a Line. If the Notice
exceed Four Lines. One Dollar and a Half per Line will be charged.
The paper that moets the eye of manufacturera bhroughout the United States-Boston Bulletin, 8400 a vear. Advertisements $17 c .8$ line For the most beautiful Site, Building, and Water Power fo manufacturing pu. ;osez, address Harris Brothers, Newport, N. Y Sewing machines of any shape and adapted to any special purpose. Models, patterns, and experimental machinery made from crude
description on paper or word of mouth. References as to integrity and description on paper or word of mouth. References as to integrity and
capacity to any extent furnished when required. Koch \& brass, 59 Scholes Street, Williams burgh, N. Y.
Wanted-Descriptive price list and catalogue of new and For Machinists' Tools and Supplies of every description, address Kelly, Howell \& Ludwif, 917 Market Street, Philadelp’ia, Pa Stencil Tools, full set, $\$ 5$. Circulars free. J. T. Lee, War renton, Ga.
Safety Boiler-Wanted party with manufacturing facilitie to take interest. G. Morgan Eldridge, 703 Walnut St., Pniladelphia, Pa. Wanted-A man who thoroughly understands how to Finish Harness and Roller Buckles and to make the Dies whict form the Tongues.
Good wages and steady employment. For further particulars, address with name and residence to B.K.Murphy, cor. 28th St. \& 7th Av., NewYork Three fourths saving of fuel, by the Eilis Vapor Engine (Bi sulphide of Carbon) in running the Haskins Machine Co's Works, Fitch burg, Mass. To whom apply.
State Patents for Salc---Black's lmproved Fertiizer, made on the farm at comparatively small outlay of cost and labor. For circular
terms, 支c.,address G.R.Black \& Co. Box D.,Donaldsville,G.\& C R.R., s.C.
Wanted-Situation as Mechanical Draftsman. One in the West preterred. Speeimen work shown and references given. Address

Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton N. Y
A Great Curiosity. See advertisement on page 421.
The PatentVertical Portable Engine-Safer than the SafestWear and Tear, none. Power Plenty. Light on Fuel. Grifinth \& Wedg
The Best Saw Mill in the Market-with Cut Gear Lever Head Blocks and Handshy's Patent Roller Set-inakes more and true Lumber, with less hands to the M.11, than any o
the country. Grifith \& Wedge, Zanesville, Ohio
Stationary Engines-25 Horse Power-for Saw or Grist Mills, ready to ship. Address Griffith \& Wedge, Zanesville, Ohio.
Wood Cutting by Electricity-Communications on this sub ject can be addr
Office, New York.
Write for Chemicals, Crude Materials, and Drugs for Manu facturers' use, to L. \& J. W. Feuchtwanger, 55 Cedar Street, New York. Steel Castings to pattern, strong and tough. Can be forge and tempered. Address Collins \& Co., $212 \mathrm{Wa}_{\mathrm{t}}, \quad$ atregt, New York. by he Haskins Machine Co., Fitchburgh, Mass.
Wanted-A first class Sewing Machine Repairer. T. Shanks, Baltimore, Md.
Galvanized Slating Nails, Stove Reservoirs, and Hollow Ware. Address Cleveland Galvanizing Works, Cleveland, Ohio
Second hand Iron Planer, to plane 9 feet long, 33 inches wide-good as new and cheap. Chas Place \& Co, , V Wanted-A partner in the Machinist and Foundry business, well established at Minneapolis, Minn. Address Chas. M. Hardenbergh. Portable Baths. Address Portable Bath Co., Sag Harbor, N.Y Standard Twist Drills, every size, in lots from one drill to 10,000 , at $\%$ manufacturer's price. Sample and circular mailed tor 250
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For hand fire engines,address Rumsey \& Co.,Seneca Falls,N.Y I. Shaw's Steam Gauges, Ridge av. \& Wood st., Phila., Pa If you want a perfect motor, buy the Baxter Steam Engine. Town's Cosiyard पuamy \& Contractora' Apparatua hor hoistios
 Niining, Wreching, Pumping, Drainage, or Irrigaing Mischa

or 'Tri-nitroglycerin, insulated wire, expluders, with pam phlet, as used
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1869. Also, Glazier's Diamonds Jobn Dickinson, 64 Nassau st., N. Y. T. Shaw's Hydraulic Gauges, Ridge av.\& Wood st., Phila, Pa Better than the Best-Davis' Patent Recording Steam Gauge Simpie and Cheap. New York Steam Gauge C•,, 46 Cortlandt St., N. Y. ters. Address Wm. Volk, 32 Staats Street, Buffalo, N. Y.
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cier that heaciany we snaus pubibsh weekly notes af some of the mors proms-

Medical Compound.-John Freehette, ot Chicago, Ill.-This invention furni hes an improved medical compound or tonic bitters for invigorating the system when reduced or weakened by sickness. In preparing the compound are taken one pound of orange peel, three quarters of a pound of cal
amus, one quarter of a pound of ginger, one quarter of a pound of bayberry amus, one quarter of a pound of ginger, one quarter of a pound of bayberry
bark, and four lemons. These ingredients are ground and put into two gallons of pure spirits, diluted to not less than seventy-five per cent of sprits. The compound is allowed to stand for thirty-six hours in a warm place, and is then reduced to forty per cent of spirits, sweetened to taste with crushed Vegar sirup, and filtered. It is then ready for bottling for use or formarket
Veec.--Peder Jürgens, of St. Paul, Minn.-This invention con Velvet Reel.--Peder Jürgens, of St. Paul, Minn.-This invention con -
ists of a pair of oval or cylindrical blocks of wood and another block, of sts of a pair of oval or cylindrical blocks of wood and another block, quare or other form, placed between them, with a wide board attached to
each end of the blocks so as to form a reel. On this reel, velvet ribbon is wound by fasiening one end to a pin in the central block and whirling th eel on a pivot at the lower side which may be placed on the counter. The reel is whirled by a handle or key affixed to the upper side, and the pin is so maced in the central block that it will not penetrate the layers of riboon hey are wound on
Rotary Puddling Furnace.-Joseph Davies, of Knoxville, Tenn.-In
thisinvention, the revolving puddling furnace is menter ated in the ordinary manner; it has a large central opening at one side to eceive the fire from the combustion chamber, to which it is closely fitted, and another opening on the other side discharging into the flue which lead to the chimney. A. flat puddling table is placed upon one part of the inte ior wall of this puddling furnace, with a hole through the side of the cyl ider, arranged in such relation to the table as to allow of balling the meta
nit in small balls adapted to be worked into blooms in the squeezer at one operation, the same as it is balled in the stationary furnace. A passag through the fluetprovides for removing the bails.
Dog ror Saw Mill.-Denison Chase, of Orange, Mass.-This invention
elates to apparatus used in saw mills for holding logs to be sawed. The log consists of a bed plate fixed to a head block, to which is attached sotted upright, against which the log rests when partly sawed. In rear o
the upright is a stand or round bar which carries the dog proper. This the upright is a stand or round bar which carries the dog proper. This
stand is attached rigidly to ohe bed plate, and the dog is fltted to it so tha it will siide up and down on it. In either direction from the central sieeve of the dog are t wo arms, each furnished with a claw or flager for entering the log. The dog slides up and down in the slot of the upright, and w
not in use is raised above the upright and turned round out of the way. Hydrostatic Safety Lamp. - Hampton S. Whitfeld, of Tuscaloosa, Ala This invention relates to that class of well known lamps where the oil
corced up by another liquid. The body of the lamp consists of an upper re ervoir, a lower reservoir, and a connecting neck or partition. The nec as two holes formed through it , one to receive a pipe which extends nearl oo the bottom of the lower reservoir, and the other to receive a flattened abe which extends up to the top of the upper reservoir, and which is de yned to receive the elongated flattened wick tube attached to an ordina eck or partition that separates the upper and lower reeervoirs, so that here will always be a stratum of air in the upper part of $L$ ne lower rese oir which cannot escape, and which keeps the oil from penetrating the par ition.
Spring Bed Botrom.-Donald McMurchy, of Jeffersonville, Ind.-This nvention furnishes an improved spring bed bottom, sımple in construction,
effective in operation, and durable. The posts, side rails, and end rails of frective in operation, and durable. The posts, siderails. and end rails
he bedstead are as ordinarily constructed. To theinner sides of the end rails are attached bars in which are formed notches or sockets to receive
ree ends of spring slats. Each spring slat is placed between and connected the ends of spring slats. Each spring slat is placed between and connected
with two slide slats which should also be elastic. The side slats are made with two slide slats which should also be elastic. The side slats are made
of such a length that when pressed downward their ends come in contact of such a length that when pressed downward their ends come in contact
with and rest upon the bars. Various appliances, whicn cannot be ex plainedin detail, are added to keep the slats in position. With this con struciion, should the central spring slats become permanently bent or set they may be removed and reversed, making the ded bottom again as good as new; light welghts will be supported by the elasticity of the central slats, but heavy weights will bring the ends of the side slats into contact with the
bars, so that the weight will be supported by the elasticityot the three slats he bed bottom being thus equally easy and elastis, whether supporting light or heavy weights.

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## [OFFICIAL.]

## hudex of inventions

For which Letters Patent of the United States were granted
for the week ending June 11, 18Te, and fach searing that datre
Acid, apparatus for gencrating carbonic, L. Kimball
Annunciator, electric, J. B. Shannon.
Awning, W. Matthews
Barometer, Emery and Johnson .... ........
Bed bottom, spring, E. Krieghoff, (reissue)
Bedstead fastening, T. W. Mo
Bedstead, hammock, J. M. Kilner
Bell ringer, steam, G. B. Snow
Beverage and sirup from mustang grapes, J. C. Wood
Billiard table, portable E. Hunt Billiard table, portable, E. Hunt
Boat, canal, Muller, Schwaab, and Krenso
Boat, canal, 3 . T. Babbitt.
Bolt, self heading, B. B. G. Stone
Boiler, feed water regula
Boiler, feed water regulator and low water alarm for, W. Painter Book binder's clamp, G. F. Holland.....
Boot and shoe naling machine, w. N. Lineell Boots and shoes, burnishing sinanks for, Bianchard, Hunt, and Care Boots and shoes, burnishing machine for, J. H. Howard.
Boots and shoes, Boots and shoes, machine for burnishing the edges of, J. W. Maloy Box, metallic, I. C. Mayo.
Boxes, etc., manufacture of, J. Trottier
Bracketfor warp creels, w. Welch.
Bridge, R. L. Partridge.
Broom and brush holder, G. B. Cunninghain
Buildinns, apparatus for moviog, w
Bureau, wardrobe, J. H. F. Lehmann
Burner, vapor, s. Rast.
Burners, light intensitying attachment for gas, S. T. Bacon
Bustle, J. I Barnum...
Butteris, blacksmith's, Connelly and Beujamin
Butteris, blacksmith's, J. H. Rhan
Camphor, preparing crade for preserving fars, etc..................................... Car axle, M. P. Hadley
Car axle, M. P. Hadley.....
Car coupling, s. G. Northr
Car coupling, F. L. Kirkiride
Car, draw bar iron for buffers of, J. T. Wilson
Carriage, J. Anderson.
Carriage curtain fastener, Ts.
Carriage, folding double steps for, J. Pender gast
Carriage runuing gear, W. Hemme
Case fur ribeens, hub for, A. Allcott....
Caster, E. G. Gory .....
Caster bottle, C. Caspe
Chair, spring rocking, P. C.
Chair, iron folding, J. Lauer
Churn, A. G. Crane
Cigar, Turley and Innes
Cisar mold. B. Hawkin
Clotn. stretching and
Cloth. stretching and drs ing, P. Hild, deceased
rizing, stretching, and drying, W. Bailey
Clothes dryer, d. O. Hill.
Culinary uteusils, S. Lee
Cultivator, J. H. Briuton, (resssue)
cultivator, A. Merril
Cultivator, G. Bradlev
cultivaror, A. Friberg.
Cultivater
Cutivator. rotary, M. Decelle
Desk, school, W. Blackburn
Desk and seats, school, Upha
Desk and seats, school, Upham and Kline
Digger, potato, D. D. T. Brown
Instilining fresh from salt water, A. M. King
Divider, H. Gerecke.
Door hanger, slidiang, C. B. cilark
Drillng machine, rock, A. J. Severance
Electromagnetic motor, J. Taggart.
Engme, oscillating. W. Sellers.
Engine, power indicator for steam, Ashton and Storey
Engine, rotarv, J. C. Wilson
Excavating machioe, s. Achenbach
arric, felted, E. Waite
Fare box, J. B. Slawzon.........
tare box, portable, J. S. Hagert
Fastener, shutter, C. S. Van Wag
Faucet, N. Hotz... .......
File cutting machine, J. E. Crisp...
Filter and cooler, water, L. Scharî́
Filter, F. J. Delker
Fire arm, breech loadikg, A. Burgess................
Fire arm, breech loadiug, w. c. and P. ग. Doäge
Fire extinguisher, C. т. Holloway
Flour boll feeder, J. Boehin.
urnace for kilns, O. Bennett...
Furnace, hot air, E. D. Norcross....
Furnace, glass, C. W. and F. Siemeas
Garment, pantaloon, G. R. Eager.............................
Gas bracket, lamp stand, etc., self sustai ing, C. Robb
Gas purifier, screens for coal, G. W. Day.
Gate, railway, Kristie and Horn
Gage, pressure, T. C. Bargrave.
Generator, steam, I. N. Wilfong
Grain cleaner, J. H. De Force.
Grain cleaner, J. H. De Forc
Grate, stove, Ransom and Burton
Grate, stove, W. Doyle....
Gun, spring, W. W. Hanna
Gun, spring, w. W. Hannal
Hammer, drop, J. E. Crisp.
Harness, tug for, N. Botsford
Haruess, tug for, N. Botsford
ene
Heater, base burning fire place, Bibb and Augee, (reisue).
Heater, steam, s. Williams.
Hoisting apparatus, w. C. Williamson
Hoisting apparatus, D. A. Noble
Gorseshoe, A. W. Smith.
 Horses from whifletrees, disengagi
Husking maehine, corn, J. Russell
Hyörocarbon, vaporizing and burning, s. J. Whiting
ournal box, G. R. Meneely
Lamp, street, J. S. Fish.
Latch, knob, C. M. Jordan.
Latch, reversible, J. Hamill
Leather slicker, G. B. Fowl
Lock, combination, G. H. Peacock
Lounge bed, H. Closterman
Lounge, bed, C. H. Hildreth
Medical compound, J. W. Ward
Medical compound, P. Roskopt
Medical eompound and disinfectant, J. Walton
Meter, liquid, H. S. Maxim....
Meter, water, Wheeler and Lane
Milk cans, clasp for securiup ine covers to, Ransom and Smith
Milk, coopparatus Kuster and Marzolf
Mill, tanning, A. Niebel
Mill pick, F. Kortick
Monon, mechanism for producing rotary, C. E. De Loriere
Movement, mechanical, M. S. Davis.
Mowing machine, B. Atwood........
Net for horses, tail, Parsons and Parker
Netting, machine for cutting leatner fly, T. Tullp
Ore was:er, L. M. Gochnauer
Oyster nursery, B. F. Lyford
Packing, metallic piston rod, C. S. Barry
Packing, piston, c. S. Barry...............
Packing, rubber, C. L. Erink, (reissue).
Padlock, B. Kenster.
Paper, eit., sizing, firetching, and coloring, P. Hill........................................... Paper, etc., sizing, J. M. Dorlan...
Pavement, block for, F. A. Lucike:ba
Photograph mounting, A. C. Platt....
Photograph mount, A. C. Partridge
Pianos, clamp for moving, D. Benson.
Plane, bench, J. Brooks.
Pianter, corn, G. Thompson..
Planter, cors, S. H. Hamilton
Planter, corn, S. H. Hamilton
Planter, hand corn, H. Lage.
Planter, hand corn, H. Lage
Plow, M. L. Gibbs (reissue)
Plow, w. Haslup.
Plow wheel, I. C. C. Bristol..
Pocizet, safety, S. Chittenden
Power, animal, H. Rosamyer,
Printing boot tops, etc., revolving support for, A. P. Nash
Projectile, J. Riguey.
Propeller, Miller and Priester.
Pruning shears, P. Broadoooks
Pulley, griping. A. S. Hallidi
Pulley block, differential, c. Hall.
Pump, oil well, A. s. Hill.
Rack, lumber, W. H. Powers......................................................
Rail and tramway automatically, operating, C. W. Hunt.......
Railway, construction of, W. S. Morrow.
Railway, maciine for removing snow from, G. Sewell
Rallway switch, W. w. Gelatt.
Rake, horse hay, J. Harris.
Refrigerator, c. o. Peck.
Retrigerator, ice box for, J. Grat.
Refrigerator, J. Gravenscine.
Refrigerator, J. Gravenscin
Rifie barrel, M. S. Colvin.
Rolier, land, J. F. Glidden
Rolling mill, relief apparatus for, J. Sulliva
Rubber, covine, C. B. Koons.
Sash holder, E. P. Masterson
Saw mill, circular,
Saw set, J. Garman
Sawing machine, w. W. Le Grand
Sawing machine, mitering attachment tor, $A$. Aitkin
Scalding apparatus, F. G. Chesman.
Scissors, guide for, W. H. S. Lawr
Scissors starpener, W. C. McGill
seat for halls, churches, etc., J. L. Kapple
Separator, grain, M. T. Nesbitt
Separator, grain, G. S. and H. Nu
Separator, middlings, E. Yeagly.
Sewing machine, fly wheel for, G. Roberts
Sewing machine, hemmers for, D. Barnum
Sewing machine, W. Heitenthal
Sewing machine, C. Gullmann.
Ship and boat, steam, B. T. Babbitt
Shutter, fireproof. F. Schumann
Shuttle box actuating mechanism, Brierly and Brierly
Shuttle binder actuating mechanism, H. H. Law.
Sideboard and extension table, Goodnow and French.
Signal, street car, J. C. Harris
Sifter, coal, W. Shelly....
Sifter, coal, L. T. Newell.
Sleigh shoe, molds for casting and chilling, V. A. Butman
Soap, hquia, J. Leetch..............
Soap, manufacture of, B. T. Babit
Soap under pressure, process for boiling, B. T. Babbit
Soldering iron, N. G. Numsen
Spinning machine, G. Draper
Stone, artiticial, W. W. Reev
Stove pipe coupling, J. T. McKim
Stove, oven door for cooking, S. s. Utter
Stove, magazine for heating, w. A. Green
Stove, tailor's neating, J. R. G
Stove, heating, J. F. Baldwi
Table, dining, B. Welteck....
Table, ironing, J. T. Plowman, Sr.
Telegraph, district and fire alarm, E. A. Calahan.
Thrashing machine, G. B. Bamlin.
hrashing machine,
Toys, J. Schwennesen.
Transplanter, B. Shirley.
Trap, Welty and Folling
Trap, Welty and Follinge
Trap, antmal, L. E. Ingersoll
Trap, hog, H. W. Hill Nayl
Truck, stone, G. A. Davidson
Truck and hoist, combined, H. Kruse.
Truss, N. Jones.
Truss, N. Jones.........................
Tubing, manufacture of, J. B. Forsyth
Tubing, manuracture of, J. B. Forsyth ......
Twine or thread cuttigg machine, C. Higby.
Vehicle, axle box tor, c. Ahrenbeck........

Vehicles, wheel for, s. Atha...........
Vehicles, wheel for, S. Atha (reissue)
Vinegar, apparatus for the manufacture of, R. D. Turner..........................,988
Wafer iron, G. w. Mason................................................. 1277,80
Wagon wheel, J. Priest
Wall, constrncting hollow, F. Collin
Washstand, E. E. B. Low.
Wasiing machine. Riggs and
Washing machine, J. Klein
Watch, stem winding and setting, E. C. Fitch.
Water elevator, E Deaver .............
Water pipe, ह゙top valve for, J. L. Hewes.
Wal
Water pipe, waste, Conver and Koons...
Well boring machine, J. F. Rupp. ..........
Whiffetree, attachment for, J. T. Williams.
Whiffetree fastening, c. Ahrenbeck....
Wind wheel, W. I. Tustin
Wind wheel, J. J. Hosey
Wind wheel and gearing, G. S. Oberdorff
Wood to be varnished, filling, F. Seabury
Wrench, dynamometer, H. R. Leonard.
Wringer, clothes, C. H. Bangs .......
Writing machine, type, E. Cadmus.
EXTENSIONS REFUSED.

## 20,447.-Whitewash Brush.-D. W. Shaw, W. Magraw

20,492.-Platrorn Soales.-J. F. Keeler.
20,5i5. - Harvesting machine. - W. H. Seymour, D. S. Morgan DISCLAIMERS
20,503. - Breech Loadivg Fire aran..-G. W. Morse.
2,182, whole No. $33,186 .-$ Thrashing Machine.-D. M. Cochrane. DESIGNS PATENTED.
5,911.-Carpet.-T. Barclay, Lowell, Mass.
5,917. -CARD BAsket. - G. D. Dudley, Lowell, Mass.
5.918. - VAsE.-N. L. Glauber, A. Schlank, New York city.

5,919.-CAMPAIGN BADGE.-E. W. Harrison, Jersey city, N.
5,921.-Carpkt.-L. Jullien, Passy, France.
5,922.-Carpet.-C. S. Lilley, Lowell, Mass.
593.-Carpet. -D. McNair. Lowell, Mass.

5,924.-Trunk Corner Clamp.-W. Bruen, Newark, N. J.
5,925. - Bockev.-H. Everett, Philadelphia, Pa.
926.- Piokle Stand and Bórtle.-G. Gill, Taunton, Mass.
5,966. - Pickle stand and Bo'trle.-G. Gill, Taunton, Mass.
927.-Badge.-J. Hartman, Jr., Ormsby, Pa.
5,997-BADEE.-J. Hartman, Jr., Ormsby, Pa.
$5,955$. FFREPPLACE STOVE. - W. J. Keep. Troy, N.
5,929.-HEATtNG STove - W. J. Keep, Troy, N. Y.
5,930.-Heating Stove.-E. Mingay, Boston, Mass.
,931.-Toy Carriage body.-F. W. Porter, Springfield, Vt.
5,932.-Oil Cloth- - V. E. Meyer, Lyon's Farms, Elizabeth, N. J.
5,933.-Cooking Stove.-F. H. Root, Buffalo, N. Y.
5,933.-COOKING STove.-F. H. Root, Buffalo, N. Y.
5,934 and 5,935.- Hot Air Requistern - -E A. Tuttle, New York city. 5,936.-STOVE.-N. S. Vedder, Troy, T. S. Heister, Lansingburgh, N. Y

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852.-Winhes and Liquors.-A. W. Balch \& Co., New York city.
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854 and 855.-Brandy.-J. Hennessy \& Co., Cognac, France.
856.-Biscuits and Crackrrs.-J. B. Kupfer, Kenosha, Wis.
857.-SALVE. - M. A. Paullin, Philadelphia, Pa.
855.-Crushed White Wheat.-F. E. Smith \& Co., Brooklyn, n. y
859.-Polisif For Metals.-F. J. Tiskham, New York city
860.-ELiastic Webbing.-J. Twamley, New York city.

APPLICATIONS FOR EXTENSIONS.
Applications have been duly fled, and sre now pending, for the extension
of the following Letters Patent. Hzarings upon the respective applications re appointed for the days hereinaiter mentioned:
55,693.-Links of horse Powers.-A. W. Gray. August 21,1872 , $11,352 .-$ Railroad Car Seats.-C. M. Mann. August 14,1872
21,416.-Coffee Roaster.-T. Heermans. August $21,1872$.
21,436. - Rallroad Car Couch. - F. R. Myers,F. h. Furniss. - August 21,1872
21,443.-Machine for Trenivg Hubs.-A. Richart. August $21,1872$.
21,465.-Sewing Machine.-S. C. Blodgett. August $21,1872$.
21.474.-Journal Box.-H. H. Thayer. August 21,1872
21.474.-Journal Box.-H. H. Thayer. August 21, 1872.2 .
21,54i.-Pin Sticiting Machine.-C. W. Van Vliet.

21,828.-Furnace For Tempering Steel.-P. G. Gardiner. October $2,1872$.
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## cy 1 P

| $\frac{\text { STRATION }}{\mathbf{A}}$ | Ill, brick, Hawley's nife sharpening mà chine, Union Stone Company's........... |  |  | Brass founding B ead cutter Bread making, new process for................. 671 Breakwaters | tion, behavior of, ........... Cements, hy draulic- Theiradaptability for use and ornamental |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Ladder, extension, |  |  |  |  |
| ors, |  |  |  |  |  |
| pun |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  | drics, wemeticai arca |  |
|  |  |  |  | ¢ricks, | Chemical exp |
| Auger, earth boring, Jilz's......... 214 B | Magneto-electric machine....... <br> Man's ......................... 35 | Agassiz, Professor Louis Agricultural chemistry and che... icalmanures Agricultural impiemente, triaio of: 398 Ag1cur |  |  | Chemistry, the last six m |
| Trel room at Pratts onil works 338 |  | Ayriculural works.................: 240 Air blower..................... 123 | $\begin{aligned} & \text { Bal } \\ & \text { Bal } \\ & \text { Bal } \end{aligned}$ | Bridge, Illinois and St. Louis. Bridge over the Miesissippi, |  |
| Hersa a |  |  |  |  |  |
| aring, self lubricating bo x and |  |  | - Bal | $\substack{\text { 3rdag } \\ \text { Bride }}$ |  |
| (eate | Moor, the attracti |  | ${ }^{\text {Ba }}$ | Brid |  |
| pull and bell, swan's <br> printers ${ }^{\text {enden }}$ and rules, <br> machne for, mith and Mc- | Museum at South Kensington, London, England............ 130 | Air pump, free piston.................: *51 Arr, pure.............. Arr suppiying attachment for | $\begin{aligned} & \text { Band saw } \\ & \text { Band } \\ & \text { Band saw } \\ & \text { Barbers } \\ & \text { Bas } \end{aligned}$ | $\begin{aligned} & \text { Bride. ...it } \\ & \text { Brole bit } \\ & \text { Broad cas } \\ & \text { Broiler.... } \\ & \text { Bromine } \end{aligned}$ | Chna and Japan, treaty bet ween. Chinese ustronomy. <br> Cninese by telegraph <br> …............. 306 |
| Collur races |  |  | - Base burning cooking stove.......: ${ }^{\text {30, }}$ | ${ }^{\text {Bro }}$ |  |
| king and brush holder,Swee |  | n, improved high pressure.. ${ }^{* 127}$ minous substances, structure | Batteries, galvanic.................. <br> galvanic |  |  |
|  |  |  |  |  |  |
| Boiler experimen | Oil | Aranian .... |  |  | the adm |
| Bootiank, po Brake, wago |  |  |  | - | Chlorotorm |
| Brick makng machne, |  |  | Battery, electric |  |  |
|  |  |  | Battery, Grove's. ....... Bealiäches |  |  |
|  |  |  |  | making........................... |  |
| le bit puiley Barnés |  | Alloys, prepepatation and compoini |  |  |  |
|  |  | Alloys, the stüäy of..................... ${ }^{40}$ |  | $\begin{array}{\|c\|c\|} \text { Bug } \\ \text { Bail } \\ \text { Buif } \end{array}$ |  |
|  |  | Amatigamation of ores of the pre. 168 |  |  |  |
| Caliber compass, Koch's.......... . 115 |  |  |  | Bunugata |  |
|  | Power hammer,d | American |  | Bung atta |  |
| Capar soormants, crochetedediowe | Press, air spring | American petroleum, iristory of.: 336 |  |  |  |
| Choper, meata, Patioios |  |  | ${ }_{\text {Bee }} \begin{aligned} & \text { Bee } \\ & \text { Bee }\end{aligned}$ |  |  |
|  |  | ${ }_{\text {A }}^{\text {A }}$ |  | - |  |
| Cloth:s rack, Miller's................ 166 Coth measuring machine, Miiler, 150 |  |  |  |  | apooarding, im |
| Confe and grain aryer, Guar dio. 9 91 |  |  |  |  |  |
| Comet, Encke's.................... ${ }_{3}$ Condensers at Prattes oil works.: 339 |  | $\left\lvert\, \begin{array}{l\|l} \hline \mathrm{AD} \\ \mathrm{An} \\ \mathrm{AD} \end{array}\right.$ | $\left\lvert\, \begin{aligned} & \text { Be } \\ & \text { Be } \\ & \text { Be } \\ & \text { Be } \\ & \text { Be } \end{aligned}\right.$ |  |  |
| Cooper shop |  | ${ }^{\text {a }}$ |  |  |  |
|  |  | ${ }^{\text {Animal }}$ Animal powe |  |  |  |
| Coton sed hall | Retrizerator, dramic, | Animus rap |  |  | ntrg watches and |
|  |  | Antic.concuss |  |  |  |
|  | Pesawiug machine | A.ts and moles |  | Califer Califor Crin |  |
| otser metals. riosity a Patent | Roof of the depot at Saratoga ${ }^{\text {a }}$ | Ants to teestry, |  |  |  |
| Curiosity, a Patent Hope Machine Co |  | Apharaius |  |  |  |
|  |  |  |  | Camedi Cana Canalina enal | Comer |
|  |  |  |  | Ca | Clothes washer ...............58, ${ }^{\text {chen }}$ |
|  |  |  |  |  | oth plaiting machine............. 150 |
| Hisog machines, Thorne an |  |  |  |  | Coioth shearing machine........... 59 |
|  | Sawing machine, spiral spring | A pparatus for mixxing soap........ 314 |  | C | Coal and smoke, c. ${ }^{\text {che }}$ W. |
|  |  | Apparatas for | 兂 | Ca |  |
|  | Screw wood, Wills'................... 387 |  |  |  |  |
| Eugine, comb | Seed tor soming, | Apparatus for rasistug doogh...i. |  | Cay |  |
|  |  |  |  |  | alo |
|  | bilge pump, Thiers'.........i. ${ }^{15}$ |  | Blateroari....................... 31 |  |  |
| Exposition ounding New Or | Shoe theitempgs. Tris |  |  | Candy, cancore cane gune | als |
| F | ${ }_{\text {Sidewall }}^{\text {Sider }}$ | Ap |  |  | als. |
| Fastener, door, Melendy's....t.. 214 | Stgnal lieg | ${ }_{\text {Apparatu }}^{\text {Apen }}$ |  |  |  |
|  | Sly nals new device tor r | ${ }_{\text {Apparatus }}^{\text {Aper }}$ | Bielenhy....................... 98 | Caoutchouc |  |
|  |  | Appian wa |  |  |  |
|  |  | Architeet, | Binderstor iorsee...............: ${ }^{59}$ | Comer |  |
| Furuse, hot anr, Hiocomb | Stanction, | Architectural |  | a yleatic |  |
| G | Stave join Steamer | $\underset{A}{\text { Arctic }}$ Ar | Blood, to purify the................. ${ }_{23}^{35}$ |  |  |
|  | Steam Stereomet | $\underset{\substack{\text { Armure } \\ \text { Atmor }}}{ }$ | Blowing out <br> Boat deta ching ap paratus.............. 234 | Carbonic acid gas in weilis.... 188,185 Carbon plates for battery........ 127 |  |
| Galvancmet Gas burner, |  |  |  |  | Coiton, Mr. H. E................ ${ }^{184}$ |
| Gasoine still at $P$ | Stool, gardener's. Whittl | Arsencte entation of. |  | Car coupl |  |
|  |  | Arseutc in paper hanging |  | Carding ${ }^{\text {Car }}$ | Combined axie box, sand band, |
|  | Surface blower, Davis and Hard. 191 | ${ }^{\text {Arsenct }}$ mag | Engrand Botler explosions.................... 39\% |  |  |
| Grattingyool, Maddy's. | Stependers, selir adjusting, Bar- | Arsenc, the ${ }_{\text {a }}$ | Boiler explosions.7.ati.:........: 384 |  |  |
| Greenhouse, interior of a...... |  |  | (eate |  | (tern |
| Guanoat the chincioua is |  | we |  |  |  |
| Ganat mostache, Randialiph | works.... Testing machi |  |  |  |  |
| Gumpowuer pressurecyuges.... | Testing machine | Artesian welis, our need for...... 378 Art1ticial stone................. 313 | Boilers, extraordinary experi. *50 |  | Combi |
| H | Tin shop at Pratit's of work Towageon canals, means of |  | the heating of |  | Oo |
| ride met tod of securing fla | Trausmititing rotaiay | Artiticar | ers, prodi | Car trge |  |
| ventilitin. Hear and light, Prote |  |  | and nul | Car truck | Combtinuisher |
| at and light, Prote:sor on | pror sewage an <br> ervorr, seit acting, Couzen's. 230 | Art progres Arts of desi | Boit fartenin |  |  |
| at by meiting ice, determı tion of higa degrees of |  |  |  |  |  |
| ter for yreen notues, hot water ${ }^{3}{ }^{3}$ d back tor carriages, Simons' |  |  |  |  | Combined table, soua, and bed.... 187 Combined too cole |
|  | Va |  |  |  | Combined wardrobëeand dédisièad 201 |
| er purposes, Baud |  |  |  |  |  |
| 1 |  |  |  |  |  |
|  |  |  |  |  |  |
| narvesting on the Hu. |  |  | Borax Borax in Never |  |  |
|  | wire | Astrouomy |  |  | ) |
| water |  |  |  |  |  |
|  |  |  | Boring maanine.................... 025 | ment, for alababi |  |
|  |  | pulsion $. . . . . . . i n . . . . . . . . . . . . . . . . . . . ~$ 238 Atmosphericengine.......... 234 |  |  |  |
|  |  |  |  | Cement for iron pipes. |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  | .... ${ }^{\text {anc........ }}$ |  |  |  |
| Kenwood Tower, Highgate, near <br> Lorden.......................... | - | in iocomotiv | ailway power. |  |  |


| Conical stop cock， <br> Conscience，preserve your |  |
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|  |  |
|  |  |
|  |  |
| copynt press |  |
|  | line， 8 |
| Cork and cor |  |
|  | drate |
| Corn harrester．．．．．．．．． |  |
|  |  |
| Corn husking and shelling ma－ <br>  |  |
|  |  |
| Corn popp |  |
|  |  |
| Corrse |  |
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|  | on cho |
| Cotton chopper |  |
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| Cotton press |  |
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| Coton seeds，on． |  |
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| Couton waste， |  |
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| Counterbalancing gang saws Counterbalancing saws and other machinery |  |
|  |  |
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| Cricked fiute． |  |
|  |  |
|  | ks in iron |
| Crossing teste triagk |  |
|  |  |
|  |  |
|  |  |
|  | stalization |
| Crystallization ot iron and steel． 105解 and other metals． $\qquad$ |  |
|  |  |
| nary boiler．．．．．．．．．．．．．．．．． |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Curiosity，a wo |  |
|  |  |
| Curious experiment，a <br> Currant worm，the |  |
|  |  |
| Cushon for the feet in railway travel，air． |  |
| Cushions，new stuming tor．．．．．．．．．． 226Cut off for water pipes |  |
|  |  |
| Cut off for water pipes．．．．．．．．．． 201Cut oft proportions ofCutter headd．molding．．．．．．．．．．．．．．${ }^{34}$ |  |

Damper for fire place．．．．．．．．．．．．． 40
Dandelion or taraxacum．
Dandruff，a stmple remedy ior．．．．：


 Demark，iron shipbuilding in．．．：
Dental orens
Dental pluger
Dental pu．．．．．．．．：


Device tor locking nuts．a．．．．．．．：
Device frr moving pianos．．．．．．．．
Device for utilizing power at rail．

Diamond drill．．．．


Disease，the
Dish dranher
Dish washe

Distincingcompetitors．$\ldots$ ．．．．．．．：
Ditconning machine．．．．．．．．．．．．．．．．．．iör，${ }^{40}$



rat atachment to plo



Dropping attachment for harvest：－
Drep．．．．．．．．．．．．．．．．．．．．．．．．．．．${ }^{1}$
Drunkenness，dangerous case of．：
3

Dryin hetubsistillation hot air．．．．
Dryin subsances by hot
Dyming substances by mechanicai

Dyelu，cotton y rrn with magenta
Dyeivg leather，
yeing on wool and silis，scariet．


## Earth auger．．．．．．．．．．．．．．．．．．．．．．．707，${ }^{45}$ <br>  <br>  <br> 

|  |  |  |
| :---: | :---: | :---: |
| tion，technical．．．．．．．．．．．．．．．．${ }^{\text {the }}$ ， teamship．．．．．．． <br> lany ard． |  | Ha |
| ical improvements ical mashine，the Holtz | Foreisn ${ }^{\text {patents }}$ ． Formin sctew |  |
|  | $1_{8 n}$ |  |
| Electrical tubes， 1 iuminous．．．．．．．． 345 Electric carriage．．．．．．．．．．．． 186 |  |  |
| clock |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| Electricity，new theory <br> Electricity，new u e e for．．．．．．．．．．．．．．${ }_{17} 13$ |  |  |
| Electricity，surface．．．．．．．．．．．．．．．．．${ }^{245}$ Electric light，the．．．．．．．．．．． 68,257 20. | $\left\{\begin{array}{l} \text { Free } \\ \text { Fres } \\ \text { Fric } \end{array}\right.$ | Heathe |
| Electric probe for wounds．．．．．．．．． Electrodeposition of iron...... 386 Electromagnet |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| Emery，coating iron <br> Emery cloth belts． <br> Emery wheels，stren gthenin |  | Heatmen for io |
| Employer and employed－A piea－ <br> sant incident．．．．．．．．．．．．．．．．．．．．．．．． |  |  |
|  |  |  |
| Enyineering，incidents in Engineerng，incing progress，six months |  |  |
|  |  |  |
| Engine，improved steam．．．．．．．．．．＊3 | Gage cock for steam＂boilers，im－${ }^{\text {rex }}$ |  |
|  |  |  |
|  |  |  |
| Engine，singular breakdown of an 345 Engines，proportions of ．．．．．．．．． 401 |  | Ho |
| Engines，rotary， $84,107, * 147, * 194,299$ Epidemics of disease，disaster， | ${ }_{\text {Gas }}^{\text {Gas }}$ |  |
|  | d |  |
|  |  |  |
|  |  |  |
|  |  |  |
| $\mathrm{rlk}$ |  |  |
|  |  | 甚 |
|  |  | Hu |
|  |  |  |
|  |  |  |
|  |  |  |
| Exposition of Louisiana，first <br> Grand Industrial ．．．．．．．．．．．．． 290 |  |  |
| Extension cases before Congress 153 Extension tathe carrier．．．．．．．．． 282 |  |  |
|  |  | ${ }^{\text {Hydro }}$ |
|  |  |  |
|  |  |  |
|  | G1 | $\begin{array}{\|l\|l\|} \text { Hydro } \\ \text { Hydro } \end{array}$ |
|  |  | （ ${ }^{\text {Hydarosatac we we }}$ |
|  |  | Hypontrous aciai．．．．．．．．．．．．．．．． |
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|  |  |  |
| Fireproof rooi． Fireproof wood Fire shield． |  |  |
|  |  |  |
| culture in New Yorki．．．．．．．．： 66 |  | $\xrightarrow{\text { Horche or a }}$ a |
|  |  |  |
|  |  |  |
|  | and iro |  |
| pis |  |  |
|  | ，iruned， |  |
| bodies | Hersir | － |
|  |  |  |
|  |  |  |
|  |  |  |
|  | Hande strap for traveilining bags．： 7178 |  |
|  |  |  |
|  |  |  |
|  |  |  |

Man and the lower animals．．．．．． 30
Man descended from the crow．．．．










 Medical or phound or bitter band．
Medium in space，a resisting
Meerschaun Men or progress
Men propsities．
Mercuriap collumn．
 separation of of．．．．．．．．．．．
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in Metala as fiue i，iurning．．．
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Metals，on the colors of Metals，on the colors of of
Meteorici iron in Greenland
Meteoric stones，velocity or
Meteorites



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Microscopy．．．．．
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Milk，artificicial

 stuay uf ．．．．．．．．．
Mineral sperm oil．
Mineral waters．




 Models，the aboilition of．．．．．．．．．．．
Mode or ba ancing oulleys．．．．．．
Mode or constructing straining
lever and bale ties for pack
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