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## TAYLOR'S AMERICAN FIELD PIECE.

First successfully employed during our late war, and mor recently in the struggle between France and Prussia, the battery gun, like the submarine torpedo, may be safely pre dicted as designed to exert no small influence in the determination of future conflicts. Even in the crude forms in which, as necessity demanded, it has beenhurried to the field its terrible execution has proved it a most formidable and deadly arm: and as in late years improvements have been made in its construction, all tending to increase its power, the fact has become more clearly apparent that the mitrailleuse forms still another link in that chain of weapons of human destruction, which, beginning with the bow of the savage, the world believed forged and complete when the needle gun at Sadowa brought to a sudden ending a short though bloody war
Witl the general principles upon which the construction of the battery gun is based, we presume our readers to be reasonably familiar. Explanations and illustrations of the Imperial, the Gatling and others, have already found place in our columns; so that, inillustrating the new mitrailleuse of Mr. Taylor, description of the minor details will be dis pensed with. A short brass cylinder, containing twenty-fou barrels, together with a quantity of machinery, is mounted on an ordinary gun carriage. Such is the general appear ance of the invention. The length of the piece is about 28 inches, and its weight, with its appurtenances, is in the neigh borhood of a thousand pounds. We begin our description with the loading mechanism. A is a magazine consisting of 24 tubes, each of which contains nine cartridges of size suit24 tubes, each of which contains nine cartridges of size suit-
able to the caliber of the barrels. The tubes are confined able to the caliber of the barrels. The tubes are confined
between heads. The entire receptacle can be instantly removed from its position when its charge of ammunition is exhausted, and another similar filled magazine substituted, so that the gun may be thus kept almost continually supplied with cartridges. A suitable number of these charged reservoirs are designed to be carried in the ordinary caisson. A

B is a cylindrical case, which encloses the feeding apparatus, consisting of 24 steel rods, which are intermittently moved forward into the magazine tubes through the medium of the rack shown above the casing, actuated by suitable mechanism in connection with the lever, D. At each move ment of the rods one cartridge is forced out of every maga zine tube, and into corresponding cavities in a rotating cham ber plate, a portion of which is shown projecting at C. This plate consists of four wings, and revolvesin the slotted breech piece into which the barrels are screwed. In each wing ar 24 cartridge chambers circularly arranged. Of course all four wings or sets of chambers are on the same plane, and rotate on a common axis, so that one after the other, as each is charged from the magazine, is revolved so as to come into exact line with the barrels of the piece.
'The same lever, D, that actuates the feeding apparatus, also communicates motion to the volley firing plunger or piston. E. F is a movable latch fixed longitudinally upon he top of the latter, holding it out of action whena fusillade discharge is desired. The details of the mechanism which xplodes the cartridges are necessarily unrepresented in our engraving. We need, in reference thereto, only allude to a number of spring spindles which are either simultaneously hrown against all the cartridges, in the wing that is in position, by the piston E , or which are caused to strike their cor responding cartridges separately by means of a cam arrange ment, within the breech and rotated by the steel crank, The first system causes a volley; the second, a fusillade.
When firing on the latter plan, as soon as each wing of the chamber plate is exhausted, a spring catch, H , automat cally stops further rotation of the crank until another filled wing is revolved into position by the lever, D. Between the wings are arranged brushes and sponges which, in passing cean the rear of the barrels between the discharges.
The lever, D, performs three offices; it works the feeding apparatus, rotates the wings, and operates the shell ejector. This last mentioned apparatus is contained in the case, I.

The movement of the lever which brings up a filled wing necessarily turns away the one that has just been fired and which still contains the empty cartridge shells. The cylinder, $I$, however, is so situated as to be exactly in the path of the discharged chambers, and besides other mechanism, encloses 24 rods, which, as above intimated, by the action of the lever, D, are caused to enter the chambers and push out the discharged shells, which fall to the ground.
The arrangement of the barrels is clearly indicated in the gun to the left of the engraving. It will be noted that their muzzles are placed in the form of an ellipse, while at the breech they are circularly disposed, the object of the former configuration being to give a wider dispersion to the balls. $J$ is the water casing, into which water may be introduced through the orifice, K , and the barrels thus continually kept cool. But three men are necessary to operate the piece, one at the crank and lever to fire, another at the rear to point, and a third to renew the magazines; and it will be remarked that all vulnerable portions are carefully so placed as to be out of danger from damage by rifle shots from the front.
At Sand's Point, L. I., a series of interesting experiments were made by the inventor, which proved quite satisfactory. At a range of 100 yards the target was pierced by a broadside which described an elongated horizontal ellipse, 2 feet wide at center and 12 feet long. At a range of 200 yards the width of this ellipse remained nearly the same, but the length increased in the same proportion as the increase of range. This was repeated, both by broadside and fusillade, a great number of times, the effect being uniform throughout he experiments. The piece was discharged several times over the waters of Long Island Sound and the effect was uite inter A water 1,200 yards away produced a noise like that of beating the surface with the flat side of a board, the projectiles covering a line of about 144 feet. The effects of the fusillade were equally curious. The missiles would fall in quick succession, producing the same sharp sound, and for more than

a second after ceasing fire this would continue, so that a charged wing could be brought up to the lever, the shells ejected, and the fire reopened by the time the last missile of the previous charge had struck. The inventor concludes that, virtually, a continuous and unceasing stream bullets may be kept up by the crank fire, for any desired length of time.
To Mr. J. P. Taylor of Tennessee is due the credit of this very ingenious weapon, of the successful operation of which we have assured ourselves by personal observation. In the experimental battery, an excellent piece of mechanical work from the shops of the Holske Machine Works in this city, from which our engravings were made, we remarked but few points that were susceptible of simplification, and we could suggest nothing which had not been anticipated by the inventor and fully provided for in a second gun which we learn he is about to construct. The piece has already attracted no small degree of attention in military circles, and we do not doubt but that it will excite even a greater interest when it appears, as we understand it will, according to the intention of theinventor, at the Vienna Exposition. Further and more detailed particulars may be obtained by addressing J. P. Taylor, patentee, or D. Hockett, attorney, Knoxville, Tenn.

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THE SOURCES OF OUR MODERN KNOWLEDGE.
In the uncertain prehistoric ages during which the ancien human civilization was evolved, Science, which regulated the social relations, did not rise above the purely material purposes which occupied the minds of men. The small number of truths, of which Science then consisted, were only empirical deductions from facts; but she advances with the progress of humanity, and from Thales to Archimedes immense scientific labors
Thates, whe
Thales, who lived twenty-six centuries ago, is one of the first philosophers, known to us, who brought his knowledge to a systematic whole. He was the founder of the Ionic school in Greece, and was equally successful as a mathema tician and an astronomer. The school founded by him was afterward split up into different sects, which embraced in their researches all branches of human knowledge.
Pythagoras then appeared; this philosopher, who by grate ful mankind of his age was called "divine," extended the domain of the mathematical sciences, and the tradition that he sacrificed one hundred oxen to the gods, from gratitude for the discovery of the famous problem which bears his name, is a proof of his trust in the guidance of a superior power. He had clearer notions than his successors; he taught the globular form of the earth, of which Anaximander had not the least idea, and he described the earth's motion around the sun; but mankind was not yet able to grasp this truth, and it had to be elaborated for two thousand years before general recognition of it was obtained.

After Plato, who, 2,200 years ago, had above the door of his lecture room the words "Nobody can enter here who is no geometrician," came the great Euclid, and then the illustrious Archimedes, the greatest philosopher of his time, who solved the most advanced problems with all the might of genius. The works of Apollonius, Hipparchus, Ptolemy Diocletian, etc., fill up this earlier period of scientific history but the authors are more specialist than universal philosophers; however, they contributed powerfully to the progress of knowledge.

At the beginning of a second period, Science seems to have een suddenly arrested, and ceases to appear as an elemen in the regeneration of humanity. She sheds, however, some of her light in the school of Alexandria; but after Diophantes her lamp appears to be every where extinct. Several centuries later, Science revives and is given back to the world by the same people that once slew her in her last asylum and surrendered the celebrated library of Alexandria to the flames, a library which contained all the philosophical works of pre ceding ages.
If the Arabs gave back to Europe, during the middle ages, some of the sciences, the records of which they destroyed in Alexandria, Europe in her turn became not only a rival, but a far superior master in the advancement of philosophy. It was then that Science took possession of certain grand theories, of which the preceding ages had scarcely any presentiment; the war which thus far had only existed in the mora world was carried into the scientific field; and human intel ligence had begun to crave the discoveries developed by exam ination and discussion in the realm of positive sciences. It was then that Luther defended freedom in the examination and discussion of moral principles, and Copernicus defended freedom in scientific research, and established the true astronomical system. Then a galaxy of great men appeared: Italy produced Galileus Galileo; Germany, Gottfried Leibnitz Holland, Christian Huyghens; England, Isaac Newton; and France, Rénate Descartes. Since that time discoveries have succeeded-discoveries with the most unexampled rapidity; and thanks to their practical tendency, the appearance of the surface of our earth has changed during the two centuries since the time of these great men more than in the two thou sand years previously. The number of discoverers and promoters of progress of the present day is indeed too great to enumerate, and what is a most striking fact, it has been steadily increasing during this century. In regard to the discoveries themselves, it appears to be reserved for the end of this century to place the crown on the now magnificent edifice of human knowledge, the labor of so many centuries, by a mighty doctrine which reunites all the isolated and various phenomena, by deducing them from a single absolute principle, the main object of modern research : The conservation of force or motion, which is founded on the principle of uni versal gravitation.

## THE BROADWAY UNDERGROUND RAILWAY.

The bill for an underground railway beneath the great thoroughfare of New York city, known as Broadway, has finally passed both branches of the State legislature, re ceived the Governor's signature, and become a law. Th wonder is, in a community like this, so noted for the num ber of its intelligent, active, and vigorous men, that such an important enterprise should have been so long postponed. No city in the world has more pressingly needed the facilities for rapid transit than New York.
It has always been conceded that the best route for a fast railway was under the surface of Broadway. The peculiar formation of the metropolis, very narrow, surrounded on two sides by deep rivers, permits the movement of its population along one general line only-towards the north. The splendid thoroughfare of Broadway, seventy-five feet in width lies in the very center of this movement, forming in fact the backbone of the city. Business of all kinds has Broadway for its focus, and probably no other street in the world is so constantly thronged with passengers and vehicles. The value of property on Broadway has become very great, and it is lined with many noble and costly edifices. Its peculiarly central position, the ease of its grades, the firmness of its soil, to say nothing of its enormous traffic, have always marked it as the natural route for an underground railway and many different companies of railroad builders have vainly attempted to secure it as a prize. The property owners on the street, comprising many of our most wealthy and influential citizens, have always, until recently, opposed the railway, and nobody appears to have had wit or power enough to overcome their opposition.
The grounds for their hostility were plain and simple They alleged that the operation of digging for the railway would endanger the water mains, break up the sewerage, et the gas pipes leaking, and tumble down every building n the street; causing a thousand times more damage and mischief than all the underground railways in the worl were worth. This idea, in whole or in part, has pervaded the minds of owners and so united them in purpose tha whenever any persons made a movement for the railway, they met with formidable opposition and signal defeat. Many and memorable have been the contests in the State legisla ture on the subject, and immense the sums of money ex pended; but the property owners invariably triumphed. In vain were they told that London had built such a railway and property, instead of being injured by it, was improved. To this it was replied that New York was not London, and that a road built here would certainly destroy the houses. For fifteen years has this sort of nonsense been allowed to bear sway, while the people suffered for want of the railway; and by reason of its lack thousands of families and business es tablishments were driven out of the State into New Jersey. Our readers are familiar with the details of the construc ion of the short experimental section of railway under Broad way, by the Beach Pneumatic Transit Company. They wil remember how this tunnel was bored by mechanism, under the surface of the pavement, below the water pipes, sewers gas pipes, and foundations of adjoining buildings, the enor mous traffic of the streets going on as usual, directly over the heads of the diggers. The public had no knowledge of the work until it was finished, and were greatly pleased with the quiet but effective manner in which it was done. That
tunnel has been in existence and the experimental railway has been in operation for three years, presenting at all times an unanswerable argument in favor of an enlarged railway, and a practical refutation of the frivolous reasoning of the property owners. Meantime the company asked from the legislature the privilege of enlarging and extending the work, so as to provide a first class underground railway, and the pub lic gladly seconded their request. For three years the company have pressed their enterprise upon the attention of legislature, and have at last succeded. Their charter is se cured. Theiraim now is to make the work the model of its kind. The railway is to extend under Broadway, Madison avenue, and Harlem river to Westchester county, nine miles, with an additional lateral branch. The work of construc tion is to be done under the supervision of State engineers. Stringent provisions are made by law to guard all public and private interests.
We shall, from time to time, present such information con cerning the progress of the work as may be of interest to ou readers. The ofdice of the company is at No. 260 Broadway, corner of Warren street, and all communications should be addressed to the Secretary, Joseph Dixon, Esq.

## THE FIRE ON BOARD THE STEAMER ALASKA.

We recently published a communication from Mr. Norma Wiard, giving us the particulars of the ignition, by " ove heated steam" as he alleged, of the felting of one of the boilers of the United States steamer Alaska. The report of this fire was sent to us by Mr. Wiard for the purpose of vin dicating his theory of "ignition by superheated steam" from the charge of being "absurd," as criticised in the Scientifi American, and also for the purpose of placing before our readers a positive example of such ignition, the facts concern ing which might be examined and verified by any one who so desired: the previous examples referred to by Mr. Wiard not being open to such examination.
It appeared to us when we published Mr. Wiard's last letter that the fire on board the Alaska could not have been caused by overheated steam, and we then gave our reasons for so thinking. We will now present further information con cerning the fire in question, derived from an authentic source which completely upsets Mr. Wiard's superheated steam heory.
We give a diagram showing the general form of the boilers of the Alaska, and the arrangement of the super

heating tubes. The steam passes from the boiler into the superheater and thence to the engine in the usual manner We also give a diagram on an enlarged scale of the upper portion of the boiler and superheater at the junction with the uptake. It was at the corner $A$, where the uptake begins, that the felting took fire, and the ignition was occasioned by

the contact of the felting with the uptake. The felting had very improperly, been packed against the uptake, the heat of which finally produced ignition. Neither the boiler prop er, the superheater, nor "overheated steam," had any thing to do with the fire, and so Mr. Wiard's superheated steam heory is again shown, by the facts in the very example he dduces, to be absurd.
We trust that the fire on the Alaska will serve as a warn ing to engineers, and others who are charged with the duty of clothing boilers, to use proper care in such matters. The elting should never be packed against the uptake or chim ney, as in this case. We are glad to know that since the fire the proper precautions have been taken on board the Alaska to prevent a recurrence of a similar disaster. The felting
around the uptakes of the boilers has been removed a dis tance of twelve or fifteen inches, and cement substituted.

In relation to the superheating of steam, we have frequent ly shown that it was always difficult to bring up the vapor to a temperature sufficient to cause ignition, and, practically, impossible to do so in any of the boilers ordinarily used. In the case of the Alaska, if we are correctly informed, the ordinary boiler pressure is 30 pounds, and at this pressure the ordinary heat of the steam, on issuing from the superheater, as shown by the thermometer, is from $276^{\circ}$ to $278^{\circ} \mathrm{F}$ Every intelligent person knows that this heat is not sufficient to ignite combustibles such as felting or wood. On the occasion of the fire referred to, the engineer reports that the fires in the furnaces were low, indicating that the pressure and temperature of the steam were not as high as usual.

## THE HYDRAULIC RAM

We have received a number of communications, recently, from readers who desired information relative to the con struction and efficiency of the hydraulic ram, and take pleasure in giving them a brief account of it.
This ingenious piece of apparatus is generally said to have been invented by the French aeronaut, Montgolfier, and improved by his son, but the earliest recorded accounts of the apparatus indicate that it was built in a ruder form, and still earlier, by an English watchmaker, Whitehurst, of Derby, in 1772 . It consists simply of a pipe, A, large enough to convey the whole required volume of water from the upper to the lower level, and fitted at its lower extremity with a check valve, B, so weighted that it will remain open until the water, rushing out around it at nearly the maximum velocity due to the hight of fall, lifts it and suddenly closes velocity due to the hight of fall, lifts it and suddenly closes
the orifice. The long column of water contained in the pipe the orifice. The long column of water contained in the pipe
$A$, is thus, while in rapid motion, refused egress at $B$, and its great inertia and its almost perfect inelasticity compel it to seek some other outlet; and if that were not found the heavy shock of such a mass of water, instantaneously checked would burst a very strong pipe unless it were "cushioned" by an air chamber. In the hydraulic ram the new outlet is at C , and the water forces its way up through the air cham

ber, D, lifting the check valve, E, without difficulty, and is finally delivered by a properly arranged pipe, leading to a
reservoir which may be at a considerably higher level than reservoir which may

## the original source.

This action is one of those whose effects are estimated by reference to the principles stated in an article which we recently published on the laws of impact. Were there no friction, the energy due to the weight of water and the hight of fall would all be expended in raising a part of the water to the reservoir. One hundred gallons falling ten feet would to the reservoir. One hundred gallons falling ten feet would
be capable of raising ten gallons to a hight of one hundred be capable of raising ten gallons to a hight of one hundred
feet, or twenty gallons fifty feet. As soon as the work done feet, or twenty gallons fifty feet. As soon as the work done
in throwing water into the reservoir has equaled the energy of the whole moving mass, the stream ceases flowing and the valve, C , closes, B opens and the stream starts again, its velocity accelerating until $B$ is again thrown up to its seat, and the operation just described is repeated.
The friction of the pipe and the tortuous course of the water prevents the full realization of the effect as above estimated. This machine where well designed and properly made gives, on the average, about sixty per centum of the perfect result. We have, in our replies to correspondents, assumed forty per centum as the more common measure of its efficiency. It evidently is not as efficient a means of rais ing water as a good turbine or overshot wheel and pumps, as the latter should be capable of throwing nearly twenty per centum more water into the reservoir than the ram, with valuable where the quantity of water is too small to justify the use of the wheel. The fact that small wheels are not a effective as arge ones is also a fact telling strongly in favo of the ram.

ESTIMATING POWER BY SIZE AND SPEED OF BELTS.
We have already complied with the request of some of our readers who desired us to state how the proper width of belting to transmit a given power was estimated.
We have now before us a request from others that we should give the rules adopted in determining the power ac tually transmitted by belts of given widths and speeds.
The rule already given was expressed by a formula which can be readily transformed into another, which shall meet the wants of the present case. It would be $\mathrm{HP}=\frac{\mathrm{W} \mathrm{S} \mathrm{V}}{7000}$
that is: Multiply the width of the belt by its speed and by the length of that portion of the circumference of the smaller pulley which is in contact with the belt, and divide the product by 7,000 . The result is the power which the belt is proportioned properly to drive.
Or, accepting the common millwrights' rule of 1,100 feet per minute on a belt one inch wide, for a horse power, we should state it thus: Multiply the speed of belt in feet per
minute by its width in inches, and divide by 1,100 . The reminute by its width in inches, and divide by 1,100 . The re-
sult is, as before, the proper amount of power to be driven sult is, as before, the proper amount of power to be driven
by the belt. The first rule is the most exact, the latter the by the belt. The first rule is the most exact, the latter the
most convenient for rough estimation. It must be remarked, however, that it by no means follows that the belt, in any particular case, transmits this estimated power. It may
drive much less or, if running very tight, it can be made to carry more than the proper amount.
It is evident that, where power is rented, its amount cannot accurately computed from the size and speed of belts. The policy of those who have power to rent to others is al-
ways to charge for the maximum capacity of the belts, and ways to charge for the maximum capacity of the belts, and
those who use the power and pay for it will use the smallest those who use the power and pay for it will use the smallest
belts and drive them at the highest power possible. The only satisfactory mett od of settling disputes between land lord and tenant is by the application of the dynamometer thus measuring precisely the power used. Every one dealing in power should keep a dynamometer of good construction on hand, and sl:ould use it more frequently than a good engineer uses his steam engine indicator. There are several good dynamometers in the market; and if those directly in terested cannot use them, or do not find time, they can $\mathbf{a}^{1}$ ways find reliable consulting engineers to do the work for them. We know manufacturers who understand this, and who send hundreds of miles for an engineer and his appara tus, to give them trustwortlly information regarding the amount of power which their machinery is using.

## ZIRCONIUM.

This metal takes its name from zircon, the mineral in which it was discovered by Klaproth in 1789 . Although the metal is rarely met with and has no use in the arts, the mineral zircon is comparatively plentiful. It is found in many parts of the United States, among which the localities N. Y to New York city are in Orange and Essex counties, reddish brown yellowish zircons of Ceylon have long been called jargons in jewelry, in allusion to the fact that, while resembling diamonds in luster, they are comparatively worthIess. Zircons occur in crystaline rocks, especially in granular limestone and granite. They are infusible before the blowpipe. If pulverized and fused with soda on a platinum wire, the, roduct when dissolved in dilute muriatic acid, gives a charac teristic orange color to turmeric paper. Zircons are almos pure silicate of zirconium, containing less than 2 per cent of oxide of iron. The finer specimens of zircon have been used for ornaments, resembling, as we have said, the diamond Zircons have also been employed, on account of their hard ness, for axles and bearings.
Metallic zirconium was first prepared in the amorphous form in 1824, by Berzelius; Troost prepared crystallized zirconium in 1865. The former obtained it by heating a mixture of the double fluoride of zirconium and potassium with metallic potassium. It can also be prepared by conducting the vapo of chloride of zirconium through a red hot porcelain tube containing metallic sodium; or by heating the chloride of irconium and sodium in a crucible with sodium or magne ium. The amorphous metal prepared in this way burns with a bright light at a temperature below redness. Aqua egia and the ordinary acids have but little effect on it; al hough it dissolves in hydrofluoric acid.
Crystallized zirconium was prepared by Troost by heating parts of the double fluoride of potassium and zirconium with 3 parts aluminum to the melting point of iron in a plumbago crucible, and dissolving out the aluminum with hydrochloric acid. In this state it is easily attackediby aqua regia, but resists the ordinary acids. It is less fus oxyhydro gen blow pipe.
A metal possessing such a remarkable power of resisting the action of acids and heat will one day become invaluable in the arts, if methods of preparing and working it with some egree of facility are ever discovered. Let those inventor who wish that they had been born a century or two earlier before everything had been invented, take heart, for wide fields of usefulness as well as glory await those who possess
real genius and talent. To-day metallic zirconium is of no real genius and talent. To-day metallic zirconium
Oxide of zirconium, or zirconia, is more easily prepared and better known, for Tessie Du Motay and others have proposed to employ it instead of lime or magnesia for the oxy hydrogen lamp. It is prepared by Du Motay for this purpose exposing to the action of a current of dry chlorine gas, which decomposes it into the volatile chloride of silicon and the basic chloride of zirconium, which latter is sublimed, and may be dissolved in hydrochloric acid and the zirconia precipitated by ammonia. 'The precipitate is dried, ignited, and mixed with borax, clay, etc., and pressed into cylinders the size of a pea. When these cylinders are heated in a jet
of oxygen and hydrogen gas, they become intensely lumin. ous, giving a steady white light fourteen times brighter than street gas. The advantage which it possesses over lime and magnesia are its perfect infusibility and its non-attraction for moisture from the air; it crumbles as lime does by air slaking. The great difference in cost has, however, over balanced the advantages on the side of zirconium, and it extended use
When perfectly pure oxide of zirconium is required, the above method cannot be employed; for although the chloride of silicon is much more volatile than the chloride of zirconium, it is practically very difficult to separate them completely in this way. A better method is that of Marignac. The mineral is broken in small pieces and ignited in a platinum dish with 2 or 3 parts of the acid fluoride of potassium. The mass, which consists of the double fluoride of potassium and zirconium, mixed with the double fluoride of potassium
and silicon, is boiled with water containing a little hydrofluoric acid, filtered, and the residue washed with a small quantity of hot water. On cooling, the fluoride of potassium
and zirconium crystallizes out. After purifying by recrystal lization, the crystals are evaporated to dryness with concen trated sulphuric acid, and the sulphate dissolved in water From this solution the hydrated oxide is precipitated by am monia.

As to the salts of zirconium, the preparation of the chloride and fluoride has already been described. Bromide of zirconium was first prepared in 1869 by D. E. Melliss of New York, then a student of Professor Wöhler at Göttingen. The oxide of zirconium was mixed with charred sugar, and kneaded into pellets by means of starch paste and dried These were then introduced int: a tube of hard Bohemian glass, The tube was heated to redness, while a current of bromine vapor was conducted through it by means of dry carbonic acid. The bromide of zirconium is a white crystaline pow der. It has a great affinity for water, with which it forms an oxybromide of zirconium, by exchanging two atoms of bromine for one of oxygen. The sulphide of zirconium is prepared by heating the metal with sulphur in a vacuum or in hydrogen gas. Zirconium forms double fluorides resembling the fluorsilicates. Its oxide also combines with bases bing the fluorsilicates.
after the manner of silica.
Zirconium, then, may be said to stand intermediate betwee silicon and aluminum, being willing to combine with either with this difference, that no compound of silicon and zirco nium has been prepared without oxygen, while its union with aluminum more nearly resembles an alloy. At all events, until it has been more thoroughly studied, we must class it among the metals.

## PATENT MEDICINES.

The German scientific papers are accustomed to publish the results obtained by analyzing the various quack medi and nostrums that come under their notice, thus exposing humbugs and warning their readers against wasting money and endangering their lives by the use of such compounds. Of course our American patent medicines are of ten subjected to the same test. Recently the Berlin Industrie Blätter published the composition of Mrs. Allen's "World's Hair Restorer." In a recent number of the same journal the fol lowing is given as the composition of the stuff sold as Dr. Sage's "Catarrh Remedy"
It contains 7 grains carbolic acid, 7 grains camphor, and 2.57 drams common salt. The whole is colored with a little Prussian blue, and sold at 50 cents per bottle, which afford a nice little profit above the expense of labels, advertising etc. The same number of this journal exposes an eye balsam sold by a widow Müller in Berlin, which is warranted to cur very form of eye disease. It consists simply of 3 grains ox ide of mercury (red precipitate) and 2.5 drams strong, unsalt ed butter. This old and well known salve is sold in boxes holding about 3 cents worth for the modest sum of 15 cents. From this statement it will be seen that the German quacks are satisfied with smaller profits than our people; for it is not long since a Philadelphian firm had the audacity to put up less than a cent's worth of cariolic soap and sell it for 25 cents as a sure protection against small pox.
The composition of the article called Dr. Pierce's altera ive extract or "Golden Medical Discovery" is given as fol lows: 4 drams purified honey, 15 grains extract of poisonous ettuce, 30 grains tincture of opium, $3 \cdot 5$ ozs. dilute spirits tasting like fusel oil and wood spirits, and about 35 ozs. of water. Ten cents worth of this trash fells for $\$ 1.00$.

## The Cincinnati Industrial Exposition.

The fourth yearly Industrial Fair will open in Cincinnati on the 3rd of September and close on the 4 th of October. We tak this early opportunity of calling to it the notice of our readers generally, and of suggesting that they prepare their conributions in due season. The exhibition, we are informed will be one of the largest and most extensive yet held in the West, and will form an excellent medium for Eastern man facturers to introduce their new products to the people of that great section of the country. Rules, premium lists, etc., may be obtained upon application.

New British War Steamer.
An event of interest recently took place at Chatham, Eng. in the launch of the Raleigh, a ship built, not, as the major ity lately constructed, to offer great resistance to shot and shell, but with a view to combine great speed with a very heavy armament. She is therefore built of iron, sheathed with wood and coppered, and lined with brown cardboard as being less likely to splinter,and also less inflammable than timber; andher dimensions are: Length, 298 feet; breadth 48 feet 6 inches; draft of water, forward, 20 feet: aft, 23 eet; tunnage, 3,210 tuns; armament, upper deck, two 12 tun guns, four 64-pounder guns: main deck, fourteen 90 cwt. guns, two 64 -pounder guns; horse power, 800 ; crew, 530 ; and she is estimated to cost, when entirely finished, about $\$ 1,000,000$.

A shell which exploded recently at the shell foundery a the Royal Arsenal, Woolwich, when placed in a cupola for being melted down, is believed to have been a 600 pounder for the 11 inch gun, a conical projectile constructed on the Palliser system which had been returned from the prac tice ground at Shoeburyness. The roof and skylights of the adjacent buildings were damaged more or less by frag ments of coke and chalk thrown up from the furnace by the force of the explosion, but the mischief done is comparative ly trifling.

A Genius in New York has notified the Post Office de partment that he has applied for a patent for printing two or more advertisements on the new postal cards. He wishe he may get the patent, but probably he won't.

## A NOVEL MODE OF MARINE PROPULSION.

M. A. Huet, a Dutch civil engineer, has invented a ma rine carriage; or, in other words, he proposes to propel a locomotive, with its train of cars, over the surface of a canal or river at as great a speed as upon a railway on land. How this result is to be accomplished our engraving illustrates. The locomotive and cars are separate vehicles, and each rests on a number of cylinders placed as represented, and arranged to revolve freely on axles. Each cylinder is a paddle wheel, the buckets of which are placed parallel to its axis, and are bent upwards so that the lower portion of the curve strikes the water nearly parallel to its surface, thus tending to lift the superstructure upwards as well as propel it forwards. The inventor suggests that some of the paddle wheels may be constructed with floats arranged spirally: those on one side of the car b. ing inclined in one direction, and those on the opposite side in the other, so that the wate
be thrown obliquely outwards to the rear.
be thrown obliquely outwards to the rear.
The motive power is supplied by a small double cylinder engine placed horizontally upon the boiler upon the platform of the locomotive. The machine is of the simplest form. The piston rod actuates a shaft on which are driving pulleys, from which, by means of a belt, motion is communicated to the two rear paddle wheels. These are connected by an endless belt other cylinders which are thus rotated. Steer ing is accomplished by going ahead with the paddle wheels on one side, and, if necessary, reversing the others, according to the direction to be taken up. A number of rudders may also be arranged, one in front of the locomotive and the others in rear of the cars. The platforms of the vehicles have rounded ends to admit of their turning curves, and springs are provided above all the axles to lessen the vibration caused by the paddles striking the water.
The inventor states that the machine can be quickly stopped by arresting the motion of the engine. The train, which when moving is slightly lifted up by the downward action of the paddles, then increases its draft of water, becoming more submerged, and so opposes a larger surface of resistance to the fluid. Consequently its momentum is quickly overcome. For sudden stoppage, broad boards are to be dropped at right angles to the line of advance, and the same are also to be used at either side of the vehicles when
they are running with the wind abeam, in order to prevent they are running with the wind abeam, in order to prevent
lee way.
The plan, we think, would be plainly impracticable in a The plan, we think, would be plainly impracticable in a
sea way, while the probability of the cars remaining upsea way, while the probability of the cars remaining up-
right, even in smooth water, during a strong wind seems to us very slight. The practical feasibility of the idea remains yet to be demonstrated.

## NOVEL RAT TRAP.

The Spanish Inquisition, among its other diabolical imple ments of torture, had a life sized figure, sumptuously dressed to represent some female saint. After a victim lad been put through the usual course of rack, hot pincers, etc., he was requested
to kiss the image. The moment, however to kiss the image. The moment, however, he began his osculatory performance, the dummy extended its arms, enfolded him in an embrace which was lined with dagger
points, and then, a convenient trap door opening, dropped him into unfathomable depths below.
This rat trap is something on the same principle, only the rodent is drawn to his doom through his unquenchable appetite for cheese. A dummy rat is constructed of any material to closely imitate the real animal. From his nose extends the rod, B, to which the bait, $A$, is affixed. D is another rod surrounded by a coiled spring, one end of which catches in a projection in the rod, B, and the other emerges $\grave{a}$ posteriori, and serves for a tail. C is one of two long needles barbed at the ends, fastened to the rod, D , and protru-
ding from the eyes of the imitation animal. ding from the eyes of the imitation animal.
The genuine rat, smelling the bait, perceives The genuine rat, smelling the bait, perceives
it under the nose of a rival. He immediate it under the nose of a rival. He immediately prepares to
capture it, collects his energies, makes a rush, and the trap. The keen points shoot forth from, and springs the artificial mons points shoot forth from the eyes of barbed ends holdster, bury themselves in his body, and the the cheese at his leisure. J. W. Ellis, patentee, of Pittsburgh, Pa. offered greater security but this proves not to be the case:


## A NOVEL RAT TRAP.

at least five hours, though generally a good deal more. Rape oil, in fact, took over six hours at $170^{\circ}$. The temperature of
$130^{\circ}$ was employed in the case of the Gallipoli oil, and also in the following instances: Castor oil took over a day before ignition; lard oil took four hours; salad oil, one hour and forty
all.
Mr

Mr. Galletly considers that the heavy oils from coal and shale tend remarkably to prevent the oxidation described, by protecting the tissue from contact with the air. It appears that the so-called spontaneous action of oiled cotton divided condition to the oxidizing action of the air. In point of fact it is the same action that causes the bloom in some of the direct processes for the reduction of iron to revert to the oxide when exposed in a heated state to the air, and the still more remarkable action that is said to have taken place in the iron removed from the Mary Rose, which had lain at the bottom of the sea till it became eaten into a porous condition. It appears to have been hoped that silk waste might have
and wrung out, if exposed to a temperature of $170^{\circ}$, set up oxidation so rapidly as to cause actual combustion in 105 minutes in the case where the action is slowest. The quantity in this instance was sufficient to fill a box 17 inches long by 17 inches broad, and 7 inches deep, but unfortunately it is by no means necessary that the waste should exist in any such bulk, a common lucifer match box full igniting in an hour in a chamber at $166^{\circ}$ Fah.
Raw linseed oil ignited less readily. The experiment was made in a smaller case than the first one above mentioned. Active combustion took place in four or five hours. Rape oil and Gallipoli olive oil ignited somewhat less readily, taking


## A NOVEL MARINE PROPELLER

Philadelphia butter is a luxury which probably a very arge number of our readess know only by name, and which, large number of our reades know only by name, and which,
like the Devonshire cream of England, is believed unattain. able save in the immediate neighborhood of the place of its production. Although this idea is doubtless correct regarding the latter delicacy, still it is not true of the far famed gilt edged" butter of our sister city; at least so says a correspondent of the Practical Farmer, from whose letter we extract the following hints, by observing which, we are ssured, the genuine article may be made:
Premising that good cows-Jerseys are the best-and excellent feeding and management are secured, the following essential points must be noted. Stable, milking sheds, and spring house must be clean, well ventilated and free from all noxious odors. The milk must be skimmedsoon enoughafter milking to obviate all danger of moldiness or absorption of the results of fermentation. This must depend largely upon the experience, judgment, and observation of the person in charge, though perhaps the best rule is to skim at the precise earliest moment when all the cream can be procured from the milk. Keep the vessel containing the cream down to a low temperature, stirring it daily with a long handled wood spoon. This low temperature for the cream, so as to avoid all dangers of fermentation, so as to avoid all dangers of fermentation,
is very important. Avoid what is called is very important. Avoid what is called
washing the butter, as the fine flavor is thus washing the butter, as the fine flavor is thus temperature that, at the point of turning temperature that, at the point of turning
into butter, it will come hard; and this is into butter, it will come hard; and this is entirely within the controlof the dairyman, by throwing in either lumps of ice or pounded ice at the critical moment, and giving the churn a few more turns, so as to lower the temperature of the mass, and allow the butter to be taken out hard. If this is not done, and the mass of butter is soft or oily, it cannot be properly worked and will never make a good article. Two workings are required, one on taking out of the churn, to get rid of most of the buttermilk, when it is salted and laid away for two or three hours. The final working is hen dona on the butter table, ten ortwelve pounds at a time then done on the butter table, ten or twelve pounds at a time,
or on the butter worker. A fine muslin cloth is wrapped or on the butter worker. A fine muslin cloth is wrapped
around a fine sporge, with which the flattened out surface around a fine sporge, with which the flattened out surface of each lump is patted till everything like buttermilk or
water is absorbed. The sponge and cloth are, of course, water is absorbed. The sponge and cloth are, of course,
from time to time, wrung out as needed. The sponge is a from time to time, wrung out as needed. The sponge is a
powerful and thorough absorber-nothing equals it in this powerful and thorough absorber-nothing equals it in this
respect. The salting is at the rate of two thirds of an ounce espect. The salting is at the rate of two thirds of an ounce
to each pound. Butter may be worked too much, and it may be worked too little. It must be solidly and neatly printed, have a fine white muslin wrapper around each pound or half pound, and be delivered in market as solid as when it left the spring.
little powder in the center of silk waste igniting in an hour while under the same conditions powder enveloped in cotton only fired in an hour and a half. The silk of course did not itself fire like the cotton, but this would be a matter of little moment, unless the quantity of powder in its immediate locality was very small indeed. It is important to note results which may be of such importance to shops, and other factories than those for powder. It is to be regretted tha nothing more encouraging can be drawn from them than the nothing more encouraging can be drawn from them than the
caution not to leave oiled waste about, even in the smallest quantities, especially in warm places.

The Oneida Community has, according to the Circular been recently exercised by the posting upon its bulletin c the following conundrum: "Why does a spinning top, at the close of its whirl, apparently go into a motion in the opposite direction from that in which it started ?" This inqui ry set all tongues in motion, men, women, and children, and the discussion is doubtless still in progress.
The new railway from Joppa to Jerusalem conveys pas sengers through in two hours. The romance of traveling in the Holy Land is forever gone.
theory. If it was in the vicinity of coal, in The soil is sand and gravel, with blue clay beneath. The tube was with withdrawn and sunk in another place to the depth of 70 feet, when rock was struck, but no water wa found.

The ${ }^{6}$ scientific American", Cubically Considered. C. J. F. writes to say that he has collected his numbers of our journal, from its birth, from his shelves, and finds that the pile measures forty-three inches in hight. He could not but be gratified to think how considerable was the knowledge he had acquired by reading such a mass of information, obtained at so small a cost.

## Treating Hardened Leather.

A. J. B., a practical man, says: "Mineral and vegetable oils are of no use on leather, and fish oils destroy leather when used pure. One part fish oil to three parts neats' foo is good for common half finished leather: but for highly finished leather, pure neats' foot is best. The white or yellow neats' foot oil is the proper sort; the reddish is adulterated Sheep's foot oil, nearly white, is better still. If leather valves, etc., are made of half cured hides, they become converted into horn, and will stay in that condition. To soften hardened
leather: Wash in lukewarm water with a little soap, use a wooden-backed brush with short bristles, as used for washng horses; scrape off the dirt and outer skin with a blunt knife. Keep on this treatment till the hide is half saturated; then twist, turn and roll the leather with both hands till all the pores are open, and work them well; if you see small cracks on the surface, good; if the leather splits, it is rotten. While the leather is damp, begin to rub in the oil with a brush as before described; use a little oil at a time and apply four or five times, and work the leather well with the hands after oiling. Set it in a hot sun for half an hour, and then put in a damp place with a wet sack over it. To keep off rats, invert a wooden box over the heap. Oil and work again the next day, and for many days after; and then compare with an old pump valve, and observe the difference."

## THE WONDERS OF THE EGG.

Professor Agassiz recently delivered a most interesting lecture at the Museum of Comparative Zöology, Harvard lecture at the Museum of Comparative Zorsity. It was profusely illustrated by specimens from the shelves of the museum. We take the following report from the New York Tribune:
The Professor said: The formation and growth of the egg and its fecundation prior to the formation of the new being are among the most mysterious processes of the organic world. The eggs laid by different kinds of animals are themselves so various in size, form and appearance that it is difl cult to believe they are all one and the same thing. Look a cup. It is the egg of an extinct bird found at Madagascar (the epiornis), the largest bird's egg known. Compare it with the egg of the humming bird, smaller than a hazel nut, scarcely larger than a small pea. In form and general aspect the difference,even among birds' eggs, is endless. Some are elongated, some are spherical, some are dull on the surface, some are polished, some are dark, others gray or white, others very bright. The number known is large. Ornithologists are acquainted with about 5,000 different kinds of birds' eggs While they differ in detail, the general pattern of birds' eggs seems the same. The outside shell is brittle, and within there is a lining membrane covering the white, while in the center is the yolk, differing in dimensions in different species of birds as much as the eggs themselves. Quite otherwise, seemingly, is the egg of the mammalia. Those which are developed are never laid. As eggs they are microscopically small, and they undergo all their transformations within the mother. Yet their structure at some time or other, in an early stage of their growth, is the same as that of the egg in all other classes of animals.
Among reptiles the eggs exhibit great variety. The eggs of alligators are elongated, almost cylindrical, evenly rounded at both ends, and about the size of an ordinary duck's egg. The eggs of the sea turtle are about as large as a small apple, rounded, and have a flexible shell. Those of the snapping turtle are much smaller, but also rounded. Those of our terrapins are oblong, as are also those of lizards. Snakes' eggs are oblong and sometimes cylindrical in shape. Frogs and toads lay numbers of small eggs. They are dropped in the water like fish spawn, in large clusters or strings. The Surinam toad (pipa) carries her eggs soldered together like a honeycomb on her back. The alytus carries them between its legs, rolled up in a bunch.
Among fishes the eggs of different kinds differ amazingly in external appearance. Some of them would hardly be believed to be eggs at all. Take, for instance, the skate's egg. t looks like a flattened blackish leather bag, with four horns or handles at the four corners. The yolk in such an egg is the size of a walnut, or larger or smaller according to the species. All skates and sharks have eggs like these, though not all lay them, the young in many instances undergoing their development within the mother. The chimera has a still more curious egg. It is like a leaf made out of parchment. In the center ing the yolk. ng the yolk.
The number of eggs laid by animals belonging to the same class is again singular ly different. The eggs (or, as we call them, the spawn) of some fish are exceedingly small and are laid in large masses. The spawn of a single herring is made up of hundreds of thousands of the skate's egg. eggs. Other fishes lay only a few dozen at a time, and in some kinds they are of considerable size. Some fishes let their spawn fall into the water; others make nests for their eggs, and others carry them until the young are fully de veloped. Some catfish carry their young in the mouth till they can provide for themselves. Certain fishes carry their young along the gills and they go in and out at will through the gill cavity. Some carry them attached to the surface of the belly or under the tail, and among the pipe fishes, strange to say, this office devolves upon the males (syngnathus).

In the higher vertebrates the young are less numerous. A great many mammalia bear but one at a time.

Insect eggs are, as a general thing, too small to be per ceptible at a distance. The egg of a day butterfly is attached by a string to a twig. Those of certain water insects are kept floating by string-like appendages. The eggs of the pear wing fly are fastened by the frailest possible threads to the margins of leaves [ $a, a, a$, in diagram]. Those of the seventeen year locust lie side by side in rows in the branche of trees. Those of the socalled soothsayer (mantis) are deposited in large, elongated clusters which might be mis taken for a caterpillar at rest.

In the two other classes of articulates, in the crustacea (crabs, lobsters, shrimps, and the like), and in worms, the eggs vary less than in insects. He egs of The pearl in the crustacea they are wing fly (Chrysopa). always small, and are carried nder the tail.
In the type of mollusks we find great variety among the eggs. C. There are mollusk eggs which might easily be mis taken for birds' eggs, some of which are larger than most birds' eggs. At first sight ene would be quite sure that the egg of a bulimus was a humming bird's egg. Others again are very different from the eggs of any animal belonging to other types.
Here, for instance, is the long string of

egG cases laid by the pyrula,
every such case containing from 15 to 20 eggs, and some times more. Others lay clusters of eggs surrounded by an egg case. The periwinkle lays an immense mass of eggs, larger than the shell itself. Here are what are called sand saucers formed by the eggs laid by the natica. The mass of eggs is pressed out between the shell and the soft parts of the animal, which at the moment are so expanded and pro truded as to cover the whole surface of the shell. The mass of eggs thus laid is molded as it were to the external form of the shell; and being laid while the animal is buried in the and, the sand accumulates upon them and forms the disk like shape. If you cut such a so-called sand saucer across, you will find minute eggs the size of a pin's head laid side by side throughout it, every egg containing, perhaps, from six to seven individuals.
Among bivalves there is not so great a diversity of eggs as among univalves. They are usually small, like spawn and generally retained by the mother.

## THE CONFIGURATION AND DIMENSIONS OF BLAST <br> \section*{FURNACES.}

We extract the following description and illustration rom Stölzel's work on metallurgy
In building a blast furnace, it is usual to make the exte ior either in the form of a quadrilateral pyramid, or a trun cated cone; sometimes, however, a conical superstructure is placed upon a pyramidal base. The shell, in many furnaces, rests on four corner pillars, the tops of which are connected by arches, or the pillars are surmounted by iron girders set in form of stairs. In other cases, the shell is supported by a ring wall and boshes, with a cast iron crest resting on pillars. In this latter arrangement, commonly use 1 in Scot land, the hearth is free and accessible in all parts. Some times the construction is varied by setting only the ring wall and boshes on pillars, the outer shell resting on a solid wall. In the truncated conical furnaces it is often customa ry, especially in England, to use a sheet iron mantle instea of one of masonry; the mantle then consists of rings or riv eted iron plates, and is lined with stone
 furnaces are still more important. The differences which ex-
ist in this may be seen in Figs. 1 to 12, in which the sections f various blast furnaces are represented.
Either these changes are made to suit the different pro cesses and the diverse natures of the raw materials, or els the different forms have been brought about by the absenc f any well known rules. In some instances the latter de ciency is easily seen; and so various are the forms employed hat we cannot attach much importance to uniformity in these structures.


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The hight of the shaft is, in charcoal furnaces, from thirt to forty feet, and in stone coal and coke furnaces, from forty to fifty feet, rarely more or less. Higher shafts are espe cially suitable for fuel (with the exception of anthracite) requiring a strong blast, for uncalcined and refractory ores and or unburned limestone; this is owing to the fact that the eat is better utilized in tall furnace. Yet there is a tain limit to the hight, because (1) the materials forming the lower courses would be weakened by the superincumbent weight, and (2) on account of the resistance which a hig column offers to the passage of blast and gases, a sort of


back pressure. Hence, in order to increase the capacity of a furnace, it is preferable to increase the width rather than the hight. The diameter of the furnace at its belly, or widest part, is from one fifth to one third of the entire hight of the tack; in charcoal furnaces it is from five to eight feet, in coke furnaces, from ten to sixteen feet, or even more; and he belly is set higher or deeper in the length of the shaft ccording to the time which the materials require to be subjected to heat before smelting, and according to the pressure of the blast. In recent times, the belly or largest part has ften been constructed in a cylindrical form, or in a slightly bent curve.


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The diameter of the stack at the top varies from one third to three fourths of the diameter at the belly. In small charcoal furnaces, it is often not more than three feet, while in coke furnaces, it may be twelve feet or more, In general, it is considered advantageous to use wider tops than was formerly the practice ; in the Hartz and in Sweden, the change has done excellent service. By narrowing the tops, the rate of outflow, as well as the tension, of the ascending gases is increased, and the heat is also drawn more to the point of exit; in consequence thereof, a part of the fuel is consumed where it is entirely wasted, and ores as well as fuel are not sufficiently prepared. This is especially objectionable where
refractory unvasted ores, poor fuel, and crude fluxes are used. Ans .ier drawback is that the narrow exits facilitate unequal sinking of the charge and prevent a quick combustion. Maranzoff, Truran, and more recently Rachette, have widened the top of the stacks so much that the dimensions of the furnace, contrary to the form generally in use, gradually increase from the base upwards; but how this extraordinary construction can be of use is a question which has called forth various views, and which can only finally be settled by practical ex perience.
For easily fusible charges and the manufacture of a white pig iron, free from silicon, Tunner still considers narrow tops, narrow belly, and a wide hearth, necessary, that the gases may reach the tension and temperature necessary for the reduction of the ores. It is evident that the capa city and daily production of blast furnaces must vary, with their dimensions and forms, from each other. For instance there are small charcoal furnaces with a daily production of scarcely two and a half tuns of gray pig iron, while the coke furnace of A. Schneider, at Barrow in Furness (Fig. 1.), turns out daily as much as ninety-seven and a half tuns, the maximum thus far obtained.
Boshes deviating at wide angles are to be avoided. Although facilitating the carbonization of the iron by retarding the descent of the intervals towards the hearth, it often occurs that a part of the charge remains on the boshes, unaffected by the heat; but with steep boshes the charges sink more rapidly and uniformly, and smelt sooner, especially if coke and a hot blast are employed.
The construction of the hearth, or that part of the furnace in which the carbonized iron is brought to a liquid, is of essential importance, as on it depends the quantity as well as the quality of the pig iron produced; and it must be adapted to the nature of the materials as well as to the blast, and in proper proportion to the capacity of the boshes. Narrow and high hearths concentrate the heat more than wide ones, hence they are especially used in smeiting gray cast iron and difficultly reducible ores, and with light coal and weak blast ; while wide and low hearths are found to be more suitable for white pig, readily fusible and easily reducible ores, dense coal, and strong blast. As the charges fall more rapidly in the latter, they are used wherever a large production is needed, the temperature necessary for the production of gray pig being brought about by a hot and concentrated blast, and by the use of a greater quantity of fucl, in case the ores need the addition. The hearth is generally of a cir cular, square, or oblong section, and it widens towards the top; and, as already mentioned, it is either free of access or is built solid, in which cass only the four arches leading to the tweer and the side where the door is remain open. In the first instance, the hearth is easily accessible in case of repairs, and it can be cooled by the air, which is desirable, for it has, of all the parts of the furnace, to endure the greatest heat, and hence is most subject to destruction. Cool ing is sometimes effected by surrounding its sides as well as the boshes with hollow iron water boxas, through which a current of water circulates; sometimes the sides are kept merely moist on the outside by slowly dripping water. However, such a protection requires a larger quantity of coal for maintaining the necessary temperature in the interior of the furnace, and is likely to cause explosion if the water, by ac cident, penetrate through into the melting mass.

In many furnaces, especially in those for making white pig, a hearth is not used; and other conditions being equal the temperature in the melting zone is thus decreased; the boshes are here made steeper and the belly higher up the shaft. We find this construction especially in many blast furnaces in Wales and Scotland, using ores found in the coal formation; and sometimes also in the furnaces of Sty ria, which use readily fusible spathic ores and brown iron ores.

To Train Fuchsias.- When a slip has grown six or eight inches high, nip out the top down to the last set of leaves; it will then throw out branches on each side. Le these grow eight or ten inches; then nip them out as before the tops of each branch, when grown the same hight as the others, nip out again; then procure a stick the size of you finger, eighteen inches in length; take a hoop skirt wire twine back and forth alternately, through holes made in th stick equal distances apart ; place this firmly in the pot back of the plant, tie the branches to it, and you will have, when in
flower, a beautiful and very graceful plant.

Ammonia for Verbenas.-The sulphate of aminonia is an excellent manurial liquid to apply to verbenas and other flowers, giving to the foliage a dark green, luxuriant and healthy appearance. It is economical, clean and easily appli ed. Prepare it in the evening before using, by dissolving one ounce of ammonia in two gallons of water. It may be applied with safety about once a week.

A fish, $3 \frac{1}{2}$ feet long, with a slender eel-like body and a large head with a mouth like a crocodile's, has been brought to San Francisco, says the Mining and Scientific Press. The teeth are sharp and transparent, sloping backwards from the jaws. Immediately back of the head commences a larg wing-like fin, about six inches high when erect, which run the length of the back. The fish was found dead at Hum boldt Bay, and is preserved in alcohol.

An old lady said to her sons: "Boys, don't you ever spek erlate or wait for something to turn up. You might as well go and sit down on a stone in the middle of a medder, with a pail twixt your legs, and wait for a cow to back up to you to be milked."

## Curreppondeute.

## Working Steam Expansively

To the Editor of the Scientific American:
I have a few ideas in regard to steam engine economy which I wish to be made public through the columns of your valuable paper
There are but few, if any, steam engines in use that util ize the full expansive force of the steam; nearly all use steam expansively to some extent, but in most cases there is but a small percentage of its force utilized. For the purpose of showing the great waste of power in nearly all of our machine shops, manufacturing establishments, saw mills, etc., I submit the following table, showing the comparative power of engines using the same amount of steam, steam pressure at 100 lbs. and an engine cutting off at full stroke being taken as giving a unit of power:
Cutting off at full stroke will develop

| 1 unit of force. |  |
| :--- | :--- |
| 1.13 | "، |
| 1.28 | "، |
| 1.40 | $"$ |
| 1.71 | $"$ |
| 2.23 | $"$ |
| 2.71 | $"$ |
| 3.60 | $"$ |
| 4.48 | $"$ |

An engine cutting off at less than one eighth of its stroke will not utilize as much force as an engine cutting off at one eighth of its stroke, as steam at 100 lbs . pressure, expanded into more than eight times its volume, will be at less than atmospheric pressure
In a common slide valve engine, the pressure on the valve and the imperfection of the exhaust render it impracticable to cut off at less than two thirds or three quarters of the stroke. Now, if we can have the induction and exhaust valves independent of each other, we may change the cutoff without deranging the exhaust. The engraving represents a vertical section of the interior working parts of such an engine. I I represent the induction valves, and E the escape. The valve at the left being open, the steam passes from the steam chest, S S, through the valve to the cylinder, and the escape, being open on the other side, allows the steam to pass from the other end of the cylinder, through the valve, E, and the escape pipe, P. The valves move in orbits, and

hence the motions are rotary. The valves are moved, bu the width of the port thus reduces the friction. There is but a portion of the valve (equal to the area of the port) ex oosed to steam pressure, and this is partially balanced by the pressure on the same amount of surface from the cylin der. Now if by a certain mechanism the induction valve may be made to open and cut off at one eighth, one sixth, one quarter, or one half of the stroke, and the escape remai open during the whole of the stroke, would there not be a
great increase of power? I have a mechanism by which these great increase of power? I have a mechanism by which these
ends may be accomplished. I have written this for the pur ose of eliciting the criticism of some one of experience, a my knowledge is wholly theoretical.
C. H. C.

Remarks by the Editor:-Our correspondent has fallen nto an error, which has already led to the fruitless expendi ure of vast amounts of time, thought, and money. Al though his statement of the relative powers developed by team of the different degrees of expansion noted is, in the abstract, correct, he would find (were he to test the matte xperimentally, as has already been done by others) that in practice the anticipated economy never follows the use of
highly expanded steam. Losses by radiation of heat, by leakage, and above all by internal condensation, become far reater in proportion to the quantity of steam used, where great expansion occurs, than with steam "following" fur re so great, finally that there is soon reached a limit, in ordinary engines, beyond which no gain results from further expansion. Chief Engineer Isherwood, of the U. S. Navy, in whose ability and accuracy as an experimenter we have the greatest confidence, although differing widely with him in our deductions from his recorded results, found that the aximum economy, in the ordinary marine engine, occurre ith the cut-off at about four tenths the length of stroke, and this conclusion was confirmed by later experiment.
With jacketed cylinders, higher piston speed, and higher team pressure, a shorter cut-off is allowable, and great econ omy is realized, as is seen in the "compound" or "double ylinder" engines now so rapidly coming into use.
Our correspondent, were he to build his engine, would therefore be likely to find himself sadly disappointed in the
result expected from a short cut-off. Again, the best engines in the market, if of sufficiently large size to justify the expense of such valve gear, are now invariably provided with independent steam and exhaust valves, and are capable of expanding to any desired extent. In first class engines, the point of cut-off is adjusted by the governor, a requisite which has escaped the attention of our correspondent.
The most intelligent, practical, and best educated engineers in the country have been studying the use of steam for many years, and are now far alead of our correspondent in both theory and practice. They understand the requisites of economy and the methods of securing it, and, as a consequence, the American stationary engine leads the world, and is copied by all the most enterprising builders of Great Britain and the continent of Europe

## A Pennsylvania Gas Well.

## To the Editor of the Scientific American

I wish to give you some description of a gas well here in the Butler county oil fields. It is situated about two miles from the village of Fairview, and was drilled last June in search of oil. It was put to the depth of 1,200 feet and was abandoned on account of a strong flow of salt water and gas; so much came out that the boiler that made the steam had to be moved to a distance of 25 rods. After the well had been abandoned about two months, the pressure of gas became so strong that it forced the water entirely out of the hole, and last fall a company was formed here to utilize the gas, which was done by bringing it through $3 \frac{1}{2}$ inch pipe here to Fair view and thence to Petrolia, three miles from Fairview. The gas will be used to light and warm both places. I visited the well in company with two other gentlemen; the gas is taken out of the well through 3 inch pipes into an old fash ioned two flued steam boiler; upon the boiler is placed a steam gage which indicates a steady pressure of 80 lbs . The boiler has also upon it two safety valves steadily blowing off also a cock in the boiler of one inch in diameter open all th time. This well has also an escape through a 6 inch pipe, the noise of the escaping through which can be heard readily for a distance of two miles. I was told by a gentleman her that the main discharge was closed for a second of time, when the indicator on the steam gage instantly flew around to its utmost capacity, which is 250 pounds. This well is a great curiosity to the neighborhood.
W. E. P.

## To the Editor of the Scientific American

On page 193 of the current volume of the Scientific American, appears an article on lens fires, which reminds me of an affair that was reported in the daily papers eighteen or twenty years ago; and believing the subject is entitled to more consideration than most people imagine, I send you the ubstance of the event alluded to
A legal gentleman, in one of our large eastern cities, upon entering his office one summer morning, found the loose papers on his table just starting into a light flame, which surprised him greatly, as there was no fire in the room a that time, neither was it apparent how they could have ignited from any external cause, the windows being closed. This happened several mornings in succession, but one day he arrived at his office earlier than usual and succeeded in de tecting the origin of the fire. Sitting at his table, he felt a burning sensation upon one of his hands, which gradually increased until it became insupportable; and on looking a the window through which the sun was shining, he noticed hat one of the panes of glass had a bubble or flaw in it which erved to concentrate the rays of light in the same manner as a burning glass, and with sufficient power to ignite paper in a few minutes. The dangerous pane was at once removed, and with it the cause of a "mysterious conflagration."
J. H. L.

Sugar Manufacture in the Sandwich Islands. To the Editor of the Scientific American:
The sugar planters of the Sandwich islands have had, and many of them are now having, a hard struggle for life. Many of us had had no experience in the sugar business when we commenced our plantations; and what little knowledge we have now has been attained only at great expense and los f time and material. I have received many valuable hint from your paper, and would like to see more upon the sub ject of plantation sugar making. My plant consists of 500 allon clarifiers, precipitators, an open train, a steam leac nd a vacuum pan. I want to know how best to apply sul phurous acid gas to the cane juice in order to check ferment tion and bleach the sugar. Also, whether sulphate of baryt used for precipitating the dirt in the cane juice? If so how should it be applied, and in what quantity?
. L. Austin.
Onomea Plantation, District of Hilo, Hawaii, Sandwich Islands.

## Low Water in Steam Boilers

To the Editor of the Scientific American
Reading the many articles in your paper on boiler explosions, and especially on the law water question, I venture to ive my views and experience which, perhaps, may benefit ome of your readers. I once attempted to raise steam and pump up a two flue 40 inch boiler with water only just up to bottom of the flues; but before I got 15 lbs. steam, I heard report like a pistol shot; and on looking under the boiler I saw the third sheet cracked from about two inches below the water, running up about a foot, and the water squirting out like a saw blade. The sheets were not overheated, for I had fired very slowly and carefully. I claim that it was caused by the expansion of the flues. I think that a boiler,
with water enough in it to protect any considerable part of $t$ and yet let the flues become hot, must be subjected to strain sufficient to open any weak places in it without the aid of internal pressure.
I am now running a boiler, similar to the one above re ferred to. The feed water enters through an ordinary stand pipe, near the back end. The engineer let the water get low and then crowded on the pump. The result was that one of the flues cracked for about 4 inches across its bottom just where the feed water strikes it. A boiler maker repaired it by putting on a soft patch, that is, a plate screwed on with red lead under it and it does very well. But on one occasion since, the water was low again, and it leaked as at first, but the pump was kept going, and when the flues were covered t stopped. These cases, and others of the same nature which I have known to occur, lead me to believe that a large per cent of explosions are due to expansion.
East Pascaquola, Miss.
P. Berger.

Discriminating Flax and Cotton Fibers. To the Editor of the Scientific American:
On page 194 of your current volume, Mr. C. R. Stodder says: "No chemical tests are known to distinguish flax from cotton fiber." Allow me to refer Mr. Stodder to the Scientific American, Vol. XIII, No. 3. "These two fibers are distinguished by rosanilin, or fuchsin. Loosen one end of a piece of linen so as to separate the woof and warp, and dip it into an alcoholic solution of fuchsin; wash in water as long as it colors the water, and then putit in weak ammonia. The ammonia will discharge the fuchsin from the cotton fiber but not from the flax, so that the cotton thread will become nearly white, while the flax retains its red color." This is Böttger's test.
H. M. Wilder. Philadelphia, Pa.

## AMERICAN LOCOMOTIVES.---THE BALDWIN WORKS.

 Let a man stand beside a railway when an express train thunders past at forty miles an hour, with its ten or twelve heavy coaches and sleeping cars; and, if he does not feel mingled sentiments of awe and admiration, he must be very unimpressible. Grade or level, straight line or curve, all are alike; it whirls over one and round the other, never ceasing in its energy for a moment.The modern locomotive is truly the most wonderful of all man's inventions; and though many may gainsay this, and moint to another triumph of ingenuity as its peer, we think, point to another triumph of ingenuity as its peer, we think,
when all its complex parts and the functions they are called when all its complex parts and the functions they are called
on to discharge under trying circumstances are considered, on to discharge under trying circumstances are considered,
the locomotive engine will stand out as one of the greatest the locomotive engine will stand out as one of the greatest
of man's works. It is not alone required that it shall be powerful and capable of drawing great loads, but it must be enduring; it must adapt itself to the work required of it; it must be rigid and yet capable of a certain flexibility in its parts. It must ride on its springs and yet hold firmly on the track; its driving machinery must be permanently attached to its boiler and yet in a certain sense entirely independent of it; and the whole of the vast machine, although exercising the most varied and opposite powers, must be so designed as to work harmoniously together. One end of it-the furnacegenerates the most intense heat while the other end is comparatively cool. One half, so to speak, the boiler, is undergoing tremendous internal and external pressure from the force of expansion and the steam within it, while the other portions have no strain whatever, except when in actual operation. When it is in oferation, suddenly the driving machinery is called upon to not only carry and withstand the burthen of the boiler and its duties, but to transmit force in an entirely different direction; to do it economically and constantly, in all temperatures and all atmospheric changes; through dust and drought, and at a velocity of twenty or forty miles an hour as the case may be. It has not only to withstand its own internal forces, which tend to derange it, but also encounter others which it would seem impossible to provide against. Think of a mass of intricate machinery, thirty tuns in weight, in motion all over, hurled at the rate of forty miles an hour over the face of the country, and then consider whether our claim is extravagant.
If such a specification as the foregoing were handed to an inventor at the present day, and he were requested to provide a machine to comply with the conditions, he might be pardoned for some incredulity as to the sanity of the man who drew it. It is a thing of slow growth, the modern locomotive
From the rude germ of the first high pressure boiler and engine mounted on wheels has sprung, piece by piece and detail by detail, the present magnificent and wonderful machine, a piece of mechanism, capable of drawing-in the
case of the heaviest machines fifty tun engines-forty times case of the heaviest machines fifty tun engines-forty times its own weight. Without apostrophizing the locomotive further, let us look into a modern locomotive shop-the
largest of its kind in the country-and see what is being done there, and follow hastily the details necessary to produce such machines.

The Baldwin Locomotive Works of Philadelphia has a world-wide reputation for its engines; and, being recently in that city, we were accorded permission to visit them. The concern has been in existence nearly forty years, and in that
time has built engines for nearly all quarters of the civilized globe. At the present time the average rate of production is nine complete engines per week. Of these, some are for
home use and some for foreign countries, but the essential home use and some for foreign countries, but the essential
character of them remains the same. All are built according to well known plans and specifications, such as have been proven and found reliable. Respecting those for foreign
countries, the works are now just finishing a number for Rus-
sia, which are of the usual American type of wood burning engines. Some months ago the company sent a number of engines to Russia to show engineers in that country how to
use their anthracite coal, of which large veins exist in the use their anthracite coal, of which large veins exist in the
southern part. Until the advent of these machines, the southern part. Until the advent of these machines, the
Russian capitalists had become quite skeptical as to the possibility of utilizing the coal, for their own mechanics had essayed the solution of the problem in every conceivable type of boiler and grate, only to abandon them all. The intense heat generated burned out all their appliances, and it remained for American engineers to put the American locomotive in successful operation. The result is that large orders may be in time expected from the country, and it is to be hoped that the Baldwin Works, who, if we are not in error, were the pioneers in this enterprise, will reap some profit, the first venture beingquite unprofitable. The Rusprofit, the first venture beingquite unprofitable. The Rus-
sian mechanics were so dilatory and slow to comprehend that sian mechanics were so dilatory and slow to comprehend that
a force had to be sent out from the Baldwin Works to erect a force had to be sent out from the Bald
the machines and put them in operation.
Of course, in making such a number of engines as these works turn out-over 450 annually-the greatest exactness and rigid attention to system must be observed, else all would be confusion. Therefore, as the first step toward getting machines under way, systems of "cards" or specifications are provided for the guidance of the foremen in charge of the several departments. For example, the superintendents, or parties immediately in charge, decide that engines of such a type must be ready on the 20th day of May. Immediately upon this decision, the schedule for so many crossheads, so many feed pumps, so many guide bars, rocker arms, links and reverse levers is made out and handed $t$ the foremen in charge of the shops where these parts are made, and the date is mentioned when they are to be delivered to the company-say for April 5th. The same plan is observed with all the otherdetails, parts, and appurtenances and it is found to work harmoniously and satisfactory. It
has the great merit of reducing every foreman to his own has the great merit of reducing every foreman to his own
place, or, more properly, of confining his attention to his own affairs. It will readily be seen that the foreman knows nothing as to whether the parts he makes are needed now or next year, but that all he has to do is to make them out of the material furnished. He cannot say, as some might: "Why, they don't want these now ; the boiler ain't made yet," and then give his attention to what he thought most satisfactory; but he does the work he came to do, and leaves the direction of it to the persons who undertook that department. 'This is really the secret, if it is a secret, of the possibility of making nine or more engines per week. Without it the other vast capabilities of the works would go or nothing
The usua
The usual routins of machine work is so well known and familiar that we shall not attempt to describe any "ponderous shears that bite cold iron as a cat does cheese." These and kindred machines have no especial novelty in them, but there are some points about the system employed in duplicating work which are worthy of attention. A routine similar to that observed in the manufacture of sewing machines and pistcls is practiced wherever possible. For example: All engines of a certain type have their details exactly alike. For such machines a system of "jigs," or cast iron frames, are
provided, which have holes in them wherever the part under execution at the time should havethem. These jigs are, therefore, merely bolted on to the rough casting-the crosstherefore, merely bolted on to the rough casting-the cross-
head for example-and the drill operated through the hole head for example-and the drill operated through the hole
in the jig. There is no marking off or "laying out," and no possibility of making any mistakes. Similarly in regard to the jaws of the crosshead. A gage or templet is put over the end, clamped in its place, the whole put into the planer together, and the surfaces reduced until the tool comes down to the gage. In this way, or by this plan, the matter of executing each piece exactly alike is reduced to a certainty. Every bolt, taper or straight, has its gage, merely a hole drilled in a block of cast iron, the exact length of the part the bolt goes into. Men don't run up and down stairs in the Baldwin Locomotive Works, trying bolts in holes in the frames, so anxious to make a good fit of them that they fail pany's time, and fit the bolts to the gages on their lathes; if they are right by them, they fit the holes the rimmers make. "So all things work together for good." All things that ossibly can be, are tested before they leave the works. The pumps, on which so much depends and which have so much
to perform, are all tried before they are attached to see if their joints are perfect. Nothing is left to chance. Every thing is looked after and seen to, and nothing is left to suppo-
sition. As our informant, Dr. Williams, remarked: "We sition. As our informant, Dr. Williams, remarked: "We
can't run on reputation one day; we try every day to do better work than the day before." And he is right. A locomotive is a machine which will not build itself or run itself, but if not carefully made will soon show it in all its parts. We specially noticed the boilers in these works, and can testify to their excellent and thorough construction. Every one is caulked inside as well as out, and we noticed, as we passed through the works, one man caulking the rivet heads in the bottom of the firebox frame. The engines made by this company are all "outside connected," that is to say, the cyl inders are outside of the frames. This practice is exclusive-
ly American in its universal application for all kinds of trafly American in its universal application for all kinds of traf-
fic, and seems well adapted to our wants. It is safe to say there are no inside connected engines built in the country today.
Also it is interesting to note how opinions vary with experience gained. In 1838 a locomotive with cylinders $12 \frac{1}{2} \times$ 16, weighing, loaded, $26,000 \mathrm{lbs}$., was believed to be as heavy as would be needed! It causes a tendency to smile now, in the mind of a railway man, to note this and the weights of
even switching engines. The heaviest engines the Baldwin Locomotive Works build are sent to South America, or, rather, the railways of that country demand the heaviest which have cylinders 20 inches diameter and 24 inches stroke. They have four pairs of drivers of 48 inches diameter, and a $^{\text {che }}$ total wheel base of 21 feet 10 inches. The weight on drivers is $87,000 \mathrm{lbs}$. and about $9,000 \mathrm{lbs}$. on the pony truck, the to tal weight being $96,000 \mathrm{lbs}$. An engine of this class will draw 2,000 tuns, grosi, on a level, beside itself and tender, and they have in actual use taken 150 gross tuns of cars and load up a grade of 145 feet to the mile, with sharp curves, at a speed of ten miles an hour and with a steam pressure of 110 lbs. ; also 268 gross tuns and load up a grade of 116 feet to the mile with 120 lbs . steam and at a speed of one mile in $7 \frac{1}{2}$ minutes. Engines of this class can run around curves of 400 feet radius, and even less.
The force employed in these works now amounts to 2,800 men of all trades. The pay roll will average $\$ 14$ per head. It is also interesting to note that, where American engine are brought in competition with foreign ones, they are at once able to prove their superiority, not only in point of workmanship, but in design and practical working. Many instances might be cited of the truth of this assertion, but
we content ourselves with only one, the Dom Pedro Raiiway of South America, where both English and American ma chines were eniployed, but the latter proved so superior that none others have been bought since 1863 .
The thinker may well ask: "What becomes of all the locomotives?" There is one factory in Philadelphia which makes 450 annually. There are three more factories in Paterson, N. J., which do not turn out less than 500 more. At Taunton, Mass., there are two which may make 200 more. One in Boston produces, or could produce, 200 more, and one in Manchester, N. H., 200 more; in Providence, R. I., 200 more; in Schenectady, N. Y., 200 more: to say nothing of smaller concerns scattered all over the country, and the repairshops of the railways, which also make no small proportion of their own work-an average of at least 1,500 locomo tives turned out yearly from the shops alone.

## Preparation of Sewage and Stable Refuse

Millions of dollars worth of valuable material yearly finds its way, from the sewers of our great cities, into the sea, serving no purpose except to contaminate adjacent waters, while sums, equally large, are expended by agriculturists for the regeneration of worn out soil by artificial fertilization. The collection of sewage presents no special points of difficulty, but its transportation to desired points is by no means readily accomplished. For this purpose an effective plan is greatly needed. One system, which we believe has plan is greatly needed. One system, which we believe has
recently been made the subject of a patent, ccnsists in comrecently been made the subject of a patent, cansists in com-
pressing the manure into cakes with dry peat, and covering the mass with soft clay or equivalent substance to preven fermentation and evaporation. The idea seems to be a feasible one, though we have no record of its being success fully put in practice.
Other patents have been granted for the preparing and baling of stable manure. This substance, in order to pre vent its otherwise too large accumulation, it is necessary to remove from city stables before the straw contained in it is in a sufficiently decayed state for fertilizing purposes. Consequently, the straw must be got rid of, and as it can be utilized for bedding for horses, or for the manufacture of coarse varieties of paper, it is suggested to winnow it out of the mass by means of a suitable machine. Then the resi duum is compressed so as to exclude the air, to which the heat and steam of manure is due; and finally the whole is covered with a coating of clay, plaster, or cement. Handles of wisps of straw for convenience in carrying and packing may be compressed with and so attached to the bale. The cakes can thus be readily stored in vessels with sufficient air space between them to obviate all danger of heating, while the use of forks and shovels is necessarily avoided.

## Edible Earths.

Dr. C. Schmidthas made analyses of the comestible earths of Lapland and Persia. One hundred parts of the substance obtained
contain

| Water, left at $100^{\circ}$ | 0.269 |
| :---: | :---: |
| Water, left at red heat | $0 \cdot 835$ |
| Aluminum | 40.797 |
| Oxide of iron | 0.310 |
| Magnesium | $0 \cdot 618$ |
| Lime | traces. |
| Soda | 1•829 |
| Potassium | 9.845 |
| Silicic acid, tr | 45.506 |

Silicic acid, traces of fluorine, loss, etc. ......
The inhabitants of the country mix this earth with th four from which they make the'r bread.
The edible earth found in Persia, and termed Gheli-Giveh, contains

| Carbonate of magnesium | 66.963 |
| :---: | :---: |
| Carbonate of lime | 23.634 |
| Chloride of sodium | $3 \cdot 542$ |
| Sulphate of soda | $0 \cdot 298$ |
| Carbonate of soda | 0.598 |
| Hydrated magnesia | $1 \cdot 311$ |
| Oxide oí iron | 0.092 |
| Aluminum | $0 \cdot 227$ |
| Silicic acid | 0.765 |
| Water combined at $120^{\circ}$ | $1 \cdot 153$ |
| Water | $1 \cdot 422$ |

Anthracemine.-This new base is one of the products of the action of nitric acid on anthracene. It appears as a very pale yellow pulverulent body, forming soluble and crystallizable salts with hydrochloric and sulphuric acids. Its composition is $\mathrm{C}_{28} \mathrm{H}_{11} \mathrm{~N}$.

## CART LOADER.

The object of the invention represented in our engraving is to obviate the hand labor of throwing the earth removed in grading down hills, excavating cellars, or making roads, into carts or wagons, and to substitute therefor a conve nient means of discharging the scrapers or other first receptacles directly into the ve hicle.
The frame of the device is of wood, and portions are broken away in the drawing to show parts otherwise obscured. A A are two trap doors in the upper platform, which are hinged at $B$, and which, when horizontal, are supported by props, C C These props are attached to levers, D D which are pivoted at E . To the outer ends of the levers are fastened chain which of the levers are fastened chains which communicate with an upright shaft, $F$, surmounted by a hand wheel. G G are springs pressing against the levers, $D$, and serving to hold the props under the trap doors.

The earth is transported to the upper platform and then dumped, and the receiving cart is placed directly under the doors. The operator then turns the hand wheel so as to wind the chain around the shaft, F , thereby pulling aside the props, C. The weight of the load then pushes down the doors, falls through, and is de posited in the cart. The doors are then returned to their place by the action of the springs, $H$, through the chains attached to them, at I, and are thus kept closed unless opened by a superincumbent weight. As soon as the chains are removed from the shaft, $F$, the props will be re-applied under the doors by the springs, D. Any convenient means may be employed to transport the load to the upper platform, either by wheelbarrows or through suitable machinery.
Patented through the Scientific Ameri can Patent Agency, February 11, 1873. For further information address the inventor Mr. Jesse ty, Texas.

## COMBINATION PADLOCK.

Mr. Joseph Kittle, of East Bend, N. C., is the inventor of the new combination padlock, represented in our illustration The device consists in a box and staple, the latter made with arms of unequal length, as shown. Upon the end of the long arm is formed a toe, A, which works in a recess in th body to prevent the staple being drawn out any further than is necessary to allow the short arm to be passed through the thing to be locked. B B are a number of rods which are in serted in transverse holes in the box in which they are swiveled in the vertical piece, C. In the side of the long arm of the sta ple, at points where it crosses the rods, B, when it is pushed in, are formed semicircular notches, which correspond with similar indentations in said rods.


When all the rods are turned so that their notches are to ward the long arm, the staple is unlocked and may be readi ly drawn out as far as the toe, A, will permit. This, how ever, cannot be done unless the operator knows how to make the proper adjustment, for 10 is evident that unles each rod is placed in exactly the proper position, the staple will continue to be held. To afford a means of indication, a disk marked with numbers or letters is attached to the outer end of each rod, by turning which, so as to bring one of the marks which is opposite the notch in a previously known position, the rod may be correctly placed.
Patented through the Scientific American Patent Agency Feb. 18, 1873.


## ATKINSON'S CART LOADER

sionally what I will call randon shots, sounding like the like appearance
sionally what I call randon shots, sounding like the firing of cannon; a few drops of rain fell at the time. I was
walking in the field with a bundle of small apple trees under my arm, when a vivid flash of lightning occurred, producing, as I thought, a rattling noise on the twigs of the trees under my arm. I turned round, but saw nothing unusual. In a few seconds a heavy report of thunder took place from about quarter of a mile distance, passing over head near to where I stood, but so high that I was quite sure it did not come to the ground. I was soon called to come to the house; when I got there I found a colored man, in my employ, in a kneel ing position on the ground and unable to stand up. From him I learned that, when the flash took place, he was walk ing through the yard near a large spreading elm with wooden pail (with iron hoops and a wire bale) filled with ater in his left hand. He felt a strange sensation, and staggered round in a circle; unable to let go of the pail, he found that his fingers would not open. All this took place before the report. He staggered along for about twenty steps, and then set down his vessel he knew not how. His left side received the heaviest part of the shock; he was not
able to work the remainder of the day, but next morning he able to work the remainder of the day, but next morning he had nearly recovered. From the observations of myself and others, it is clear that the electricity did not come to the earth Am I right in supposing that there were currents of electric ity ascending from the earth to the clouds, and that this man had become charged with the same and conseque shock when it left him? A similar thing has happened to ascending currents are active when lightning strikes the earth?"

## The Canal Navigation Problem

E. B. says: In your article on canal navigation, volum XXVIII, page 97 , you speak of the desirability of improve ments in the manner of working boats. I would suggest that the main propelling power be exerted by the screw in the stern, but that two smaller screws be placed at the bows working independently. By working one of the bow screws faster than the other, or by working one forward and the other backward, the boat may be readily turned. Boat should certainly follow each other in trains when possible, a a dozen boats in a train would meet with very much less resistance than as many mingly.

## Water Lined Cupolas

E T M . ave in Californin for melting ore water Hing te and oxide of copper with very economical rulta; but the decline in the price of copper put a stop to the business The furnaces would slag up about four inches thick and re main so, requiring no other lining; and very little steam was made, except above the melted part of the charge.
Monster Cannon.-Herr Krupp is to send to Vienna two cannons, which are the largest yet produced at his factory Both are of bronze; one is $22 \cdot 1$ feet deep, interiorly, $4 \cdot 8$ fee in diameter, and weighs 418 tuns; and the other is 13.2 feet in length, 4.9 feet in diameter, and weighs 50.5 tuns.

Colored Dresses--An Item for the Ladies. is not often that we find scientific items of any especial degree of interest to the members of the fair sex who may perchance, glance over our pages; but now we believe w perchance, glance over our pages; but now we believe we
have got one which must be simply absorbing. Probably, madame or miss, you are the possessor of summer dress, made from some white dia phanous material; and it may also be im agined that during your shopping you hav inspected goods of similar nature, only of varying colors, from which you have pur chased sufficient material to construct a num ber of those bewildering garments, in com parison with the intricacies of which the most laborate works of modern engineering fur ish no parallel Now, a learned Germa rofessor has invented a plan whereby your ingle white dress may be chanced as as you desireto any color you may fancy and his in your any and in your own laundy, so that hereafter money which you would devote to several bes of varying hues may be entirely saved, while you may appear daily, if you choose,
tollettes of totally differt nt complexion. The process is very simple, and consists in erely coloring the starch used in the "doing up." Suppose a white dress is to be tinted Deautiful crimson: three parts of fuchsin, an aniline color which any chemist can read y procure for you, are dissolved in twenty parts of glycerin, and mixed in a mortar with a little water. Then ordinary starch finely pulverized, is stirred in, and the thick mass obtained is poured out and dried on blotting paper. The powder thus obtained is used just the same as common starch, and so applied to the fabric. When the latter is dry it is slightly sprinkled and pressed with a moderately warm iron.
By means of other coloring materials, mixed as above described, any desired tint may be obtained. We should counsel, however, av avoidance of damp localities, and strongl deprecate going out in the rain, as we doubt the "fastness" of the dye, and" would no the "fastness" of the dye, and would no hortly assume a rather streaked and zebra e.

## Noisy Sewing Machines,

A. C. B. sends the following hint to the owners of sewing machines: Having a Wheeler \& Wilson, which I thought made more noise than necessary, although it is one of the most quiet, I examined it and found that one half the noise proceeded from the recoil of the feed works after making the titch. In five minutes I filed a dovetail in the end of the eed and inserted a thin slip of soft wood, which entirely kills the sound. If any one else wishes to reduce the rattling of their sewing machines to a minimum, let him try my plan.

## CULINARY BOILER.

Mr. Israel Kinney, of London, Canada, is the inventor of he novel form of culinary vessel represented in our illus. tration. The object sought is to provide a means of con ucting away vapors arising from the cooking article, so that they will pass into the stove and up the chimney, and thus not be disseminated through the house. This is effected by casting the side wall of the pot with a vertical recess, ex-

tending down from the top to the bottom, following the off set made by the pit. The outer edges of the recess, down to the plane of the offset for the pit, are formed with flange to receive a sheet metal slide, A, which closes the recess and preserves the circular form of the vessel, and at the same orms a flue. The vapors rising are drawn down through the atter, and thence into the stove. This improvement is ap plicable to all vessels used in cooking. Patented August $2^{7} 7$ 1872.

Saccharine Matter in Mushrooms.-A. Muntz says hat mushrooms yield a sirup, readily crystallizable, which presents all the properties of the sugar obtained from the manna of the East.


BOW BRIDGE, FROM THE NOOK ON THE SHORE OF THE LAKE. CENTRAL PARK, NEW YORK CITY. It is not very many years since the central portion of Manhattan Island was a wilderness of swamp, relieved only by great masses of arid and jagged rock. The inhabitants, principally emigrants from the
Emerald isle,lived in a state of primeval simplicity zand dirt, in ricketty sheds and cab. ins, which at once did duty as dwelling houses and as stables for an occasional cow and innumerable pigs and goats. A more
dreary and desodreary and deso it would be difficult to find; pools of stagnant water bred myriads of mosquitoes, miasmatic diseases raged unchecked, vegetation was loor and scanty; in short, the ultimate disposal of so large a tract of apparently value less land furnished a continued problem to all interested in the future improvement and growth of the city.
Such was the unpromishours in the afternoon in a beautiful pavilion erected for the purpose, and thousands of people gather to listen. Leading from the Mall to the Lake Level is the Terrace, a fine architec-
tural work of Nova Scotia stone, covered with elaborate
arving. There are finely executed bas
of Night and Morning, the Seasons, and other artistic deigns, all exquisitely chiseled der the hands of science and of art, the value lessand unhealthy waste became transformed into the most beautiful, if not the
For the benefit of our many readers who have never visited Central Park, we present herewith a few engravings from sketches of some of its loveliest portions. Entrance can be had at any of the numerous gates-so called by courtesy, for no actual portals are yet in existence-and we can follow our own fancy or the directions of one of the gray coated keepers in wending our way to the great central avenue or Mall. Here, leading in a straight line for a quarter of a mile, is a broad footpath, lined with rows of tall elms and a smooth lawn. On Saturdays, during ummer, an excellent band plays for several tural work of Nova Scotia stone, covered with elaborate
 rom the massive blocks. The lairs down which we pass lead to an arcade under the main Drive, the ceiling of RUStic seat and fountain which is inlaid with tile in mosaic work, the design and coloring beautiful in effect, and thence we step out on the Esplanade, a broad plateau on the shore of the lake. In the center is a great fountain, the bronze group belonging to which has not yet been placed in position. The lake is of almost entirely artificial construction, and covers twenty acres; and to see its beauties we must avail ourselves of one of the numerous gaily painted boats which glide over its surface. Now we pass a bold jutting rock which changes into a grassy slope, spreading far up the hill, then a clump of willows, the over hanging bows of which extend far over the water; then we shoot by an ornamental boat house, with its steps leading down to the water's edge; perhaps we glide in among a flock of swans and ducks, that tamely crowd around to catch bits of bread that we may throw to them. Then as we skirt the shore we catch glimpses of and just before our row is over we run
ing material from which it was decided to produce a park which should rival the celebrated pleasure grounds of England, and overtop in magnificence the Parisian Bois de Boulogne. Engineers were engaged, the ground was surveyed, and the itinerant population driven from its fastdriven from its fast
nesses. For years an nesses. For years an
army of laborers made army of laborers made
the great area, of 862 acres, a scene of continuous labor. Bogs and marshes were drained, beautifullakes replaced fetid pools, substantial roads took the place of muddy cow paths, and graceful bridges were thrown across precipitous ravines. Then followed the landscape gardener, and the dry places became carpeted
with velvety turf, the with velvety turf, the
bare rocks covered with bare rocks covered with
creeping vegetation; walks were laid out trees and shrubs innu merable planted, rustic arbors of exquisite de. sign built in romantic spots, and, finally, un-
under Echo Bridge, the concave form of which indefinitel multiplies every sound
The finest piece of architecture in the Park-we may add one of the most elaborate of its kind in existence-is Bow Bridge, shown in
 our larger illus tration. It is made entirely of iron, and the span, in addition to being quite long, is of the beautiful bow shape indicated by the name. We pass over it to where the path are all curves and crooks intricate wind ings, which we can follow, and retrace again and again finding new beauties each time. There are vine covered ar kors, from which occasional glimpses may be had of the lake
 the hill is the Bel vedere, now a
granite and not

the summer house.

a very prepossessing structure, which serves as an obser vatory. A splendid view can be gained, from its upper bal cony, over the great Croton basins, the city and far across the Hudson and East Rivers to the shores of New Jersey and Long Island. Near the Fifth avenue entrance of the Park is the old Arsenal, but now the Museum. Here is a very fine zoological collection-which is at present in tempo rary quarters-comprising many valuable and rare living animals. Within the building proper are fine entomological collections, anḋ a series of excellently prepared stuffed animals. The natural history of the United States may be well studied from the above, as well as a number of fossil remains from
which plaster models of prehistoric animals will sometime be completed.
There are several fine statues at present in the Park, and it is expected be added. The


ECHO BRIDGE.

Shakespeare monument is at the end of the wall, and close by it is a splendid group of an Indian hunter and his dog. There are also statues of Morse and busts of Schiller Burns, and Humboldt.
Work is still in progress, and every year finds new beauties added to New York's great breathing place. That it is appreciated by the people, the crowds which throng every pathway on Sundays testify, suggesting indeed the thought that even this large expanse will ere long become too small and another vast park will be needed to supply the want o our constantly increasing population.

NEW BOOKS AND PUBLICATIONS.
Castle's Universal Interest Tablets. New
Anthony \& Co., 62 Liberty Street. Price $\$ 2$. This is a neat leather case, contanning three cards with interest table
printed on them. By manipulating the cards according to the printe directions, the interest on any sum for any length of time can be easilly ascertained. Our book keeper has tested the table
system the neatest and quickest he has ever seen.
Report of Progress of the Geological Survey General Report of the Commissioner of Agricultur and Pubiic Woris of the Province of Quebec, for Montreal: La Minerve
The subjects of these twointeresting and valua ble reports are too large to Te fully discussed din our columns ; it must therefore suffice to say that the
complition of the books showz eelous and thorough reeserch on the ear compliation of the books shows eaeaus and thorough research on the par
of the ofllcers of the Geological Survey and the Commisioloner of Agricul ture. Indications of thriving industries and a prosperous population are to
be found throughout the ers, especially for farm hands.
Messrs. A. D. Mellick, Jr., \& Brother, 6 Pine Street, New York city, hav publighed an excellent book on the railway enterprises and real estate
resources of New Jersey, which will be found valuable to all who thluk of locating near New York.
Flower Object Lessons, or First Lessons. in Botany: a Familiar Description of a few Flowers. From the French
of M. Emm. Le Maout. New York: William J. Read, of M. Emm. Le Maout. New York: William J. Read,
116 Fulton Street. 116 Fulton Stree
A little work likely to be useful to the teacher and lateresting to the pupil. It its well suited for use in the well known kindergarten system, and
will, we hope, help to popularize the knowledee of one or the most beaut1 ful and accessible of scientific studies
The Mystery of Metropolisville. By Edward Eggles ton, author of the "Hoosier Schoolmaster," "The End of
the World," etc. New York : Orange Judd \& Co., 245
Broadway. Broadway.'
Here we have another pleasant, racy story of western life, from a writer eccentricicties of the order life in our States. Mr. Eggleston's fame eccentrictities of the border life tn our States. Mr. Eggleston's fame as an
original thinker and story teller was made by his frst book ; and the last orignal thinker and story telier was made by his irst ooos: and the laat
work from his pen more than sustanns his reputation. This story was writ ten for Hearth and Home, wheretn it frrst appeared.
Detall, Cottage, and Constructive architecture, con taining Seventy-five Plates of Perspectives, Ele vations,
and Plans for Houses, Villas, Cotages and Country
Houses. Published under the direction of A. J. Bicknell. Houses. Published under the direction of A. J. Bicknell.
Price $\$ 10$. New York: A. J. Bicknell \& Co., 27 War ren Street.
This is a handsome and elaborate volume, containing some hundreds of
designs for houses in all styles, with drawings of all the necessary details The value of this Dook to persons intending to build, and to country belld ers in places where architectural talent is not readily avallable, will be well understood from its title; and the engraving and printing are such as to make it an ornamental volume, worthy of the admirable examples with
which the book is flled.

Inventions Patented in England by Americans.
[Compiled from the Commissioners of Patents' Journal.] Boot Pegeing Mcouive.-J. H. Reed, Boston, Mass.
 Mative Hosk.-E. P. Richardon, Laurence, Mass
middings Skparator.-E.L. Lacrotx, Minneapolis, Minn.
Middinges Skparator.-G.T. Smith, Minneapolis, Minn.
Nerdir Tareading Device. - G. P. Farmer, Brooklyn, N. Y
Nerdle Thrending Device.-G. P. Farmer,
Pressure Gack.-J. w. Stiles, New York ety.

Stram Bollerr.-G. H. Babcock, Plainfield, N. J., S. Wilcox, Brooklyn, N. Y
Triating Fribr.-W.

## Eecent guxerican aud forign equenty.

Improved Shutter Fastener.
Elen D. Anderson, Freeterick, MA.-The Invention consists in combining side, rear, and bottoon end of each shutter, whereby the shutters may not only be securely locked together against the weather strip, or back against
the house, but may be " bowed "at varions intermed tion the house, but may be " bowed "at various intermediate points. to affo
larger or smaller opentng and a greater or less degree of light and alr.

Imploved Explosive Cartridge Pile Driver.
structing the of relatively constructing the namer and anvil of that class of pile driver
in which a cartridg is is employed and wheren powder is caused to explode and be convertcd into a highly expansible gas bet ween the auvil and the
hammer. The resistance of the latter enables it to drive the former wlth great force against the pile. By the present construction of hammer and ehamber is made very deep, while this increase in the depth causes the chamber to heat very rapidily, to often set friae eto the cartridge, and thus to
cause the hammer to stick in the anvil. The present invention entirely ob cause the hammer to stlck in the anvil. The present Invention entirely ob-
viates both these evils, as the gases cannot expand exceptin the direction of and against the hamner and anv11, while the cartridge chamber can be cartridge.
John w Improved Roll for Rolling Railway Rails stonn w. Cooper, Hubbard, Ohito.-The invention relates to modes of con locked together by a grove on one, into which the upper edge of the other
fits. The invention consists in the mode of constructing the eroll groove fits. The invention consistsin the mode of constructing the roll groove so hat the larger section of rail is brought into prellminary shape and sub.
sequently recessed on the under side of head to receive the upper edge of the lesser section.

Improved Pea Vine and Corn Stalk Gatherer.
Absolan B . Sharp, Labadievilie, La.-.This sinvention relates to a rake
adapted especially for gathering pea vines, corn stalks, and other plant cultivated on ridges, and it consists in the provision of a revolving rake head carrying a series of teeths of unequal lengths, which are so arranged
in relation to each other that the teeth operate or rake both in the furrow and on the ridges, a hinged check plate being provied or combned with
the rake for holding the teeth stationary untll the rake for holding the teeth stationary untila a load to colliected by the
same, when, through the medum of a hand lever and conneoting rods, the
plate is disengag
charge the load.
Improved Nut Lock.
Edward Turner, Greensburgh, Pai-This invention relates to that class of Evices used to prevent nuts from belng turned on their screwboits by jar
ing or jolting, and thus allowing the latter to, be loosened. Theinvention fflciently to al uch a diameter between two opposite points of the curved part of their ircumferences that the said curved part and the corners of the nut will ro ate in circles that out each other

## Improved Lamp Shade.

Wm. Simons, Charleston, S. C.-This invention consists of a shade forme of two llke parts, approximating an ellipse in shape, and united at the end top or upper edge which adapts it to the fan shaped flame of a lamp or gas burner. Thetwo parts may be readily detached to adapt the shade fo

Wm. H. Catler, Buffalo, N. Y.-The object of the invention is to provide an improved case for containing medicinal preparations (more espectally
that known as carbolate of iodine) and instruments for inhaling the same and to this end an oblong rectangular wooden block is bored longtudinally with two parallel holes, one to contain the bottle, the other the inhaling instrument. The cover of the case is of sheet metal, provided with
a thumb plece, and with flanges fitting in grooves formed in the longe a thumb plece, and with flanges fitting in grooves formed in the longer
sides of the block, at the open end thereof. The case is cheaper and more sides of the block, at the open end thereof. The case is cheaper and more
durable than paper boxes heretofore used for the same purpose, and is caurable than paper boxes heretofore used for the same

Improved Chair.
nnel R. Chalk, Mt. Wa
gton, Md.-The inven on ennisits in improving the ordinary mode of applying spring backs to celve a spring back, and so that the back may be rigidly held at any point
Improved Carpet Stretcher.
David White, Normal, M1I.-This invention consists in applying a swiveled n any desired position and thereby enable the same person to do the stretch ag and tacking down

Improved Umbrella Holder.
Abraham Oberndorf, Jr., Baltimore City, Md.-The Invention consists roviding the lower end of an umbrella handle with means whereby it ma
Philipp Wagner, Morrisania, N. Y.-The invention relates to the con struction of a bridge for sheet metal sockets of brushes (mainly paint
brushes), so as to secure strength and cheapness in the manufacture. The rushes), so as to secure strength and cheapness in the manufacture. The at concavities receive the side edge

## Buoying and Stopping Leaks.

e, and inflatable bag secured to the gunwale, passing down the side of th vessel, up through certain tubes, and connecting with the deck, whereby

Improved Cotton Picker.
vertical cylindersand revolving -his invention consists in brushes fixe each stalk with which the rotary brush comes in contact will be deprive of the ripe cotton. It also consists in the arrangement of mechanism for perating the cylinder from the wheels and in guides that reach cut fro e side and in advance
talks up to the brushes
Combined Adjustable Pinchers and Grappling Tool. instrument which may be used as a wrench, pinchers, or grapple tor raol or or carrying weights. The jaws, by means of a series of holes, are made ad ustable to adapt them to articles of different size. A shank rod is con inchers. This rod extends back and passes into the handle, and on th placed the wedge shaped slide conststing of two rods witich pass through eyes at the ends of the plicher handles. At the back end of this slide is a
screw which allows the handle or other appliance to be frmly attached to screw which allows the handle or other appliance to be firmly attached to
the slide. As this slide is moved back and forth on the rod, it will be seen that the handles of the pinchers and the jaws will be made to move neare upon the angle of the lide rove variations in this movement dependin secured between the jaws, it is pinched or griped by pulling upon the slide or handle, and is loosened therefrom by a contrary movement. This feature adapts the toolfor grappling for artcles in wells or under water, as well a for carr.
places.

## Improved Composition Sidewalk.

Charles H. Howard, N. Y. This construct a sidewalk or pavement without having to haul loads of stone bricks, gravel, or other matter to the locallty of the proposed walk or pavement, which matter is usually embodied in the composition of walk
and used in place of the soll originally there contalned. After the grad width of the proposed walk is thoroughly worked orer and made very fine A quantity of magnesia and carbonate of baryta, mixed together, varying in proportion with the nature of the soll found on the ground, is introduced and mixed with the carth. After the chemicals above mentioned have been properly incorporated in the soil, sllicate of soda (soluble glass) is added en the mass is almost dry, it should be covered over with a coa stone, will not rot like planks, and can be very rapidly made.

Phylander Daniels, Jackson City, Mich.-The object of this invention furnish an artificial stone or pavement which combines strength and du rising from the to 1 a solution of glue, isinglass, soluble glass, and concentrated ley, whic is applied to a mirture of sand, Portland cement, and pommeled glass
This mixture is well dampened with the solution till it forms a pasty mas of the consistency of mortar; and may be formed and well tamped into molds, where it will soon harden, to be taken out and exposed to the air to
dry. It may also be laid in the form of a fireproof pavement, or any other

Improved Harvester.
Thomas Y. Woolford, Romney, W. Va.-This
 mowers, and as front cut or rear cut machines. To the outer end of the reel when the machine is adjusted as a reaper. The main driving wheel re volves loosely upon the end of the axle and is made to recelve the maste wardly projecting rim, upon the outer surface of which are formed notches thedrive wheel. Upon the innersurface of the the inner side of the rim of formed teeth, into which mesh the teeth of the pinion wheel placed upon the end of the shaft. In the outer side of the gear wheel is formed a slo to recelve a cross head formed upon the end of a shaft so that the said gea heel may carry the said shaft with it in 1ts revolution. By this construc cos, by moving the gear wheel inward sufflciently to remove it from the wheel is moved back and forth upon the shaft to throw it out of and into position that it may be conveniently reached and operated by the drive a position that it may be conveniently reached and operated by the driver
with his foot. The shaft extends across the frame, revolves in bearinga at
tached to the side bars of sald frame, and to 1 t is attached a gear wheel, th riving shaft. Another shaft is placed a little below and in the rear of the xle, and to its end is attached a balance wheel which serves also as a crank nd of the finger bar is deta hickle bar. The shoe, ous parts connecte ith tt , can be readily adjusted to adapt the machine for a front or rear cut. Improved Clasp Button.
Andrew Flatley, Brooklyn, N. Y.-This invention has for its object to fur Ish an Improved detachable clasp button for connecting the ends of co lars. The invention consists in a clasp button provided with spiral wire
fasteners upon the inner side of its two parts to adapt it to be conveniently asteners upon the inner.

Improved Car Coupling.
Aaron K. Kline, the patent granted, to the same inventor, March's, 1872; and consists in a elve and hold the coupling rod when not in use

Improved Bag Tie
John Bannihr, Hempstead, and Daniel H. Rhodes, Bald winsville, N. Y. dise. A lever is plvoted to the connecting plate at one end end anstened It at the other end by a hook. TLe string is fastened by passing it throug a hole in each of the parallel plates above the connecting plate and under
the lever. The latter ts then pressed dowa upon the cord, drawing it down the lever. The latter is then pressed down upon the cord, drawing it down
bet between the plates and wedging it fast, the lever being then fa
hook.
Improved Die for Forging Hoe Plater
Improved Die for Forging Hoe Plates.
Lovell T. Richardson, Auburn, N. Y.-This invention relates to dies which are used in steam, water, or other power hammers for plating planters' hoes from the blanks before they are rolled out. Part of the face of the lowe plane surfare. The face of the upper die is beveled on its corners so as to leave a flat tapering surface.

## Improved Waist Belt.

John H. Vogt and ists of a waist belt for ladies' wear, which is woven of a fancy warp of silk cord for the front, a black or binding warp of gimp or strong thread for the
ody, flne silk warps for the borders, and a weft of gimp. The cord for the arp and the gimp for the weft are coarse and heavy, so as to produce whe and the gimp for the weft are coarse and heavy, so as to priduce

Improved Fireproof Building Block.
willam T. Van Zandt and Lucten A. Tartlere, New York city.-This invenW dnst, coke dust, cinders, sand, or other suitable material, to form fireroof blocks or bricks fors walls, roofs, cellings, floors, and partitions, the proof blocks or bricks for walls, roofs, cellings, floors, and
material being made plastic with water and shaped in molds

Improved Sample Fastener.
Charles Mason, to the trade a device by which goods may be quickly placed on show cards
or boxes, and taken off again, avoiding thereby the fnconvenience of the resent mode of applying them, and saving time and labor. The invention onsists of a wire bent in triangular shape, with ends overlapping each other, and acting like springs, one end b
the other to the article to be exhiblted.

Improved Wood Fence.
Daniel G.Temple, Farmersvine, La.-This invention has for its object to urnish an improved fastening for securing pickets and other upright
oards or planks to the horizontal bars of the fence. In putting up the ence, bolts are passed through bars midway between the pickets. A wire s passed through a hole in the head of the bolts or around a groove or neck
ormed upon said bolts. A second wire is passed along a bar upon the side oposite the pickets and the ends of the bolts or spikes are bent dow or clinched around the said wire.

## Improved Toy Puzzle.

Benjamin F. Ellis, Newton, Pa.-This invention consists of a puzzle com prising two or more $U$ shaped bows of wire, with a ring formed in each en
cross bar for each bow passing through the rings, and having a simila ing at each end, the two being connected together by the large bow passing bow. With these bows an out the puzze is to be worked on and off the small bow through the ring and over the ends of the bows and cross bars.

$$
\begin{aligned}
& \text { Improved Window Sash Ventilator. } \\
& \text { ates, Cold Spring, N. Y.-The invention relate }
\end{aligned}
$$

John C. Bates, Cold Spring, N. Y.-The invention relates to the wel nown mode of ventllating houses through air inlets and outlets in the win
dow sashes, and consists in employing two slides, relatively apertured with respect to each other and to the sash bar, so as to admit either a direct or

Improved Rotating Hook for Sewing Machines.
Sew Atrd and John Aird, Troy, N. Y.-The objeet of this invention is Andew Atrd ard
to substitute for the present brush loop check, applied to the rotating hook
of Wheeler \& Wison sewing machines, a device which does the same work of Wheeler \& Wilson sewing machines, a device which does the same work
with great regularity, rapidity, and security, avoiding the insufficient work g of the brush check and the annoyance resulting therefrom. This inve on consists in a reciprocating hook placed inside of the rotating hook an in connection with and regulated by a cam in such a manner that the 100 . ake up a new loop.
Improved Hose Port Holes for Partition Walls.
Henry Woodman, Boston, Mass.-This Invention has for its object to fur les into a closed room and flood tit to extinguish a fire without its bein ecessary to break into the room, saving much time, and preventing the fir rom making so much headway. The invention consists in the box flaring
both directions. The mouths of the box are closed with doors hinged a in both directions. The mouths of the box are closed with doors hinged at
their lower edges, which are provided with spring catch locks which can be pened upon the outer side only with a key, but may be unlocked from the by ding back the bolt of the lock with a stick. In the partin re formed two or more holes, each of which is provided with a door, whic
doors are placed upon the opposite sides of said partition and are hinged at helr outer edges to the sldes of the box, and are provided with springs to old them closed. When it erted through the hole in the partition, and the other door artiopened by rawing back the bolt of tas lock by means of a projection upon the inne nd of sald bolt. The nozzle of the hose may then be inserted through one of the holes in the partition. One of the holes in the partition may bc used
to look through while the hose nozzle is inserted through the other, the laring mouths of the box enabling all parts of the room to be seen, and the ream of water to be directed to any desired point. When he withdraw and the door closed, the spring door closing itself as soon as the hose nozzle withdrawn.
Improved Furniture Castor.
Cevedra B. Sheldon, New York city.-The invention relates to castors fo urniture and other purposes, and is an Improvement upon the subject ma nchanged from the device.therein described, but the particular means by Which the same is carried out belngmademuch more simple and less expenqually with those of the former as ant the public. Tts movabe and will distribution of strain, requiring, however, much fewer balls, and but one ess cost.
Slatted Flexible Support for Mattresses and Car Seats.
Collin Pullinger, Philadelphia, Pa.-The invention consists in two thick untted together at sultable intervals to form pockets into which are placed wooden or other slats.

Improved Cotton Press.
James P. Derden, Bastron, La--The object of this invention is to improve the means now in use for pressing cotton, hay, and simillar commodities, and it consists, first, in a rectangular shaped base frame, upon which stands of which are connected by a cro:s timber This screw has no longitudinal motion, but is simply revolved by means of a pulley on the end thereof, and a belt from the motive power. The screw
presses through a truck frame as through a screw nut. As the screw is re volved, this truck frame travels back and forth. Truck wheels revolve on lever whose fulcrum is at a point near the top of the upright triangular
frame; this lever is connected with the truck frame by a bar. The tollower is suspended from the short end of the lever by a bar by means of a slot and pin, which allow it more or less play. The connecting bar is inclined to an angle and the follower is raised. If the screw is revolved so as to remov
the truck frame out ward and bring the bar to a right angle with the it will be seen that the follower will be forced downward with inward power. The truck frame and the bar form a toggle or knee joint to operat

Improved Floor Clamp. construction of flooring clames.or plate, are secured two uprights by bolts, that pass through the said up rights and through the said plate. The upperparts of the uprights projec rights project below the plate to straddle the timbers to which the flooring
or ceiling is to be attached. The bolts are made longer than the width of the plate so that the uprights may be placed wider apart or closer togethe clamp is to be placed. Upon the upper side of the plate is placed a siddne clamp is to be placed. Upon the upper side of the plate is placed a sliding screw which passes through a longitudinal slot. The hand screw is espe:
clally designed for locking the plate in place to hold the flooring or celling board in place until secured. In the upper side of the rear part of the sild ing plate are formed teeth, into which mesh the teeth of the pinion wheel
the journals of which work in bearings in the upper parts of the uprights said journals being made long so that they may not be drawne from their bearings when the uprights are spread apart. Upon the projecting end of
one of the journals of the pinion wheel is formed a head to receive the lever for moving the sliding plate forward and back. To the for ward end of the sliding plate is secured a plate to rest against the board or other timber to
be moved, and which may be secured to said sliding plate by a set screw. Hooks are pivoted to the uprights to hook upon the opposite edge of the sleeper to prevent the device from silpping while being used.

Improved Street Sweeper.
Orson W. Kellogg, Fond Du 1ac, Wis.-The invention consists in the im
provement of street sweeping machines. The frame is pivoted provement of street sweeping machines. The frame is pivoted at one end
on the axle so as to swing or oscillate thereon, and its other support is the wheels which are directly under the brush shaft, and gage the brush to the wheels which are directly under the brush shaft, and gage the brush to the
ground. These wheels are mounted in the curved bars, which are fitted adjustably to the frame, so that the latter can be shifted as to hight to ad-
just the pressure of the brush on the ground. The dust pan is pivoted at just the pressure of the brush on the ground. The dust pan is pivoted at
one end of a rod just in advance of the brush, and the other end dragsalong the ground to receive all the dust lifted by the brush, and conduct it up to parts, so as to conform to the uneven surface of the ground better than it
would if made wholly in one piece. Near the lower end the pan is connectwould if made wholly in one piece. Near the lower end the pan is connect
ed by cords with the frame, so as to be raised by the said frame when it it raised. The endless elevator runs from a roller up into the dust box, over
another roller, and discharges the dust on the bottom. The roller has a Both the brush and the endles elevator are geared at each end with one of the truck wheels. The elevator,
by belts and pulleys which turn independently of each other, and the pinions of the brush and pulleys of the elevators, are connected to their respectiv shafts by gearing which engages only when turning forward, so that in turn-
ing corners, when one truck wheel runs slo wer than the other, the shafts the driver on the other side and be independent of it. A rake is provided
for loosening up the matters caked on the pavement in advance of the
brush.
Improved Distilling Apparatus.
Gaspar Hunziker, Summit, Miss.-The condensers consist ted by return bends at the top, consist of the vertical large horizontal return pipe at the lower ends, the pairs of vertical pipes
being connected together at about the middie by pipes, and arranged in beling connected together at about the middie by pipes, and arranged in
sections of about three pairs. Pipe connections are made between each section, with the unper portions extending up into or through a cask to
each section, the first section being connected to the kettle, and the last the sectional condenser are connected together. The tank has a supply pipe extending to an elevation constderably above the kettle, and the con-
denser to receive the liquor to be distilled from an elevated cistern or tank denser to receive the liquor to be distilled from an elevated cistern or tank
high enough to force the liquor through the condensers and into the kettle A rectifying flask is introduced in the connecting pipe between the last two
sections of the condenser ; and a flavoring flask is provided from which the distilled liquor passes from the last section of the sectional condenser to the coil in the tank. A small quantity of water is putin the kettle through a funnel, to protect it from the heat, and generate steam for heating the apparatus
up to the working condition. The cock in the reservoir is then opened, and the liquor to be distilled is allo wed to fill the tank, and, flnally, flow into the be heated to the best advantage by the vapors which it comes in contact be heated to the best advantage by the vapors which it comes in contact
with. The vapors rise up into the condensing pipe within the tanks, the
condensing begins in the first section, and whatever is condensed flows condensing begins in the first section, and whatever is condensed flows
down into the return pipe to return to the kettle for being redistilled, while the vapors continue to be acted on in the other sections to which they flow
by the cooling medium, by which the separation of the heavy vapors and by the cooling medium, by which the separation of the heavy vapors and
watery substances is continued, increasing the strength of the alcoholic vapors, as required, using more or less of the sectional condensers, which
will have such pipe connections and cocks as may be needed to pass the wapors through the connections and cocks as may be needed to pased. At the same time, after the heavy
val vapors and watery substances are mainly separated the volatile portions
are passed through rectifying and flavoring substances, and thus the necessity for special apparatus to pass the distilled liquor through these subsity for special a
stances is saved.

## Improved Wrought Iron Blind Hinge.

William R. Goodrich, Utica, N. Y.-This invention relates to wrough
metal hinges, which are not liable to fracture in use ; and consists in the metal hinges, which are not liable to fracture in use; and consists in the
peculiar relative construction of parts by which the whole hinge Is enabled In the forward part the hinge are bent over at rightangle to form flanges. In the forward part
of the flange is formed a hole to receive the conical pintle of the other part.
The rear part of the flange projects to serve as a stop to prevent the blind The rear part of the flange projects to serve as a stop to prevent the blind
from swinging back against the wall, and also for the catch to lock the blind open. To the forward part of the flange of the other portion of the fits into the hole before mentioned. Upon the rear part of the flange is formed a catch, the edges of which are made inclined or curved to catch
upon the stop to lock the blind open. Upon the forward edge of the lower part of the second portion is formed a catch to serve as a stop by striking against the flange to prevent the blind from being raised from its hinges. In
the edge of the flange is formed a notch, for the catch to pass through when
> raising the blind from its hinge
> Improved Cutter for Harvesters. of locking cutters to the cutter bar of a harvester so that each blade can be readily removed without taking off the others. It also consists in a nove
mode of conecting the cutters with the cutter bar so that the latter can be
> or left handed machine. It also consists in a new mode of fastening th
> series of cutters together upon the cutter bar.

Improved Nail Plate Feeder.
Samuel K. Paden, Pulaski, Pa.-The invention relates to that class of neil plate feeders which vibrate laterally to bring the plate at the proper angle
to the movable cutter. II consists in applying a pair of horizontally and intermittently rotated friction disks at the junction of the hopper and fee to the proper extent. It also consists in connecting the shafts of these Harly arranged to hold them to the plate yieldingly. It also consists in applying, at the front end of a vibrator, a hinged bearing arm, which is pressed down upon the nail plate by a spring whose tension may be
adjusted. It also consists in a peculiar train mechanlsm for rotating the
friction disks intermittently and to the proper distance.解 turned at the proper angle to a movable knife and to be fed forward by
single movement of the vibrator. It also consistsin the application to nail plate feeders of means whereby the vibration is allowed to move some dis-
tance before the friction disks begin to rotate so as to allow the movable ventent me rons of of the hopper as soon as its predecessor has passed from the hopper and
grippers. It also consists in regulating the bevel or taper of the nail by eans of the conveyance of two levers which determine the amount scillation of the plate

Improved Magazine Fire Arm.
George D. Luce, New Orleans, La.-This invention relates to improvement loading, firing, and cartridge-ejecting mechanism. The hollow sheet meta tock constitutes the magazine chamber and contains a magazine of four tubes, arranged parallel with each other, connected together and mounted
on a pivot at each end, so as to be turned to present the cartridges to the passage, through the base block, for being delivered into the carrier. The Crtridges into carrier. The magazinels provided with a thumb bit at the ower end for turning it by hand. A receiver or frame incloses the loading
iring, and cartridge-ejecting mechanism proper, and is formed of a contin aring, and cartridge-ejecting mechanism proper, and is formed of a contin-
nation of the stock so shaped as to be cylindrical in its upper and rear porion, the barrel screwing into it, while its two sides are parallel below the which the cartridge shells are ejected. The guard lover is pivoted to thes plates and is allowed to move a certain distance before pushing the retract-
or forward. A stud pin with a friction roller on it is arranged on one side the trigger when wrin under the hammer to throw $1 t$ back, to be caugh by the trigger when the guard lever is thrown forward for extracting th anism to cause it to raise the breech plate to open the breech for the dis charge of the shell and the introduction of a new cartridge ; after which suitable means cause the breech plate to fall and close the barrel. The re-
tractor has a notch into which the flange of the cartridge falls before bein ractor has a notch into which the flange of the cartridge falls before being
pushed into the barrel, In which it lies after being discharged, ready for ever is phed back by the retractors into the hollow carrier, when the guar corner, which, as soon as the shell has been pushed back into the carrier, engages with devices so that the further movement of the guard lever pulls passage to receive another cartridge, as shown in broken lines. The cart idge is forced in by the spring of the magazine, and forces the shell out
through the discharge tube, the flange of the shellbeing at this time released rom the notch of the retractors by the swinging out of said cartridge with the carrier as the latter is swung down in front of passage. A rounded stud
on the retractor is provided, so as to cause the retractor to spring down on the retractor is provided, so as to cause the retractor to spring down
and escape past the flauge of the cartridge when the guard lever is pulled back, in case a cartridge may fail of benge discharged, and be forced back when the last cartridge is fired, on account of there being none in the mag. azine to force it out of the carrier, and which might injure, or perhaps break
the retractor; but this will not happen if the muzzle of the gun is held dowi so that the cartridge will fall out of the carrier by its own weight. It only in case this may be forgotten or neglected that the shell can thus get
back into the barrel, and even then the flange will not be in advance of the notch except in case the shell happens to move forward in the carrier befor

Improved Medical Compound.
urify the blood, and is composed of Indian rhubarb, gentian, galangal ro wormwood and saffron, macerated together in alcoholic liquor. A table

Improved Furnace for Heating Iron Bars, etc.
ph Pardoe, Worcester, Mass.-Two fires $\varepsilon$ re arranged, one Joseph Pardoe, Worcester, Mass.-Two fires \&re arranged, one on each
side of the furnace hearth, and are fed alternately with fuel, so that the gases from the fresh coal of one fire will be consumed by the heat from the Incandescent coal of the opposite fire. The iron is placed lengthwise o
the hearth, so that the flame and heat pass between the bars and length wise thereof, instead of first striking the sides of the bars, as in ordinary furnaces. The fron, besides being placed parallel with the draft, may by
this arrangement be cut in longer pieces than where it is placed transverse ly of the course of the flame. By having two fires arranged in this furnac the fron may be introduced through the right and left hand doors alter
nately, and kept in two separate piles, one exposed to fre of the fresh fue and in the process of gradually heating, and the other exposed to the he incandes

## Improved Hot Air Register. Brooklyn, N. Y.-This invention c

Edward A. Tuttle, Brooklyn, N. Y.- This invention consists of an exten above the floor, through large holes adapted to alluw the air to circulate top of the pipes so that the falling of the sweepings and other matters int the pipes is effectually prevented, and the whole is enclosed in an orna hides them and the opening through the floor from view.

Improved Yarn and Cloth Beam and Whip Roller. is to remedy the tendency in the wooden yarn and clotu beams and whip rollers of looms to shrink and become warped at their junction with the pulleys, and thus to allow the pulleys to lean at an oblique angle thereto
This has the effect to cause the yarn to be wound unevenly on the yar This has the effect to cause the yarn to be wound unevenly on the yar
beam and to create, when unwound, an unevenness of tension which pro duces a want of uniformity in the cloth.

## Improved Hand Car

mproved m improved mode of connecting the hand lever with the crank shaft. Th
frame or truck of the car supports a top frame work. The two wheels a one end are mounted upon the axle, which also carries a pinion. Into thi
pinion meshes a toothed wheel which is mounted upon a crank axle that with a the lower part of the frame. the connects the crank of the axle provided with handles at the ends, so that when the fs, by the occupants o the car,oscillated on its pivot it willimpart rotary motion in the desired di
rection to the wheel, and thence to the axle to propel the car. The crank shaft is hung in its bearings in such manner that it can slide thereon, and it under side of the frame. By swinging the lever in one direction the shaft will be moved in its bearings to carry the wheel out of gear, while, when
the lever is the lever is swung
with the pinions.

Improved Paper Feeding Machine.
Miguel Piedra, Jersese CCity, N. J. The operation of feeding paper to a
swift printing press, requiring considerable manual dexterity, Is generally swiff printing press, requiring considerable manual dexterity, is generally
performed by hand labor. This invention of Mr. Piedrast, by substituting very ingenlous and dousderable economy in the wages of extra hand but to increase the capabilities of the presses in connection with which
t may be used, and Insure better register. The paper to be fed by this
apparatus is in the form of superposed sheets placed upon a table at the back part of the machine. This table is made up and down adjustable,
either by being hinged at its back end or secured by a vertical slide, and is pectally made up and down adjustable at its forward end. A hollow nder is so arranged that, when it arrives at its backward position, a pipe
pendent therefrom will arrive over the pile of papers resting on the table At this moment a plunger is drawn out of the cylinder, and a vacuum, or paper is, by the elevaion of the table, rated anto with the cup he val the vacuum in the cylinder will be applied against the upper sheet on the
table, and will suck the same against the lower end of the pipe. The cylinder at this time makes its forward motion, and takes the upper sheet
corward with it untilafter it has reached its most forward position. The plunger is, by suitable means, violently thrown in to the cylinder to discharg the sheet from the end of its pendent pipe. The backward motion of the
plunger causes a spring lever to shut the valve. The motion tmparted to this lever is, of course, simultaneous with the entering of the plunger into he cylinder, and consequently the valve is shut at the same time that the
plunger enters the cylinder; the paper being therefore discharged from the nd of the tube by the shutting of the valve as much as or rather more than by the expulision of air from the cylinder. The cylinder now resumes its
backward motion, and the operation aforementioned is repeated until the paper on the table has been entirely removed, in successive sheets. The mechanism herein described is not intricate, and is stated to be easily kep ous that can be devised, because it dispenses with all the griping devices by hich the shi

## lmproved Wheel for Vehicle.

Hiram Pitcher, Fond Du Lac, mode of combining and arranging the hub with a sleeve and axle made fast through a sleeve, the outer end being square, which fits the outer end of the sleeve, so that the latter forms the arm or wearing surface of the axle.
The wearing surface of the sleeve is at each end thereof, between which is The wearing surface of the sleeve is at each end thereof, between which is an oil chamber. The hub forms the box, the two parts of which have each xle and against the end of the sleeve. A screw nut on the end of the axle bears against the end of the sleeve. A cap screws on to the outer
part of the hub, In which is a square orifice for introducing a plug wrench for turning it on or off. Through this cap oil is introduced to the oil champon the inner part of the hub, but the flanges are equal in diameter, and support the spokes. The spokes entirely fill the space between the flanges o that the washer rests upon solid wood. The wheel is thus formed without mortises in the hub or tenons on the spokes. Each part of the hub has
polygonal section, by means of which they are readily separated with a a polygon
wrench.
Improved Low Water Indicator and Alarm for Boilers. in a steam boiler, and gives an alarm by blowing a whistle in case of low water. When the boiler has a sufficlency of water it cuts off the steam rom the pumping engine, and stops thereby the supply of water. The
rame, to which the actuating part of the apparatus is attached, is suspended by means of bolts from the shell of the boiler. The apparatus consists of
Wwo sections, one being inside and one outside of the boiler, the forme divo sections, one being inside and one outside of the boiler, the former
being the actuating part and the latter the indicating and alarm part. A oat is supported in position by the vertical guides which connect the upper ever is a sector wheel which engages with a vertical sliding rack. The other end of this lever is connected with the botton of the float by a rod, and also has a counter weight, which is designed to balance the rack so that
the float, as it rises and falls with the water in the boiler, will cause a coresponding motion in the rack, with but slight friction. A rod, the lower hrough a tube into a dial chamber on top of the boiler, and has upon its upper end an index pointer. This pointer passes over the face of the gradated dial plate, and its position, being governed by the action of the float
and consequently by the hight of the water in the boiler, will indicate, by means of the marks and figures on the plate, the quantity of water in the governed by the action of a valve which is on the lower end of a rod actuted by an arm on the upper end of the rack. The arm slides freely on the alve rod, and when it strikes the collar the valve is lifted from its seat steam enters the pipe and the whistle is blown, thus giving the alarm for
low water. A pipe connects the boller with the pumping engine. When here is a sufficient supply of water this pipe is closed by a cone valve on foat, and the pumping engine is again supplied with steam.

## Improved Grain Measure and Register

nosm B. Clat, Lyte, Min. omes from the separator. The hollow cylinder is supported by legs, of such a length that bags to recelve the grain may be conveniently hung upon
the discharging spout upon the lower side of said cylinder. With an open ing in the upper side of the latter is connected a hopper to receive the grain, ant to conveniently see when the measure is full. An inner and smalle yner cylinder comes close up to the upper side of the outer cylinder The ner cylinder comes close up to the upper side of ene cy of the two cylinders to allow the grain to flow out freely through the spout. he inner cylinder is divided into two equal compartments, and upon the opposite sides of the partition are formed openings to receive the grain
from the hopper. Each compartment contains exactly half a bushel. One nd of the shaft projects and works in a small frame attached to the end of the end of the shaft is attached mechanism to prevent the inner cylinde and consequently the wheels of the register, from turning back, and also gearing which actuates a second shaft to which a lever is pivoted. To the
side of the lever is pivoted a lever pawl, the inner end of which is bent nward, passes through a hole in the lever and enters a hole in a wheel. A
number of holes is formed in this wheel to receive the end of the pawl, at such a distance apart that the movement of the wheel through the space be tween two of said holes will give a half revolution to the inner cylinder.
The cylinder shaft connects with gearing which actuates the fingers on the dial plate of the register. Upon the dial plate are formed two circles of ivision marks, to the outer one of which one finger points, and to th
nner one of which the other finger points. The teeth of the gear whee re so arranged that the first finger may move one space upon its scale of division marks at each semi-revolution of the measuring cylinder. The second fingermoves through one space upon its circle of division marks at each revolution of the first finger, so as to register the nnmber of bushels
counted. The machine is designed to be placed at the side of a grain hrasher or cleaner so as to re
with said thrasher or cleane

Improved Extension Attachment for Stove Pipes Samuel Johnson, James Creek, Pa.-This invention has for its object to
urnish an improved attachment for stove pipes, by the use of which th ove pipe may be conveniently lengthened and shortened to adjust it to of place where thestove is to be set up. To the lower part of the length Ilpe that slides into the other is at tached the lower end of a har that
slotted longitudinally. The end of the bar that is attached to the first pipe is made with an offset to raise the body of the bar away from the pipe. The ther or free end of the bar has an inwardly projecting flange formed upon
to rest against the side of the pipe and steady it. To the lower part the side of the other length of pipe is attached a screw, which projects hrough the slot of the bar to recelve a hand nut, so that by tightening the may be readily adjusted and by loosening the said nut the lengthe of pipe

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E. B. H. asks how to
E. M.D. asks how old zinc can be made pure
A. F. V. wants to know the best and quickE. J. C. asks: What is the preparation and D. P. asks: How can I toughen horse hair G. G. F. asks how to remove slight scratches
off the face of a looking glass. T. Y.S. asks how to bleach China grass. It R. R. asks: At what speed should a band S. H. H. asks how to remove the rough A. S. asks if it is possible to draw wire
trom a gold dollar to reach the length of a mile? If not, W. W. C. asks: Is there anything that will
Wake ieather stick to iron and form a water tight joint for hydraulic rams?
C. H. R. asks for a recipe for an elastic polin

rears, and up to the present time they have not multi-
W. S. asks: 1 . What will remove black ink rom writing paper wthout injury? 2. What Is the easi-
est way to make a hole in a watch spring, without tak. mper out?
J. R. C. asks: What is the best kind of ma-
erial for a foas for petroleum? " I want something that will fioat freely on the ofl and that will not become affected by it

| C. M. D. asks for a rule for measuring paint. |
| :--- |
| er's works oniron bridges for instance, a bridge |
| 800 feet |

 hrough?
R. R. asks: 1 . What is the best time of the year as regards health to go to the Istum ins of Pa
and what santary course should be pursued?
C. J. F. says: I have a flat roof covered ten
ears ago with pitch and gravel. It now begins to leak little. I have been thinking of scraping off the loose gravel and then applying a coat of Rosendale cement,
say half cement and half sand. What do you thlnk of ?
R. R. asks: If somebody buys a tract of Whole tract, water and alls , has he ha right to close oup the
creek with a dam, or must he let other people rom be. creek with a dam, or must he let other people from be-
low float their saw logs through his land? The logs low float their saw logs through his land? The logs
could not tioat if the man had not dammed the creek
A. F. O. asks: What is bichromatized gelain? How is it prepared, and what are its properties and uses? 2. How can I make a quickly drying cement that
will resist the action of bolling alcohol, or with what arnish can I cover ordinary cements to accomplish the same object? 3. Is there any work in which are minute.
I described the manipulation of thermometer making especially blowing the tubes and graduating the seales?
G.H. H. asks: Why is it that, in putting the nger on elther the in or outsside of the closed eye, aylight, anda bright, luminous spot about the size of gold dollar in the dark? It is an experiment which all can try; perhaps thousands have noticed it before; but
what 1 is it that appears so bright where all else is dark, because of a nitter
lid by the finger?
D. S. s. says: On page 52 of your current vol.
ume in answer to . K . Maiers you direct nim to treak tones sto small pleces and then to mix sand (shary wish to know whether tiver gravel which Ihave in and niswer instead. Also, will it make a suffliciently stron cellar wall, and if so, would cement mixed with lime be better for a cellar wall than cement without the lime?
J. G. K. asks: 1. Where can I obtain the Hetand mace or 1 ite in or yari is there any place or otice in the city of New Yor
where such a standard or model measure is kept open Hor he punibe? 2. Could some correspondent tive me
forme ractical details concerning the system of irrigaHon as practiced by the Mormons in Utah, and ton as practiced by the Mormons in Utah, and also
about Irrigation generaly for agricultural and garden ing purposes?
2. Is there not a kind of of oalk with edible acorns which may be used as food, or are acorn3 actual-
yused as food? If so, where and how? I wish to know y used as food? If so, where and how? I wish to know
he botanical or other name and some charucterstict $d$. the botanical or other name and some charu
seription of such oaks and where they grow.
M. E.P. Says: Can there be any such thing oo be an engineer myself; but suppose a boiler should be
 should be set on the top of another larger safety valve.
For instance, the whole top of the steam dome might For Instance, the whole top of the steam dome migh
form a valve, fited and made steant tight and arranged with a sufflciently long lever and heavy welghts to stand In Internal pressure of say one hundred pounds to the suare Inch, while the small safety valve was set to blow
of at elghty. Would that be practicable? Or would off a telighty. Would that be practicable? or
several smalier ones attached to one boller be of
E. A. S. says: Nearly two years ago I tore
ap an old coal chute, that had been built for eighteen ears, and found the sleepers and cross trees as sound a
when trat laid The timber was ladd to when frrs latd. The timber was lald in our common
sand, and some of it was round, just as cut in the woods, with the bark on, and this was as sound as the rest.
Thee were pine, hemlock, spruce and oak. The slack coai had worked through the cracks, and water had leaked through and formed a crust about six inches
through. We had to use a pick to break through the crust. The earth was saturated for about two feet down and looked like iron ore. Could slack cool and and be
used to lay Nicholson pavement, and be e cheaper and bet. ter than the old proce ess? And would it last till it wore
And out, with int regard to the kind of timber used? I claim
that this can be done, and, if so, the discovery of the
same.


Owing to the illness of one of our editors, the replie to several of our correspondents relating to chemical F. A. S. will find particulars of cupro-am. directions for hardening taps and dies on $p$. 91 , vol. 28.-
G. T. S.canrepair his leaky tin roo f by following the diections on p. 199, vol. 28.-W. V. C. and M. C. M. will find the directions for polishing wood, given on p. 72, vol. 26,
suffcient for the purpose.-W. H. G. will find the subject of preserving eggs practically discussed on p.107, vol.28, C. R. asks how to brown gun barrels. Answer: Read
he articles on pp. $154 \& 266$, vol. 26.-W. M. will find the the articles on pp. $154 \& 266$, vol. $26 .-\mathrm{W}$. M. Will find the
process for bluing steel described on p. 10, vol. 25.W. P. B. and J. P. C. will find anple directions for re-
pairing rubber boots on p. 155, vol. 26.-J. A. E. asks how pal
to join heavygumbelting. Answer: Read the two artlicles on p. 27, vol. 28.-G. R. and others will find the Gramme magneto-electrical apparatus described and illustrated
on p.410, vol. 26.-F. F. will find practical directions for making an Eolian harp on p. 330, vol. 26.-M. B. will find a recipe for a pickle for tempering mill picks on p. 106,
vol. 25. -E. K., F. T. J., and W. H. W. will find the subject of whitewashing fully discussed on p. 122, vol. 24.-A. K. -M. C. M. will le able to mount chromos, etc., by fol-
lowing the directions on p. 154, vol. 27.-T. E. C. will find


 R. S. Waskv for a ocering for
sult our adertising colums
E. C. M. is informed that the information E. C. . . is is informed that the information
on tounteneration bone black is derive from the
and accounts published, by the Inventors of the process, in
Europe. It is not an extract from another publication. J. L. L. asks what we mean by a a saw of 16
gage. 16 nswer: The blade of the saw wis the thickness of P. P. H. asks if any metal expands and conalcohol. Answer: Yes; read S.'s letter on page 242 of
our current volume. P. P. H. asks if mercury can be kept in an
iron vessel without affecting the latter. Answer: Yes: nercury is generally sold in cast iron flasks.
A. says: The following account of a boiler dsasier appears in a sacramento (Cal.) dally journal of
March 25,1873 : "Last evening the residents were starlued by a loud explosion, which was im mediately followed by na alam of ire. It became evdient that some remarka.
le freak of steam had taken place, for an immense boiler, rent and torn by an an explosion, lay across second bricik house immediately opposite told of the terrific
force with which it had been hurled. Investigation dislosed the fact that the boiler belonged to the Sacrame o foundery of Wm. Guttenberger, 105 and 107 Front entirely through the end of the shop tn which tit was sit-
uated, across the alley, through a large yard, demolishing the fence on tits road; then rislng through the air, it passed entirely through three rooms and both front and
pack walls of a brick house before it had reached its
 ave taken place without loss of life, and search was at once commenced amid the ruins for the injured, but left the foundery some time before, banking the frca and leaving everything apparently safe, and that all the
ocupants of the injured house were down stars at the occupants of the injured house were down stairs at the
time. It is supposed that the explosion was of such time. It is supposed that the explosion was of such a
nature asto give a circular motion to the boller in its filght, which,combined with the inmense velocity, caused it to cut tits way clean through all obstructions. The
partituon walls, furniture and brick walls were as com. partition walls, furniture and brick walls were as com-
pletely and cleanly cut tlirough as could have been done by the tools of a mec hanic, while the boilier shop 1s a com-
Diete wreck of broken timbers. The most plausible the ory of the cause of the explosion is that the fire got under way after the workmon had left, na nd thus gener-
ated sieam sufficlent to cause the accident . t ever, impossible to arrive at any conclusions last night, and it will require removal and examination of the debri today to get at any accurate deea of how it occurred.
a casual examination of the boiler shows that in ome places it was very much worn and thin, some o the pieces left in its track belng but ittre thicker tha
heet iron." On going to the spot, immediately on reading the above, I found the boilier, as it lays on the
treet, to be about 10 feet 1 ong by 42 inches in treet, to be about 10 feet long by 42 inches in diameter,
30 fues about 2 inches 3 iameter. The front end is off and gone; one slde of the boiler, from one end of the fues to the other, has been forced in by some cause, as
If some great pressure had been applied to the outside. If some ereat presure had been applied to the outside. The fues are all forced close together at the center,
while the ends of most of them remain in their proper places. Now what I wish to know 18 : How is it possi-
bie for the front end of a boiler to blow off and the bal. ance ot the boilier to follow with such force in the same
Irection? In this instance, the boller wis the east ; the front part is gone and the bottom we find
 the ground with the back end of the boiller frrst, show.
ing that it must have made at least one half of a revolu. ion endwise. I would as soon expect to see a cannon, hen fred, go in the same direction as the ball, as to see
boller tollo up te edo haps you can glve a satisfactory explanation of this my ery. A Aswer: We are quite as much at loss to account
forthis remarkable circumstance as is our correspoud ent, and hope that he will continue his investigation untithe can give us more complete data upon which to
base an opinion. Is there nomistake in the description
given of the relative position of the boiler before and
E. R. D. says: I have a $\frac{1}{2}$ horse power oscil.
ating engine; how large a boilier shall I want and what yhickness should the tron be? The boller is to beheated by a stove; will a barrel setting over the boiler, with a
pipe running down into it, do for a feeder? Answer: We hovld make a tubular boiler having about a suare foot
of grate surface and 2 f feet of heating surf face It woul frate surface ard 2 feet of heating surface. It wout made of iron a bout an eighth of an inch thick to carry
100 pound steam. A properly constructed plunger feed 100 pounds steam. A properly constructed plunger feed
pump should be attached to the engine. We should not
J. H. C. asks what per cent of the water
supplied to a hydraulic ram can be returned to the point from which it fell? Does a ram give as good results
under a given head of water as a turbine wheel? An-
L. \& D. W. C. ask: How can we ascertain the quantity of power transmitted by belts of different
widths, and pulleysof variousdiametersand speed? An. swer: See the editorial columns of this issue.
W. H. C. asks: Would a pressure of steam
hold up a column of cold water under the following circumstances: suppose I Ihave a tank of cold water 3 feet
hilgh connected by a pipe to my boiler above the
ond vater line (the tank also sitting above the water line), What pressure of steam, if any, woold hol the water
back; or would the cold water condense the steam and the difference in temperatures create a current and allow
the water to run in the boiler under any pressure, the steam taking its place? Would the same result take place (the tank betng closed and able to sustain the pres-
sure of the steam in the boilier) if the tank were fuil as if half full? Or would the same result take place if the Answer: $A$ pressure of one and a half pounds would equilibrate that of the column of water. In the case it to the boller were large enough, might condense the steam. If that were to occur, the water in the tank
would then flow into the boiler with the same rapidty that it would issue from the pipe were the pipe led into the open air and $a$ hole made in the top of the tank. The steam could only take the place of the water when the
Ipe was made of suflicient size to allow the steam to


April 26, 1873.
hapipecu, auu une arrangement has, in that sh.
hsed as an automatic feed, with some suceess.
D. G. says: We have a new kind of a pump
ately introduced into this (mining) district this pump was originalys intended for a 14 inch pump, plunger and uacket combined, the object of which is tod odscharge on
ailf the water on the down stroke and the other half o the up stroke, thus making whatis claimed to be a ba nce pump, with a great saving in power in working in deep mines. The parties who use this pump discarded which makes the pump now a 12 tinch plunger pump. The bullder of this pump has discovered an advantage in dis harging the water through the jack head over pum arrel, and a saving of ten the former, A. We place the two pumps in a shaft, 20 feet deep; the foot valves are on a level with one an-
other. Now the best talent in the county claims that ther. Now the best talent in the county claims that the water in B will travel 10 feet further than it does in
$A$, in other words that $B$ ralses $a$ column of water 200 feet in hitht, while A o orly ratses a column 190 feet, and
spills water 10 feet in advance of B. $I$ claim that the water in $B$ does not travel any further than it does in $A$
hat they both pump agalnst a column of water of the ame hight, and that A does not discharge water 10 fee in advance of B. Will yougive us your highly value opinion? Answer: We are inclined to agree with our correspondent on this point. We think, with him, tha discharged into a reservoir at a level 200 feet above, no
modification of the machine will beable to make the lift nything less than 200 feet. We differ from the sal best talent"; holding opposite views, and should pre
fer to accept the opinion of some of the intelligent ap prentice boys who read the Scientific American ather than subscribe to the views of said " best talent. Any two pumps, pumping against equal heads, will
require the same power to do their work, provided J. K. says: We have a steam mill for sawand causes a great deal of scale on the boiler. Now w ave contracted for a new boller of 30 horse power and wish to know what arrangement we can make to con
dense the exhaust steam to use for feed water. Answer We presume that the most satisfactory arrangement
will be found to be the usual condenser and air pump, which can be attached by any competent constructin engineer. There are one or two forms of "siphon conever, and are said to perform well.
J. M. says:
42 inch boilers, 22 feet long, with 2 fourtees inch flues in each; the shells are made of $1 / 4$ inch iron and the flues are made of iron of the same gage. They have been in
use for 12 years, and I inspected them this week; the cale that is deposited on them is no thicker than a sheet of writing paper and is black and glossy; there are no leaks and they appear to be in as good condition as
though they were only two years in use. I am expected to press them to 65 lbs. per square inch. I have had charge of bollers for the last sixteen years and I have
read the Scierstiric all that time ; but as this is the first time that I have hacl to deal with bollers with large flues, wou believe would be the highest safe strain that what carry, and whether the shell or the flues will stand the most pressure before giving way. Will you tell me how to compute the strains on flues in plain arithmetic, as I the boilers described, if perfectly sound and of good iron, is safe at the pressure of 65 lbs., and the steamboat law of $1 / 4$ inch metal. The flues, if in equally good conditity should collapse at about $806,000 \times \frac{1}{1} \times \frac{1}{4} \div 22 \times 14=163 \cdot 5$ pounds. One quarter of this pressure. or 40 pounds, is be carried, and we, ourselves, ehould object to carrying more than one sixth, 28 pounds. The flues will, therefore,
give way first, under the conditions assumed, and should not be subjected to more than 40 or 45 pounds, although they may stand four times that pressure. The weak correspondent probabiy knows quite as well as we our many accidents occur from collapsing flues. To deter mine the strength of any flue, made of good iron, well times the square of the thickness in inches by the proD. says: Suppose a party owes me. I sue if' reports "no property, except letters patent in the deit is his own or purchased). Can I have said letters patent attached and sold at sheriff's sale? Answer; A
patent cannot be taken and sold under an execution in in ordinary action for debt in which judgment has been
P. L. asks: Would sleeping always with
our head to the north tend to magnetize the metallic your head to the north tend to magnetize the metallic
constituents of the flulds and solids of the human body? If so, would it increase nervousness? $\Lambda$ nswer: Persons
having the "iron constitution" might be so aftected. P. L. asks: How can you construct a
that will draw water from a well that is 45 or 50 feet dsep? Answer: Use a common lift and force pump, the L. W. C. asks: Can you give me an explaaccordins to history, were discovered by Professors Henry, Wheatstone and Morse, as early as betwenen 1836
and 1812? Also, could that patent be cnforced and thereand 1812? Also, could that patent be enforced and thereby close opposition telegraph companies? Answer:
The Page patents were granted by special act of Con-
gress. Thieir validity has not yet been determined by gress. Their validity has not yet been determined by
the Courts.
N. B. D. says: I wish you could tell me N. B. D. Says: I wish you could tell me
what is the matter with my magnet. The coresaremade of soft iron, about 3 inche long; they are joined at the smaller end by being screwed into a small piece of iron When Iattach the wires of a local battery to them, they considerably larger than those on my sounder, but do not possess any attractive power. Cari you tell me
where the trouble lies? Answer: Your mistake may be in the connection of the terminal wires of the two are wound in one direction and slipped on the cores, at the end furthest from the armature, connect either the two outside, or the two inside, terminal wires with each
other. If we had your magnet here, we would correct
your mistake, if not too great, without cost.
W. M. E. sends a mineral and asks what it gold. Of no value.
A. M. R. says: 1. What proportion of the 33 inch chined cast fron wheol and an hron rail? f brakes with shoes of castiron $4 \times 12$ nches, what pro-
portion of car and load must be applied to the brakes to make the adhesion of wheel to brake equal to wheel o ail? 3. All things being equal, what is the measure of lifference of adhesion between a rolling wheel and a to twenty per cent when dry, about ten per cent when greasy, and about tive per cent for very light loads on a
very greasy rail. 2. The friction is about the same as the preceding, and the same proportion of weight should b not slide without rurning 3 Rolling friction of tral on a level being about one third of one per cent, th ratio of rolling to sliding will be 45 or 60 to 1 for dry, 30
to 1 for greasy, and 15 to 1 for very light weights and 1 for greasy, and 15 to 1 for very light weights and
very greasy rail. The sliditing friction of a rolling and
W. H. C. asks: 1. How can zinc lining in 2. Is there a durable paint or varnish for stoves, to be grease and whiting. 2. There is nothing equal to first uality finest ground black lead for stoves
N. N. Says: 1. I have a fire box boiler 18 enter and 2 nearer the bottom. At about $2 \% / 2$ or 3 nches from the outside shell, a crack has occurred in one joins the boiller head, on the under side of the flue and next to the adjoining flue. How can I instruct a black-
smith to repair the break?
2. The flues, from burnin mith to repair the break? 2 . The flues, froin burning
light wood, are fncrusted with a thick conting on the re surface of each, apparently deposited from the with making steam, being a non conductor of heat. What will precipitate cellulose from its cupro-ammonium
solution? 4. What is cellulold? solution? 4. What is cellulold? Answers: 1. Take
piece of boiler plate large euough to cover the crack complefelely, with width enough to allow room for flange
through which to bolt. Fit very carefully, working it ot and finally bolt it in place with \% inch head and nu bots, making the joint tight with a cement of red and
white lead and ofl. 2. Make a scraping tool for the purpose and remove ter with hat, if it cannot be detached
by a stream of water, or by a brush. 3. Precipitate by eutralizing with excess of hydrochloric acid. 4. From
W. A. P. says, in answer to S. S. P. S. who
sked what are the diameters of English drivers: Their express locomotives have a single driving
wheel on each side, the diameter of which differs on diferent railroads. I enquired concerning them while in London last summer, and was told that the largest on
the London and Southeastern Railway were about 9 feet ndiameter ; those on the Midland railway from 8 to $8 \%$ eet; and on the London and North western railway and hers, they varied from $6 \frac{1}{2}$ to $8 \frac{1}{2}$ feet. Those on th L. \& N. W. railway are chiefly from 7 to $7 \frac{71}{4}$ feet in dof less diameter; but from what I saw, I should say that they were generally larger than those used on freight
J. J. B. says that W. D. O.'s question as to ne, and the answer is yery simple: By the common eon ent of nations, the 180th degree of longitude from Gree解 in turn, and consequently this is the line sought for by
w. D.o. When a ship going west crosses this line at and vice versa; when a ship going east crosses this line ne, that it is only Friday noon. This arrangement
G. L. B. says, in answer to E. M. B's
ion on calculating speeds and diameters of pulleys Multiply the diameter of the pulley (in inches) by the peed that it runs and divide by the dameter of the driven pulley. He says that machines come to him im multiply the diameter of the pulley by the spe Ine of shafting runs, and the answer will be the dlame ter of the pulley required in inches.
J. C. H. says, in answer to T. G. who asks emery, 2 lbs., Stourbridge loam, 1 lb.; mix to a thick paste and press into a metallic mold,
bake or burn in a muffle to a white heat.
$\underset{\text { athod of transferring pictures to glass: My method }}{\text { S. T. W. replies to S. L. D. who asked for }}$ of transferring pictures is to use balsam of fir and alco it and then, instead of letting it dry for 2 t hours, immediinger; of course it requires a little more care, and should be rubbed very lightly the closer you get to the picture. When allowed to dry for 2Hhours, the paper absecure a mach finer and quicker job
A. O. says, in reply to J. B. M., who asked water strongly impregnated with salt, and what woul be the difference if sal ammoniac were used in place of
salt : All substances which increasc the conductivity of heat of the water produce also a higher degree of hard noniac. Theel. This is the case with salt and sal a: certain influence ; so we can explain why the ancient for hardening steel. For this reason according to Pliny, steel works were often crected in their vicinity and at a distance from the mines. There are now use
nitric acld, potash, nitre, prussiate of potash, crystals artar, etc. Tree English fle cutters potash, crystals Vitriol to 30 or 40 parts of water. In some cases where
no fresh cold water is at hand, such additions may be A correspondent replies to T. E. B., who Thro three or four oyster shells in the stove, while the
fire is hot, and leave them there. They work like charm.
A. H. M. says, in reply to J. C. C.'s query er and fllter above your pump a foot or two, so the hot
water will flow to it, and then insert a small pipe in the suction close to the pump, of sufficient hight to extend
above the head of hot water, leaving the upper end open for the steam to escape, I think you will be able to force your hot water without cooling it again, and
thus you will not lose the advantage of heating and ul-
tering.

Minerals.-Specimens have been receive amined with the results stated S. H.-It is galena, the ore of lead. J. W. T.-It is a siliceous rock, containing either car
onaceous matter or oxide of manganese : analysí would be necessary to determine
A. H. -It is calcareous marl.
G. C. S.-They are pyrites and mica J. F. S.-The specimens co
ickel, but considerable iron
came from the dark colored rock sent?
D. H. W.- 1 not
E.-It is yellow ocher, which is useful as a coarse pain
nd for polishing. If there is an abundance of it, it nd for polishing.
should not lie idle.
W. P. H. -The specimen is interesting as being a relic of the superstitious arts practised by the "medicine y one with which the negroes are acquainted, whic vould produce the symptoms mentioned. If any other
correspondents of the Screntiric American know of he use of the "Hoodo," or anything similar, among the
negroes in the Southern States, we wish they would

## COMMUNICATIONS RECEIVED

The Editor of the Scientific American acknowledges, with much pleasure, the re ceipt of original papers and contributions upon the following subjects :
On the Atlantic Disaster. By C. D. O.
On a Plan for an Underground Telegraph By W. F.
On the Solarity of the Magnetic Needl By H. S.
On a Railroad Accident near Memphis, Tenn. By A. C.
On a Hydraulic Ram. By J. P
On Professor Haeckel's Opinion of the Em bryo State of Man. By J. L.
On Trying Circles with a Square. B G. B.D

On Moonites. By W. L. D.
On Double Action Friction Gear. By J. B. H On Clarifying the Water of Kansas City By H. R.
Also enquiries from the following

##  W.J.S.-A. K.-R. D. B.-H. A.-G. G.S.-E. M.-J. -F.S.J.-E.F.O.-F.R.-w.G.-J. H. W.-J.S. M -W.H.C.-T. C.J. - A. H.-J. B. - B. A. C.-A. C H. J. N.-R. W. S.-C. D. F.-G.M. E.-A. M.-J. S. Correspondents who write to ask the address of certain nanufacturers, or where specifled articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications mount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries. <br> |OFFICIAL. <br> Index of Inventions

FOR WHICH
Letters Patent of the United States were granted for the week ending March 25, 1873,
and each bearing that date.

## [Those marked (r) are relssued patents.]

Acid, boracic. F. Gutzkow
Adding machine, A. M. St Ar, expelling, G. A. Frear. Alral, etc., low water, J. Ross Amalgamator, F. Morris Bale tie, cotton, G. Brodie (r). Bed, spring, D. E. Tayl
Bedsteat, F. G. Ford..
Binder, temporary, D. Dunton.
Biscuit, cutting, $J$ \& S. Turner
Boats, propelling, J. S. Anderson
Bonler, culinary, It B. Lewis...
Books, ete., backing, Foster, Baylic, \& Harlin
Boct sole presser, Seaver, Sc
Bran dus' er, J. T. Mc Nally..
Breast pin tonguc, L. H. Sond
Brick machine, , T. T. Barton..
Bromine, produciag, Leyer \& Wint
Butter rolls, ctc., forming,
Can opener, J. J. Reed.....
Car brike J. K. Knowlton
Cay c.upling, C. H. Gearhart.
Car coupling, H. E. March
Car coupling, A. Pritz
Car replacer, H. Voth,
Car wheel, Waketeld \& Berryma
Carpet fastener, A. J. Williams.
Carriage spring, C. S.S. Griffing.
Carriage capper, G. S. Greene, J
Casks, pitching, F. Brenner...
Castcr, furniture, C. B. Sheldon.
Caster, furaiture, C. B. Sheldon.
Caster, table, T. Shaw.
Chair, reclining, G. D. Gcss.
Chair, tilting, F. A. Farker...........
Chair, ta 1 le, and lounge, J. Croghan
Chest t rotector, E. F. Wilder.
Cock, stop, J. P. Mern.......
Cock, welghted gage, Tasker \& McMillan
Collar, G. F. Rice.
Collar pad, P. H. B.
Cotton, etc., compressing, F. Weldon.
Coupling, friction, J. Hendy (r).
Crib or hammoci, D. . O'Graiy
Crib or hammoci, D. C. O
Cultivator, M. Lewellin..
Cultivator O. M. Pond...

Deskivator, hand, G. W. Ruc
Desk, school, D. G. V
Door bolt, J. Jones..
Door cheek,
Door check, B. Poulson......
Doughnut mold, G. Maclilet
Earth closet, I. S. \& H. R. Russel
Engine, dummy, M. H. Hollock
Engine, hot air, $\Lambda$. K. Rider (r)
Engine or pump, rotary, L. Chapm
Engine, steam, A. E. Baker.......
Engine, steam, J. W. Wibrate rotary, W. C. Stiles...
Engine, rotary, H. Taylor...
Engine, vapor, J. F. Haskins
Engine, valve, P. W. Mellen
Engine, vave,
Engine, cccentric rod, J. F. McCutcheon
Fabrics, etc
Fabrics. etc., opening, w. Birch.
Fan, automatic, w. Fo Fan, automatic, W. Fay.........
Feather renovator, J. B. Rlley Feather renovator, J. B. Riley.
Feed cutter, Bartle \& \& Garlock.
Feed apron, etc., P. R. Mansticlá 'ertilizers, Christy \& Bobrownic ifth wheel for carriages, etc., D. wilco. Freproof shutter, W. M. Vars.
 Funnel, measaring, T.E. Cropper Furnace, hot air, T. T Yapola, o. Bolton, Game table top, G. G. Thomson.......
Gas, etc., washing, Brown \& Thomas Gas governor, R. Koch.................. Grain weighing, F. S. M.
rappler, S. B. Dexter.. Hammer, power, S. Pennock....
Harness, hame for, C. Robinson Harrow, J. Smith....
Hinge, spring butt, H. A. Clark Ho and roller, E. Blanchard............. Hoist, I. Smith,............... Horseshoe, I. De Mott. Horse collar, E. H. Sprague..............
Horses, cleaning, Allison \& Homelius. Hose pipe and sprinkler, W. W.
Hydraulic motor, B. A. Bloch Hydrocarbon, burning, C. J. Eames Hadrocarbon, burning, C.
Jack, earriage, D. Heestand Kiln, R. Connable........... Kiln, malt, etc., J. Gecment.
Lamp burner, J. W. Wyatt. Latch, reversible knob, W. H. Andrews Latch, reversible knob, R. L. Webb......
Latch, reverrisle knob, A. F. Whiting. Leather, etc., skiving, P. D. Cumnings Lock, indicator, E.
Loom, C.J. Kane. Loom, power, J. Shinn..
Loom take up, S. Estes Lubricator, stcam, W. Hamilton.
Lubricator, steam, W. Gowenloc Lubricator, steam, W. Gowenlock
Mandrel, buffing, G. B. Dunham.. Meat chopper, J. A. Haru.............. Hetal castings, grinding, G. H. Spencer Metal lincd vessels, J. Matthew Metal vessels, R. J. Howdon.
Metal vessels, beading, C. W. Mill, fanning, L. H. Decker Mucilage, , Kloczewskki \& Mindeleff
Musical instrument w Musical instrument, W. Leigi...... Organ stop action, J. A. Smi
Package register, G. W. Moor
Pall, dinncr, P. Molan..
Paper, ornamental, A. D Paper, ornamental, A. Del
Pencil, lead, T. H. Müller.
Petroleum oil, J. K. Truax Penci, lead, T. H. Müller.....
Petroleum oil, . K. Truax..
Photographic bath, H. J. Su Pitcher top, G.P. Lang, Jr
Planter, hand, D. B. Seely. Plow, T. J. \& G. M. Clar
Plow clevis, A. Kaufman Post driver, I. V. Adair ..........
Pressing machine, , C. Sa
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Pulley, M. K. Whipple........
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Railroal switch, G. W. Billings. Rake, horse hay. J. F. Kcller..
Rake, revolving, A. B. Slarp. Refrigerator, R. Tay lor
Register, counting, G. H. Rəgister, measuring, M. Spring wate Fiegister, etc. ston f,, C. Hiltcn...
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Sad iron, Fv. L. Hubb Sail and marine drag, T. M. Flee
Safe, burglar proof, W. Corliss.
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Sceding machine, D. Cain Separators, sicve for, B. \& M. Miller
Sewing mochine winder, A. B. . Sewing macline, button hole. Iowar Sewing machine caster, J. B. Lincoln $1 . . .$.
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Soldering apparatus, C. B. Koons.. Soldering tool, J. Sears.
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Sole trimmer, Gallagher \& Coyle
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Windmill, G. A. Swartz...
Window shade clip, F. Mull e
Wrench heals, forming
Wrench head, forming, L. Chapman.
APPLICATIONS FOR EXTENSIONS.
Applications have been duly fled, and are now pending, gs upon the respective applications are appointed for the days hereinafter mentioned:
24,593.-Harvesting Machine.-Mc C. Young, Jr. June 11.
24,655 - Protecting Iron Surfoces.-T. Selleck. June 18 24,685. -TiLL ALARM. - E. B. White. June 18. 24,700.-Harvester.-L. and J. Miller. June 18.
$24,772 .-$ Keg.-J.Wilson, C.Green, W.Wilson, Jr. June

EXTENSIONS GRANTED. 22,793.- Cracker Machine.-J. Fox.
23,536.-Pyrotechnic Night Signal.-M. J. Coston.
23,436. -Wringing Machine.-S.A. Bailey. 23,555.-Bedstead Fastening.-L. W. Buxton.
23,41- -Rote La Ming Machine.- W. Pittman, W.C.Boon 23,491--Rope Laying Machine.-W.Pittman, W.C.B.
23,520 .-Burnishing Machine. -Le Roy S. White. DESIGNS PATENTED 6,512.-CARPET.-A. Cowell, Kidderminster, Eng.
6,513 to $6,517 .-\mathrm{CARPETs}$.-O. Heinigke, New York city.
 6,521--CARPET.-R. Hoskin, New Y Ort city.
6.52.-CARPET.-J. Humphries, Kidderminster, Eng 6,523.-PENCLL.-E. S. Johnson, Jersey City, N.J.
6,52 \& 6,525.-CARPETs.-L. G. Malkin, New York city.
6,526 \& 6,527. -FLoor CLotHs, ETC.-C.T. and V.E. Meye

 6,535-Boot Jack.-E. J. Steele, New Haven, Conn.
6,536.-PIcture Frame.-L. Steinkiliper and L. We Williamsport, Pa.
6,537. - Door LATCHEs, Etc.-A. Wonder, New Haven,

TRADE MARKS REGISTERED
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1,177.-Whisky.- 3 . H. Engelke, St. Lenis, Mo.
1,177.-Whiscy.- 13 . H. Engelke, St. Lois, Mo.
1,178. -MEDICAL Preparation.-R.Hoyt, New York city. 1,178. -Medical Preparation.-R. Hoyt,New Yo
1,179.-CIGars.-Kerbs \& Spies, New York city.
1,180 -CIGArs ,-Kerbs \& Spies, New York city. 1,180.-Cigars.-Kerbs \& Spies, New York city.
1,81.-Whisky.-J. J. McClelland, Austin, Texas 1,182.-Coor $\operatorname{trove}$. pusey, McLeod \& Co., Troy, N. Y. 1,183.-Sugar Lemon Compound. -Preston et al, B
$1,18!$.-Gold Foil.-S. S. White, Philadelphia, Pa. 1,181.-GoLD Foil.-S. S. White, Philadelphia, Pa.
1,155 \& 1,186.-SoA Ps.-J.. . Williams \& Co., Glastonbury,

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