a WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, ANI MANUFACTURES.


NEW YORK, DECEMBER 7, 1867.
$\left\{\begin{array}{c}\$ 3 \text { per Annum } \\ \text { [IN ADVANCE.] }\end{array}\right.$

The Celebrated Niagara Suspension Bridge. For many years it was a question discussed by the merchants and tbe people on each side of the line which divides the United States from the British possessions, how to make
metals. This contact breaks one circuit and completes an otber, and thus transmits to the other extremity of the tele graphic line information of the partiticular degree of heat at
that instant indicated by the thermometer. This thermome-
as seen in the engraving, is similar to that in ordinary use. It is shown in both the views in section. On a projection on one side of it is pivoted a double lever cam with a thumb one side of it is pivoted a double lever cam with a thumb
piece on each arm of the lever. When, as in the engraving,


## THE SUSPENSION BRIDGE ACROSS THE NIAGARA

of the Niagara river. At length, in 1855, the problem was solved by the erection of the suspension bridge, which is to this day unsurpassed by any other similar structure in this or this day unsurpass
The bridge is located about two miles below the falls, and spans the river at a hight of nearly 250 feet above the water. It is supported by four wire cables, nine-and $a$-quarter inches diameter, which pass over towers erected on each side of the river. From center to center these towers are 800 feet apart. 14,560 wires were used in the cables, their united strength being estimated at 12,000 tuns. It is a railway and ordinary passenger traffic bridge combined, the carriage and foot ways being twenty-eight feet below the railway track. Its rigity and strength may be conceived when it is stated that under the passage of heavy trains the deflection is less than four inches.
Mr. John A. Roebling was the engineer, who will superintend the erection of the proposed bridge which is to connect New York and Brooklyn.

Telegraphic Meteorometers.-Prof. Wheatstone has de vised a new class of instruments for taking observations in stations which for any cause are not accessible for very long periods. The telegraphic thermometer, a type of this class, consists essentially of two parts; the first is the magneticmotor, constructed on a plan similar to that used by the inventor in his alphobetical magnetic telegraph, and is so ar ranged that by turning a handle the lever at the other extremity of the line will describe by regular steps a complete circle. The second part conslsts of a metallic thermometer, in which the unequal expansion of two different metals is made to move a leter or pin around a graduated circle which morks the 1 marks the degrees of temperature. The two parts are in the circle must, at some point, come in contact with the pin, which is moved by means of the expanding or contracting
er is not self-recording, but responds with accuracy when ever questioned.

## MONEY'S IMPROVEMENT IN UMBRELLAS.

The insertion of the ordinary wire spring commonly used
n umbrellas and parasols necessitates a mortise in the han

dle, which by being cut nearly through the stock diminishes its strength and makes that portion comparatively weak at the point which should be the strongest.
The slide, in which are pivoted the inner ends of the ribs,
the lower end of the lever is pressed down the boss of the eccentric or cam impinges rigidly and firmly on the surface On the contrary when the urp staff the pressure of the boss of the eccentric is released from the stick and the umbrella can be readily closed, the slide moving freely on the stick. This position is seen in the mall section marked $A$
The patent for this device, obtained through the Scientific American Patent Agency, Oct. 29, 1867, is owned by William Money and Edgar McCloud, either of whom may be addressed relative to the sale of rights, etc., at Paterson, N.J.

## The First Steam Fire Ship

Edward Thomason, of Birmingham, England, laid before Edward Thomason, of Birmingham, England, laid before
the Admiralty, in 1796, a model of a vessel propelled by padthe Admiralty, in 1796, a model of a vessel propelled by pad-
dle wheels and a steam engine intended for use as a fire ship. The rudder was also to be operated by the engine, the powder and combustibles also to be fired by the same means, as soon as the driving shaft had accomplished a certain number of revolutions. No person was to accompany the vessel. The distance from the English blockading fleet to the French fleet in the harbor being known, also the course of the chan. nel, the steam fire ship was to be adjusted and started. After the engine had made a given number of turns, the rudder would be moved and the vessel's direction changed accord. ing to the channel, and so on until the paddles having made the total number of revolutions required to carry the ship into the middle of the hostile fleet, then presto, click the ex losion was to take place and the unsupecting enemy were plosion was to take place and the to be set on fire or blown sky-high. But in those days the
Admiralty did not believe in steam power and so the novel fire ship was never built.

Adding to the width of a belt and of the faces of the pul. leys, increases immensely its power of conveying force. A wide belt is always better than a narrow one strained to its utmost capacity.

## THE AMERICAN TORPEDO BOAT OF 1776

The historical records of our Revolutionary war contain notices of the attempt made in 1776 to destroy the British fleet then anchored in the harbor of New York, by means of a submarine apparatus. The following details of the construction of the torpedo vessel, its operations and final loss, are from the pen of the inventor himself, D. Bushnell, of Connecticut, and were communicated by him many years ago, to the American Philosophical Society, from whose record we transcribe them. This we believe was the first submarine boat ever constructed. Every part seems to have been well considered, and the whole exhibits a degree of ingenv ity quite remarkable for those early days of invention.
The external shape of the submarine vessel bore some resemblance to two upper tortoise shells of equal size, joined together ; the place of entrance into the vessel bells, at the head of the animal. The inside was capable of containing head operator, and air sufficient to support him thirty minutes without receiving fresh air. At the bottom, opposite to the without receiving fresh air. At the lead for ballast. At one edge, which was directly before the operator, who sat upright, was an oar for rowing forward or backward. At the
other edge was a rudder for steering. An aperture, at the other edge was a rudder for steering. An aperture, at the
bottom, with its valve, was designed to admit water, for the purpose of descending; and two brass forcing-pumps served to eject the water within, when necessary for ascending. At the top there was likewise an oar, for ascending or descending, or continuing at any particular directed the course, and a ventilator within supplied the ves sel with fresh air, when on the surface.
The entrance into the vessel was elliptical, and so small as barely to admit a person. This entrance was surrounded with a broad elliptical iron band, the lower edge of which was let into the wood of which the body of the vessel was made, in such a manner as to give its utmost support to the
body of the vessel against the pressure of the water. Above body of the vessel against the pressure of the water. Above
the upper edge of this iron band there was a brass crown, or cover, resembling a hat with its crown and brim, which shut watertight upon the iron band ; the crown was hung to the iron band with hinges, so as to turn over sidewise, when opened. To make it perfectly secure when shut, it might be screwed down upon the band by the operator, or by a person without.
There were in the brass crown three round doors, one di rectly in front, and one on each side, large enough to put the hand through. When open, they admitted fresh air; their shutters were ground perfectly tight into their places with shut., There were likewise several small glass windows in the crown, for looking through, and for admitting light in the day time, with covers to secure them. There were two air pipes in the crown. A ventilator within drew fresh ai through one of the air pipes, and discharged it into the lowe part of the vessel ; the fresh air introduced by the ventilator expelled the impure light air through the other air pipe Both air pipes were so constructed, that they shut them selves whenever the water rose near their tops, so that no water could enter through them, and opened themselves im mediately after they rose above the water.
The vessel was chiefly ballasted with lead fixed to its botom; when this was not sufficient, a quantity was placed ithin, more or less, according to the weight of the opera or, itser The vessel, with all its appendages, and the versetting. The vessel, with all its appendages, and the operator, was of sufficient weight to settle it very low in the
water. About two hundred pounds of the lead, at the bot wom for ballast, would be let down forty or fifty feet below tom for ballast, would be let down forty or fifty feet below the vessel ; this enabled the operator to
surface of the water, in case of accident.
When the operator would descend, he placed his foot upon the top of a brass valve, depressing it, by which he opened large aperture in the bottom of the vessel, through which he water entered at his pleasure; when he had admitted a sufficient quantity, he descended very gradually; if he ad mitted too much, he ejected as much as was necessary to obtain an equilibrium, by the two brass forcing pumps, which were placed at each hand. Whenever the vessel leaked, or he would ascend to the surface, he also made use of these forcing pumps. When the skillful operator had obtained an quilibrium, he could row upward, or downward, or con tinue at any particular depth, with an oar, placed near the
top of the vessel, formed upon the principle of the screw, top of the vessel, formed upon the principle of the screw,
the axis of the oar entering the vessel ; by turning the oar the axis of the oar entering the vessel ; by turning the oar
one way he raised the vessel, by turning it the other way he one way he rased it.
A glass tube, eightecn inches long, and one inch in diame er, standing upright, its upper end closed, and its lower end which was open, screwed into a brass pipe, through which the external water had a passage into the glass tube, served as a water-gage or barometer. There was a piece of cork with phosphorus on it, put into the water-gage. When the vessel descended the water rose in the water-gage, condens ing the air within, and bearing the cork, with its phospho rus, on its surface. By the light of the phosphorus, the rus, on its surface. By the light of the phosphorus, the the depth of the vessel under water ascertained by a graduated line.
An oar, formed upon the principle of the screw, was fixed in the fore part of the vessel ; its axis entered the vessel, and being turned one way, rowed the vessel forward, but being turned the other way, rowed
turned by the hand or foot.
A rudder, hung to the hinder part of the vessel, commande
it with the greatest ease. The rudder was made very elas-
tic, and might be used for rowing forward. Its tiller was within might be used for rowing forward. Its tiller was right angle, on an iron rod, which passed through the side of the vessel; the rod had a crank on its outside end, which commanded the rudder, by means of a rod extending from the end of the crank to a kind of tiller, fixed upon the left hand of the rudder. Raising and depressing the first-men tioned tiller turned the rudder as the case required.
A compass, marked with phosphorus, directed the course oth above and under the water ; and a line and lead founde the depth when necessary
The internal shape of the vessel, in every possible sectio of it, verged toward an ellipsis, as near as the design would allow, but every horizontal section, although elliptical, yet as near to a circle as could be admitted. The body of the ves-
sel was made exceedingly strong; and to strengthen it as sel was made exceedingly strong; and to strengthen it as much as possible, a firm piece of wood was framed, paralle the conjugate diameter, to prevent the sides from yielding to the great pressure of the incumbent water. in a deep im mersion. This piece of wood was also a seat for the operaE.

Every opening was well secured. The pumps had two sets f valves. The aperture at the bottom, for admitting water was covered with a plate, perforated full of holes to receive he water, and prevent anything from choking the passage r stopping the valve from shutting. The brass valve migh kewise be forced into its place with a screw, if necessary The air pipes had a kind of hollow sphere, fixed round the top of each, to secure the air pipe valves from injury; these
hollow spheres were perforated full of holes, for the passage hollow spheres were perforated full of holes, for the passage
of the air through the pipes; within the air pipes were shut ers to secure them, should any accident happen to the pipes or the valves on their tops.
Wherever the external apparatus passed through the body the vessel, the joints were round, and formed by bras pipes, which were driven into the wood of the vessel, the holes through the pipes were very exactly made, and the ron rods, which passed through them, were turned in a lath rust and leaking. Particular attention was given to bring rust and leaking. Particular attention was given to bring in and without the vessel, before the operator, and as conve niently as could be devised; so that everything might be niently as could be devised; so that everything might be
found in the dark, except the water-gage and the compass, found in the dark, except the water-gage and the compass,
which were visible by the light of the phosphorus, and nowhich were visible by the light of the phosphorus, and no-
thing required the operator to turn to the right hand, or to he left, to perform anything necessary.

## the magazine.

In the fore part of the brim of the crown of the submarine essel was a socket, and an iron tube, passing through the socket ; the tube stood upright, and could slide up and down the socket, six inches; at the top of the tube was a wood rew, fixed by means of a rod, which passe 1 through the
 tube; by pushing the wood screw up against the bottom of a
ship. and turning it at the same time, it would enter the planks; driving would also answer the same purpose; when he wood screw was firmly fixed, it could be cast off by un crewing the rod, which fastened it upon the top of the tube. Behind the submarine vessel was a place above the rudder or carrying a large powder magazine; this was made of two pieces of oak timber, large enough, when hollowed out, to aratus screw, turned by the operator. A strong piece of rope exended from the magazine to the wood screw above men tioned, and was fastened to both. When the wood screw was fixed, and to be cast off from its tube, the magazine was to be cast off likewise by unscrewing it, leaving it hanging to the wood screw; it was lighter than the water, that it might rise up against the object, to which the wood screw and itsel were fastened.
Within the magazine was an apparatus, constructed to run ny proposed length of time, under twelve hours; when it had run out its time, it unpinioned a strong lock resembling gun lock, which gave fire to the powder. This apparatus was pinioned, that it could not possibly move, till, by casting off the magasine from the vessel, it was set in motion.
The skilful operator could swim so low on the surface of he water as to approach very near a ship in the night, with out fear of being discovered, and might, if he chose, approach the stem or stern above water, with very little danger. H could sink very quịckly, keep at any depth he pleased, and rew a great distance in any direction he desired, withou oming to the surface, and when he rose to the surface, h could soon obtain a fresh supply of air, when, if necessary,
be might descend again and pursue his course. e might descend again and pursue his course

EXPERTMENTS.
In the first essays with the submarine vessel I took care to prove its strength to sustain the great pressure of the incum
bent water, when sunk deep, before I trusted any person to bent water, when sunk deep, before I trusted any person to erson to co under water without having a strong piece of rigging made fast to it, until I found him well acquainted with the operations necessary for his safety. After that I out rim descend, and continue at particular depths, wisse go under her, and fix the wood screw mentioned before into her bottom, etc., until I thought him sufficiently expert to put my design into execution.
I found, agreeably to my expectations, that it required many trials to make a person of commen incenuity a skilful operator ; the first I employed was very ingenious, and made himself master of the business, but was taken sick in the
campaign of 1776, at New York, before he had an opportu-
nity to make use of his skill, and never recovered his health
atTEMPT TO SLNE A BRITISH SHIP OF WAR.
After various attempts to find an operator to my wish, I ent one, who appeared more expert than the rest, from New York, to a fifty gun ship, lying not far from Governor's Is and. He went under the ship, and attempted to fix the ooden screw into her bottom, but struck, as he supposes, bar of iron,which passes from the rudder hinge, and is spiked under the ship's quarter. Had he moved a few inches, which he might have done, without rowing, I have no doubt but he would have found wood where he might have fixed th screw ; or, if the ship were sheathed with copper, he might easily have pierced it; but not being well skilled in the man gement of the vessel, in attempting to move to anothe place, he lost the ship; after seeking her in vain, for som time, he rowed some distance, and rose to the surface of the water, but found daylight had advanced so far, that he durs not renew the attempt. He says that he could easily have astened the magazine under the stern of the ship, above water, as he rowed up to the stern, and touched it before he descended. Had he fastened it there, the explosion of one hundred and fifty pounds of powder (the quantity contained in the magazine) must have been fatal to the ship. In his eturn from the ship to New York he passed near Governor' Island, and thought he was discovered by the enemy on the land; being in haste to avoid the danger he fearcd, he cast off the magazine, as he imagined it retarded him in the well, which was very considerable. After the magazine had been cast off one hour, the time the internal apparatus was set to run, it blew up with great violence.
Afterward, there were two attempts made in the Hudson River, above the city, but they effected nothing. One of them was by the afore-mentioned person. In going toward the ship, he lost sight of her, and went a great distance be ond her; when he at length found her, the tide ran so trong, that, as he descended under water for the ship's bot tom, it swept him away. Soon after this the enemy went up the river, and pursued the boat which had the summarine vessel on board, and sunk it with their shot. Though I fterward recovered the vessel, I found it impossible, at that time, to prosecute the design any farther. I had been in a bad state of health, from the beginning of my undertaking nd was now very unwell ; the situation of public affairs was such, that I despaired of obtaining the public attention, and he assistance necessary. I was unable to support myself and the persons I must have employed, had I proceeded. Beside, I found it absolutely necessary that the operators should ac quire more skill in the management of the vessel, before could expect success; which would have taken up some time, and made no small additional expense. I therefore gave over the pursuit for that time, and waited for a more favor able opportunity, which never arrived.

## Alabaster and Plaster of Paris.

Alabaster is a compact gypsum, and occurs massive, with compact fracture ; it is translucent; has a glimmering lusr, and its colors are white, reddish, or vellowish.
The purest kinds of this mineral are used in Italy for vases, aps, candlesticks, and other ornaments. It is found at Castelino, in Tuscany, thirty-five miles from Leghorn, at two undred feet below the surface of the earth
The yellow variety, called by the Italians alabastro agatato is found at Sienna; another variety of a bluish color, obtaind at Guercieto, is remarkably beautiful, being marked with variegated shades of purple, blue, and red. These alabas ers are carbonates of lime.
The principal manufactory of alabaster ornaments is at Valterra, thirty-six miles from Leghorn, where about five thousand persons live by this kind of labor. In making, they require great care, and must be preserved from dust, as the alabaster is difficult to clean. Talcum, commonly called French chalk, will remove dirt, but the best mod $\vartheta$ of restor ing the color, is to bleach the alabaster on a grass plat. Gum water is the only cement for uniting broken parts.
Plaster of Paris is likewise a compact gypsum, but contain small portion of carbonic acid, which makes it effervesce when treated with acids. It was formerly exported only rom Montmartre, near Paris, hence its name; it is much sed in ornamenting rooms in stucco, in taking impreasion of medals, in casting statues, busts, vases, timepiece stands andelabras, obelisks, and for many other purposes.
The common plaster of Paris is ground after being cal cined; and in this condition it has the property of forming a piable mass with water, which soon hardens, and assumes he consistency of stone.
Oriental alabaster is not a sulphate but a true carbonate of lime, and on account of its peculiar tint and transparency and as it appears that it was formed similar to stalagmite, it was called by the ancients, alabaster.
M. Krupp is about to construct, at his works at Essen, ingle-acting stoam hammer, far exceeding in size any now in existence. The design for this hammer-which will have head weighing 120 tuns-have already been prepared, and the patterns are now in hand. At present, the largest ham mer at M. Krupp's enormous establishment is one with a 50 tun head, falling nine feet, six inches. This is a single-acting hammer-the only one on the works, all the others being double-acting. The smaller hammers have heads varying fron twenty-five tuns downwards. In addition to these, $M$ Krupp has also some peculiar tilt-hammers, in which a steam ylinder is placed between the head and fulcrum of the ham mer, and the piston working in this cylinder is directly coupled to the hammer shaft by a connecting rod.

The Wondrous Textile Fabrics of Hindoostan.
In the manufacture of muslin the Hindoos surpass all other people, as they do in the manufacture of the Cashmere shawl. There is a class of muslin termed " woven air," the fabric of which is so marvelously fine that the Hindoos themselves are fond of relating all kinds of strange theories respecting it. Mr. Bolt, in his "Consideration of the Affairs of India," speaking of the Dacca muslins, says that according to report, the Emperor Aurungzebee once " was angry with his daughter for showing her skin through her clothes, whereupon the young princess remonstrated in her justification, that she had seven japlithz, or suits, on ; another tale was to the effect that, " in the Nabob Allaverdy Kahwan's time, a weaver was chastised and turned out of the city of Dacca for his neglect in not preventing his cow from eating up a piece of "Abrovan," which he had spread and left upon the grass-the muslin, of course, being so fine that the animal could not see it upon the herbage.
So delicate is the manufacture of the short staple of the Dacca cotton, that it can only be woven into yarn at certain times of the day. The morning is generally so employed before the dew has left the grass; if spinning is carried on after that time, the spinner, who is always a woman under thirty years of age, spins the yarn over a pan of water, the evaporation of which affords sufficient moisture to prevent the fibers from becoming too brittle to handle. Delicate as the muslin is, it will wash, which European muslins will not. The durarability of the Dacca muslin, notwithstanding its surprising fineness-a piece of "evening dew" one yard wide and four yards long, only weighing 556 grains-is said to be owing to the greater number of twists given to the Dacca yarn, as compared with the finest muslin yarns of England or France. The time taken to spin and weave the threads in a piece of " woven air" is very great; the reader will not therefore be surprised to hear that it sells at the rate of a guinea a yard.
The "Abrovan,", or "Running Water," is considered the
second class of muslin; "Sabaum," or " Evening Dew" is the third quality. It is; "Sabaum," or "E is so fine that it can ecarcely be distinguished from dew upon the grass. There are several other very fine Dacca muslins that are There are several other very fine Dacca muslins that are
known by distinctive names, but these so poetically desigknown by distinctive names, but these so poetically desig-
nated are the most famous. The Daghdhobees, who remove nated are the most famous. The Daghdhobees, who remove
iron mold from this precious material, use the juice of the iron mold from this precious material, use the juice of the
amroold plant for that purpose ; and to remove other spots or amroold plant for that purpose ; and to remove other spots or
stains a composition of ghel, lime, and mineral alkali. There stains a composition of ghel, lime, and mineral alkali. There
are Mahommedans who also repair this "woven air" with a are Mahommedans who also repair this "woven air" with a
skill equal to that of the Hindoo, who weaves it. For inskill equal to that of the Hindoo, who weaves it. For in-
stance, it is said that an expert Rafuger, or darner, "can exstance, it is said that an expert Rafuger, or darner, can ex-
tract a thread twenty yards long from a piece of the finest muslin of the same dimensions, and replace it with one of the finest quality." It is said that they execute their finest work under the influence of opium.
A still more exquisite and expensive work of the Indian loom is the figured muslin. A piece of this fabric measuring twenty yards, made in 1776 , cost as much as $£ 56$. The splendid yet subdued effect of weaving gold and silver thread into the different fabrics made in India has never even been ap proached by Europeans. Some of their silks have a sheen upon them like the breast of a pigeon, or indeed of the Im peyan pheasant. In nature we never find that even the most splendid effects offend the eye by appearing harsh. The In dian artist seems to have caught the very art there is in nature, and he uses his gold and silver with a caution, a prodi gality, and an economy fitted for the occasion. The native never throws away gold where it will not be seen. Thus on the turban cloth only the end that hangs down by the neck is thus ornamented; in the waistcloth the fringed end, etc. The gold thread is so very pure that it never tarnishes, aud it washes just as well as the other threads of the garment. The thread of the precious metals is called kullabutoon, and is manufactured wholly by hand.
The embroidery in the woven garments in which this ab solutely pure gold is employed never tarnishes-a perfection o whish European fabricators have not yet attained.
[We have seen 9 vail brought by Gov. Thomas H. Seymou Tartary, which, although one yard wide and the Tartary, which, although one yard wide and three long vould float in the atmosphere for an appreciable time befor descending to the floor.-EDs.

## The Limits of the Human Ear.

Prof. Tyndall, in a course of lectures on "Sound," deliv ered before the Royal Institution of Great Britain, states that the perception by the ear of musical sounds and the range of hearing in general is limited by quite narrow bounds.
Savart fixed the lower limit of the human ear at eight complete vibrations a second; and to cause these slowly re curring vibrations to link themselves together, he was
obliged to employ shocks of great power. By means of a obliged to employ shocks of great power. By means of a
toothed wheel and an associated counter, he fixed the upper toothed wheel and an associated counter, he fixed the upper
limit of hearing at 24,000 vibrations a second. Helmholtz limit of hearing at 24,000 vibrations a second. Helmholtz
has recently tirld the lower limit at 16 vibrations, and the has recently tirld the lower limit at 16 vibrations, and the
higher at 38,000 vibrations, a second. By employing very small tuning-forks, the late M. Depretz showed that a sound corresponding to 38,000 vibrations a second is audible. Taking the limits assigaed by Helmholtz, the entire range of the human ear embraces about 11 octaves. But all the notes comprised within these limits cannot be empioyed in music. The practical range of musical sounds is comprised between 40 and 4,000 vibrations a second, which amounts in round numbers, to 7 octaves. "The deepest tone of or chestra instruments is the $E$ of the double bass, with $41 \frac{1}{4}$ vi brations. The new pianos and organs go generally as far as $\mathrm{C}^{1}$ with 33 vibrations; new grand pianos may reach $\mathrm{A}^{11}$ with with $27 \frac{1}{\frac{1}{2}}$ vibrations. In large orgaias a lower octave is intro
duced reaching to $\mathrm{C}^{11}$ with $16 \frac{1}{2}$ vibrations. But the musical character of all these tones under E is imperfect, because they are near the limit where the power of the ear to unite the
vibrations to a tone ceases. In highth the pianoforte reaches to $a^{\text {iv }}$ with 3,520 vibrations, or sometimes to $\mathrm{c}^{\mathrm{V}}$ with 4,224 vibrations. The highest note of the orchestra is probably the $\mathrm{d}^{\mathrm{v}}$ of the piccolo flute, with 4,752 vibrations."

Rule of the Road for steamers.
The following lines seem to be admirably adapted for the purpose of preventing collisions at sea. They are calculated to imprint upon the minds of mariners the "Rules of the Road for Steamers," more vividly and indelibly than any osher process would effect. The author will achieve as great an amount of fame as he who paraphrased the days of the months, and the number of days in each :-

1. Two steamships meeting end on, or nearly end on.

Meeting steamers do not dread
When You see thrree lightrsanead and
Port your helm, and show your Red.

## 2. Two steamships passing

## 

3. Two steamships crossing. This is the real position of danger. The steamship that has the other on her own star board side shall keep out of the way of the other. There is nothing for it but good look-out, caution, and judgment.

If to starboard Red appear,
TTis your dunt to keep clear
Act as judgment says
'T1s your duty to keep calear,
Act ; jadgment says is prop:-
Port-or starboard-back-or, stop her !

4. All ships must keep a good look-out, and steamships must stop and go astern, if necessary.

Both in safety and in doubt
Always kep a good look-out;
Should there not to roo torn,
Stop your ship, and go astern. -Mechanics' Magazine.

## Subjugating an Elephant.

Recently, a Cincinnati paper says, a circus elephant, thirtyix years old, 10,000 pounds weight, and named Tippoo Saib while in winter quarters at Connorsville, Indiana, became un ruly on account of a change of his keeper, and went to war against all mankind. He would allow no one in his quarters, and struck at every one who approached him with his trunk and tusks most violently. His keeper determined to subdue him, and the process and result are thus described: Thenew keeper, with nine assistants, had fully equipped himself with keeper, with nine assistants, had fully equipped himself with
chains and cables for tying, and spears and pitchforks for chains and cables for tying, and spears and pitchforks for
subduing Tippoo. The first thing done was to fasten a bricksubduing Tippoo. The first thing done was to fasten a brick-
bat to the end of a rope and throw it over the end of the tusk-chain, which latter is fastened to one leg and one tusk. By means of this rope a 20 -tun cable chain (formerly used to subdue the famous Hannibal) was slip-noosed around the tusk. Next, an excavation three feet deep was made under the sill of the house, and while the elephant's attention was attracted to the other side of the room by a pail of water poured into his trough, the cable chain was passed through the excavation and fastened to heavy stakes outside. All this time the infuriated monster struck all around him with terrible ferocity, and tugged at his chain with incredible momentum. The next thing accomplished was the snaring of his hind legs. This was consummated by the slinging of fresh ropes around those two stately pillars of elephant flesh, bone and muscle, and finally, by the stealthy strategy of the keeper and another man, these ropes were fastened to stumps out side. The elephant was now sufficiently pinioned to allow the order, "Charge pitchforks," to be given. Ten men, armed with these ugly implements of offense, plunged them into the rampaging beast, taking care, of course, to avoid pene-
trating his eyes or joints. The tenderest spot in an elephant trating his eyes or joints. The tenderest spot in an elephan is just behind the fore legs, and that locality was prodded unmercifully. By means of a hooked spear sunk in his back with such awful strength that he swept his tormentors of their feet and made his chains whistle like fiddle-strings. After an hour's fighting he was brought down on his side, but for two hours longer he tugged at his chains with frenmied obstinacy. He pulled so hard at times that his hind legg were straight out behind him, and three feet off the ground At the end of three hours the giant gave in by trumpeting which is the elephant's way of crying enough. The momen this peculiar cry was heard the battle ceased. The keeper
made Tippoo get up and lie down a number of times, and he was as obedient to the word of command as a gentle pony The animal was then groomed and rubbed off with whisky He allowed all marner of liberties without so much as flap ping an ear. He was a subjugated elephant.

## Scotland's Pebbles

Scotland can boast of her pebbles and fine specimens of uartz found in the form of perfect crystals, varying in colo rom pure white to.amber and a deep brown. Our native pebbles are of singular conformations, and are of all colors-
red, green, grey, auburn, yellow, and also of the jasper kind red, green, grey, auburn, yellow, and also of the jasper kind
with a mixture of colors. A curious phenomenon connected with a mixture of colors. A curious phenomenon connected with the color of
distinct localities.
Pebbles are found in every county of Scotland, but more plentifully in Ayrshire, Argyleshire, Aberdeenshire, Perth shire, Morayshire, Roxburghshire and Mid Lothian. There is the Arthur Seat jasper, found on Arthur's Seat ; the Pentland pebble on the Pentrond Milis; the Perth bloodstone on the Ochil and Moncrieff Hills; the Montrose grey pebble a the Ochil and Moncried Hins; the Montrose grey pebble a
Montrose, and so on. A small rivulet in the land of Burn
contributes one of the richest and finest specimens that is to be found in Scotland. The Arthur Seat jasper deserves special notice, being rich in color and variegated in streaks. It is found in large quantities on the face of the hill. On the top stone Cairngorm ranges, in Aberdeenshire, the. Not many years ago the Scotch amethyst could be plentifully procured years ago the Scotch amethyst courchased, but now it is becoming scarce, and brings in the market from 50 s. to 60 s . per ounce. Another brings in the market from 50s. to 60 s . per ounce. Another
favorite Scotch crystal is the garnet. It has a red. or port wine color, and is found in very small quantities, of no great wine color, and is found in very small quantities, of no great
size, at Elie Point and along the sands on the coast of Fife. size, at Elie Point and along the sands on the coast of Fife.
A jewel in which the yellow cairngorm, the lilac amethyst, and the pink or red garnet is harmoniously combined, is remarkably fine. Our moss agate is not the least beautiful and valuable of gems, and for certain styles of setting it is peculiarly suitable. But the chief of our Scottish gems is the pearl. There was a tiara finely set in gold and enamel in the Dublin Exhibition, valued at £500, made of Scotch pearl. Fine specimens of pearlsare found in the rivers Forth, Teviot, Clyde, Earn, Tay, Tweed, and the rivers of Ross and Sutherlandshires. A fine specimen not larger than a pea will bring £25, and larges ones will command at times as much as £80 or £90.-London Mining Journal.

South American Coal Mines.
Coal exists at various localities along the Pacific coast, from Russian America to Patagonia, and is now mined to a from Russian America to Patagonia, and is now ing Vancouver's Isiand, Washington Territory, limited extent in Vancouver's Isiand, Washington Territory,
Oregon, California, at Panama, in New Granada, and at the Oregon, California, at Panama, in New Granada, and at the
towns of Lota, Lotilla, and Coronel, in Chili. But all these towns of Lota, Lotilla, and Coronel, in Chili. But all these
coals are of later date than the true Carboniferous, and apcoals are of later date than the true Carboniferous, and ap-
pear to be the production of periods from the Jurassic to the Tertiary. They are of all grades of the bituminous class, from the mineral pitch, or asphaltum, to the natural coke. The veins or seams are generally thin and unreliable, and subject to the imperfections natural to all coals of recent formations. But, under present circumstances, these deposits of coal are invaluable to the commerce of the Pacific.
The coal mines of Panama are worked by several English and American companies, almost exclusively for the use of the ocean steamers of the Pacific. The coal is of a soft, bitumi nous character, and is much inferior to the English and our Cumberland steam coals.
Though coal exists at intervals along the entire Pacific coast, it is only worked at two prominent points south of California, viz., Panama and at the Chilian mines in the northern portion of Araucania. The mines in Chili are located at the towns or bays of Lota, Lotilla, and Coronel, which lie about 200 miles north of Valdivia. The coal area is comparatively extensive, but the seams are generally thin and frequently terminate abruptly. Tbeir dip is irregular or undulating, and mining operations are conducted by both shaft and drift. A considerable coal trade is done here, and sailing vessels are constantly being laden for various ports on the Pacific, and passing steamers generally supply themselves here. The coal is soft, and burns rapidly with great flame and smoke, but leaves only a moderate residuum, and makes no clinker.

## Electrical Countries.

In a paper addressed to the Academy of Sciences, M. J. Fournet treats of a new and curious subject, viz., the electric state of certain regions. From the report of this paper, in "Galignani," it appears that in the mountains of the basin of the Rhone and their offshoots, there are some spots distin guished for their evolution of electricity, which is sometimes very remarkable; while others, though apparently identical in surface, are in a state of alssolute electric neutrality. Some very striking instances of this are quoted by M. Fournet. On the night of August 11, 1854, when Mr. Blackwell was on the Grands-Mulets, at an altitude of 3,455 meters, the guide, F. Couttet, on leaving the hut, perceived the surrounding ridges apparently on fire. He immediately called to his companion to witness the scene, which was owing to a tempest Their clothes were literally covered with electric sparks, and their fingers, when held up, were phosphorescent. At that very time Lyons was visited with a deluge of rain, and the whole day had been exceedingly stormy. In 1841, as the same guide was accompanying M. Chenal up Mont Blanc, they were overtaken by a violent storm, and found themselves enveloped, as it were, in thunder and lightning. All the tones and rocks around them emitted electric flames, and ye the summit of Mont Blanc, and the sky around it, was per fectly clear. In 1867, Saussure, Jalabert, and Pictet, were on the Breven at an altitude of 2,520 meters. They soon expe rienced a strange pricking sensation at their fingers' ends on stretching them out. This sensation became stronger and stronger, and at length electric sparks could be drawn from Jalabert's hat-band, which was of gold lace, and even from the knob of his cane. As the storm was raging above their heads, they had to descend some twenty-five or thirty meters where the influence of this electricity was no longer felt, Another instance of this occurred on July 10, 1863, when Mr Weston and several other tourists ascended the Jungfrau and there the snow itself, which fell during the storm which overtook them, proved to be electric.

Weste by a cable despatch that Brown \& Level's life-saving tackle, for instantaneously lowering and detaching smal boats from the sides of vessels going at full speed, has been adopted by the French navy, after a trial at Toulon. We are leased to hear of Messrs. Brown \& Level's success in intro acing their most excellent invention abra land, and in several countries on the continent

## Bullock's Printing Machinery.

 The largest proportion of all the letter-press ${ }^{\top}$ printing now done, is executed upon what are known as "cylinder" printing machines-a discovery which dates back to 1790, due, we beiieve, to William Nicholson, of England, who, about that period, took out a patent. His plan consisted in attaching the types to a cylinder, and the impression was produced by making the types press against the sheet, which was carried on another cylinder. This is the general principle upon which all of the fastest newspaper presses nuw operate. A modified form of cylinder press, in which the types are placed on a flat bed, while the sheet is carried on a cylinder, is very extensively employed for book and job printingand job printing.
In nearly all of the above forms of cylinder presses the pqper is only printed upon one side, and is fed to the machine by hand one sheet at a time. The operation is thus partly mechanical and partly manual After the edition has been all passed through and printed upon one side, the types are changed and the second side is printed. For every printing cylinder an attendant or " feeder," as he is termed, is required. If the press has one cylinder, thep one -"feeder" cylinder, thep one - "feeder" works; if two cylinders, then
two feeders. two feeders.
On page 136, current volume, the reader will find an illustration of the great ten-cylinder printing presses now in use at the Neo York Herald office. It is the practice at the Herald, Tribune, Times, and other prominent daily newspaper of- | in construction it is not liable to get out of order and can be fices, to run two or more of these great printing presses, and easily repaired.
to transfer the sheets from one press, as fast as one side is We have seen an official report, by 0. H. Reed, superinprinted, to the other press, thus quickly completing the presswork on both sides. To run two of these presses requires the employment of twenty are about $\$ 3$ a day each, so that the cost of merely placing the sheets on the press the sheets on the press
forms a great item of forms a great item newspaper expense.
Many attempts have Many attempts have been made to get rid of this expense by rendering the cylinder presses automatic in their operation, but without much success until the rare genius of the late William Bullock, of Pennsylvania, developed new light upon the subject. In carrying out his plans he made practical use of the important and valuable patents of Mr. M.S. Beach ents of Mr. M. S. Beach, the present proprietor of the Newo York sun.
We have the pleasure to present herewith sev eral illustrations of Mr. Bullock's inventions. supplied to the press in Perfecting Machine the paper is $\quad$ being executed on a single Bullock press; and that the use ing enough to make several thousands of newpapers. B are the type cylinders, on which the usual stereotype plates are secured; C are the inking cylinders; D the blanket cylinders, between which and the type cylinders the sheets are pressed and type cyl
The operation is very simple. The roll of paper, A, having been mounted in its place, the machinery is started, unwinds the paper, cuts off the required size, prints it on both sides at one operation, counts the number of sheets and deposits them on the delivery board, E , at the rate of 8,000 to 14,000 per hour, or counting both sides, at the rate of 16,000 to 28,000 impressions, The labor is only that of placing the rolls on the press and removing the printed paper, which ordinary hands can do.

We have seen some most excellent book printing done on the Bullock machines which are at work in the government offices in Washington. They are also employed in some of the prominent newspaper offices in Philadelphia and New York At the Sun Philadelphia and long the in tumber of spoiled impressions average long time in turning out the immense daily edition of that paper. Two more presses-the same kind but of an enlarged and superior pattern-are now being introduced there.
The Bullock press promises to effect a considerable revolu-
tion in the art of printing. It is adapted to all kinds of presswork, fine or rapid. Its capacity for the rapid production of printed sheets is unequalled. Its first cost is comparatively mall. But a small place or room is necessary for setting it p. The largest size is eleven feet long, six feet wide, and of pressmen, are required for its management. Being simple

## BULLOCK'S SELF-FEEDING AND PERFECTING PRESS

ndent of the pres at Washington, made to John D. Defrees. Congressiona Printer, in which he shows that it would require eighteen of the Adams presses to do the same amount of book-work now
his goods into sheets, count, wrap and tie them upin separate bundles. All this consumes much wrapping paper, twine and time, which is saved by the use of the Bullock press, as the paper is delivered in rolls just as it naturally issues from the paper-making machine, and the paper-maker is enabled o supply paper for these improved presses at from one to two cents a pound cheaper than ordinary paper. The Bullock

press prints with a perfect register, and for newspaper work this is important as it permits the reduction of the blank margin of the sheet, and thus saves paper.
Altogether the advantages and economies in favor of these ew machines are so great that, in many cases, printers might, by adopling them, be enabled to throw away their present cumbersome presses as olā iron, and make a very large annual profit by the operation. Think of saving $\$ 5,000$ on the press$\$ 5,000$ on the presswork of a single job. This is the statement from the government office in reference to the printing of the volume of the Agricultural Report which was printed on a Bullock press. In connection with the printing machine Mr. Bullock invented a very simple and excellent tevice for wetting the roll of paper, which we also illustrate. It will be readily understood by a glance at the engraving. The paper is passed from one roller to another, and midway in its passage a number of jet fountains are so arranged that their spray will tall upon the passing sheet
Another very ingenious improvement is the machine for shaving the backs of the curved stereotyped plates. The plate, $A$, rests in the concave movable bed, $B$, which travels under the cutter head, C. The latter rotates with great rapidity, and reduces the back of the entire plate to a perfect parallel with the type face in the short space of two minutes. Full information concerning these valuable inventions can be obtained by addressing the Bullock Printing Press Com pany, 738 Sansom street, Philadelphia.
The Company manufacture several modified forms of press es, for printing both sides, suitable for small editions of books and newspapers.

Iv France milk is packed in small tins, easily moved by one man, and by a simple contrivance the stopper screws close down upon the contents of each tin, so that the motion of the railway cannot churn the milk in transitu. The tins are then placed in covered wagons, and in summer are wrapped in cloths, which are watered from time to time, so as to promote coolness by evaporation. The result of this care, which costs but little, is: that the milk supply of Paris is proverbially excellent. Why do not some of our New York milk dealers adopt this plan?

The Millionth Part of an Inch.-Mr. Whitworth has been striving to give to a committee from the House of Lords a just conception of this extremely minute subdivision of a linear space. He uses this illustration: "You have only to $\left\lvert\, \begin{aligned} & \text { rub a piece of soft steel a few times to diminish its thickness } \\ & \text { a millionth of an inch. }\end{aligned}\right.$

Self-Adjustable Single-Horse Hay Rake. One of the principal obstacles to the general adoption of the horse hay rake in some portions of the country, where the land lies in alternate hill and dale or hole and knoll, is the continual care and anxiety on the part of the driver to avoid the sudden inequalities of the ground and still gather his hay in a workmanlike manner. It is enough to do to keep the horse or horses in train without being compelled to attend also to every obstacle in the form of irregularities on the surface of the ground.
The engraving presents a perspective view of a single horse hay rake, the teeth of which are allowed to adapt themselves automatically to the surface of the ground without the direct intervention of the driver. The rake head is suspended by braces projecting downward from the front of the curved side bars, the connections being made with straps passing from the braces around bearings on the rake head. The teeth are held in position by similar curved teeth which reach to the rear side of the teeth and which reach to the rear side of the teeth and are held by notches on the teeth. A pawl engages with two projections on the rake head, which is pivoted to the rear curved arms and is
operated by a handle directly in front of the operated by a handle directly in front of the driver's seat. When the rake is loaded the driver merely pulls this handle toward him, which disengages the pawl, when the rake revolves and discharges the load, the pawl at once reëngaging with the rake head and holding it in position for gathering another load, the teeth of the rake, by the peculiarity of its suspension, allowing sufficient movement for ready adaptation to the unevenness of surface and still keeping close to the ground.
The rake cannot be thrown out of gear or revolved by this slight movement until the driver releases it from contact with the pawl, which is entirely under his control. No more definite description is probably necessary for a proper understanding of the peculiarities and advantages of the implement. It is the subject already of several Fair premiums, although the letters patent-secured through the Scientific American Patent Agency-are dated only July 2d, 1867. Rights are for sale by the inventor, Sylvester Johnson, box 238, Evansville, Ind.

The Great American Tunnel through the Hoosac Mountain.
We reproduce a profile view of the Hoosac mountain and tunnel, from the official report of the Joint Standing Committee of the Massachusetts Legislature on the Troy and Greenfield Railroad, because great general interest has been felt in field Railroad, because great general interest has been felt in
its progress, which the terrible accident of Oct. 19th has reits progress, which the
vived and stimulated.
The charter of the road known as the "Troy and Greenfield Railroad" was granted in 1848, and it authorized the construction of a railroad from a point on the "Vermont and Massachusetts Railroad," at or near Greenfield, Mass., to the iine of the States of New York or Vermont, to connect with any railroad which might be constructed from or near Troy. N. Y. Its capital stock was limited to $\$ 3,500,000$. The great work to be done was to construct a tunne done was to construct a tunne
under the Hoosac mountain, a disunder the Hoosac mountain, a dis-
tance of nearly five miles, of which, on the first of January which, on the first of Janua
last, 5,873 feet had been bored.
The progress of the work has been greatly retarded by the inability of contractors to perform their engagements, owing partially to the errors made in calculating for the work-such calculations being more or less, from the nature of the undertaking, conjectural-and from financial difficulties. On the first of January, 1867, the excavations at the east end had reached the extent of 569 feet, at the rate of about 47.42 feet per month. But little has been done at the west end. The tunnel here must, from the nature of the strata, be sided and in cose proximity 24,000 bricks are molded daily by six brick machines.

The dimensions of the tunnel are as follows: Rock cutting, 24 feet high and 24 feet wide ; the brick work, 26 feet high and 26 feet wide; the bottom of the tunnel having a culvert three feet deep, the tunnel being graded toward either end to facilitate the escape and discharge of water. In the culvert is laid a 12 -inch pipe for the conveyance of air for ventilating purposes; an 8 -inch pipe to carry air for the drilling machines, and a 3 -inch pipe for supplying water to the holes which are being drilled. If gas is to be used for lighting purposes, it will be conveyed in a similar manner.
At the east end are two air compressors, designed to drive the drills, each having four cylinders, those of one being 13 inches diameter by 20 inches stroke, and those of the other 25 inches diameter by 24 inches stroke. They are driven by water from a canal fed by the Deerfield river, a dam across which, being a part of the work, cost $\$ 244,912.29$. The central shaft is intended to afford additional means of prosecu ting the work of tunneling, and also to ventilate the tunnel when completed. It is of oval form, or its cross section is an ellipse whose axes are 27 and 15 feet respectively. When completed, its depth will be 1,037 feet. More than half that
distance was completed when tho terxible mecideat ocenred
which sent thirteen poor fellows into eternity. As the ma chinery for pumping the water from the shaft was destroyed by the fire it is rapidly filling up, and work is, of course, suspended herefor a time
The west shaft has an area of 8 by 13 feet, and is 316 feet deep. The power used here is an engine of 100 , and one of 40 horse power, driving a compressor of four cylinders of 13 inches diameter and 24 inches stroke. On the 1st of December last the heading toward the east was advanced 1,042 feet', and that toward the west, 293 feet.


## JOHNSON'S IMPROVED HAY RAKE.

of the power used being employed to free the tunnel a of the power used being employed to free the tunnel and
shafts. On one occasion, at the west shaft, the workmen shafts. On one occasion, at the west shaft, the workmen
struck a stream which discharged at the rate of 23 gallons per minute. The pumps were unable to prevent its rise, and per minute. The pumps were unable to prevent its rise, and
larger ones had to be procured. After it was pumped out, on recommencing work, another vein was struck that discharged over 100 gallons per minute. Subsequently, and after extra exertions, the water was removed sufficiently to allow the work to proceed.
The new shaft is located about 264 feet westerly of the west shaft. It is 6 by 13 feet in diameter, and will be, when completed, 277 feet deep. It is worked from both above and below. On the first of January last, those working from the top had reached a depth of 180 feet, and those from below had progressed 45 feet. At this point are two engines, one of 14 and one of 10 horse power.
Atter making a succession of experiments with different drilling machines, the one known as the Burleigh drill has


## THE HOOSAC TUNNEL

done by hand drilling. For blasting, Dr. Ehrhardt's powder was tried in November, 1866, but its effect was not satisfactory, a poisonous gas being evolved which drove the miners from their work. The cost of this powder is about twice that of common powder but its power for blasting purposes is superior.
Last summer, Col. Tal.P. Shaffner experimented with nitroglycerin, an account of which we gave, from the pen of Col. Shaffner, at the time. The committee from whose report we quote speak highly of its effects, and recommend it as possess ing palpable advantages. The blasting is done, however, with ordinary blasting powder, these attempts to supersede with ordinary blasting powder, these attempts to supersede
its use being evidently regarded merely as experiments. The blasts are fired entirely by electricity.
From the foregoing it will be seen that this great work is making haste slowly." A glance at the diagram, which is drawn to a scale of little over 4,000 feet to the inch horizontal, and about 1,100 vertical, will show that with thel meth ods hitherto employed it is almost hopeless to look for the completion of this work during the present generation Meantime, however, some more rapid method of boring and mining may be introduced which may make what seems at present a task of almost infinite labor, one comparatively easy of successful accomplishment. We sincerely hope such may be the case.

## Ancient Roman F raining tyheel. $^{\text {ren }}$

The Paris Presse relates the discovery, in one of the mines f Portugal, of an old wheel which was doubtless employed y the Romans to raise water in the operation of draining the mine. It is well known that the hydraulic works of the Ro mans surpassed in extent any of those of modern times. As that great people had not the use of either steel or gunpow
den, thay were semetinaes obliged to saise water ever a ded
where modern engineers would carry it right through. In some of the mines of San Domingo were dug draining galeries nearly three miles in length, but in some places the water was raised by wheels to carry it over the rocks that crossed the drift. Eight of these wheels have recently been discovered by the miners, who are now working the same old mines. These wheels are made of wood, the arms and elleys of pine, and the axle and its supports of oak, the fabic being remarkable for the lightness of its construction. It is supposed that these wheels cannot be less than one thousand and four hundred years old, and the wood is in a perfect state of preservation, owing to its immersion in water charged with the salts of copper and iron. From their position and construction these wheels are presumed to have been worked as treadmills by men standing with naked feet upon one side. The water was raised by one wheel into a basin, from which it was elevated another stage by the second wheel, and so on for eight stages. The wheel is on exhibition at the Academy of Arts

The Siemens Process.
Although the new mode of steel manufacture recently patented by Mr. C. W. Siemens hus not as yet obtained a commercial standing or importance, it is attracting considerable attention on the part of metallurgists in this country and abroad. The Siemens process consists in reducing the iron from its ores by the action of gases containing a surplus of carbon, and elevated to a high temperature by the combustion of a part of these gases. It is, in fact, the action of a reductive flame, such as used very frequently in metallurgic ductive flame, such as used very frequently in metallurgic operations on a large scale, or such as can be produced on a
small scale by means of the blowpipe. This flame deprives small scale by means of the blowpipe. This flame deprives the metal of the oxygen and other elements combined with it
in the ore, and brings it down in a molten state, as cast iron in the ore, and brings it down in a molten state, as cast iron if charged sufficiently with carbon and tapped at a low temperature, or as steel if the proportion of carbon be smaller, and the temperature of the furnace sufficiently high for keeping this steel in a liquid state. The process in its abstract and theoretical rationale is one of great scientific beauty. It attempts to treat with the materials in the most direct manner, avoiding all the different makeshifts and imperfections which are incluced in the present practice of iron smelting. In its practical development, the Siemens process has not as yet passed its infancy. Experiments have been made by Mr. Siemens in his model steel works at Birmingham apparently on a very small scale, and a small piece of steel made by his process is exhibited at Paris. The Barrow Steel Works have commenced experimenting on a much larger scale, a furnace which, according to present notions, may beconsidered a fullsize specimen for practical work having been erected in these stee works, and some charges of hem atite ore having been smelted or reduced into steel in this furnace Some ingots are said to have been produced, but the facts relating to the manner of working, and the lessons drawn from these first experiments, cannot be published yet. The furnace, we understand is now about to be altered, and further experiments will be made with it shortly. At the recent visit of the guests of the Furness Railway Company to the Barrow Steel Works, this new furnace although not in operation, and so far under reconstruction that very little of its internal ar rangement remained visible, seemed to be regarded as an object of great interest by several visitors.
The question naturally arises, what are the practical ad vantages to be expected from this new process? but this cannot be answered otherwise than in very general terms at this early date. It is likely that the production of steel by the Siemens process will require less carbon than the present mode of first over-carburizing the iron, and then decarburizing it by a special and second process. It is also clear that the application of gaseous fuel will make the quality of iron much less dependent upon the quality of the fuel, since the very worst kinds of fuel can be made suitable for smelting by generating gases, and purifying the latter before they come in contact with the ore. The formation of a suitable slag in the process of smelting will, in an equal degree, lose its im portance, since the iron in the Siemens furnace does not re quire a similar protection against any oxidizing influence as is the case in the blast furnace in front of the tweers. The only condition which seems to come out more prominently and more forcibly in the Siemens process than in the present practice of iron smelting and steel making is purity of the ore. This, however, seems to become more and more a primary condition with iron smelting in its present form, and will not, by itself, interfere with the prospects of success of the new process, if all the other necessary conditions will be fulfilled in a sufficiently practical manner.-Engineering.
an accurate Aim.-After some experiments with the old musket in 1838, the committee of officers drew up a table of instructions for soldiers" in firing with it. Among other things the soldiers are told, "in firing at a man at 600 yards aways aim 130 feet abowe him." A note in The Einotneer is our authority.

## Steel Under the Microscope.

An experienced steel maker can estimate very closely the precise quality, chemical composition, tensile and compressive strength, and even the mode of treatment which a steel has undergone, by looking at its fracture. The appear
ance of the crystalline texture which is more or less disance of the crystalline texture which is more or less dis-
cernable by the naked eye, and the method in which cernable by the naked eye, and the method in which
the reflected light gives certain variations of laster, are the the reflected light gives certain variations of laster, are the
scanty yet very important indications from which, by a series scanty yet very important indications from which, by a series
of guesses as to probabilities, an opinion may be formed of guesses as to probabilities, an opinion may be formed
which has every chance of being correct. This being the case, it seems very obvious that, by the assistance of the microscope, we should be capable of observing the texture of steel and iron fractures more correctly and more minutely. and a smaller amount of experience or nicety of observation should be sufficient-should enable us to form a correct opinion of the qualities of any given sample of steel. This is the case, and to such an extent that it is most astonishing how metallurgists could have neglected the use of the microscope to such an extent as it generally has been. We have already drawn attention in this journal to the interesting researches made by M. Schott, the manager of Count Stollberg's foundery at Ilsenburg, upon the appearance of liquid and solidifying cast iron under the microscope, and we can quote the experience of this metallurgist as to the advantages to be obtained from microscopic observation of various kinds of
steel. M. Schott, at his visit to the Paris Exhibition, made steel. M. Schott, at his visit to the Paris Exhibition, made some most remariknble "guesses, as some steel-makers would
call his conclusions, with regard to the qualities and method of manufacture of many hundreds of steel samples exhibited there, and of which he, in many cases, had no other knowl edge than that which he could gather through the aid of a small pocket microscope, made of $t$ wo pieces of rock crystal, formed into a very powerfal single lens. A pocket microscope of this kind ought to be the companion of every man interested in steel manufacture. Lenses of the usual kind, even if piled up in sets of three or four, are entirely insuf ficient. The lens must be of a very small focus, and properly achromatic. A little practice is sufficient to enable the user easy to learn the meaning of what is thus seen, and to estimate from the appearance the quality of the steel inspected. M. Schott has established for himself a kind of theory which, we believe, will be useful to those of our readers who desire to use the microscope in their researches upon the qualities of steel. M. Schott contends that each crystal of iron is an octahedron, or rather, a double pyramid raised upon a flat square base. The hights of the pyramids in proportion to their bases are not the same in different kinds of steel, and the pyramids become flatter and flatter as the proportion of carbon decreases. Consequently, in cast iron and in the crudest kinds of hard steel, the crystals approach more to the cubical form from which the octahedron proper is de-
rived, and the opposite extreme, or the shaft wrought iron, rived, and the opposite extreme, or the shaft wrought iron, has its pyramids llattened down to parallel surfaces or leaves,
which, in the arrangement, produce what we call the fiber of the iron. Between these limits, all variations of hights of pyramids can be observed in the different kinds of steel in which these crystals are arranged more or less regularly and uniformly, according to the quality and mode of manufacture. The highest quality of steel has all its crystals in parallel positions, each crystal filling the interspaces formed by the angular sides of its neighbors. The crystals stand with their axes in the direction of the pressure or percussive force exerted upon them in working, and consequently the fracture shows the side or sharp corners of all the parallel crystals. of reality good steel under the microscope shows large groups
or of ine crystals like the points of needles, all arranged in the
same direction, and parallel to each other. If held against same light in a particular direction, each point reflects the light completely, and a series of parallel brilliant streaks are light completely, and a series of parallel brilliant streaks are
shown all over the surface. Now, the exact parallelism of shown all over the surface. Now, the exact parallelism of
the pointed ends or of the streaks of light is one of the most decisive tests for a good quality of steel, and this is not visible quite so frequently as might be generally imagined. On the contrary, a great majority of steel fractures show crystals arranged in parallel groups or bundles, as before described, but clustered together in several distinct crystalline layers, which are not parallel to each other. The consequence is that the needle-points, visible under the microscope, appear to cross each other at certain places, or at least they point in such directions that, if elongated, these lines would cross each other at a short distance in front of the fractured surface. Wherever the crossing actually takes place, a ridge or line is generally visikle to the naked eye, and the color of the two parts of the fractured surface which contain the different groups is different, since the light which falls upon one group at the proper angle for reflection will be in such a position wi:h regard to the other group as to throw the points of the crystals into the shade. The one part of the surface, therefore, will appear bright or silvery white, while the other will look dark or grey in color. As usual, inferior specimens are
more instructive than the best qualities, because there the more instructive than the best qualities, because there the
peculiarities and faults come out most strikingly. We have peculiarities and faults come out most strikingly. We have
seen a piece of a Bessemer steel block from a spoiled charge, in which the crystalline structure of the spiegeleisen was seen in some spaces, particularly at the edges of the air-bubbles, perfectly distinguished from the coarse-grained crystals of the mass of steel all round. This mass, moreover, contained groups of very different character within itself. In a specimen of steel or iron. made by another process, we could discover clearly defined crystals of pyrites, indicating the ex-
istence of sulphur in an unexpectedly tangible manner istence of sulphur in an unexpectedly tangible manner. Re-
peated melting, heating, or hammering of steel has, in genpeated melting, heating, or hammering of steel has, in gen-
eral, the effect of reducing the sizes of crystals, and also of eral, the effect of reducing the sizes of crystals, and also of
laying them more parallel. Still there seems to be a differ
ence between the treatment which gives parallelism and that which causes the reduction of sizes in the crystals. The former seems to be principally due to the action of the heat, and repeated melting is the great panacea in this respect. The small-sized crystals, or what is called fine.grain, can be obtained by mere mechanical operations. In fact, hammering at a dull, red heat, or even quite cold, is known to proThis is a property making the grain of steel extremely fine at a sufficiently elevated temperature, steel seems to crystal lize in large grains, which remain if it is allowed to cool slowly and undisturbed by mechanical action.-Engineering.

## Ice in Deep mines.

The main entrance to the pits at Dannemora, Persberg, one of the oidest and most celebrated of the Swedish iron mines, of the oidust and most celebrated of the Swedish iron mines, to require some fifteen minutes to walk around its mouth. A scaffold is erected out so as to overhang this abyss, upon which the hoisting machinery is placed. The observer can look down into this frightful abyss upward of 500 feet, to which point the light of day extends, and beyond which all is shrouded in darkness, save when feebly illuminated by the dim lights of the miners. One of the most remarkable facts connected with this mine is the largequantity of ice which is always present there. Professor Von Leonhard, in his "Popular Łectures on Geology," says: "The deeper you go the more the ice increases. And in order to remove it from the pits it must be raised up in buckets. At some places the ice is 90 feet thick; it forms real glaciers, which are never diminished by any change of external temperature. This fact, ished by any change of external temperature. This fact,
however, should not be regarded as contradictory to another, however, should not be regarded as contradictory to anot pits
which will hereafter be illustrated, and which is that pits which will hereafter be illustrated, and which is that pits
become warmer in proportion to their depth. The phenomenon at Persberg, as we shall see, can be explained on natural principles. When the visitor has reached the bottom he is conducted by his guide into vaulted chambers, through immense regions of ice. Many of these vaults are so large that fifty men can conveniently work in them at the same time." This occurrence of ice in deep mines is not an isolated fact. Ice is found in the pits of Ehrenfriedensdorf, in Saxony. Leopold Von Buch tells us that formerly, in Norway, mining was prosecuted above the region of eternal snow. Wood, for he timbering, could not be had there, and its want was sup plied by filling up a drift with water, and allowing it to needed, the balance of the ice being left in lieu of wood for needed, the balance of the ice being lef Mining and Scientific
timbers. It is also well known, says the Minit tress, that the ancient Peruvians obtained ores on the Cordilleras, in places elevated above the perpetual snow line. The mines of Rauris, in upper Austria, lie entirely within the glacier region, and most of the shafts open in eternal ice, clear as crystal; the miners' huts are surrounded with ice. On what is known as Gold Mountain one of the shafts is sunk 100 feet through pure glacier ice. A gold mine in the deep valley of the Alps, near Salzberg, is the highest in Europe which is now worked. There are two tunnels near this mine entirely surrounded with glacier ice. The miners of this region undergo great hardships from exposures, and to avalanches, which often sweep them to destruction while yoing to and fro to their work, or while reposing in their is a is a locality deep within one of the iron mines of Dannemora,
already noted, where the mass of ice is 120 yards thick.already noted, wher
Mechanics' Magazine.

## NEW PUBLICATIONS.

Wherler's Homes for the People. Geo. E. Woodward, 191 Broadway, N. Y. ${ }^{\text {Prente }}$ Price $\$ 3$.
This is 1 ne of a series of new works on architecture, Jnst from the press of
Mr. Woodward, who makes it a specialty to publish this class of literature. Gervase Wheeler, anthor of the work nuder consideration, had his manascript ready for tthe press some years ago, but unfortunately the building
where the work was in preparation was consumed by fre and the work of many weary months was lost. But what was :his loss was the public gain, for there have been many improvements in archltecture since the anthor's
calamity, which he has introdnced into the volume before us. The work is embellished with one handred engravings of villas, cotta ges, and country

## Wheeler's Rural Homes.

The author of "Homes for the People" has also pablished throngh Wood
ward, 191 Broad wav, a similar but less comprehensive work enttled " Raral Homes," in which he not only illustrates plans of a number of cheap cot tages, but also gives engraving of a variety of rustic farniture suitable for
summer hooses and lawns, such as settees, chairs, fower stands, etc. The
 honess; also a form fror :drawing
landord and builder. Price $\$ 2$.
Woodward's Rural Art. Geo. E. Woodward, Author
and Publisher, 191 Broadway, N. Y.
 or architecture and rural art. It is not .unlike Wheelers works, noticed
above, in its general character. Mr. Woodward designs to issue a work of this kind every year, adding all the new features and fashions in the con-
truction and flish of country houses, Elther of the above works will be struction and fingh of country houses, Either of the above works will be
found useful to builders or persons aboat to erect or furnish country houses. Haswelu's Engansers' and Mechanics' Pocket Book.
New York: Harper Brothers. Mr. Haswell has long been known as one of our most experienced and rella ble civil engriniers. His Pocket Book 18 regarded as one of the standard works,
for ready reterence, in all that relates to engineering For some time past for ready reterence, in all that relates to engineering. For some time past
the author has beea engaged in enlarging and revisng the matter contained
 300 preves he has enlarared the book to 650 closely? prin teded pages, and we even-
ture to say thas no work of the clind has ever been produced which contained ture to say that no work of the kind has ever been produced which contained
so much information apon the varions branches of engineering, condensed
 neering, steam navigation, are given in the most convenient and intelligible form. Mr. Haswells new book orght to be in the possession of every engl-

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

Priladelphata claims to be the ereatest manufacturing citt in the world,
excent Liondon. 1866 the factories there produceed over two nundred milIon of dollars worth of staple goods.
Trikey has projected three lines of raillway, the frrst from Constantinople obelyrade; the second from Enos, a short distance west or Constantino.
Die, to Varna on the Black Seaz; the third from Enos to Uskntp in Northern ple, to Varna on the Black Sea;; the third from Enos to Uskntp in Northern
Macedonia. The contract for them has been awarded, and the means will be furnished by Englisb, French, and Belgiam capitalists.
The gold yield for the country for the present year is about as follows :
Montana $812,00,000$; Idaho $86,000,000$ Ore Oon $82,000.000$; Colorado $85,000,000$
 ta1 874,000,000.
The common 60 -seat American railway passen ger car costs from $\$ 4,000$ to
 our roads cost aboat $\$ 14,000$. There is a wide difference too, in the weight,
in favor of the American car. The interest on the greater cost, and the nf favor or the American car. The interest on the greater cost, and the
hanuling of theestra weight of the English car must be paid for by those who value exclusiveness safficiently to one them. In coses $\begin{aligned} & \text { hhere e the English } \\ & \text { and }\end{aligned}$ coach have been introdaced here, they have. not proved a:proftable inve
ment, and there is very little prospect of their being widely adopted. ent, and there is very little prospect of their being widely adopted.
The coal deposits of Russian America are pronounced valueless, the miner.
al being found only in small contorted seams. Iron is found in worthless al being found only in small contorted seams. Iron is found in worthless
beds of clay, and far up on the:Konkon, gold nay be obtained but under such beds of clay, and far up on theiKonkon, gold may be obtained but under such
circumstances that it is salso valueleses, peing only workable two months in the year. Staing of copper have been found on rocks near Norton Bay, but no leage or seam.
There is a stone quarried in Cornwall, Eng., called the Polyphant stone,
which can be cut by hand saw with ease when first mined, but in time be,
 comes exceedingly hard. It occurs of a neatral grey color, and also of a
green with red spots and is admired by architects for its chromatic effects.

The New York and New Haven railroad have Jast introduced a new system of warming their r assenger cars, by means of tot water circulating through ipes placed under each seat. By following this plan all the heat 1s econo mized and thns keeping the feet of the passen gers warm, the whole body ex
pritences an agreeable sense of comfort. We hope to see other roads adopt ing this excellent mode of warming cars.
A train of thirty cars was loaded with railroad iron at the Cambria iron works, Johnstown, Pa., last week, the destination of which 18 a point on the
 distance to be traversed is is fiteen hundred milies consididerably more than
half way "across the continent," and all this distance is to be traversed half way "across the continent,",
withount transhlpment of the iroul.
The number of Bessemer steel converters now eatablished in Earope, num-
bers 115, which are capabie of producing half a million of tuns per annum
 twenty-two converters is the next greatest producer, 1,460 tuns weekly twenty-two converters is the next greatest producer, 1,40 tans woeks.
Next comes France with twelve converters and 880 tuns; Austria, fourteen
converters, and 650 tuns ; Sweden fifteen converters, and 530 tuns. The Bes. converters, and 650 tans; Sweden fifteen converters, and 530 tuns. The Bes-
semer process is worked at one locality only in Belgium, and Italy has two semer process is worked at one locality
establishments, with a very small yield.
South America does not propose to be outcone on the trans-continental paraiso and Santiago railroad across the Andes to Buenos Ayres. A German paraiso and Santiago rairoad across the Andes to Buenos Ayres. A German
engneer, otto Von Armen, has surveyed the route, a company has been engmeer, otto von Armen, has surveyed the route, a company has been on both sides of the track upon which they propose to establish German col onies, although liberal inducements will be held out to all other nationalities
to settle there. As an instance showing how railroading pays in Sonth Amerto settle there. As an instance showing how railroading pays in Sonth Amer-
ica, it is stated that the road from Santiago to Valparaiso has earned during the past year the sum of $\$ 910,241$, being quite an increase over the previous
thated year.
The experimental elevated railroad in Greenwich street this city has been completed for quarter ot a mile from the Battery. At the last meeting of the
stock stockholders the engineer's exhibit of present and probable future cost, hav
ing been inspected it was ananimously resolved to proceed with'the extension Ing been inspected it was unsnimonsly resolved to proceed with;the extension
of theroad!one quarter mile further, to Cortlandt street, preparatory to its in spection by the State commissioners, as required by law.
The Massachusetts State Council, recently by a unanimous vote, annulle
the contract made in July with Messrs, Dull, Gowan and White, for complet the contract made in July with Messrs, Dall, Gowan and White, for complet
ing certain portions of the Hoosac tunnel, including the central shafi. They authorized the commissioners to take possession of all the tools etc., belong authorized the commissioners to take possession of all the tools etc, belong
ing to the state and to make an immediate settlement with the contractors
The The reasons for this are that the bids for the contract were much too low and an increase of rates would soon be necessary, and the councll are ad verse to making any advance in that direction.

##  

 Mandracturing Brioks.-E. W. Crittenden, Pittsbargh, Pa.-This invention relates to certain new and useful improvements in manutacturing bricks, designed for operating on a large scale, and more especially with a View of disp snsing with the hard labor and expensive manipulations hitherto
required in the process of brick making. The invention consists, improved means for crushing or making. The invention consists, ist, in a mpore elastic state to be molded or compressed into brickss. 2d, in an im-
proved
proved means for molding and compressing the clay into bricks, and 3 d , in a ovel and improved means for drying the compre novel and improved means for drying the compr
to render them suitable for burning in the kiln.
SAFETY ATtACHMENT FOR WATCH Pookets.-Edward Williams, New York
city.-The present in city.-The present invention relates to an attachment to watch pockets o
wearing apparel, the object of which is to prevent the abstraction or remova of the watch carried in such pocket from the same, without the knowledge or consent of the wearer or owner, thereby obviating all possibility of the watck being stolen when the person wearing it is in a crowd, or otherwise
favorably situated for the operations of thieves, pickpockets, etc.; the said favorably situated for the operations of thieves, pickpockets, etc.; the said
safety attachment being of such a nature and construction as to be easily safety attachment being of such a nature and construction as to be easily
manipulated by the wearer, and to offer no impediment to the free remova manipulated by the wearer,
of the watch by such person.
machine for Heading and Squaring Bolts.-Albert R. Bailey, New Ha ven, Conn., and Wilson W. Knowles, Plantsville, Conn.-This invention reconsists in a novel arrangement ot dies and a header, arranged to operat In such a manner that a square is formed on a bolt, contif guous to its head, greater thicer that a square is formed on a bolt, contiguous to its hea and square formed on the bolt at one operation.
Cobn Plantrib.-J. m. Sampson, Waynesville, ill.-This invention relates a and improved corn planter, of that class in which the seed distribu ng device is operated by hand, the device being mounted on wheels, and al
so arranged that a very simple, cheap and efficient corn planter is obtained.

Brush Holder.-Joseph Messinger,Springfield, Vt.-This invention relate to a new and improved holder, by which scrub-bashes may be firmly secure erator stooping over and working on the knees, as is now universally done. The invention consists in constructing the holder in such a manner that the handle thereof may be turned or adjusted in a position at right angles wit
the brush, or longitudinally therewith, and the holder at the same time be the brush, or longitudinaliy therewith, and the holder at the sam
perfectly simple in construction, and economical to manufacture.
Gatin Spring.-W. W. Sutliff, Town Line, Pa.-This invention relates to an metal spring, hinged atone end to the back of a gate, while the other end is free to catch in one of a series of notches in a block fastened to the post or frame of a gate or door, which spring, by its pressure, k eeps the gate olosed when it is not forcibly pushed open.

Thill Coupling.-Silas Rogers, Stanfordville, N. Y.-This invention re-
lates to a new and improved mode of connecting thills to axles, whereby the lates to a new and improved mode of connecting thills to axles, whereby the
thills may be readily attached to and detached from the axle, and all rattling thills may be readily a
Devich for Cutting Boot and Shor Herls.-Benj. F. Goddard, Charlestown, Mass.-This invention relates to a new and improved machine for cut-
ting boot and shoe heels, and is designed to save labor and stock in the production of that work. The invention consists of a combination of dies or cutters, of different sizes, arranged in such a manner that they may be manipulated or adjusted so that the several layers of leather composing a heel may be cutout to form a heel approximating to the desired shape, requiring but a trifing amount of trimming in order to finlsh it.
Towels.-John Cast, Coventry, England.-This invention relates to an im
proved method of manufacturing towels to be emplosed for friction ot the proved method of manufacturing towels to be employed for fri
surface of the skin of persons after bathing, or similar purposes.
Hand Loor.-T. Henry Tibbles, Kansas City, Mo.-This invention relates to imporvements in an ordinary hand loom, and consists in a new device for
operating the drivers and throwing the shattleby the motion of the lay, with operating the drivers and throwing the shattle by the motion of the lay, with
one picker staff and a shifting weight, and working the treadles by direct action of the lay, without treadles, through the medium of cam rollers. Hand Loom.-A.Smith and P. P. Smith, Plymonth, Mo.-This invention re lates to improvements in the construction and arrangement of a hand loom,
and consists in a device councected with the shattle drtvers in such a manne that the motion of the lay shall operate on the drivers to throw the shattle that the motion of the lav shall operate on the drivers to throw the shuttle,
and also a device connecting the treadle shaft with the lay to work the treadle.
Snow Plow.-James'S. Zane, Pleasant Plains, Ill.-This invention relate to an improvement in the construction of snow plows for railroads, and con of the road to an elevated double mold board, which is hinged and so ar ranged in combination with machinery that it may be raised and lowered as required.
Window Jack.-S. P. Loomis, Philadelphia, Pa.-This invention relates to
an improvement in the construction and arrangement of a window jack or platform support for house painters.
Burglar alark.-D. B. Skelly, Lockport, N. Y.-This invention consist in an arrangement of springs which, when set or strained, are heid in posi tion by a small wire or thread, but when the wire or thread is broken or loos ringing a bell and discharging a pistol, and at the same time it ignits a matcl and lights a lamp.
Center board.-Felix Doming, Penataquit, N. Y.-This invention has for
its object to improve the construction of center boards, and make them more effective in operation.
Drilling Maching.-George Downing, Schuylerville, N. Y.-This inven tion has for its object to furnish an improved drilling machine, simple in construction, easy to be operated, which can be so adjusted that the full force o
the blow may be effective, whether drilling a shallow or deep hole, and which willdrill vertical or inclined holes with equal facility.
Broaboast Sexding Machine.-Augustas Weitman, West Union, Iowa.This invention relates to a new and improved broadcast seeding machine,
and it consists in means employed to pravent the chokiag of the harness and also in means to insure a proper distribution of the seed and the sowing or the same in a perfect manne
Paddle Werel.-E. F. Bostrom, Newnan, Ga.-This invention relates to a new and improved paddle wheel designed for both river and sea steamers
and has for its object a more efflient action than hitherto of the buckets or and has for its object a more efflient action than hitherto of the buckets or float boards at varying depths of immersion.
Hair Picking Maderne.-Franklin Frey, Liberty, Ill.-This invention re lates to a new and useful improvement in the construction ot a machine for
picking or breaking up the matted knots of hair used for mixing with mortar to plaster houses.
Atr Chamber.-Richard H. Hilton, Newbern, N. C.-This invention relates to a new and improved method of constructing air chambers for pumps and other purposes whereit is desired that a steady and uniform current of liquid
or fluid should be discharged and the invention consists in arranging strainer and ball valve in the chamber and also a sand trap or sediment strainer and ball
chamber therein.
Combined Horse block and Hitching Post.-George W.Preston, Corning, N. Y. This invention which relates to a combined horse block and
hitching post consists essentially in combining in one device made of cast hitching post consists essentially in combining in one device
iron or other suitable material a horseblock and hitching post.
Coirgined Shrineina and Punching Maomine.-C. v. Statier, Woodhull, IIl.-This invention relates to a new and
and punching wagon tires and other articles.
Forming amd Cuttine Wire.-J. Wasson, Elyria, Ohio.-This invention which are driven by gearing and in a conting knifs which may be roller by the foot whereby wire for tinners' use and for other purposes may be formed, measured off, and cut with great celerity.
Charr Bortom.-C. W. Royse, Peterborough. N.H.-This invention relates
to an improvement in chair bottoms and consists in securing the overlapping nds ofthe network to the frame by means of wire staples.
Drvicr for Bending Tires.-Dennis Wetzel, Springifeld, Mo.-This in vention relates to an improved device for bending tires for
sists of a double-rimmed wheel to suit tires of different sizes
Mandactiore of White Lead.-Isaac M. Gattman. New York city.-The
natare of this invention consists in manulacturig white mproved process whereby the metalis wholly converted without waste into white lead of great purity of color and perfect opacity in a very shor time compared with the ordinary nnd most approved process by corrosion of the metallic lead known as the Dutch method.
BULLET MaCeine.-W. Spillman, Marion Station, Miss.-This invention re-
lates to improved devices for forming bullets or mpie balls and consists in ates to improved devices for forming bullets or munie balls and consists in
revolving disks or rollers having one or more eccentric groovescatin the revolving disks or rollers having one or more eccentric groovescutin the
face oftheir peripheries in combination with cams and impinging rollers o stationary dies so constructed and arranged as to compress and shape cylindrical sectionsof lead fed into the machine as to form spherical or conical balls as described.
Coal Screen.-Edward W. Weston, Providence, Pa.-This invention re-
lates to an improvement in the construction of screens for separating broken lates to an improvement in the construction of screens for separating broken
anthracite coal and assorting it in different sizes, and other similar purposes.
Distiliting Spirits of Turpentine.-David Cashwell, Fayetteville, n C.-This invention relates to an iuprovement in distilling spirits of turpenIne and consists in an apparatus for applying steam to extract and expe Hand Loom.-H. M. Cooper, Lindley, Mo.-This invention relates to in provements in the construction of hand looms and consists in an arrangemen back and forth all the operations of the loom are performed, the whol tructure being simple, easily regulated and kept in order, while the work gin of the loom is positive and tffective in every part for weaving fine coarse cloth.
Window Fastening.-Benson Mayo, Chatham, Mass.-This invention re.
lates to an improved fastening for window blinds and consists in a device lates to an improved fastening for window blinds and consists in a devic hich catches and holds the blinds either open or closed alike.
Door and Gate Spring.-Enos Stimson, Montpelier, Vt.-This invention elates to a door and gate spring for holding a door or gate either open ose
Toilet Table er Stand.-F. Kopper, New York city.-The pressnt in
vention relates to improvements in a toilet table or stand, which consists in oconstructing the stand that it can be folded up into a compact shape whe not in use, and when to be used brought to the proper form to receive and support a toot bath or a wash bowl, or any other toilet article, or to be
used for any of the ordinary purposes of the toilet.

Try Square.-J. E. Cowdery, Wheatland, Iowa.-This invention relates to a pivot and furnished with a finger pointing to a graduated scale. Irontne Table.- -llbert A. Cuittenden, Boston, Mass.-This invention re-
ates to an improved ironing table, and consists of a table or skirt board suprted at one end upon a rail

Wood type Cabinet or Case.-Charles Aldrich, Marshalltown, Iowa.the present invention a cabinet or case for wood type is provided, which cable, and one in whici the type can be kept entirely free of dust or dirt. Trace Buokle.-A. E. Bailey and I. Nichols, Middleville, N. Y.-The
ackle embraced in the present invention is extremely simple in its construc n and arrangement, and in use most efficient and practicable
Hook for Holdba ok Straps.-Wm. A. Bagley, Ansoma, Conn.-The hold ack hook embraced in the present in vention is const ucted in two parts or ctions, one of which is ixed to the shaft and the other arranged to swas asten itself to the fixed part when brought over the same.
Snow Horseshoe.-Ervine Carman, Schoolcraft, Mich.-This invention re ates to eneath the hoof with a rubber between it and the hoof.
SHow STaND.-John G. Oonk, Owensville, Ohio.-The present invedio relates to an impr oved stand for the storing and showing of goods, etc., in
stores, which consists in providing the stand or closet with a series of roller which the goods are wound and from which they can be unwound for be on which the go
ing shown, etc.
Hose Guard.-David P. Lewis, Huntsville, Ala.-The present inventio ing railroad tracks, in cases of fires, the object of which is to allow the running of the cars and at the same time afford no obstruction to the free pass ge of the water through the hose.
Chiminer.-Jos. F. Stafford, North Granville, N. Y.-The object of this in
ention is to prevent buildings being set on fire from burning out of the vention is to prevent buildings being set on fire from burning out of the
chimney. The invention consists in the employment of a damper located in himney. The invention consists in the employment of a damper located it the chimney near the top, and operated by
STEP LADDEr.-M. E. Abbott, Bethlehem, Pa.-This invention relates to a endered adjustable and so formed that the braces may be folded up in small space.
Bow Instruments.-George Gemünder, New York city.-This invention
 quality of sounds may be produced, and so that the tones may be propa ated with more clearness, power, and distinctness than they could on in raments in which the ordinary sound posts are used.
Rotary Swing.-J. N. Forrester, Bridgeport, Conn.-This invention re ates to a new rotary swing, which is so arranged that the seats revolv
oth around a horizontal and a vertical axle; whereby a very ageeable motion is obtained, and whereby all sense of giddiness, generally created bv the simple revolution around a horizontal axis is completely overcome
head block for Saw Mills.-Charles H. Brookbank, Connersville, Ind This invention consists in the constraction and arrangement of the part by which the screw-sharts on which the head blocks slide, are operated, 8 ,
hat they are only revolved in one drection while the log is to be fed, th at they are only revolved in one drection while the log is to be fed, th the carriage while its upper portion is connected with a horizontal sliding

Puip for Comprissing air.-Onofrio Abruzzo.-Harlem, N. Y.-Thi nvention relates to a new arrangement for compressing air, in such a man $r$ that the air can be compresed to an nudelnite degree by hand or by an mall power
Washing Machnve.-W. W. Cox, Carbondale, Ill.-This invention con asses, said roller being arranged nearly under the corrugated roller, and hung in dovetail blocks, which slide in corresponding grooves that ar rovided in the sideboards of the suds box.
Car Startrr and Brakr.-John Wiley, 2d, Soath Reading Mass.-This vention has for its object to improve the construction of the improved
ar starter and brake patented by the same inventor, March 12, 1867 , and ambered 62,911 .
Stram Brake.-Gugene Bourson, Brassels, Belgium.-This invention re der to revulate the mor for using the steam trom the boilers withoat loss, in rades, and to slacken or stop the progress of a train without resorting $t$ he ordinary brakes. The invention consists in conducting steam direcul ach side of thepiston.
Corser.-A. W. Webster. Ansonia, Conn.-The present invention relate nore particularly to the clasps for corsets, and it consists in making the
ook portion or part ofsuch clasps of wire,bent into the proper shape there or, whereby rivets are dispensed with, and a stronger and more reliable, a ell as cheaper clasp,produced.
Brandirg Iron.-Charles Rundquist, Mankato, Minn.-The present inven on consists, among other features, in a novel construction of the holder fo
the types, also in the form of the shanks of the types, and in the means em ployed for securing them in the holder.
Meat Spit.-Paul Fisher, Williamsburgh, N. Y.-This invention has for its object to tarnish an improved spit so constructed and arranged as to be more manner.
Chimary. - Bennett J. Goodsell, Pent Water, Mich.-This invention has for its object to fornish an improved chimney so constructed and arranged as t entilate the room or rooms of the house, act as a spark arrester, and at th

## himney.

Rubber Shoe.-J. Weidenman, Hartford, Conr.-This invention has for its eect them from slipping down upon or working under the heel of the innes

PLow.-Jonathan R.Davis,McKay, Ohio.-This invention has for its objec o furnish an improved plow so constructed and arrangex as to adapt itse uneven ground, and so as to enable it to work close up to the upper ro of plants, upon side hille, and
Mill Gearing.-Joshua C. Cunningham, Oglethorpe, Ga.-This invention relate crown wheel, with each other, and with the main or driving shaft.
Cotton and Hay Priss.-Barnabas B. Alfred, La Grange, Ga.-In this invention a double acting screw operates in combination with two slotte
levers, working the follow-block with great power and velocity.
Construotion of Stoves or other Heating Apparatus for Warmine nd Venticating Buildings.-Thomas Whitaker, and Joseph Constan-
ine, Manchester, England. The object of this invention is to obtain a eating apparatus for air or liquids, which, though comparatively occupyin bat a small space, presents not only a very large surface to the medium hot gases, which are compelled to come into contact with all the available combnstion of the fuel is given off to the apparatus, and produces useful effect, instead of escaping for the most part through the chimney, as is usu
ally the case. ally the case.

Mandfacture of Trunks, Valises, etc.-Samuel S. Riter, Philadelphia, Pa.-The object of this tavention is to manufacture a substantial leather rank, which shall have no seams at the edges, and which may be made en tirely without s'itching, for the parpose of economy, strength, and dura
bility. Sewing Machine-Caleb Cadwell, Waukegan, Ill.-Tuis invention is de igned to effiect im rovements in the mechanism for teeding and guiding the
loth, regulating the tension, taking up the slaci thread, and winding the loth, regulating the tension, taking up the slacis threas, and winding the their axes, and operating the shattle.
Cooling Glass Molds.-J. H. Reighard, Wbe3ling, West. Va.-In this Nention the plunger is made hollow, and connected with a hollow piston or, and is cooled by water injected through tie piston rod. The mold is water isinjected from a reservoir, when the instrument is in use, for the parpose of cooling it.

## 



G. H. S., of Mich.-A good way to learn to draw sketches of machinery is to copy the engravings published in the Soientifio Ameri ons.
S. W. P., asks, "Can you supply me with a recipe for mak ing a paste that will be
is achance for inventors
E. H., of Ohio., asks if it is necessary to extend his exhaust pipe farup the smoke stack to aid his draft. We think it only necessary
to introduce the exhaust pipe into the up-take and turn the end upward to introduce the exhaust pipe
to produce the desired result.
J. H. G., of Ky., inquires as to the proportions of sand and hydraulic lime to make a cement to harden under water for a foundation
on gravel. We can only refer him to Gillmore's ". Treatise on Hydraulic on gravel. We can only refer him to Gillmore's "Treatise on Hydranulic
Cements "published by D. Van Nostrand, 192 Broadway, New York city in different locilities vary greatly.
J.B. P., of Vt.. says he has used one of "Douglas' pitche spout pumps No. 1, the barrel betng two-and-a-half inches and length o
stroke four-and-a-half inches. The leading pipe is fitt-six feet in length the hight of the pump from the water in the well twenty-five feet perpen dicular. It will not work ; neither will a larger size, which I tried. What is the diffculty. Will a smaller pump or larger pipe do the business? Knowing that the Douglas pamp is a good one, we can only surmise tha
there must have been some troable in the connections, or that the pump, there must have been some troable in the connections, or that the pump,
itself, needed some doctoring. Certainly any properly constracted pump the connections of which are perfect ought to lift water twenty-five feet. B. G. K., of Md., asks for the components of the well-known Babbitt meta.. Although there are superior compositions in the marke
yet many of our readers may desire information on this subject. To fou pounds of pure copper melted, twelve pounds of best tin (Banca is consid pounds of pare copper melted, twelve pounds or best in (Banca is consid
ered as pure as any) are gradually added; then eignt pounds of antimon (regalus). After melting, twelve pounds more of tin are added. Powdere charcoal sprinkled over the surface of the metal in the crucible will pre
vent oxidation. When to be used for lining boxes one pound is sometimes melted with two pounds of tin .
A. A. W., of N. Y.-" Which is the strongest, a solid cast iron shaft, or one with a small hole or of a larger size through the cente
from end to end, and would the same answer to this question be applicable to a shaft of wrought iron or steel?" In casting iron, or even steel, the outside cools and contracts more rapidy than the interior ; consequentl a hollow shaft of equal or the same weight is stronger than a solid shaft.
Forged shafts of wrought iron and steel are not sublect to the same law in Forged shafts of
the samedegree.

## 

## $T$ The charve for tenertion undere iniss nead ts 50 cents $u$ une.

Pattern Letters and Figures for inventors, etc., to put on pat terns for castings, are made by Knight Brothers, Seneca Falls, N. Y
Wanted-A second-hand low-pressure engine of about sixty horse-power. Address A. Catchpole, Geneva, N. Y.
The attention of those engaged in the manufacture of Burg glar-Proof Safe Locks is called to an advertisement on our last page.
A Great Bargain.-The Patent Right of Forman's Combined Steam Baker and Reflecting Roaster. illustrated on page 312, present vol
ume Scientific American, will be sold low, either entira or by States and ume Scientific American, will be sold low, either entira
Counties. Address Irrael Forman, Fairmont, west Va.
Parties wishing to purchase good second-hand Portable and Stationary Engines, from four to fifteen horse-power, apply to Abram Lo
gan, Tideoute, Pa. ports can be supplied at low prices. Address Samuel C. Jones, Box 775
New York Postoffice. New York Postoffce.
Hand Machines or Planes for cutting out Match Splints, wanted. Send cuts and prices to Packard's Machinery Agency, Milwankee, Wis
S. G. Tufts, Maineville, Ohio, wishes the address of all par ties engaged in making Hames and Plowhandles.
M. Nial, Troy, N. Y., wants address of Toy makers.

Manufacturers of improved machinery for manufacture of Cotton Batting, address; with description, T. L. Kinsey, Savannah, Ga. Wanted-a second hand set of Tinners' tools. Address, with
fall description and price list, H. D. Heath, Candor, Tioga county, N. Y. fall description and price list, H. D. Heath, Candor, Tioga county, N. Y. I wish to know where I can obtain Peat putup for shipment. Peat charcoal would suit me better. C. Browning, Rush Ran, Jefferison
E. Ware, Bayonne, N. J., wishes the address of Threshing Fish Nets.-Manufacturers of machinery for making these articles will please address J. F. Brown, Lock Box 20 , Binghamton, N. Y.
Parties desiring any kind of new apparatus invented, ordraw ings, etc., made, address with confidence, A. E. W., Inyentor and Dratts
man, 114 Fulton st., New York.
Geo. S. Hurford \& Co., Canton, Ohio., wish to obtain a ma chine that will make small bolts with a head on both ends, in size from 1
inch long by $3-16$ inch thick, up to 8 inches long by $1 /$ inch thick.

Machine for Topping and Stripping Sorghum and Sugar Cane.
Every additional facility for the extraction of the sacchar ine matter from cane or other sugar-yielding plants is of general importance, as the use of sugar is now almost universal and the demand for it constantly increasing. Sorghum, as well as sugar cane, must be stripped of its leaves before going to the crushing mill, and this work, if performed by hand labor, is slow and quite laborious. The engraving presents a view of a machine which performs this work rapidly and ef fectually.
The machinery is mounted on a suitable frame and is sim ple and easily managed. The power is applied, either by hand, through the crank, A , or by power, to the gear wheel $B$, which drives the pulley, C, connecting by a belt with D , to give motion to the endless apron, E. The same shaft on which is the pulley, C , drives the shaft seen in the front part of the machine. On this shaft is a cutter wheel, F, and a grooved wheel for receiving the stalks and presenting them to the stripping knives. The topping wheel, F , has one or more knives seated in its periphery which in their swift revolution pass phery which in their swift revolution pass
in immediate contiguity with a fixed curved in immediate contiguity with a fixed curved
blade on the bar, G. This device is for topping the cane, the tops falling on the apron, E, which carries them out of the machine and deposits them on one side.
The cane is. laid on the table, H, between which and the frame the operator stands. After topping the cane each stalk is passed between the peripheries of the grooved wheel and the smaller one above $i$, which is held in connection with the former by the spring arm, $I^{\prime \prime}$ the lower or groozed wheel spring arm, 1 ; the lower or grooved wheel being faced with rubber to insure the necesgrooved or plain, this, however, being imgrooved or plain, this, however, being im-
material. In an upright, back of these feed material. In an upright, back of these feed wheels, is a V-shaped knife fixed, with which engages a similar one that may be elevated or depressed by the lever, J, the knife working in upright slides. This lever may be operated with a spring with sufficient tension to hold the two V-shaped knives close to the stalk. The leaves fall upon the endless apron and are carried, like the toppings, off to the side of the machine. The edges of the $V$-shapedknives are so beveled as to offer no opportunity of becoming clogged. The machine may be extended to any required length, as the machinery is very light and easily driven, requiring but little power.
This machine was patented through the Scientific American Patent Agency, May 21, 1867, by James A. Campbell, who may be addressed for the purchase of State rights or the en tire patent at Kent, Portage county, Ohio.
scale for weighing letters, papers, etc.
The engraving presents a view of a scale intended for determining the weight and therefore the postage of mailable matter, as letters, papers, pamphlets, etc. Something similar

is needed, not only in mercantile concerns and offices where the correspondence is voluminous, but also in private families, as it saves annoyance and trouble to the writers of letters, as well as to post office clerks. The device shown is intended to furnish a very cheap apparatus, which can be used at all times and under all circumstances. It can be easily described.
The scale, or receiver, A, has attached to its bottom a slip of metal graduated to ounces and their parts, and held steadily in position by a weight, B. At the upper end of this slip is a spring, $C$, which engages with knife edges on the upright slip, and is riveted at its other end to a support, D, through the outer end of which is a longitudinal slot allowing for the vibrating or swinging movement of the up.right, which passes through it. The arrangement may be permanently secured to a desk, or railing, as seen in the engraving, or may be temporarily held when the letter is placed on the scale, A. The spring, C, is made of tempered steel, or of hard ralled brass, tosted to its tension po as always to givc ths

ounces, and cannot, on account of its simplicity, get out of order. Patented through the Agency of the Scientific American, October 15, 1867. Agents are wanted in every city and town. Commanications may be addressed to Cox \& Latham, 299 State street, New Haven, Conn.

Luxurious Chair.
One of the most simple and useful improvements in house hold furniture that has recently come to our knowledge, is a new chair, a substitute for the rocking-chair, patented by D Witt, of Hubbardstown, Mass., on the 20th of last August, and made and sold by Dexter Howe, 169 Canal street, New York. The frame of the chair-seat rests upon two upright
iron bearings, firmly screwed to the frame, the lower end


## CAMPBELL'S IMPROVED CANE STRIPPER.

resting in a socket which allows the upper portion of the chair to rock back and forth. Near the center of the bottom of the chair two coil springs are so arranged that they per form the office of rockers in an ordinary rocking chair, the bearings supporting the weight of the occupant, and admitting only the back and forward movement, which the springs assist the sitter in making. This chair possesses all the good features of a rocking chair, and is free from the objectionable features of an ordinary rocker.

## ROYS' APPLICATION OF CORRUGATED IRON.

The enormous increase of strength, or resistance to strain and pressure, gained by corrugating thin iron, otherwise too weak for the purpose intended, is well known to mechanics generally; but the varied uses which iron thus treated may be made to subserve may not be so well understood. In the construction of buildings and boats it has for many years been employed, and also for roofing purposes. The engraving, however, represents its application for laths to support mortar or plaster, as well as its use for arched connections between flooring beams.
For the former purpose the ordinary thin sheet iron is employed, having holes punched through it at intervals, to allow the passage of the mortar for "clinching," as seen at A. The
 ectio length or width required, and may be held to the ceiling or walls by nails or screws. For
he latter, where strength is required, thicker iron may be employed in combination with iron flooring beams, as seen at B. It
 can be used for clapboarding, lining, siding, or roofing, as may be required, rendering the build mensely stronger than any brick or wooden structure. These do not exhaust the uses of this method of preparing iron, as the

## telligent reader may easily see

For these applications of corrugated iron a patent is now pending through the Scientific American Patent Agency. Communications may be addressed to F. Roys, Hoyt \& Co. East Berlin, Conn., for further information.

## Artificial Production of Ice.

It is not necessary for the production of ice that the tem perature of the air should fall to the freezing point. Ice may be produced abundantly in all latitudes where the thermometer falls to $40^{\circ} \mathrm{F}$., if proper appliances are employed ; and as this temperature is reached at some period of the winter ays in nearly all of out Southern Statex, there is no reason why ine inhabitant should not provide thernelyen with ice


North. Large quantities of ice are made in the night time in India, in the months of December, January, and part of February, the thermometer standing at from 35 to 40 . Th following description of the method employed near Benares, and equally applicable to this country, we find in the $R e$ pertory of Arts:-
"A space of ground of about four acres, nearly level, is di vided into square plats, from four to five feet wide. The bor ders are raised, by earth taken from the surface of the plats, o about four inches; the cavities are filled up with dry traw, or sugar-cane haum, laid smooth, on which are placed as many broad, shallow pans, of unglazed earth. as the space will hold. These pans are so extremely porous that their outsides become moist the instant water is put in them: the are smeared with butter on the inside to pre vent the ice from adhering to them; and thi it is necessary to repeat every three or four days; it would otherwise be impossible to re move the ice, without either breaking the ves sel, or spending more time in effecting it than could be afforded, where so much is to be done in so short a time. In the afternoon, these pan are all filled with water, by persons who walk along the borders or ridges. About five in the morning they begin to remove the ice from the pans, which is done by striking. an iron hook into the center of it, and by that means break ing it into several pieces. If the pans have been many days without smearing, and it hap pens that the whole of the water is frozen, it is almost impossible to extract the ice without breaking the pan. The number of pans exposed at one time is computed at about 100,000 ; and there are employed in filling them with wate in the evenings, and taking out the ice in the mornings, about 300 men, women, and children the water is taken from a well, contiguous to the spot. New vessels, being most porous, an swer best.
" It is necessary that the straw be dry ; when it becomes wet, as it frequently does by acci dent, it is removed and replaced. I bave wetted the straw of some of the plats, and always found it prevented the formation of ice. The air is generally very still when much ice is formed gentle air usually prevails from the south westward about daylight. I had a thermomete mong the ice pans, during the season of mak ng ice with its bulb placed on the straw, and ing ice, with is, and another hung on a pole, five feet and a half above the ground; and commonly observed that when ic was formed, and the thermometer on the straw was from 37
to $42^{\circ}$, that on the pole would stand about four degrees high to $42^{\circ}$, that on the pole would stand about four degrees high
er ; but if there was any wind, so as to prevent freezing, both er ; but if there was any wind, so
the thermometers would agree."

## MORRISON'S MACHINE FOR KNEADING DOUGH.

The device in the annexed engraving is intended to super cede the direct application of muscular power rarely employed in kneading dough for bread, much less labor being required by the use of the machine and the work being more rapidly and neatly performed.

A is a box or dough receiver, having a concavity, B, extending transversely across it. On suitable uprights is hung tho crank shaft, C, directly over the concavity. To each of these cranks are attached arms carrying shoes of wood at the lower end, which work in the concavity, B. Tbey are guided by the horizontal bar, D, which forms a fulcrum for the arms,

and, in combination with the cranks, gives the shoes a curvilinear motion, by which the dough is carried under them through the box in a direction corresponding with the direction in which the shaft is turned by the handle, E .
The operation of the machine is very simple; the bottom of the box and the wooden plungers are to be covered with flour to prevent the dough from adhering, and by working the crank, the dough is compressed and carried gradually under the shoes as may be desired. It can be worked by hand or steam power, is simple, and not liable to get out of order, and can be used for working butter as well as kneading dough. Letters Patent were granted through the Scientific American Patent Agency, Oct. 1, 1867, to W. B. Morrison. For the purchase of rights or machiues application should be made to Morrison \& Baker, Muskegon, Mich.
The Day Line-Correction.-The correspondent whose diagram on the above subject we published on page 324, current volume, thinks the line is placed ten dogrees too far to the sast. Thase of our roadars interested in this subject will?


## Stuentitit <br> ghmixam.

MUNN \& COMPANY, Editors and Proprietors.
PUBLISHED WEEKLY AT
LO. 37 PARK ROW (PARK BULLDING), NEW YORK.
o. D. munn. s. h. wales. A. e. beach.
 for the Sosirs. Trubner \& Co.,

VOL. XVII., No. 23.... [New Series.]. ...Tweenty-first Year.
NEW YORK, SATURDAY, DECEMBER 7, 1867.

$\underset{\text { PROCESS }-. . L A T E}{\text { THE }}$ IMPROVEMENTS IN PROCESS--.LA.
PUDDLING.
Of all the processes in the manufacture of malleable iron, from its existence in the ore to its delivery in merchantable shapes, that of puddling is not only the most laborious and difficuit, but it is probably the most important. It is in this stage of its manufacture that the quality of the iron is deter mined to a very great degree; no matter how excellent the pig may be, either unskillfulness or carelessness in this process
will spoil the quality of the product. Those who have never seen a puddler at work, standing, as he is frequently compelled to do, from one half to three quarters of an hour before a partly opened furnace door, can scarcely form an idea of the severity of this labor. So onerous is it, that it is with great difficulty that men can be found fit for this duty, both on account of its tax on their powers of endurance and also because of the skill required in the manipulation of the partially molten metal.
The writer has seen many instances in his experience, of puddlers actually dropping down before their furnaces, prostrated and exhausted by the heat, and in one large iron establishment, numbers of these men are continually incapacitated for work by the exhaustive character of their labor Many of them instead of feeling brisk and in good spirits in
the morning before commencing their day's work actually the morning before commencing their day's work actually
dread returning to the works, knowing very well what suf dread returning to the works, knowing very well what suf-
fering they will have to go through beforea day of toilis finfering they will have to go through beforea day of toil is fin-
ished. What makes this labor more unbearable than it otinerwise might be, is the fact that it is only a part of the pudding process that requires skill, at other times the puddler is merely exhausting himself by performing manual labor.
labor. The object of puddling, it may be well to observe, is to expose the partially liquid iron at a sufficiently high temperature, to the oxygen passing through the furnace, so that it may be deprived of ite carbon, and it is in this part of the operation that the mass requires incessant stirring in order to bring every portion of it under the influence of the fire. Thus far but comparatively little skill is necessary, but when at the latter part of the operation the iron acquires a pasty
consistency, the skill of the workman is demanded to form the pasty mass into the required number of balls for the rolls, squeezer, or hammer.
One of the results aimed at in the puddling process is to bring the iron up to the "boil", as it is termed, while the furnace is at its greatest temperature, and to accomplish this the most rigorous and incessant stirring is neceessary, but during this stage so exhausting is the drain on the powers of
endurance of the workman, that the closest oversight will endurance of the workman, that the closest oversight will
not prevent him from adopting means to lower the heat of the not prevent him from adopting means to lower the heat of the
fire, to which he is exposed, by lowering the damper, and to fre, to which he is exposed, by lowering the damper, and to
hurry the iron into an improper boil by throwing upon it wet slag or refuse. It is almost unnecessary to say that this treatment, if it does not ruin the product of his labor, so deteriorates it as to make what is termed cold short, a comparatively useless iron. Those who have visited iron works can scarcely fail to notice that the workmen close the dampers, in many instances as soon as the iron is melted, at the very time the highest temperature is required to carry off the superfluous carbon and other impurities. We have thus spoken at length of the puddling process in order to show its great importance and the difficulties attending it when it is carried out as it should be in order that the lest quality of iron may

partment of iron manufacture, in order not only that the puddler may be relieved of that part of his labor which re atires but little skill, and that ing its fiercest, but also to enable him to give more attention to the latter part of the operation where his skill is most required.
Several plans have been advanced to accomplish this end, and of those which we have seen, that of Morgan, of England, appears to be the most practical and to have fewer objections than any other. That a description of this apparatus may be clear to those of our readers who have not given attention to
iron manufacture, we will state that the process of puddling iron manufacture, we will state that the process of puddling
is carried on in what is known as a reverberatory furnace; is carried on in what is known as a reverberatory furnace
that is, one in which the material to be subjected to the heat of the fire is not brought in contact with the fuel, but is placed on a sort of hearth a short distance in front of the furtervenes. This bridge and the top of the furnace is so curved that the flame of the fire urged by a powerful draft impinges on the substances placed on the hearth. In the present case the iron is placed there and it is through $a$ door opening upon it that the puddler performs his manipulations.
In the apparatus of Morgan a vertical shaft passes through In the apparatus of Morgan a vertical shaft passes through
the top of the furnace directly over the center of the hearth the top of the furnace directly over the center of the hearth
where the iron is placed. Fastened to the bottom of this where the iron is placed. Fastened to the bottom of this
shaft, which is kept revolving by means of bevel gearing shaft, which is kept revolving by means of bevel gearing
driven by steam power is an arm fitted with four fangs or prongs, each one about the size of a puddler's "rabble." These prongs stir the iron by moving at the necessary speed, when it is in a liquid state, and thus purify or refine it much more thoroughly than can be accomplished in the ordinary way by a man poking the mass through a partially opened door. There is no necessity, by this method of closing the dampers, to reduce the draft because no one is annoyed by the unendurable temperature, but the furnaces can be urged to their utmost, and that, too, at that stage of the process which re quires the greatest heat. As soon as the iron acquires its pasty consistency the mechanical "rabble" or stirring iron is withdrawn by the assistance of the usual balance weights through a hole in the top of the furnace which is closed by a
fire-brick stopper. After it is withdrawn it is immersed in a fire-brick stopper. After it is withdrawn it is immersed in a
tub of water which is moved to the proper place by a truck tub of water which is moved to the proper place by a truck
running on a track, and the stirring tool is ready for the next batch of iron. As this mechanical rabble revolves in a circl it will be seen that the hearth of the furnace, where the iron is placed, will require to be changed from the usual oval to a circular shape. This is, however, a change very easily made and one which in new furnaces would not increase the cost of construction.
To recapitulate what we have already partially stated, it will be seen that this contrivance is a step in the right direction, and if practical difficulties are not found to exist to prevent its application, the process of puddling will not only be rendered much more perfect as regards the quality of the product, but the labor of the puddler will be shorn of its horrors, and no doubt the number of heats that he is now able to get out in a given time will be increased to a very considerable extent ; and still further, workmen of intelligence who would now shrink from the terrible labor of a puddler would no doubt gladly take up with this department of iron manufacture. The consequence would certainly be a great increase in the quality of wrought iron and would perhaps enable it to hold its own in some of those branches of the arts where steel is now disputing the supremacy. We are not among those who think that steel is destined to entirely supersede wrought iron; the fibrous and ductile character of superior wrought iron has not yet been reached by the steal makers, except perhaps in rare instances, and then a considorable quantity of a uniform character could not be counted on. There are several directions in which the successful introduction of mechanical puddling will lessen the expense of iron manufacture, among which is the saving of what is technically termed the fetling lining of the furnace; the longer the iron remains in a liquid state the more will this lining be eaten away and the iron must of course remain longer in the liquid state by the old method than by the proposed mechanical process, for the reason that by the former
a very much longer time must be taken to stir it sufficiently to deprive it of its impurities than by the latter, where the stirring may be much more powerful and efficient. Before taking leave of this interesting and imporiant department in this great industry, we must say that we cannot call to mind anything in the mechanical line which demands improvement more than the process of puddling.

## A REMARKABLE SUMMER EXCURSION

One pleasant morning last June, a goodly company of ladies and gentlemen-some 75 in number-embarked from the foot of Wall street, New York, on the fine steamer Quaker City, for an excursion to that most atttactive of all parts of the world, the Mediterranean. Along its classic shores they coasted during the entire season, visiting every memorable and interesting place. Oftentimes they made diversions to the interior; but they were usually glad to escape from the land heats of the day, to enjoy cool and refreshing sleep on
board the ship at night. They first landed at the peninooard the ship at night. They first landed at the peninsula of Gibraltar, and some of them journeyed thence through Spain, France, Switzerland, and Italy, joining the ship again at Naples. Thence they passed on to Athens, Constantinople, Sebastopol, and Odessa, at which latter place they visited the Palace of the Emperor of Russia, by whom and his interesting family they were most cordially and splendidfa Dextained. Returning they visited the Den Sea, Thobee Alowandia in Tgypt, the Nie, tha Fgromion, Algiexs, Malta

Cadiz in Spain, Madeira Islands, and the Bermudas, arriving safely home, a few days ago, after an absence of only five and a half months. It is one of the most novel, remarkable, and successful excursions that we remember to have heard of There were no accidents, no sickness, every place laid down in the programme was faithfully explored, and not a single rainy day interfered with the projects of the party. How much more rational to spend a summer among such interest ing and wonderful scenes, filling the mind with useful knowledge, than to be cooped up in a hot hotel at some fashionable watering place. The excursion we have described was pro jected and commanded by Capt. Duncan, of Brooklyn, N. Y The complete success of this first enterprise will, we trust encourage him to a renewal every year. As soon as the Pacific Railroad is completed a pleasant summer excursion may extend from New York to China, Japan, and back.

## PATENTS IN CANADA TO AMERICAN CITIZENS.

We are glad to see that the subject of amending their patent laws is about the first thing that engages the attention of the New Canadian Parliament. A telegram from Ottawa dated the 22 d says
In the House last night the following notice of motion wa given: Whether it is the intention of the Government to ex-
tond to citizens of the United States the same facilities for ob tend to citizens of the United States the same facilities for obtaining patents in Canada that are afforded to citizens of the Dominion, and whether the privileges to order patents now wick are to extend to other parts of the Dominion.
In addition to the above we have private advices from prominent citizens in the Provinces stating that there is bu little doubt but that a bill will pass early in the session ex tending the same rights to citizens in the States to obtain patents as is accorded to residents of Canada.

Mr. Legge has favored us with a copy of his pamphlet showing the importance of a radical amendment in their laws. He says
Among the British Provinces in America, we find tha New Brunswick and Newfoundland have wisely shaken of the shackles of prejudice and exclusiveness, and allow all foreigners to obtain patents on the same terms as are granted
to their own citizens. By this arrangement, the intajitants of these colonies or provinces are permitted to obtain patent in the United States for the reduced fee of $\$ 35$, in place of th discriminating fee of $\$ 500$ charged to the inhabitants of Can ada, Nova Scotia, and Prince Edward Island, in return for their exclusiveness in not permitting American citizens to obtain Letters Yatent on any terms, even by the payment of an equally large fee.
The United States Patent Law is so framed that as soon as we cease to discriminate against their citizens in th granting of patents in the Dominion of Canada, their fee a
once drops from $\$ 500$ to $\$ 35$, without additional legislation The proposed change in our laws, by which this good re sult would be obtained, will at once open a market of 35,000 000 of enterprising, wealthy, and speculative perple to our Canadian inventors, as all wishing to apply could afford to pay the lesser fee of $\$ 35$, while but few can pay, in the firs instance, the larger fee, $\$ 500$. In return for $35,000,000$, given
to our inventors, we give theirs but about one-tenth the num to our inventors, we give theirs but about one-tenth the num
ber, and as our inventors, as a class, will equal, it not excel ber, and as our inventors, as a class, will equal, it not excel
those of the United States, in point of ability, we have a large margin in our favor, by the proposed alteration. From this it is evident thatif in the new law we adhere to the exploded exclusive principle, it will result, to use a common but forcible expression, in "cutting our own throats," without doing much harm to our neighbors.

Evils of 'right Lacing.
Sometime ago the death of a young lady passenger, Miss Stainsby, in one of the cars of the London underground railway was reported, caused, as then alleged, by suffocation due to the bad state of the air in the tunnels. A legal in vestigation ensued from which it now appears that one of the causes of her death was tight lacing.
Prof. Rodgers, lecturer on medical jurisprudence and on chemistry, was the first witness, and at his request the evi dence of Dr. Popham as to the appearance of the body was read to him.
Dr. Popham added that he had found the deceased was tightly laced, and that the result would be to compress her chest and impede the free action of her lungs.
Prof. Rodgers said he had examined samples of air taken on four different occasions from the tunnels of the Metro politan Railway, and also from various other tunnels. Tho air in its pure condition contained 2,080 volumes or oxygen per 10,000 , and from 3.7 to 6.2 of carbonic acid. On the 4 th of September he found that in the worst tunnel (i. e., Gowe street), there were 1,870 measures of oxygen, and there was but a slight trace of carbonic acid. The highest amount of carbonic acid he had found on any one occasion was 18.7 per 10,000 ; but the atmosphere of a theater four feet above the stage was 23.7 . The slight deficiency of oxygen which he found would not act injuriously, even upon delicate persons, passing as they did, rapidly through the tunnel in trains. Thought that under the circumstances under which the deceased had entered the train-that was to say, considering that she had eaten heartily, was tightly laced, had diseased heart, and was already faint before she entered the tunnelher death had resulted from natural causes. The jury heard other evidence, and then, without hesitation, brought in a verdict :-" Died from natural causes."

Petroleum Trials.-We trust that soon we shall be fa vored with exact information respecting the trials under government patronage of petroleum as a fuel for generating steam in marine boilers. The Chief of the Naval Bureau, B. F. Isherwood, will give these results in the Annual report of the Secretary pt the Nary, and a more complete technical report, with full detalle, drawings of the bolexs, we, whl be


## OFFICIAL REPORT OF <br> Patents and Ceams

Issued by the United States Patent Office,
for the weex ending november 19,1867
Reportad Offcialy for the sesentitic american
Patents ARE GRaNT
being a achedule of fees:-




. ot Canada and Nova Srotia pay 8500 on application.
(\%) Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specif ying size of model requirea, and muc
other information useful to Inventors, may be had gratis by addressing other information useful to Inventors, may be had gratis by add
$M U N N$ \& Co., Publishers of the Scientific American. New York.

70,933.-STEP-Ladder.-M. E. Abbott, Bethlehem, Pa,
 In combination with a step-ladder, I claim the pivot joints, a a, and the
long stappes, a, and and c c, or their eqnivalents, substantially as and tor the
purposes described. 70,934 .-Apparatus for Condensing Air.-Onofrio Abruz-




 70,937.-Joiners' GAGE.-Masnn C. Ames (assignor to him-
 substantialliv as and for the purpose described.
$70,938-$ Hook FOR HOLD-BACK STRAP.-William A. Bagley, I Alaim a ho, oonk for hold.backstraps, made in two parts, B, and pivoted part,
C, substantially as described. Co, 0,939 .-BoLT MACHINE.-Albert R. Bailey, New Haven,











 H0, Henry - Bescharaee albany For THE MANUFACTURE OF SALT. -
I claim he arrangement and combination of the soaking pan, K, drying



 IClaim the adingtanle spring. C, head, E, as arranged in combination with
the arms, Bot tor the nerpose and in the manner set forth.
70,946 .-W Wre Work --W annibald R. Boerner (assignor to himself and Carl R. Beerner). Chicago, Ill.
I claim wire work to be used for any purpose, when construs I claim wire work to be used for any purpose, when constructed substan-
tiall| as herein described.
70,947 .-PADDLE-WHEEL.-Edward T. Bostrom, Newnan,
 seribed, for the purpose specified.
70,948 .-STEAM ENGINE.-Eugene Bourson, Brussels, Bel-
 able the gosineer to stop or retart the motion of the piston, bvo conducting
steam or water, or both, into the ends of the cylinder, substantially as here-


 and arranged as and for the purpose set forth.
$70,950 .-H E A D$
BLOCK FOR SAW MILL.-Charles H. Brook-






 Whei, d, and screw rod, C, as herein shown and described.
70,951 . -MACHINE
and Charles N. Brown (assignors to themselves and J. Mason Gross) Pro

 as to effect the presentation of the artecle to be ground
titantially as esescribed.
70,952 .
 substantially as herein set torth.
70,953 .-MARKER FOR PLANTING CorN.--John Burnham (as-




70,955.-Towel.-John Cash, and Joseph Cash, Jr., Coven-
 r0,956.-APPARATUS FFR DISTLLLING Spirits of TURPEN ITris.-David rashyellit Fayetterilie, N. C. C.


 70,988. IRONING TARLE.-Albert A. Chittenden, Boston,
 70,959.-ChURN.-Charles Colby (assignor to himself an







 as and or the purpose herein sef forth, Tafton, Wis.










 ${ }_{70,967 \text {.-Washing Machine.-William W.Cox, Carbondale }}$

 $70,988 .-T o o l$ Supporter or Rack.-Zenas M. Crane, Dal-

 B, and arranged substanttilly as speeified. -E. W. Crittenden, PittsIoligi, Pat , The flated or corrugated rollers, B B $\mathrm{B}^{\prime \prime}$, a rotary screen, D ,
nd endes




 70,971. LOAF-BREAD MACHINE.-John D'Arcy, San Fran
 70,7 ase - PLow.-Jonathan R. Davis, McKay, Ohio.

 70,973.--BotTLE W WAFER.-Henry B. Davison, San Fran

 $7,974 .-T r d n d l i n g$ Hoop.-John G. De Coursey, Phila-
 70,975.-Boiv Tree.- Peter De Vries, Adrian, Mich.
 70,977.- HARVESTER RAKE.-Wm. P. Dillman, Joliet. Ill.



 70,978.-ROCK-DRILLING MACHINE.-George Downing (as




 0,979.-A a tomatic Ventilating Stove.-Richard Eaton,






 OU,






 , 0,98 . - Roparayy Swinc.- I. N. Forrester, Bridgeport, Conn
 $0,98:$;-BotTIE STopper.-Howard B. Fox, Oxton, an

 70,987 .- Michine for Picking Hair.-Franklin Frey, Lib-




















 To substantialy as and for the purpose speciied.

 lot ted cap or capat, FH , substantially as herein shown and descr bed and
Or the $0,9 \mathrm{Mich}$. Ice Cuttivg Machine.-Wm. F. Gordon, Detroit,

 70,995. . FRNACES FOR ROASTINGG ORES.-Henry Goulding I Silver City, Nevada, adion he arrangement of molds containting ores to be roasted, so that they
can be gradully brought nearer the fre or removed from it, substantially



 0,996 .-APPARATUS FOR MOLDING Collars.-Solomon S.
 0,997.-DIE FOR SWAGING HAMMEZS. Henry Hammond,
 0,998 .-Die for Fomine the Claws of Hanmers.-Genry

 K, arranged and operatho substantially as described.




 2perated substantialy as and or the parposes above set ortho




 stantialy as and hor the purpose specied.
71, Shank Springs . For Boots and Shoes.-Edward
 71,04--Method of Drying Gunpowder.-E. E. Hendrick,


71,005.-Lighting Gas by Electricity.-John M. Higgins











 7 hingeio-Pantoaraphic Engraver.-John Hope (assignor


 the rolier, to be engraved by the meanssubstantiall ys as esribu,
71,011 . AMALGAMATOR. - Alfred Horn, Silver City,

 ${ }_{71,1012 .-B o l t}^{\text {gerined }}$ Machine.-Wm. W. Hubbard, Philadelphia,








 71,015.-Governor For Steam Engire. - Reuben K. Hun-





 ${ }_{71}$ geribed and set forth.
 ${ }^{\text {to }}$ the other sidee as and for the porp pese set forth




 manner aud tor the purposes described and set forth. 1













 in one casting,


 71,008.-AAPPARATYS For Charging Soda Water.-John




 71,030 .- FIRE EsSCAPE.
 1,31 . Window Blind Fastening.-Benson Mayo, Chat
 the bracket rest, d, and the windo bind A. aranged and operating sut

 71,03s. Ho Hor Skirp. - John McKeever, New York city
 71,034.-FTLOOR CLOTH AND CARPETING.-John B. Meldrum T elaima a jute foor cloth, or carpet printed win an he 71, 35 . HAND Loom.-A. Meredith and P. P. Meredith,
 ranged and operating substantialiy in the manner and or the purpose hereit
fown
71,036 . APPARARATUS FOR DYEING HAIr.-Charles Merrit



 tially intite maner as and for the purpose specilied.



 Iton, Ind contriction of a maching for molding tilies for ratans by mean
 the purpose as herein set forth. -J. Ferguson Morsell, Stamford
$91,041 .-$ SPRING BUCKLE.-J.







 Ti, the purnoses herein set forth and deseribed.
 77,
 $71,046 .-$ LEVER FOR RALLROAD CARS.- Jay Noble, Rochester

 fr, o4s.-Machine for Cutting Pasteboard, etc.-Samuel




 T1,051.- LABEL HOLDER FOR RAILROAD CAR.-John H. Par
 7,
年, 053.1 .






 71,056. - Rock-DRILLING MACHINE.-Walter Pierce, Onion





 71,058.-Apparatus For Printing Tin Foil.--John Polhe.


 71,059.-Horse Block and Hitcheng Post.-Geo. W. Pres-


 ${ }^{71,060 .-B E L L O W s}$-C. W. English, Cincinnati, Ohio
 ${ }_{71,011}^{\text {posen }}$--Childden's Carriage.--Horace H. Prindle and John



 71,063 .- RAITWAY CHAIR AND SLEEPER.-Leonar I clamid, Ist The combined sleeper and chair, consisting of the couping

 1,055. Ceseribed D DASERR-R. W. Robinson, Cliniton. Ill.





 ${ }_{71}, 0688$.- Branding Iron.-Chas. Rundquist, Mankato, Minn

 and blocks. Lite later secured in position between the types by mean 1,



 Noleg, Nauvoo, Ill.
 2d, The combination of the roller, E , the ratchets, E , and the tackle, H h
 Hilaire Andre Levalloisis Parss, France.





 71,


 ${ }_{7}^{\text {socribed. }} 7$ Mis.-Bullet Machine.-W. Spillman, Marion Station





Ind fri the purpose set forth. S. Stafford, North Granville, N. Y
 f1, iofi.-Atraching Thills to Carriages.-Wm. Starkey,




 7i,080.-Dror Press.-Norman C. Stiles, Meriden, Conn.,











 3, The stop V, in eombination With the matin castings, B, and rock shafts,




\section*{| end in the |
| :---: |
| spectited. |}

ppecinea. Writing Apparatus for the Blind.-Jobh surpos
71,084 .-W and

 71,085.-Bronzing Machine.-J. F. Tapley, Springfield I Mass, Bist, In combonation with a drum for carrying the paper, one or more



71,086.-Machine for Digaing Post Holes.-J. Thompson


$71,087$. - Hand Loom.-T. Henry Tibbles (assignor to himself

 71,088.-Stump Extractor.-John Turner, Grand Haven,


 71,090 .-WASEING $\quad$ MCHINE. -Horace Warner, Lake City

 71,


 mond, III, assignor to himself, Jonathan S. Rooberson, John Black, and $E$









 ${ }_{71,095 .-R u b b e r ~ S h o e s .-J . ~ W e i d e n m a n, ~ H a r t f o r d, ~ C o n n . ~}^{\text {ren }}$

 71,096. - Broaddast Sedin Machive.-Augustus Weit



 cline substantailvin the manner as and ror the pur pose set for
 7 pose set forth 71,08 . Harvester Rake.- Peleg Werni, Chicago, IIl.





 substantiallin the manner and for the purpose herein descrined. Wetzel,

 di, 101 . Lesinedicator for Carriage Wheel bearings. -

 71,102.-Car-Brake and Starter.-John Wiley, 2d, South


 71,103.-Printing Apparatus.-J. M. Wilbur, Cleveland,


 71,104.-Stereotype Casting.-J. M. Wilbur, Cleveland,




71,106.-SAFETY ATTACHMENT FOR Pockets.-Edward Wil-



 purpos.

 aild ah and for the portose eet forth. $\mathbf{H}$ 'and L , substantially as and for


 fi,110.-Burglar-Proof Safe--Linus Yale, Jr. Shelburne I Falls, Mass. Ma apen ppace between the edpes of the door and the door Trilit.

 71,112.-LLAMP ExTINGUISHER-C. E. Abbot, Malden, Mass Iclaim 19t, The arrangement for conjoint operation, of the tongue, $t$, and
nnger,$m$, as
and
 ${ }_{71,113 .-C o t t o n ~ a n d ~ H a y-P r e s s .-B . ~ B, ~ A l f r e d, ~ L a ~ G r a n g e, ~}^{\text {sen }}$

 1,14. APMARATUS FOR RATIING AND Lowering Window
 firbeantialyyint the manner set forth, the combination being su bestantailis
 71,115.-DIINER PLATE.-J. K. Andrews, Ant m, Ohio.



 tandially as and fort the purporese specititad dhe fine $G$, to the malt floor, C


 gtantialy as and or the purpose descrijed. Atwood. Trenton, N. J. t claim artificial frel composed of coal tar, coal dust, peat and lime, eni 1,120.-Apparatus for Making Stamp-Gilt Paper Hang



 , wici- Piston Packing For Steam Engive.--James Bar
 as herein set forth. John Bean, Hudson, Mich
 ${ }_{71}$,123.---LAtch for Carriage Door.-Norbert Belvallette




 1,126 Mass RPENTERS' 'WorkBence.-James Bragdon, Bos
 constructed, arranged, and operating substantially as specitied.



 , substantially as and for the parpose descrited Bush, Rensselaerville,





 1,131- - Sewing Machine.-Caleb Cadwell, Wauk







 8th, The espring. x , applied to the spools, M 1 M 2 , in the manner and for the
 anderenn desribed.
 ni, ald -TRANPSLANTFER FOR GARDER UsE.-Hiram Car-








 1,137 -Horse ${ }^{2}$ HAY Fork.-Abraham Coates, Watertown,






 11,139 .-BUIDDING ECAFFOLD.-N. B. Crawford, Bennington,



 orth din combination therewith, I claim the ladder, b , applied as and for the



 tintially as described and for the purposes set forth. Da Camarah, Jr., I clisim tube., C, substantially as and for the purpose especifed.
$71,143 .-$ PAPER BAG.-George Dare and Diana Dare, Au-
 $7{ }_{71}$,144.-Tube Well.-T. J. Dean, St. Louis, Mo.
 7r,




 ad forthe swivel block, H. as constracted and used with the permanent pos 71,148.-NAII PLIATE FEREDING DEVICE.-Daniel Drawbaugh,





 71,149.-BREECH-LOADING TIRE-ARM.-Julius Elson, Boston,
 set forthe combination of the solid brech, block, B, when constracted as de.
geribed, the hinged baarrel, $A$, the projection, E , and the hinged fcrow roa, b ,



 they are hinged.
 ${ }_{71}$ prposes seet Prothe . 1 . William Fields, Wilmington, Del

 71,154.-POCKET Book Clasp-D. E. Fisk, Springfield, Mass.
 71, Wis. -GROUT CONDUCTOR.-W. S. Follensbee, Janesville,



71,177.-TRREAD CUTTER-W. L. Gallaudet, New York city.
 risadily detached therefrom, substantialy in the manner deseribed.




 ${ }_{7}$ scribed. 1160 -Requlator for Motive Power.-James E. Gil-






 Charies S. Locke), watertown, Mas. Hall (assignor to himself and

















































 constructed and arranged as and for the purposes set forth.
71,178 .-CALIPERS OR DIVIDERS.-M. G. Imbach, Hartford,
 1, Pa.



 pose herein set forth.
71,181 . Compound Tool for Cuttina, Punching and Up-
 ,





 ${ }_{71} 1,183$. - LEVER JACK - T. J. Kindleberger, Eaton, Ohio
 1,







71, 186.



 1,187.-Window Shade_-Philip Lindemeyer, Hoboken, N

 ditan fild 188 - Antial Trap.-Nathan M. Linton, Wilimington, O

 fied ingredients or their equivalents, sbstantially as described. Chester S.





 1,191.-Process of Scouring And Cleansing Wool and


 scribed.-Systrm of Measuring and Cutting out Dresses.



 71,195-GATE FAATENNLG-George MCCoy, Antioch, Cal.
 1,196.-Invalidand Fracture Bedstead.-Thomas Mc-




 71,197.-Artificial Leg.-Abner McOmber, Schenectady


71,198.-Hay Raker and Loader.-Gideon C. Mead, Guilford, N. F., Rhe combination with the hinge piece, a, and spring, b, of the

 (licolt, WIndsor Locks, Conn.

in combination with the shafts,b, weights, g , bars, d , and platform, b , sub1, 2000- PRINTRE'\$ GALLEB. -P. Gray Meek, Bellef onte, Pa.



 1,202. CAAR CoppiLING.-George R. Moore, Lyons, Iowa.

 71,204.-Flutina-Melodeon.-Joseph Müller and Freder-
 tad. Suppiyng trest, air to the eontinuons eirrent of air in the instramen


 1, France . Photocrapic ApPARTUS.-Octave Nicour, Paris,











 ${ }^{1}, 2$ burg, Ressignar to the Meatros. - Frederick Ortlieb, Williams









 (claim the barz, AB and co, and spring, D, constructed and arranged to perate in the manner and for the purposes set forth.
1, 10 .-COMPosirion For Coatina Wood, Iron, Paper

 sde as a new articlepor mosmonfacurare, the composition substantially as her Ndecribed and for the uses and purposes set. 1 ortril. Northampton, Mass
 71, 12 eneseribed.



 1,214.- Hotel A ANUNCIATOR.-H.'B. Porter, Chicago, IIl



 71,






 described. Combination and a arrangement of the annular tap or auxiliary
ralve the with the




71,220-BABY WALKER.-Joseph Rohr, Batesville, Ind.

geribed, alic oonstructed and arrangeed substantially as and for the purposese





 and








 and iof the propesese fortiv-AIfred M. Seabury, Johnstown,









71, 231.-APPALATUS FOR MIXING Mortar for MAKING


















 and












vantages as explained.
71,243.-MACHINE FOR HEADING BoLTS.-Wilber SWathel
(assignor to W.J. Clark, H. H. Clark, and C. H. Clark), Southington, (assignor to W. J. Clark, H. H. Clark, and C. H. Clark), Southington
I conm,
claist, In bolt machines, the two independent clappers. G a and L , and the two separate projections, B1 B2, on the shaft, B, and the wedge piece, E,
arrange an represented, so at onoprate relatively to each other and to the
header and moving die, substantially as and for the purposes herein set
 71,244.-Air Heating F'urnace.-John M. Thatcher, Ber-










 ,to






 1,248, LLAMP.-Charles N.TYyer Buffalo N. Y






 1,2,20.- Ha LI LoADER-Albert Vose, Pittsfield V .
 and

















 the parposes set forth. Marsha!l D. Wellman, Allegheny City, Pa I claim the agitators, C C, constructed as described, and secured between
the spaces in the erate, , withits projections.e., the whe being con
structed and operating in the maner substantially as and for the purposes

 $71,255 .-H_{\text {arvester.-Wm. N. Whiteley, Springfield, } 0 .}$

 and
ring In combinbination with the pitman, A, of a har har the purpose described.
ring machine, the solid
71, Products.-Charles P. Williams (assignor to himself and George T. Lewis), Philiadelphia, Pa. Pacture of the phosphate of soda and other phos-
I latim the artor mant
Thates by the process or method herein shownand described. Yates by the process or method herein shown and dessiribed.
71,257 . HARVESTER GUARD FINGER.-William A. Wood,

 71, ${ }^{\text {forth. }}$, 58. - SLleEPING CAR.-Jonah Woodruff, Pittsburgh, Pa.


 II,259.-Machine for Cutting and Punching Flynet
 crib The adjustment of tie cutter bit or stock, by means of the lever, as de-
sd, The manner of securing the knives and spacing keys by means of set
 forth. The metal bed plate, F, adap apd to receive the perforated guides for
vatio ous sized atraps, subustantially as and tor the purpose set torth. 71,260-Grate, Fireplace, and Furnace.-Wm. Young,


## REISSUES

2,799.-Elevated Railway.-P. Andrew, Cincinnati, Ohio I claim, 1st The construction and arrangement of a quadruple track upon
single row of pilars, provided with cross arms for suspending and support
ing the



 2,800- Harvestrr Rake - Chas. F. Davis, Auburn, N. Y









 2,803.-Machine for Cutting Parer.-Hervey Law, Chat



 ,

2,831.-Printer's Type.-Darid Bruce,Brooklyn,assignor to 2,832.-Prife Bruce), New York city. Wulius Herriet (assignor to David 2,833.--OrNAMENTAL Type.-Edwin Charles Ruthven, Phil-,834.-Trde Mark.-Joseph Scholfield, Constantine, Mich 2,835.-Satchel.-R. M. Seldis, New York city.
2,836.-Sewing Machine.-W. G. Wilson, Cleveland, Ohio.

## PENDING APPLICATIONS FOR REISSUES.

application has been made to the Commissioner of Patents for the Reissue of the following Patents, with nevo claims as subjoinea. Parties who desire
to oppose the grant of any of these reissues should immediately address MUNN \& Co., 77 Park Rov, $N$.
1,576.-LAMP.-Rufus Spaulding Merrill and William Carle nte Boston, Mass, assignees or Curistian Reichmann, Philadelphia, Pa,
1867. Sept. 21,1858 . Application for reissue rcceived and filed Oct. 11 ,






 66,498.- Mirme ANNIHILATOR.-Charles T. Jerome, Minneap-


 45,389.- Heating Apparatus.- Thomas S. Clogston, Boston, Dec. 13 , 1864 . Application for reissue received and filed
Oct. I liam the application and use for heating parposes of one or more tabes
having a corregated or annular ribed surface in combination with a boiller aving a corregated or annular ribbed surface in coob bination with a boilier
or other sintable steam generato and pipes for conducting the steam or hot
water from said generator to the corrugated tubes, essentially as herein
hown and described. 18,175.-Type Setting and Distributing Machine.-The










 11th, The pusher, b6, on the conveyer to discharge the type from the










Also the compoand metal and wood basket rim with the wood at interior,
substantially as betore set forth.
39, 39,582.-COAL STove.-Dennis G. Littlefied. Albany, N. Y



 4th, The magazine constructed as described in combination with the fur-
naceseparateor rom it and sumpended. within a chamber isolated from the
chamber surroundins the magazine. cthamer the combination of a magazazine contracting in diameter from the mid-
die or other line down ard to its io wer end with a furnace suspended with-

 66,318.-GLOBE VALVE FOR STEAM ENGINEs.-Joseph J.



 58,494.-GRATE BAR.-Sterry Smith, Salem, Mass. Dated
 57,337.-Horse HAY Fork.-Mary Jane Laird, Middletown,






 scribed and for the purpose specified.
68, 095. . THRASHNG MACHINE AND SEPARATOR.- Hugh W.
Mat thew s, Chicago, III. Dated Aug. 2T, 1867. Applic tion for reissue re-


 stantially as described.
sd, A stationary or movable rack, C, composed of perforated slats having,
longitudinal spaces betwen them in combination with serrated blades, $D$,



















## Inventions Patented in England by Americans. PROVISIONAL PROTECTION FOR SIX MONTHS.

 2,890.-Apraratus for Suprrieating Steam and Other Vapors.--Lef
 2.971. - Driddering $\operatorname{AND}$ Sptce Boxes.-George W. Putnåm, Peterborough



## EXTENSION NOTICES.

James Pitts, of Clinton, Mass., having petitioned for the extension of a patent granted to him the 28th day of February, 1854, tor an improvement in which takes place on the 28th day of February, 1868, it is ordered that the said petition be heard at the Patent Offlce on Monday, the 10th day of February next.
George $W$. Coats and James Russell, of Springield, Mass., having peti
tioned for the extension of a patent 1854, for an improvement in machines for sticking card teeth, for seven 18s4, ror an improvement in machines for sticking card eeeth, for seven day of August, 1868 , it is ordered that the said petition be heard at the


HARRISON BOILER
DESTRUCTIVE EXPLOSION.
Twent toouand hores.operer have bean made and put
 ${ }^{20} 4$

## $\mathrm{A}^{\text {PRIZE }} \mathrm{ot}$ Me Pedat

SHAW \& JUSTICE
DEAD STROKE POWER HAMMER. The great satisfaction given by these Hammers where-
ever introuded, warrants the Patentee inasserting them
to be THE BEST, as well as the mo meconomical Ham.


$\mathrm{C}^{\text {RICSSON }}$ CALORIC ENGINES OF





Patent power and Foot-PUNUH-
 $\mathrm{F}_{\text {PR FIRST-CLASS SHA FTING WITH }}^{\text {OR }}$ PRESSURE RLOWERS-Equal in Force

THE CELEBRATED "SCHENCK

 I RON PLANERS, ENGINE LATHIES,


## PHoENIX IRON WORKS



$\underset{M}{\text { M }}$



P ORTABLE AND STATIONARY Steam

A MESSIEURS LES INVENTEURS-
 Sclentinc Amercan outce, No. sit Paik $\pm$ Row, New York $\mathbf{S}_{\text {Entrin }}^{\text {ETSLUMES }}$ AND NUMBERS
 M ODELS, PATTERNS, EXPERIMENT-

C Harles a seiely, consulting

C AN I OBTALN A PATENT? -For Ad-



13 Portable Engines, from 6 to 15 Horse. 13



## New Tanks For Sale.

 TO PAPER MAKERS AND OTHERS


 PRACTICAL SRENTTIFIC bOOKS on


Water Wheel For Sale. $\mathrm{O}_{\mathrm{drexs}}^{\mathrm{NE}} \mathrm{WATER}$ WHEEL OF THE AN
 iron, second-hand, but in good condition. Will be sol
c.lete. Ind Inquire of
in los
ALLEN BROTHERS, Sandy Hill, N. Y. F Stationary Steam Engines of superior construction

## Steam Boiler For Sale.

 ameter. face plate. serfety valve, second-hand, but ingood
condition. Inquirate
23 inss]
LuLEN BROTHERS. Sandy Hill, N. Y. B URGLAR-PROOF SAFE LOCK.



COR SALE, AT A GREAT BARGAIN, 48 inches. Address
304 Chestnut st., Phuliadelpha,
.
TO PATENTEES.-Metal Small Wares of
 HASLE'TINE, LAKE \& CO.

AMERICAN EMERY





 T IBERAL ARRANGEMENTS WILL BE
 $\mathbf{W}^{\text {ANTED Invento }}$
and Arien Intuentor of of Nivew and Imporoed Tration

PRATT, WHITNEY \& CO
 bility, and convenience
ENOR GAS ENGINES, From half
INVENTORS having Patents to sell will ntors' Exchange 512 EroadwavF New Tork on

A RTIFICIAL EARS FOR THE DEAF

YOU CAN SOLDER your own tin ware

$\mathrm{G}^{\text {REAT ECONOMY IN FUEL- }}$








## GREAT ECONOMY IN WATER POWER. LEFFEL'SDOUBLETURBINE WATER  <br> LuCIUS W. POND, <br> Iron and Wood Tools, And Machinery, TURBINE WATER WHEELS.

$\qquad$ Works at Worcester, Mass.
Sale Roo 85 Libertyst., ( 2 doors West or Broa way), New York. E-Very superior upright Drill
 TODD \& RAFFERTY, Manufacturers and


babcock \& wilcox's
Patent stationary steam en Gilks, Brill by the H ,
 $\mathrm{H}_{\text {Paten }}^{\mathrm{OYT}} \mathrm{RROTHERS}$












TURBINE WATER WHEELS-

$\mathbf{F}_{\text {and }}^{\text {OR SALE-Mineral Land-Missouri Pine }}$


P
$\mathbf{W}^{\text {ANTED an A A ent-One chance in each }}$





## CIRCULAR SAWS,



WITH
EMERSON'S PATENT MOVABLE TEETH.
These Saws are meeting with
UNPRECEDENTED SUCCESS,
great superiority $\begin{gathered}\text { And their } \\ \text { Both as to } \\ \text { BVERY }\end{gathered}$ other Kind, EFFICIENCY AND ECONOMY

Is now fully established.
Also
EMERSON'S PATENT PERFORATED
CROSS CUTTING, CIRCULAR, AND LONG SAWS. (All Gumming Avoided.) And
EMERSONS PATENT ADJUSTABLE SWAGE,
For Spreading, Sharpening, and Shaping the Teeth of all Splitting Saws. Price $\$ 5$. Manufactured by the

AMERICAN SAW COMPANY,
Office No. 2 Jacob street, near
ve Pamphlet and Price List.

WHITE


##  <br> 

J OSEPH A MLLER'S Improvements in





E UROPEAN AGENCY for the Exhibition



STEAM AND WATER GAGESS, STEAM

A GOOD CHANCE FOR BUSINESS IN


B. T. TRIMMERSS Smut Machines and

 E. A. BAGLEY \& Co., Manufacture




## WIRE ROPE.

## 



 POWER PUNCHES ROTARY SHEARS
 THE STONE'S RIVER UTILITY Y Works
 ${ }^{2}$
$\mathrm{B}_{\text {AIver }}^{\text {OILE FELTING SAVES TWENTY- }}$



The very highest prize, THE CROSS OF THE LEGION OF HONOR, was conferred on the repre sentative of the Grover \& Baker Sewing Machines, at the

Exposition Univcrselle, Paris, 1867, thus attesting their Exposition Univcrselle, Paris, 1867, thus attesting their | rooms 495 | Broadway, New York. |
| :--- | :--- |
| ATENT IMPROVED | 20 | PATENT MPROVED ENDLESS $O$ M





 PATENT INK ERASER, BURNISHER
 CARPENTERS SEND (or $T$ TE Excelsior Wind Mill and the Genuine

E COUNT'S Patent Hollow Lathe Dogs










17 eow $5^{\circ}$ !
arm
L. D. FAY, MANUFACTURER OF MA


 and

