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## Improved Screw and Tapping Machines.

 We wish that every mechanic in the country could see the machines from which the drawings for the accompanying engravings were made. They stand in our office, and in perfect accuracy of workmanship, are not merely a credit to the manufacturers, but are an honor to American mechanics. They are designed for cutting screws by steam or other power, one machine being constructed to cut the external threads on the screw, and the other for cuttting the thread of the receiving or female screw.screw machine.
Want of uniformity in the screws used in connecting parts of machinery is a source of trouble and ex-
dle by the screws in the side of the upright. The spindle has only one flange or collar, which is outside of the front box. Between this flange and the end of the box is a hardened steel washer. The cone pulley, $c$, is well fitted to the arbor and kept from turning by a spline. Back of the pulley is a nut by which the pulley can be forced forward and its hub kept up to the rear end of the front box. By this means the front journal can be readily kept tight, though considerable wear should take place. The rear box is made in two parts in the usual manner. Should the spindle heat by continued use, it will not bind endwise, nor will its expansion lengthwise affect the accuracy of work done on the machine. The spindle is
the edge of this head are six or seven holes radiating from the center, which serve to hold the mills, cutter and dies used in making the screws. The head is held very firmly in its place, while the cutters are operating, by a steel pin, which comes up through the piece on which the revolving head rests at the point nearest the line spindle. Ihis pin is hardened and slides through a hardened steel bushing, and the upper end, which is tapered, enters into hardened bushings in the bottom of the head. These steel bushings are ground inside and out after hardening, and the pin is afterward ground into them, so that the point fits them all alik3. This pin is withdrawn when the long hand lever is moved back by means of a short


BROWN AND SHARPE'S TAPPING MACHINE.
pense both to the manufacturer and operator, so that in many cases what was at first supposed to be the cheapest article, becomes in the end the most expensive. The difficulty in producing screws perfectly uniform and interchangeable has been principally owing to the imperfect machinery used ; imperfect not only in workmanship but in construction, and especially wanting in devices to compensate for the wear which will unavoidably take place in the running parts.
The annexed cut represents a screw machine which in its general construction is not new, but it has some novelties which will be noticed in the following description. The bed, A, which is of cast iron, is quiie heavy, and has at one end two uprights cast solid with it, into which are fitted bronze boxes to support the spindle. The front box, $b$, is made in four parts to close up for wear, the two middle pieces being forced in horizontally toward the center of the spin-
hollow and is provided with a hollow spring collet, in which shells of different sizes (which are cheaply made) are inserted, for holding the wire. The rear end of this collet is round, and fits the tapering hole in the end of the spindle. The front end is squared, and fits a hole in the chuck or collar, which screws on the end of the spindle. In this chuck are two screws bearing on opposite sides of the square end of the spring collet, by means of which the wire is centered, after which it can be moved, and still kept central, by loosening only one of the screws. At the other end of the bed of the machine, resting upon two V-shaped ways, is a rectangular piece, D, which can be fastened at any point by a bolt from underneath. Upon and attached to this is another piece, which is fitted to slide in a direction parallel to the bed, and is moved by a long hand lever, E. On the end of this sliding piece nearest the spindle a round head, $F$, is so arranged as to revolve horizontally. In
lever, of which the fulcrum is attached to the sliding piece, which supports the revolving head, one end being connected with the pin and the other striking an inclined plane in the lower piece, which is fastened to the bed. The extreme back motion of the long hand lever, E, brings a star wheel on the under side of the revolving head in contact with a dog projecting upward from the lower piece, which causes the head to revolve far enough to bring the next tool in a position ready to operate on the wire. When the hand lever is brought forward, the star wheel slips over the dog, the pin enters the hole in the head, being forced up by a spring acting on the rear end of the short lever, after which the cutter commences to operate. There is an arrangement whereby any wear in the center hole of the revolving head can be compensated for. On the other $\in$ nd of the sliding piece, projecting underneath it, is a screw which can be set to limit its motion. The tools in the working
head are each held by two screws, by loosening which arbor which slides freely, but is prevented from turnthey can be moved endwise to make the adjustments required for the different cuts on the work. Between the spindle and revolving head, and attached to the bed, is a slide rest, operated by a hand lever, G. It has two tool posts, one at the back, sliding in a groove paralicl with the ways of the machine, and one in front, sliding in either one of two grooves, side by side, but at right angles with each other. The bottom of this rest is planed on the ways of the bed, and can be moved upon them to any position required. Two tools are used in these for cutting off, pointing, or grooving. The motions of both these tools are limited by set nuts upon a screw underneath the rest. The lathe bed has short legs and is set upon an iron table having a channel around the edge to catch the oil. The overhead work has two patent friction pulleys to reverse the motion of the arbor. Several sizes of these machines are made-the largest suitable for screws like the breech pin of the Springfield rifled musket, and the smallest for screws $\frac{1}{16}$ to $\frac{1}{1}$-inch diameter, and for drilling gun cones. On the large machines a hand wheel, with rack and pinion, is used to operate the tool head.
The overhead pulleys, with the hangers in which they run, are represented in a reversed position on the floor beneath the machine.
These machines will be found very useful in any machine shop for making all kinds of set screws and studs at half the usual cost, and of perfectly uniform size. They have been introduced into the U. S. Armory at Springfield, and into many of the private gun manufactories throughout the country.
Gunmakers and others desiring further information can address the manufacturers, J. R. Brown \& Sharpe, at Providence, R. I.

## tapping machine.

All machinists have experienced the tediousness of cutting screw threads in nuts or other parts with a tap worked with an ordinary tap wrench. Various devices have been employed to facilitate, this operation, especially when large numbers of holes of small diameter are to be threaded. The tap is sometimes fixed to the spindle of a lathe and motion given to it in either direction by means of a belt pulled by the hand of the workman, or in some cases, where the lathe has a reverse motion, by power. When the piece to be tapped is toolarge to admit of this method, a tap fixed in a bit stock is tolerably efficient. A machine has occasionally been used in which the tap is severed by means of a treadle. But most of the arrangements in common use are objectionable either on account of being too slow, want of accuracy in the work performed, or the expense occasioned by the frequent breaking of taps.
The machine shown in the annexed cut is intended to obviate these difficulties. In its general apperance it resembles an ordinary lathe, the two pulleys, $a$ and $b$, in the head, are, however, independent of each other, one having an axle extending to the right and the other to the left. These axles pass through holes in the ends of the head stock, and are thus supported but left free to revolve. Through the axes of the axles of both pulleys a hole is bored in which an arbor is fittcd so as to slide freely, and to one end, $c$, of this arbor a tap is secured. In the middle of the arbor a mortise is made in which is inserted a flat piece of steel about three inches long. This piece stands at right angles with the arbor, projecting an equal distance on both sides, and comes between the two pulleys when the arbor is in place. It acts as a dog by which the arbor is revolved. In the side of each of the two pulleys, between which this dog is placed, are two small studs. These are designed to catch the dog and thereby revolve the arbor, but the distance between the outer ends of these studs in the opposite pulleys is sufficient to leave the dog free from both, so that the arbor may be at rest when both pulleys are revolving. The pulleys are driven in opposite directions, and by pressing the piece to be operated upon sigainst the end of the tap, the arbor is moved endwise, and engaged by means of the dog and clutch screws with one of the revolving pullies. This gives motion to the tap, cansing it to enter the hole in the work and cut the thread. A slight movement of the work in the opposite direction, reverses the tap by moving the arbor endwise sufficiently to disengage the dog and connect it with the other pulley. The foot or tail stock, $d$, carries an
ing by a spline or feather. On one end of this arbor is a stop which can be adjusted to limit the end motion as desired, and on the other end any device required for sustaining the work can be placed. By setting the stop on this arbor the tap will cease to revolve at any desired point, so that holes with bottoms can be tapped with the same facility as others, care being observed to have the unlocking take place before the end of the tap touches the bottom of the hole. This arrangement entirely prevents the danger of breaking the tap, for, if the motion is not reversed by the operator as soon as the stop strikes, the continued motion of the tap withdraws the dog in the arbor from the clutches in the pulley. The taps are made from straight pieces of round steel wire and are held in the following manner. $\Lambda$ straight hole is drilled in the end of the arbor about three inches deep, and of a little larger diameter than the wire from which the taps are made. At the outer end, this hole is tapered for half an inch in depth at an angle of $80^{\circ}$. A piece is then turned to fill this taper and to project slightly beyond the end of the arbor. This piece is bored the size of the tap wire and a slit is cut through one side to the hole in the center. It will be readily understood that if a wire, filling the hole in this tapering piece, is inserted in it, and the piece itself then forced into the tapering hole in the end of the arbor, the wire will be held firmly. This is effected by a screw cap fitting a thread cut on the end of the arbor and having a hole in the center to admit the tap. For tapping the small parts of guns, sewing machines and other light work, this machine is particularly useful, and it has been introduced into several of the principal armories in the country. It is manufactured by J . R. Brown \& Sharpe, at Providence, R. I., to whom those interested can apply for further information.

NOTES ON MILITARY AND NAVAL AFFAIRS.

## tife strcation.

Military matters are progressing as rapidly as possible. General McClellan is pushing " on to Rich. mond" with rapid strides. At last accounts he was within twenty miles of that city, and it was expected by some thet the enemy would make a stand at a point called Bottom Bridge, while others assert that Virginia will be evacuated as rapidly as possible. Gen. McClellan needs the active cooperation of the divisions of Gen. McDowell and Gen. Banks. We are of the opinion that injustice was done when these commands were taken away from him. This is our conviction, but we may be wrong. The responsibility of defeating the enemy in Vigginia devolves chiefly upon him, and if for want of control over these two divisions he should be defeated the odium of failure would be unjustly charged to him.
Gen. Halleck is almost within speaking distance of Beauregard at Corinth, and is skirmishing with him daily. A great battle at that point is impending.
Some of our journals are loudly proclaiming that the war is nearly over. We should be happy to re cho this pleasing idea, but we warn our readers against being too sanguine on this point. The rebel lion will be crushed we have no doubt, but it is all nonsense to set the time when this will be brough about. It may be one month, it may be six, it may take twelve to crush it, but it must be done.
captcre of norfolik-Destruction of the "merri-
mac' ${ }^{\prime}$ and the navy yaro.
One of the most important successes which has attended the operations of the Federal governmentin its efforts to suppress the rebellion is the surrender f the city of Norfolk and its occupation by our troops. This event took place on Saturday, the 11th inst. The President and Secretary of War had proceeded to Fortress Monroe, with a view, no doubt, to secure a more efficient coöperation of the naval fleet in Hampton Roads with the military operations of Gen. McClellan. After their arrival the iron-clad unboat Galena proceeded up James river, toward Richmond, and the Konitor, Nargatuck and other vessels went toward Norfolk, with a view to shell out Sewell's Point, and, if possible, draw out the Merrimac, to engage her in conflict, but she refused to come out. The batteries on the Point were effectually helled, and the President in person decided to land forces, for the purpose of moving upon Norfolk, ant,
after a most careful reconnoissance, selected the spot for the landing. After the forces under Gen. Max Weber had proceeded some distance toward Norfolk he was joined by Gen. Wool, Secretary Chase, and Gens. Mansfield and Viele. Gen. Wool took every precaution to provide for all emergencies that might arise, by ordering up reënforcements. The entrencherd camp of the enemy, some three miles in extent. was found deserted, and no serious obstacle presentes itself to the advance of our forces. Upon reahing the immediate environs of the city a deputation of citizens was met, bearing a white flag, headed by the Mayor and a portion of the Common Council, wha made a formal surrender of the place. Gen. Wool proceeded to the City Hall, where he was well received by the inhabitiants, and announced to the poople that he had taken military possession of the place and appointed Gen. Fiele Military Governor. In his proclamation the Governor stated that " these who had left their homes under the anticipation of any acts of vandalism may le aesured that the government allows no man the homor of serving in its armies who forgets the duties of a citizen in discharging that of a soldier, and no individual right: will be interfered with.'
The huge iron clad war steamer--the Merrimacwhich has created so much stir the world over, and which was the terror of the bulls and bears of Wall street, has finslly become extinct. She was blown up on the morning of the 11th, in order to prevent her from falling into our hands. The explosion is dcscribed as grand and terrific. It seemed like the shock of an earthquake.
Accomp"nying the report of the occupation of Norfolk was also the arnouncement that the Gosport Navy Yard was safe and untouched. We could not credit the report, yet it seemed to le official, and we hoped it might prove true. Information, however, is received, that all the workshops, ship houses, and splendid dry dock were destroyed, together with several vessels in the yard and on the stocks, nothing remained but the charred remains of what was once the most complete and best-equipped navy yard in he country. G/n Wool in his dispatch, says "I visited Craney Island, where I found 89 guns of large caliber, most of which were spiked ; also a large number (f shot and shell, with about 5,000 pounds of powder, all of which, with the buildings, were in good order. As far as I have been able to ascertain, we have taken about 200 cannon, including those at Sewall's Point batteriez, with a latge number of shot and shell, as well as many other articles of valuestationed at the navy yard, Craney Istand, Sewall's Point and other places.

## occupation on new ormease.

The latest intelligence from New Orleans announces that the city is now fully occupied by the Federal forces under Major-Gen. Butler. He has taken the f.mous St. Charles Hotel for his headguarters, and has issued a sound and judicious proclamation, placing the city under martial law. Mayor Monroe and the aldermen of the city have been cast into prisom as traitors. The General sent his peolamation to the various newspupars published in the city, but they all efused to print it. Therefore he took possession of the True Delta office and called in Northern printers, who worked it off speectily. The people are represented as very sour, but Gen. Butler plainly informs them that, while he will protect them in their rights of person and property, he will at the same fime not submit to any thing like treason against the government, either in word or deed. No porsense of that kind can be tolerated inder the smplu folds of the star-spangled banner.
incidents on the mississtiple
The official reports of Commodore Buracret and Capt. Porter, concerning the engegement which resulted in the capture of New Orleans, proves it to have been one of the most brilliant ulva victories on record, perhaps the most so, considering the great preparations which had been made on land and water to resist the advancing fleet. Capt. Bailey, who brought the official report of the surrenter of bort Philip and Jackson, : intes that inst prerious to the ttack the commanders of the French ind English nen-of-war, which were lyirg in the river, aked and readily obtained the consent of Commodore Farragnt o visit the forts their object being to examine the means of defense. The officers reported to the Com-
modore that it would be useless for him, with his wooden ships, to attempt to battle with forts so thor oughly prepared to resist an attack. The gallant Commodore replied that he was sent by his government to make the attack, and intended to try it on at all hazards. Our fleet had to contend with regular case mated forts, heavily-armed land batteries, iron clar gunboats, rams, turtles, chains, floating rafts, fire ships, \&c., all of which had to give way in the pres ence of the skill and bravery of our gallant tars.

> aNOTIIER NAVAL ENGAGEMENT.

A naval engagement came off on the 10 th inst. near Fort Wright, on the Mississippi, between Commodore Foote's fleet of gunboats under command of Capt. Davis, and the Confederate fleet, under Capt. Hollins The Federal gunboat Cincinnati was rum into and in jured by the Louisiana, but will soon he again repaired. The rebol ram Mallory attempted to do the same thing for the St. Louis, but was destroyed in the attempt. The rebel fleet retired down the river--satisfied for the time being that it would be uscless to contend further. The Memphis Argus, in an article on gunboats, says :-Thus far, it must be confessed, our attempts with the gunboats on the river have been a disgusting fizzle. The people know it, and so does the government."

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the fleet off moblie.
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The Petersburg (Va.) Express, of the 9th inst., publishes a dispatch from Mobile which states that the advance of the Federal fleet, consisting of seven vesels, are off Fort Morgan and ten more off Horn Island, moving Eastward. This confirms the announcement of Com. Farragut, that he intended to follow up the stampede of the enemy to Mobile. Stirring news may soon be expected from that quarter

Chain-clad sloors-of-war at new orlfans.
The most conspicuous feature in the outward ap pearance of the ficderal heetwas the iron-linked mail of the sloops-of-war Richmond, Brooklyn and Pensacola, each of which harl their engines and boilers protected by chain-cables hung in bites on the outside and triced to eyc-bolts and rods running fore and aft. The chains were propped from the hight of the gundeck to below the water line, and connected together by strong cordage. 'Thís was equivalent to four inch plates, provided it withstood the effects of glancing or oblique shots. The only danger apprehended from the chains on the steamers was from raking shot tearing them off, in which case it was feared they would become entangled with the propellers. To guard against this, some of the ships unshackled the chain in short lengths, so that it might reach astern. The machinery of the Iroquois was protected in the same way, the credit of originating which plan is due to Assistant Engineer Hoyt of the Richmond, upon which ship it was first adopted, the other vessels following her example.
Among the most efficient of the internal arrangements for the protection of the boilers, the destruction of which by a shot or shell was the most to be dreaded, althongh this was not the only dangerous part of the ships, was that adopted on board the sloop-of-war Mississippi, the machinery of which, being more above the water line, was consequently more exposed to the fire of the enemy. The preparation of this ship for the action involved an immense amount of labor, which engaged her officers and crew for weeks before the attack. Under the direction of Chicf-Engineer Lawton, Mr. Bartleman, the First-Assistant, worked night and day with a strong force, and constructed a temporary roof in the coal bunkers just below the water line, about which the heavy chain cables of the ship were packed in layers, running fore and aft. The ends of the shaft of the Mississippi were protected by four bales of baggage on the outside of each wheel. The bows of several of the ships, including the Richmond and Hartford, were protected by sandbags piled up beneath the forecastle, and intended to be removed aft to break the force of raking shot after the ships should have passed the forts. The bulkheads of other gunboats were strengthencd in like manner, and also by sand bags, and the coal bunkers of all being kept full, supplied the wants of extra barriers to shot and shell. From the moment the sloop-of-war Portsmouth arrived in the river, her officers and crew were engaged in putting the ship in fighting trim. She wore a mail, constructed of her sheet chains, for the protection of her bow against a raking fire, and spread a complete
spar netting of strong ropes to prevent her lofty spars-cut away by cannon balls--from falling on deck.
skidlful preparations.
The sloop-of-war Richmond, taken altogether, was by far the best fitted ship in the squadron. Her hull, standing rigging, and in fact every part of the vessel which could afford the least mark for the rebel artillerists, received a coating of mud paint; she wore splinter nettings, inside of her bulwarks, and spar nettings running fore and aft over her decks. In addition to the iron mail, which she wore externally, her machinery was protected by sand bags, packed gainst her bulk-heads.
The gunboats Katahdin, and the Ifarriet Lane wore their boarding nettings, and other gunboats and ships were provided with the same barriers against the enemy. Many of the ships carried kedge anchors on their yard arms, and grappling hooks on their jib booms, with which to fasten to the gunboats and fire afts of the enemy.
All of the sloops-of-war carried howitzers in their tops, those on the IIartford and Mississippi being inclosed with plates of boiler iron for the protection of the men, while the IIartforl, Pensacola and Brooklyn wore a sorven of cordage around their fore and main tops.
Over nine thousand shells were thrown by the fleet in the bombardment of the forts below New Orleans. Most of them were 13 -inch shells which cost with their filling nearly $\$ 20$ each.
re-opfning of soutilern ports
The President of the United States, by proclamation, announces that on the 1st of June the ports of Beaufort, N. C., Port Royal, S, C., and New Orleans will be re-opened to commercial intercourse, except as to persons and things and information contraband of war.
launcif of tite new tron-clad shits.
The new iron-clad ship-of-war, built by Messrs. Cramp \& Son, of Philadelphia, was successfully aunched at Kensington, Philadelphia, in the presence of an immense crowd. The christening was performed by the veteran Commodore Stewart, of the old Ironsides, at whose suggestion the name of Ironides was given her. She will be a very formidable vessel, and is expected to go into service about the 1st of July.

Cause of the Motion of Camphor on Water.
Mr. Charles Tomlinson recently made a communication to the Royal Society detailing his investigations into the cause of the singular movements of small pieces of camphor when floated upon water Ihis phenomenon has long been known, but has never before received a satisfactory explanation. Mr. Tom linson finds that the movements only occur when the camphor is placed upon perfectly clean water, con tained in a clean vessel, and that they may be imitated by smearing any small floating objects with a volatile liquid, such as ether, chloroform, \&c., and the floating it upon water ; when the camphor or other volatile substance, being slightly soluble, spreads in a film over the surface of the water. These films are, however, not given off uniformly, but separate more quickly from the sharp angles and broken surfaces than from the smoother parts of the camphor, \&c. and passing off in straight lines re-act upon the frag ments of camphor, causing them to rotate in the opposite direction to that in which the film is passing off. Mr. Tomlinson has devised an ingenious method of rendering these films visible, by fixing the pieces of camphor and then dusting the surface of the water with lycopodium powder, when the currents produced by the passing off of the films are rendered distinctly visible. The irregularity of the movements depends greatly on the influence exerted by the different pieces of camphor on each other, and also on the attraction of the sides of the vessel. It may be noticed that a pece of camphor, when placed in water, wastes much more quickly at the surface of the fluid than above where it is exposed to the air, or below, where it is acted upon solely by the water ; this is owing to the film which is constantly being formed, and which evaporates into the air as rapidly as it is spread out on the surface of the water. Whatever interferes with rapid evaporation tends to arrest the singular phenomenon ; therefore the movements are not nearly so lively on a dull, foggy day as on a bright, shining
one, when cvaporation goes on with great rapidity. Any fixed oil, or the slightest greasiness of the water, or of the containing vessel, will, by producing a fixed film on the surface, prevent the formation of the camphor film, and so interfere with the occurrence of the interesting movements.

## UNITED STATES CIRCUIT COURT--.-0HIO.

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Tilghman vs. Werl.-A very important chemical case was recently decided at Cincinnati. It was heard before Judge McLean and Judge Leavitt, shortly before the death of Judge McLean. It involves a saving, it is said, of hearly one cent a pound in the manufacture of candles. The outline of the case is as follows. Richard A. Tilgh ing nentral fats into fat acid and olycerine by the siuple use of highly heated water under pressure. Prior to his invention the neutral fats were decomposed into fat acid and glycerine by the use of lime and suiphuric acid, or the glycerine was destroyed and the fat acid set free by nother process. A patent was granted to Tilghman on of Cincinnati. The defond brough against M. Werk, was not the original and first inventor of the process patented, but that substantially the same process was described in Payen's Chemistry in the year 1851; in Reg. nault's Chemistry in 1853, and in Roret's Encyclopedia. The defendant also denied that the process or plan em boyed by him was infringement of the complainant's patmong others, Professor seientific testimony was taken Professor Wayne and Grasseli were examined. The case vas argued by (ieorge Harding and Henry Stanberry for complainant, and by Charles fox and Nathaniel mean r., for defendants. Judge Leavitt delivered the opinion at the last term of the court. A motion was afterward made for a renearing before sulge swayne and Judge eavitt, and refing ing: Pla
acturine firs invention consists in a process for manuwater in a liquid state above the ordinary bofing point of vater, and consequently under meserre on fatty bodies or substances.
2. The invention is based on a discovery made hy plaintiff that water highly heated and under pressure, of itself into their elements, fat acid and glycerine. ito their elements, fat acid and glycerine.
he books relied on by the defendant. Reonault's in bayen's process acts by destroying the gi ycerine, and doe not mention highly-heated water under pressure as the decomposing agent, and is therefore unlike the plaintiff's 4. Milly \& Motard's process, deseribed in Roret's Ency clopedia, although using a ciose boiler containing fat does not rely on the chemical decomposing power of high-ly-heated water, but requires the presence of lime to combine with all the fat, and thus prevents the formation of any free fat acid, and is therefore unlike the plaintift's. 5. Arthur Dunn's process by use of soda is similar to hat of Milly \& Motard, and unlike the plaintiff's.
6. The plaintill's invention is a useful and practical one 7. The description of the process is sufficient in the
pecification. $A$ fixed rule is there given, which will ce: tainly insure success, and it is also made known that cer tain variations may be made without changing the protain va
cess.
8. A
tion
8. A principle and a process distinguished. The invenion claimed by plaintift is not merely a principle, but also a process by which that principle may be made prac ical and operative
plaintiff's patent:-
I. Defendant uses and requires water in his process.

Ti. That water is lighly heated and under pressure.
Iti. That water decomposes a certain portion of the fatty body into free fat acid and glycerine, and to this xtent intinges.
IV. The defendant also employs six or seven pounds of certain portion of tat into lime soap, and that portion of the operation does not infringe.
10. Where a patent is for a process a defendant cannot avail himself of the process to a partial extent without infringing.
11. The amount which the plaintiff should recover is to from the adoption and use of the plaintiff's invention.

Indurious Action of Iodine on the Teeth.-The Dental Cosmos says :-M. Stanislas Martin has fourd as the result of repeated inhalations of iodine in the treatment of phthisis, that the gums become very sensitive and swollen. The alveolo dental periosteum next suffers, and the teeth soon lose their solidity. The mouths of some persons, however, seem insensible to the iodine. He has formerly shown that sugar and camphor exert a deleterious action on the teeth themselves, decomposing them and leading to their loss; and he believes that the same is true with regard to iodine, which especially attacks the carious teeth, and those the enamel of which has become damaged by the heat communicated to the mouth by moking. He has now under examination some teeth ompletely saturated with iodine.

We are indebted to Hon. Ira Harris, for valuable public documents, also to Hon. Mr. Kellogg and Hon. Mr. Casey, for similar favors.

## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

At the regular meeting of the Polytechnic Association of the American Institute, on Thursday evening, May 8, 1862, the Chairman, Prof. Joy, announced the subject for the evening to be
the manufacture of soap,
and opened the discussion with the following re marks :-
It is not known when the manufacture of soap was first introduced. We find mention of it in our earliest classical writers and in the Old Testament; in Jeremiah, ii. 22, is found the expression, "Though thou wash thee with niter and take thee, much soap ;' and in Malachi, iii. 2, "for he is like a refiner's fire and like fuller's soap :" but it is doubtful whether the soap here alluded to was made of the same materials as are at present employed.

The niter mentioned in Scripture was not our saltpeter, but an impure sesqui-carbonate of soda, procured from certain lakes in Egypt. Solomon was acquainted with the action of an acid upon this salt, as he says in Prov. xxv. 20: "As he that taketh away a garment in cold weather and as vinegar upon niter, so is he that singeth songs to a heavy heart.' Pliny calls it nitrum and relates the circumstances attending the discovery of glass by its accidental fusion with silica on the shore where the sailors were using it to support their kettles while cooking their dinner.

The difference between soda and potassa was not known to the ancients and this was first recognized by Duhamel in 1735 . The alchemists were of the opinion that the alkali of plants was produced by the burning, and it was not until 1764 that it was shown to be present in the living plant.
According to Pliny, the Komans learned the art of soap making from the Gauls.
Pliny says : ". Soap is an invention of, the Gauls and is used for giving a reddish tint to the hair. It is prepared from tallow and ashes, the ashes of beech and elm being preferred ; there are two kinds of it, the hard and the liquid, both of them much used by the people of Germany, the men in particular more than the women.'

The city of Pompeii contained a complete soapboiling establishment. It was near the sea shore, conveniently placed for the importation of the blocks of soda (niter) from Syria and next door to the Custom house. The works were uncovered after having been buried more than 1,700 years and found in a tolerable state of preservation.
The first room contained lime soap. In the second were five oval vessels made of cement and coated with hard stucco, which had been used in the manufacture of soap. It is a curious fact that the pumice stones which were rained down upon Pompeii and drove out the soap boiler of that day, are now ground up and used by our manufacturers in the preparation of sund soaps. Whatever may have been the origin of this manufacture, it is clear that it was carried on in a thoroughly empirical manner for many centuries. We are indebted to a man still living for our knowledge of the scientific principles which lie at the foundation of this important industry. The French chemist Chevreul first announced to the Academy of Sciences in Paris, in a paper dated July 5, 1813, his discovery of the compound nature of the fatty bodies. Previous to that time, fat had been regarded as an unmixed organic substance-Chevreul showed it to be composed of several salts, which he called stearine, margarine and oleine. These bodies will be described by the gentleman who is to follow me.

The influence of Chevreul's discovery upon the manufacture of soap and candles was immense, and so great has the industry become that all parts of the world have been laid under contribution for the supply of the raw material. There is an oft quoted sentence in Liebig's Letters on Chemistry :-"Die Seife ist ein Massstab fuer den Wohlstand und die Cultur der Staaten." (Soap is a measure of the prosperity and civilization of a people.)
Liebig refers to the endless threads of manufacture which are bound up with this industry.
The extensive supply of soda ash, has suggested its use in the manufacture of glass and in the preparation of soap. Sulphuric acid was necessary in its manufacture and the supply of this acid became 80 great
that its application increased in proportion. To make sulphuric we need nitric, and for nitric we send to explore and civilize South America, and obtain nitrate of soda, and thus diminish the demand for salpeter and render that available for gunpowder. Hydrochloric acid is an incidental product in the manufacture of soda ash, and this acid being remarkably cheap is extensively used in the preparation of bleaching powders, and in many manufactories; and thus one discovery ramifies in every direction and tends to the civilization of people in remote countries. In this respect, the manufacture of soap is a measure of the prosperity of a people.
I shall leave the practical operations of soap mak ing to gentlemen who are familiar with the subject.
It is known that when a great number of bodies are buried in trenches under certain conditions, a peculiar change takes place. The oleine and glycerine are often removed, and pure acids (stearic and palmitic with ammonia) remain behind. The body retains its natural shape.
During the removal of the bodies of the victims of the cholera buried in Potters-field on Forty-ninth street, numerous examples of this decomposition were observed, and a body is now preserved in the Museum of the College of Physicians and Surgeons on Twenty-third street. This fat is called adipocere, from adeps, fat and cera, wax. It has been thoroughly investigated by Dr. Wetherill, of Philadelphia. The specimens on the table are from the Potters-field, and the soap and candles were prepared from the adipocere in the course of some scientific experiments.
The Chairman concluded by giving a detailed ac count of soda ash, illustrated by diagrams and by specimens taken from each step in the process.
He then called upon a German chemist, Mir. Engelhard, of St. Xavier College, to take up another branch of the subject.
Mr. Engeliard-Mr. President, The fats and fixed oils, used in the manufacture of soap, of different qualities and properties, are taken both from the animal and vegetable kingdoms. Chemically pure fats have neither taste, smell nor color, and leave a grease spot on paper. They are lighter than water, having generally a specific gravity of .91 to .94 . All of them are soluble in ether ; a few in alcohol, and none in water. Heated by themselves they will resist a temperature of $500^{\circ}$ rah., but above that decompose ; hence their name, fixed oils, in contradistinction to volatile oils, which may be distilled without alteration.
When oils in vats are heated with the hydrated alkalis, such as lime, potash, soda, a process called saponification takes place.

To count up all the different constituents of the known fats and fixed oils would require too much time, and therefore I shall speak of those only which constitute lard, suet, palm oil and olive oil. All fats are mixtures of two, three or four closely-allied substances, namely, stearinc, palmatine, margarinesolid at ordinary temperatures-and one liquid, olein. The more olein a fat contains in proportion to the other constituents, the less solid is it. [The speaker then described in detail the four substances named. They are all composed of carbon, hydrogen and oxigen, in the following proportions :-

| Stearine.... $\mathrm{C}_{114}$ | $\mathrm{H}_{110}$ | $\mathrm{O}_{12}$ |
| :--- | :--- | :--- |
| Palmatine. . $\mathrm{C}_{162}$ | $\mathrm{H}_{98}$ | $\mathrm{O}_{12}$ |
| Margarine. $\mathrm{C}_{108}$ | $\mathrm{H}_{104}$ | $\mathrm{O}_{12}$ |
| Oleine..... $\mathrm{C}_{114}$ | $\mathrm{H}_{104}$ | $\mathrm{O}_{12}$ |

If a fat or fixed oil is heated with a caustic hydrated alkali the following decomposition takes place:Stearine $+6 \mathrm{HO}=$ glycerine +3 stearic acid and 3 water. Stearine $\mathrm{C}_{114} \mathrm{H}_{110} \mathrm{O}_{12=3}$
6 Water
$\mathrm{H}_{6}$ 6 Water

$$
\overline{\mathrm{C}_{11,4} \mathrm{H}_{116} \mathrm{O}_{18}} \quad \begin{aligned}
& \text { 1 Glycerine. } \\
& 3 \text { Water..... }
\end{aligned}
$$

olein consists,
Stearine, palmatine, margarine and olein consists, therefore, of stearic, palmitic, margaric and oleic
acids, with the base glycerine. In soap making the following decomposition takes place :-
$\mathrm{C}^{9}{ }_{11} \mathrm{H}_{110}{ }^{\mathrm{O}}{ }_{2}+6(\mathrm{HO})+3(\mathrm{KO})=3(\mathrm{KO})+3\left(\mathrm{C}_{36} \mathrm{H}_{35} \mathrm{O}_{3}\right)$ $+\mathrm{C}_{6} \mathrm{H}_{8} \mathrm{O}_{6}+3(\mathrm{HO})$
The stearate of glycerine is decomposed and the stearate of potash is formed. We substitute for the base, glycerinc, in the original combination, a new,
stronger base, potash, and form the new salt known as soap.
[The speaker next described the several acids mentioned, and pointed out the proper methods of detecting the various adulterations used in the manufacture of soap.]
The Presidenf-There is a gentleman present who will give us some information in relation to vegetable soaps.
Mr. Austin-In some countries the natives use the seeds of some plants as substitutes for soap, of some plants the bark is used, and of others the root. Such plants are found to abound in an acrid, narcotic prin-ciple-a vegetable alkali, called saponin ; but whether their virtues as purifiers of linen depend upon chemical or mechanical action is a question I believe not yet settled. These plants are confined to a very few widely-diverse natural orders of the vegetable kingdom, and frequently to a very few genera of those orders. However, it is, no doubt, contained in many plants where it is not at present suspected to exist. I will mention briefly a few of the more important plants containing saponaceous secretions. The seeds of many plants of the soap-berry family, as the horse chestnut, contain this matter to a great extent. he fruits of these latter lather frcely in water, and "a few of them will cleanse more linen than sixty times their weight of soap." Pounded and thrown into water they stupefy fish.
There are two or three genera belonging to the natural order-Hosacea and the tribe Guillaie-remarkable for their saponaceous secretions. Guillaia saponaria yields one of the barks called Guillaia, used as a substitute for soap. "T'wo ounces of this bark are sufficient to wash a dress,'" and it is said to give a remarkable luster to wool. It contains a substance which occasions violent sneezing, and which is allied to saponin.
The California soap plant belongs to the natural order-Liliacea, and to the Scille or onion tribe. It is used by the natives as a substitute for soap. This plant produces a thick bulb, which is inclosed in a remarkably large and thick bundle of black, coarse fibers-the remains of the nerves of former leaves.
All plants secreting saponaceous matter (and I have mentioned only some of the more important oncs) contain also an acrid, narcotic, and often highly poisonous principle, and, no doubt, the two principles are identical-saponin or an allied vegetable allsali. These plants also furnish many useful medicines, and not unfrequently highly nutritious food. The poi sonous principle is readily expelled by heat, as in the manihot or jatropha, whence the cassova and tapioca are derived.
Dr. Stevens-This is the bread fruit of Brazil, and I have seen the natives preparing it for use. The plant resembles very closely our sassafras; it has the same rough bark and the same palmate leaf. The food is derived from the root, and it probably produces a larger amount of food from a given area of ground than any other plant. A yield of 3,000 , 4,000 , and 5,000 bushels to the acre is not uncommon, and the cultivation is of the roughest kind. In fact, it has no cultivation except planting. The universal South American knife, the machete is used to cut a hole in the sod, the plant is inserted, and left to take its chance. It is sure to take its chance, however. It will root out all other plants, and it camnot itself be destroyed. The root is grated in mills, the milk flows away, and the pulp is dried for food. The milk is wasted by the hogshead ; I have seen a river white with it for a long distance below the grating mill. This milk is poisonous, and it contains the saponaceous principle. The women use it freely for washing their persons, and I am bound to say, that during the bread fruit harvest is the only time of year that they are clean.
Prof. Seely-I will say a word in regard to soft soap. Genuine soft soap, such as I knew in my boyhood, is not now to be found. This was made by the farmers from the ashes of their wood fires. 'Ihe ashes were placed in a barrel, and leached by pouring water upon them from time to time, and then the lye was boiled with grease to make soft soap. Now farmers come into the city and buy something under the name of soit soap; but it is nothing but a little hard soap with a great deal of water and a little sal-soda. It would be much more economical to buy the hard soap without the water.

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Dr. Yeakel's Mode of Making Cannon.
Messrs. Editors :-The United States was pleased to grant me Letters Patent for a new and improved mode of making cannon and ther ordnance, bearing date February 1, 1862 ; but as the papers therewith were placed in the confidential department of the Patent Office, it was not reported in your published list of patents of that date ; therefore you could not have had information thereof until your agency was sought to patent the mode in England on the 31st day of March. As this mode of constructing ordnance is destined, in my belief, to recommend itself as superior to all other ways of making cannon now in use, I hope you will grant me the use of your valuable paper for the purpose of presenting a few reflections on the subject of ordnance.
cannon not so good now as they were fifty years AGO.
It is generally conceded, I believe, that since the It is generally conceded
coal measures of the earth have been opened and coal so generally used in the smelting of iron ores, the cannon and other ordnance so made are neither so gool or strong as formerly, when wood only was employed ; this is because all coal contains to a greater or less degree, a sulphur pyrite, generally in the form of the bisulphite of iron, which, as an atomic part of the metal is greatly destructive of its tenuity and strength. Besides, all cannon and other ordnance of whatever or by whatever principle they are cast, are only in a crystallized form
a gun siould be homogeneous in materiat.
Thus, by Capt. Dahlgren's principle, the outer shell of the casting from the trunnions to the end of the breech is made very hard, by a cooling process which vitrifies the metal, so called, of the exterior of the gun, for a couple of inches in depth. By this alteration of the crystallizing process it is intended to diminish the expansion of internal metal opposed to the expansive forces of the burning powder. But I am told that the process of cooling defeats its object by vitiatisg and weakening the internal crystallization, causing the metal to slough away rapidly at the vent hole.
what the frencif and englisif governments have DONE.
The French and particularly the English governments have expended a great deal of money in efforts to improve their cannon since the commencement of the Crimean war ; and they have attained a considerable improvement, especially of their heavy ordnance ; nearly all these latter inventions and improvements have had for their object the substitution of wrought iron and steel for cast iron. Thus one inventor uses a central tube wrapped with wire and soldered, then incasing the mass within an outer metallic covering or jacket. Another builds a series of rings around a central caliber core, then another series are shrunk on the top of the first, and all are welded together. Still another, Mr. Greener, carefully forges and planes a sufficient number of parallel bars, and arranges them around a central mandrel hooped together and then welded. The Armstrong gun, as now made, consists of a given number of bars of iron wound spirally on a central core and then welded by means of a chuck ram to each other and to the breech. The reinforce band on the outside of the Parrott gun is so made while the tube is of cast iron. But it will readily be seen that if a single defective welding should exist, by any one of these several modes, and in practice it has been found almost impossible to prevent their occurrence, the whole forging is lost; I have been informed that only one in three are reliable.

Mr. Horsfall, of England, first made what he denominated wrought-iron guns, by welding together successive piles of heavy bar iron, until he had built up and forged the approximate form and size of gun. This iron mass was then bored and turned in the usual manner. It is in this way that the heavy shafting is made in the United States and elsewhere. objections to tile hammered wrought-iron and semi-steel guns.
By Mr. Horsfall's plan two insuperable difficulties are encountered, which have not as yet, nor are they likely to be overcome. First, by imperfect welding of the component fragments of iron used, and, second, defective consolidation and lamination of the whole forging; besides the repeated heats to which the substance of the mass is subjected, renders the interior structure granulous, spongy and unconsolidated. In nearly all of these heavy forgings it is only the outside of the mass which is laminated and consolidated from impact of the hammer, the impress of impact or pressure of roller, diminishing toward the center in a direct ratio with the diameter of the mass. These objections apply equally to the forging of semisteel where the mass made is composed of piles of
to weld the same around a central mandrel, solid or hollow, of a little less diameter than the intended bore of the gun ; then to bore and finish in the usual manner.
The plan is illustrated in the annexed engraving; A $a$ being the mandrel and B B, the sheet wrapped around it. A cylinder thus made it would be impossible to burst, for it is not possible to conceive any other form into which metal could be shaped, which would oppose so great strength and resistance to the expansive forces of gunpowder. At the first glance it would seem to be impossible to construct large cylinders by this mode. But such impression is mainly due to the fact that the eye is not familiar with the kind of machinery required to execute the work. Within the past thirty days I have visited some forty furnaces and forges in Massachusetts, New York and Pennsylvania in the hope of finding a furnace and rolling forge, a triffing or at least not very expensive alteration in which, by the addition of a mandrel, rest and a roller adjusting itself to the ever-increasing mandrel mass, would enable me to construct a mass which would finish up say 500 .tos- weight. But I have not found any, and I must wait until I can command the means to construct the furnace and forging or wrapping mill. One necessary prerequisite is an annealing or heating furnace having great bottom surface to heat the plate, with a wide door, and of width and depth very much greater than generally met with, and so constructed as to heat the plate uniformly; this is required for one of my processes. Next we require a winding or wrapping mill in near relation to the mouth of the furnace, that will wrap up tightly the red-hot plate on its central mandrel. Now a plate of

## YEAKEL'S MODE OF MAKING CANNON.

charcoal iron, called ingots, welded together. Mr. Krupp, of Essen, in Prussia, is the inventor of this mild or semi-steel, and although the explosion of his trial gun, at Woolwich, England, on the sixteenth fire, was not by any means a fair test of his principle, still it may well be doubted whether thick masses of iron or steel can be perfectly consolidated by the impact of hammering or the pressure of rollers. When we were surprised by the present rebellion from the pursuits of a long and prosperous peace, our government had to create field batteries on an immense scale to meet the exigencies of the occasion, and the Secretary of War did certainly the best thing possible in contracting for brass field guns of the old pattern, the Parrott cast-iron gun with wrought-iron reinforce, the Wiard semi-steel, and a wrought-iron gun made by Reeves \& Co., of small caliher, in about equal proportions, that we might have in the shortest possible time an abundance of field artillery. The first named is brass, the second and fourth kinds of gun are not homogeneous, and the third-named gun is consolidated imperfectly; it remains to be seen whether the United States, in its ordnance and field artillery, is any better off than England was at the close of the Crimean war.
new mode of constructing cannon and other ordnance.
We come now to consider as briefly as possible the mode by which I propose to construct wrought-iron and steel ordnance of any size, from the $6-\mathrm{fb}$. field piece to that of 150 Hh . caliber. I would first premise, by suggesting the belief that the strongest form which metals can be made to assume, reference being had to great size and surface, is the plate or sheet form, for the obvious reason that to give them this form the metal must be attenuated, and to attenuate is to consolidate, to laminate and to render the plate. fibrous. By my mode it is proposed to take, inspect. ed carefully, rolled plates of charcoal iron, of a determinate thickness and of a length, if in one plate, or in one, two or more plates of an aggregate length, equal, when wrapped to produce the intended diameter of the cylinder, and of a width somewhat exceeding the desired length of gun, and to wrap and
iron thus heated hot and wound up on its mandrel under tension, which tension may best be made by a roller adjusting itself in pressure to the increasing mandrel mass, is ready to go back into the furnace for its welding heat, and the welding and consolidation may be made by impact of hammer or the pressure of rollers. This is one mode of constructing the mass which you see is not impracticable, and a gun constructed in this manner would be the best ever yet made. But there are one or two metallurgical conditions connected with the above process from which it would be well to relieve the forging. Another way of producing the mass is to bend around a central mandrel, a first layer of plate metal, and to weld this first mandrel fold to itself, or itself and mandrel, then continue by means of a wrapping mill to bend several inches of plate at a time, and then to weld it, and so on until the entire mass is wrapped up and welded.

It will be perceived that by this second mode the laminated and fibrous character of the plate is mainly retained, while a doubt may be permitted whether by the first process the mass retains its plate consolidation as perfectly as by the last-described mode. This second mode will require the mandrel to have a rest in the furnace as well as the mill, as the mass requires to be changed frequently by means of a crane or rail slide-way from the furnace to the winding mill and back again. This last mode, it will be seen, unites a number of advantages over the first-described method -first, the forging obtained will certainly preserve to a greater degree its laminated and fibrous character, for only so much of the mass is exposed to the intense heat as is about to be welded. Second, all impurities of the metal, called slag, will constantly be furced out before the welding pressure of the roller or hammer. Third, the mass will not be exposed to the danger inherent to very large forgings, exposed to intense heat in mass to take on a new form of crystallization ; and, lastly, a forging of almost any required diameter can be made by this mode by the use of several plates of one thickness or of different thicknesses.

A third way in which this form of wrought cylin der may be made, is to wrap and weld a plate of iron simultancously around a central hot mandrel in an almost inappreciable space of time ; if, as the most experienced forgers in the country assure me, and my own experience approves it, the welding flux lasts three seconds on a quarter-inch plate of iron, five seconds on a half-inch plate, and from eight to ten seconds on a seven-eighth-inch plate. Why not? provided the welding cylinders are heated to a maximum consistent with their retention of strength equal to the welding, and the wrapping and welding machinery is in such close relation to the furnace fires as to insure the welding heat to be as perfect on the last inch of plate as on the first.
By this mode it will be seen that the most carefully consolidated plates of iron or steel are rolled or wound and welded together in one continuous length or lengths, thereby producing a quality of uniform welding and consolidation of metal, and a form of barrel composed of concentric welded folds capable of opposing a resistance to the explosive force of powder, which cannot be obtained in any other way.
Lafayette, Ind. D. T. Yeakel, M. D.
[In accordance with Dr. Ycakel's special request we permit him to state his case in his own way. Our readers will understand that we are not responsible for the opinions of our correspondenis.-Eds.]

## "Philosophy of Projectiles."

Messhs. Eiritoles:--Mrom your remarks in the Scl * entific American of May 3d, under the above caption, I infer that my communication to which you there allude is not sufficiently explicit. You appear to have understood me to argue that shells, from their shape, are the most efficient projectiles against iron-plated vessels. And as bearing against this opinion, you state the fact that cast-iron shells will crush against iron plates. As an instance, you say, "The large shells fired by the Merrimac against the Monitor, we understand, were all broken in pieces." You also refer to experiments related by Sir Howard Douglas, where solid cast-iron shot were broken to fragments against plates only five-eighths of an inch in thickness.
I was urfortunate in not making myself well understood. Id.o not hold that a hollow shot is the most cffective projectile when guns of small caliber are used, and where a solid shot can be thrown with equal velocity ; nor do I claim that cast iron is sufficiently tenacious to give the best results; but I do hold that when it becomes necessary to use guns of 20 -inch caliber the shot must be made bollow, or of a material lighter than iron, because of the impossibility of imparting great velocity to such a mass of metal in the shape of a solid shot, and of the almost certain disaster that will follow the attempt. If cast iron is not strong enough for such shot something stronger must be used. I do not, however, think there is any present necessity for the use of such large guns, but fully believe a well-constructed hollow shot, of 250 Bbs . weight, may be fired from a 15 -inch gum so as to penetrate through the side of any vessel now afloat.
Now a word in relation to the cases you have cited. The shells thrown by the Merrimac could not have been over $7_{2}^{1}$ inches in diameter, as she ap. appears to have had no guns of larger caliber. For that size there appears to be no necessity for using hollow shot; but had they been solid the result must have been the same, as is clearly proved by your ex. ample of experiments, as given by Sir Howard Douglas.
In this last example there is one important fact which is not clearly shown in the brief manner in which you relate it. The shot, though " converted into a cloud of langrage too numeous to be counted,'" in every instance, went through the target, which was a section of the Simoom, the plates being supported by strung iron ribs, which, whenever they were struck, were broken in pieces and carried away. And when the experiment was repeated, after filling all solid between the iron ribs with $5 \frac{1}{2}$-inch oak timver, and ahling $4 \frac{3}{2}$-inch oak planking, Sir Howard says: "All parts of the shot passed right through the iron and timbers, and then split and sped abroad with considerable veiocity." In fact Douglas condemns irou ships of war for this very reason, and questions their use as transports in case of war, be-
cause of the terrible effect of the broken shot after they pass into the vessel. I might follow his statements further, and show, from him, that hollow balls proved as destructive as solid shot, but I will not occupy your space with statements that have been already made public.
And now allow me to correct an error that appears in my communication as published. I am made to say, "It is claimed that a much longer range may be attained with the large shot." It should read, " with the long shot." I readily admit the claim of long range for large shot.
L. S. Wicklin.

Washington, D. C., May 3, 1862.
[Capt. Benton, of the Ordnance Department, U. S. A., in his work on "Ordnance and Gunnery," agrees with our correspondent in his opinions respecting the effects of large projectiles. He says, "It remains to be determined whether vessels can be conveniently covered with sufficient thickness of iron to resist the crushing effect of enormous projectiles of the 15 -inch columbiad ; or, in other words, is it practicable to increase the resistance of such iron coverings as to keep pace with the increase in the destructive power of projectiles?"' Capt. Rodman claims, with a show of reason, that if the 15 -inch gun is not sufficient for this purpose much larger ones can be made that will suffice.

Respecting the resistance of wrought plates to shclis, Capt. Benton says, "Thin plates of wrought iron may serve as a protection against shells of any size. The plates may be penetrated, but the shells are broken by the impact, and, therefore, rendered harmless, if the woodwork behind the plates is sufticient to arrest the fragments." He also says, "Cast and wrought-iron projectiles, fired with high velocities against thick wrought-iron plates, are generally broken by impact, while those of puddled steel and homogeneous iron are not much affected by it."
Capt. Benton states that iron-clad ships could be serionsly damaged by land batteries. He says, Though iron-plated vessels have been made which are capable of resisting isolated shots from heavy cannon, none have yet been made fultilling all the conditions of flotation, stability and manageability. which are capable of resisting a simultaneous and concentrated cannonade of 68 -pounder shot, or of rifle projectiles. Such vessels may afford shelter for heir crews, for a time, and may pass sea-coast bat teries with comparative impunity, but it would not be prudent for them to take up a position near a place guarded by powerful cannon, for the purpose of cannonading it, more especially if the command of the land batteries gives a plunging fire on the vessels.'
Capt. Benton's conclusions, he states, were chiefly drawn from experiments made in England, as related in Sir Howard Douglas's "Naval Gumnery.
Naval gunnery, naval architecture and fortification are in a transition state at present. Monitors and Merrimacs ; Dahlgren, Rodman, Parrott and Armstrong guns make men stand wondering respecting what new and more destructive agents may turn up next. -Eds.

## Setting Sweet Potato Plants.

Messhs. Editors :--On page 260, present volume, Scientific American, is an extract from the Ohio Val ley Farmer, by M. M. Murray, in which he gives very good directions for the selection of grounds, \&c., for the cultivation of sweet potatoes. As I am from a potato region, and have had much experience in planting and raising them, I will add another simple plan for setting out the plants, which may be done at any time your plants-called "slips" down in Dixie -are ready. It is better to prepare your ground immediately before the planting, as the freshly-prepared ground is much looser, and is, therefore, more suitable to receive the plants. Having got the ground together with your plants all ready, no matter how dry the weather, commence about the middle of the afternoon, having tubs or barrels of water conveniently situated, and use about a teacup full of water to each plant. The ground being loose, the four fingers of the right hand are passed down about their length into the earth and the dirt pulled up so as to make a hole large enough for a cup of water. With your left hand carefully set your plant down as it should stand. Now let some person pour on the cup of water, which will cause the fibrous roots to swim and
straighten out and stand in their natural position. Now quickly let the dirt in your right hand be conducted around your plant in as loose a manner as possible, leaving the top of the plant properly out of the ground. No packing is desirable in this case. By using this method we never have to wait for a suitable season, but get the plants ready as soon as possible. Thus set they commence growing right along, and live and do better than if planted in any other way, unless it is a very favorable season. Much time is saved, and we have a much larger and more abundant crop. If the water is slightly manured it will still be better. A. W. Todd.
Louisville, Ky., April 24, 186ニ.

## Concave Bolt or Projectile.

Messrs. Edurors :--Having noticed in your valuable paper a great variety of newly-invented projectiles, I would ask your opinion of one I have experimented with. I use a rifle of medium size. I have cut a clean hole through $\frac{1}{2}$-inch iron plate at 25 yards distance. The shot is made of stecl, concave at both ends, being turned from the inner end to within $\frac{3}{16}$ ths inch of outer, leaving a shoulder $\frac{1}{16}$ th inch ; from the shoulder to the inner end is ag'in made to the former size with lead. Could the same be used with effect in larger guns? What is your opinion as to it being a patentable article? May I find an answer to the above in your paper.
J. B. W.

Maine, May, 1862.
[The projectile you describe is not new. A gentleman exhibited a similar one in this office sometime ago, and the iron target which was shown with it, indicated about the same result you have obtained. It was well riddled. 'The shot were fired from a Springfield army rifle. We see no reason why a large projectile might not be used equally as well, and the result be correspondingly great. We do not think you can obtain a patent unlesss you have your case put into interference with another pending application, and can prove priority of invention.-EDs.

## An Improvement in Shell Fuses-mpening for a New

 Invention.Messrs. Editors :-Being a regular reader of your valuable paper, I have seen calls for new inventions promptly responded to by improvements in the cases suggested.
As an officer in charge of a division of the mortar service, I have found by experience that an improvement in making fuses would greatly improve our practice. As it is, our fuses seem to be filled by hand, and somebeing very soft, they do not burn the length of time they are expected to before the explosion of the shell. Some again are very hard, and they burn too long before the explosion takes place. The consequence of this irregularity in filling fuses is that we cannot depend upon our practice.
Now, if some of your readers would make a piece of mechanism by which fuses could be filled under a uniform pressure, they could be tested and marked properly, and then we could burst a shell with that precision necessary to secure perfect success.
By permission of Capt. H. E. Miaynadier, commander of the mortar service, I have the privilege of making this suggestion. Thomas. B. Gregory. On board U. S. steamer Judge Torrence, near Fort lillow, May 3, 1862.

## New Churning Power Wanted.

Messis. Editors :-To your list of "inventions wanted," I would suggest the addition of another, namely, some simple power for churning milk, to take the place of dog, sheep and horse powers. 'The want of such a power has long been felt by butter makers, as little reliance can be placed upon a dog, a goat, or a sheep for churning in a dairy. Such a machine should be cheap, simple in its construction, easily taken care of and economical to use. C. S. Wallkill, Orange Co., N. Y., May 1, 1862.

An Alabama paper reports that four caves are now worked for niter in that State. In one place fourteen hands in four months and a half produced $2,755 \mathrm{lbs}$. In another place $9,000 \mathrm{fts}$. were insde at a cost of 75 cents per It ., and another $4,350 \mathrm{ibs}$. at 73 cents.

Miss Harrief Hosmar's celebrated statue, Zenobia, has been sent to the Great Exhibition in London.

## The Ventilaton of Prines.

The following are extracts from a paper on the important subject of ventilating mines, by Mark Fryar, of Glasgon, lately read before tiee South Wales Instithte of Engineers :-
The greatest of all blessings that man can enjoy in this world is that of perfect health; and whoever may devise means by which the health of a community shail be in any way improved must be looked upon as a benefactor of his race, and an instrument in the hands of the Almighty for the benefit and comfort of his creatures. The animal system of man is a most wonderful and strangely complex piece of mechanism, the order and healthy action of which depend upon the observance of certain laws, whish laws are exceedingly simple, and suggested, in most cases, by instinct, the operation of natural desire, or absolute requirement. The violation of any one of these natural laws is sure to be productive of evil. No man has an absolute right to deal with his health according to his own will and pleasure. Our social bonds unite us so closely together that we cannot injure ourselves without injuring others; and the civil law of the kingdom very justly interferes with all projects and processes in the arts and industrial pursuit; which necessarily endanger life, or are productive of ill health and premature death. - The extent, however, to which such interference should be carried is a very grave question, affecting, as it does, not only political freedom and the just liberty of individuals, but also the full scope of productive and munufactuing skill and enterprise. Not only is it the duty of every man to be careful of his own health and life, but he must be equally solicitous respecting the health and whety of his fellow man. There are some thousands of workmen employed in mining and other occupations in the world who are daily expesai to dugers--to unhealthy fumes and vapors, deleterious gases, and atmospheres which, from various canses, are charged with insidious discases, making life but a lingering death, and yet the workmen thenselves are comparatively unaware of their own condition in this respect. There are special branches of industry and art in the pursuit of which the individuals occupied therein are exposed to what promotes disease and very materially shortens life, and from which the rest of mankind are exempt; but many of the evils are irremediable, and there must alwilys be a class of men who are willing to sacrifice part of the ycars alloted to man that they may pursue a trade or calling of their liking, or society must dispense with some of its present conveniences and luxuries. It is, nevertheless, true that by care and skill the sanitary arrangements, even in plases where deleterious operations cannot be avoided, may be considerably improved: and everything that can be done, by way of mitigating such an evil, surely ought to be done. . . . . The composition of the atmosphere, when in its normal condition of purity, and therofore best adapted for the requirements of life, has been ascertained to be, per 1,000 parts, 788 nitrogen, 197 oxygen, 16 moisture, and 1 carbonic acid gas. A consideration of the process of respiration will enable us more clearly to understand the ill effects of breathing in a vitiated atmosphere. The number of respirations, or alternate breathings, is about twenty per minute under ordinary muscular activity, and the avorage quantity of air inhaled about sou cubic inches per minute. It has been discovered that the taller a man is the greater is the vital eapacity of his lungs for air. . . . In com-minus there is, generally speaking, a much larger amount of deleterious gas produce than in metalliferous mines. Fwery crevice, opening, or pore met with in rocks during the process of mining is likely to be full of gases of some kind. In coal-mines these gases are chiefly caibonic acid, canbueted hydrogen, and nitrogen, the presence If the later proving that the coal, while in its natural position of a bed or soam, is undergoing decomposition. Carbonic acid gas is also produced by the brathing of aimals, the burning of lamps, and the decaying of timber; and Dr. Snow has shown that carbonic acid "acts more delcteriously upon the system in proportion as the normal quantity of oxigen has been reduced." The writer then traces the effects of breathing the impure atmosphere of mines, and concludes this part of his subject by saying, "A precty extensive acquaintance with the most pre-
vailing diseases among miners convinces me of the truth of the following, viz., that there are very few young men above the age of 25 who are quite free from pectoral disease in some shape or other, and above the age of 35 there are not 10 per cent who do not suffer more or less from astimatic disease. Above the age of 40 almost all miners are the subjects of chronic bronchitis and asthma; and at this age they generally bear the unmistakable marks of premature old age, and for the most part are unfit for engaging in any severe manual occupation." As a remedy in connection with good ventilation, restriction should be placed upon the hours of labor in the pit, and the adoption of more stringent measures as to the age at which boys are allowed to work underground. The laws of ventilation are very simple, and of easy application. We have seen that a man actually requires about 300 cubic inches of air per minute to maintain vital energy ; but seeing that the due supply of air to the working places in mines depends upon so many contingencies, and that so many causes are in operation by which the air is made impure, it is considered that from 50 to 100 cubic feet of air per minute is the least amount that should be supplied to each man in the underground places of a mine. hadly ventilated mines are most intolerably stupid metan of making interest out of invested capital. Mr. Waodhouse, the eminent mining engineer of Overscal, Leicestershire, who has had large experience in the ventilation of coal mines, says "A large saving is invariably realized in practice from the adoption of improved modes of ventilation, because the constant introduction of fresh currents of atmospheric air into the pits tends in a remarkable degree to protect the woodwork of the mine, and to keep the roadways dry and in good order. In pits with a rapid circulation the men respire more freely, the roadways are kept dry and repaired at less expense, and the timber lasts longer by years ; and, therefore, it is a matter of strict economy to ensure a good ventilation." The best ventilated mine is the best paying mine, or, at any rate, its profits are much greater by a good ventilation than it would be by a bad one. It saves the timber and the cost of maintaining the ways; it enables the men to perform a much greater amount of work in a given time; preserves the health of the miner, and thereby adds to his com fort and to the number of his days in the world.

## Signs of Health.

Perhaps there is no living writer on medical subjects who enjoys a higher reputation for keen observation than Professor T. Laycock, of Edinburgh. The following are some of his opinions delivered in a recent lecture respecting the outward signs of sound health, and indications of long life :-

1. The skin should be healthy ; this is indicated by a freedom from dry scurfiness, both of the skin and scalp ; a certain suppleness, the result of due secretion of sebaceous fluid ; a firmness of texture equally removed from transparent thinness and coarse thickness ; a freedom from chronic congestions, patches of varicose vessels, or any skin discastes, whether parasitic or diathetic. 2. The skin products, whether appendages-as hair, nails and teeth-or secretions, as the pigmentary, sebaceous or perspiratory, should be normal and healthy. The expressions of the eye should be free from peevishness or irritability, for these often mark a tendency to shortness of life; there should be no arcus senilis, or infiltration of the lower cyelid, or marked vascularity of the upper lid. The complexion may be of any temperament, but should be good of the kind; there should be no signs of unhealthy blood, as a peculiar pallor, or icteric tint, or duskiness of hue. Perhaps the best single criterion of a sound, enduring constitation is to be found in the character of the hair and teeth. I'crsons tending to longevity have usually sound, well enameled, well set teeth, continuing free from decay until old age, and their hair is thick, not soon gray, nor falling early. In such persons the general powers are vigorous, and it is only some visceral disease or acute fever which shortens life. If to the signs of good health you can add good conduct, and the fact of longevity being hereditary in the family, the individual has a good chance of long life.
The appearance of the patient may be fallacious as to the formation and deposit of fat, whether in the cavities or the adipose tissue. This occurring beyond
the healthy mean is not a mark of strength, but of degeneracy. It constitutes the popular sign of advancing age in the "decreasing leg and increasing belly " of Shakspeare ; and an early or excessive fat deposit is not unfrequently indicative of premature old age. Scrofulous children and youth are apt to be very fat before tuberculosis comes on ; very fat men or women rarely reach sixty, and all the fat infantile monsters die early. Polysarcia, as this fatty condition is termed, is to be distinguished from atheroma, which is fatty degeneration, limited to the arterial tissues, and also from fatty deposit in the muscles. It is a general mode of degencration of nutrition arising from constitutional tendencies, often hereditary, and apt to show itself at epochs of evolution or decline, especially of the sexual glands. Another commonly-received sign of a good constitution is a clear, florid complexion, and it may be rectived as such, with reservations. But it not unfrequently is the sign of a dangerous tendency to serious discases of the heart and blood vessels, and to rheumatic affections in persons otherwise of a vigorous habit, and should never be accepted as a good sign without cautious inquiry, more especially into the morbid tendencies as to the nervous system.

## Pastils for the Breath and Ulcered Gums.

The following are given by the American Druggist's Circular as being more convenient to use for the teeth and gums than liquids:-
First, Take of hypochlorite of lime 7 drachms ; sugar flavored with vanilla, 3 drachms; gum arabic, 5 drachms. The pastils are made so as to weigh from 10 to 11 grains. Two or three of these pastils are sufficient to remove from the breath the disagrecable odor produced by tobacco smoke. The pastils thus prepared have a gray color and become quite hard; if pastils of whiter color are required the following substances are employed :-
Second, Take of dry hypochlorite of lime 20 grains; pulverized sugar, 1 ounce ; gum tragacanth, 16 grains. The hypochlorite of lime is triturated in a glass mortar, and a small quantity of water is poured upon it ; it is then left to repose, dccanted and a second quantity of water added ; the two liquids are filtered and the gum and sugar added so as to form a paste. This is divided into pastils weighing from 12 to 16 grains. If it is desired to aromatize the paste, one or two drops of an essential oil may be added ; the oil should be added to the sugar and gum before the paste is formed.
To remove the yellow color from tceth take of dry hypochlorite of lime $\frac{1}{2}$ drachm ; red coral, 2 drachms. Triturate well and mix thoroughly. This powder is employed in the following manner : A new brush is slightly moistened, then dipped in the powder and applied to the teeth.
The following preparation has been employed by Dr. Angelot, of Briançon, in the treatment of ulceration of the gums, a very frequent complaint with soldiers :-Take of hypochlorite of lime from 10 to 25 grains : mucilage of gum arabic, $1 \frac{1}{2}$ to 4 drachms ; sirup of orange peel, $1 \frac{1}{2}$ to 2 drachms. Mix thor oughly. This mixture is employed as a lotion to the ulcerated gums.

The Ohio Valley Farmer states that a bill is now before the Ohio Senate for making an appropriation of $\$ 1,000$ to employ a competent person for giving instruction to persons in the manufacture of beet sugar. The Former suggests that the bill be amended so that the premium of $\$ 1,000$ be awarded for the best specimen of $5,000 \mathrm{lbs}$. of merchantable sugar, and 25 ths . of white sugar, made either from the sorghum or the beet root.

Agiassiz says:-Of all air-breathiug animals, none exhibits a more surprising power of adapting itselt to great and rapid changes of external influences thon the Condor. It may be seen feeding on the sea shore under a burning tropical sun, and then, rising from its repast, it floats up among the highest summits of the Andes and is lost to sight beyond them, miles above the line of perpetual snow, where the temperat ure must be lower than that of the arctics.
The Atlantic Monthly for May is received. It sus tains its character as the leading literary magazine of the country. It is published by Ticknor \& Fields, Boston, at $\$ 3$ per annum.

## Improved Light Telegraph

The Morse alphabet, in which the several letter are formed by dots and marks of various lengths, may be used in many other ways than that for which it was originally designed-telegraphing by electro magnetism. For instance, two operators, sitting together in church, are able to carry on a silent conversation by pressing their fingers on each other's hands-forming the letters by continuing the pressures the proper lengths of time.
An apparatus has been invented by L. O. Colvin and G. H. Gardner, of Philadelphia, for telegraphing at night by means of a lantern and screen so arranged that the light may be readily displayed and obscured, and thus the letters of the Morse alphabet may be formed by successive flashes of light of the proper lengths. This apparatus is illustrated by the accompanying engravings, of which Figs. 1 and 2 are ver-
lamp. From this cone it is supplied to the lamp through perforated screens, $o$ and $q$.

Fig. 3 represents the manner of mounting the apparatus upon the top of a mast either on sea or land, so as to be operated by a person at the foot. A telescope, $i$, at convenient distance above the ground or deck, is connected with the lantern, A, by means of cords, $f f$, and pulleys, $g g$, in such manner that when the telescope is turned the lantern will be turned also, and thus the beam of light may always be kept paralle with the axis of the telescope. Hence the operator has merely to point his telescope to the station to which he wishes to transmit a message, when the light will be visible from the same station.
For secret dispatches the alphabet may of course be altered so as to be intelligible to those only who have the key.
the specification of this invention, with engraving in the next number of the Scientific American.

## The Sole-Cutting Business.

The Bay State, Lynn, Mass., says:-Within the past ten or fifteen years there have been great changes in the shoe manufacturing business in this city, and we presume that changes of a similar character have taken place in other towns where the manufacture of ladies' and misses' boots and shoes has been carried on. Within that period the sewing machine and the sole-cutting machine, and different kinds of machinery for heeling have been introduced. And the introduction of machinery has led to the systemizing of the business in such a way as greatly to facilitate production.
The commencement of the sole-cutting business may properly be dated to the time, or about the


COLVIN AND GARDNER'S LIGHT TELEGRAPH.
tical sections, while Fig. 3 represents the mode of operating a lantern from the masthead of a vessel.
A is a close lantern provided with a lamp, B, and having a glass, $a$, in one side opposite the flame. A conical reflector, C , is placed outside of the glass plate to bend all the rays that issue into parallel lines so as to form a cylindrical beam of light. Inside of the glass plate, $a$, is arranged a shutter, D , in such manner that when this shutter is down no light can issue through the glass, but by raising the shutter the light is exposed.
To enable the shutter to be raised and lowered with great ease and rapidity it is operated by electro magnetism. A lever, E , is connected with the shutter, and passing through a slot in the side of the lantern, has its fulcrum at $b$, and carries upon its shorter arm the armature, $H$, of the electro magnet, G. When the circuit of this magnet is closed, the armature is drawn down and the shutter is raised, exposing the light. In order that the shutter may drop very quickly when the circuit is opened, a spring, $e$, is inserted into the core of the magnet, and a pin, $p$, attached to the armature, compresses this spring when the circuit is closed, but on opening the circuit the reäction of the spring throws up the pin and armature, starting the shutter down, when its descent is completed by its own gravity; the weight of the shutter slightly overbalancing the armature. Thus the successive flashes for transmitting signals are made by opening and closing a magnetic circuit as in the electric telegraph.

Either the calcium or electric light may be employed or the flame of a lamp. The lamp represented in the engravings is recommended by the inventors. The air is admitted through a perforated screen, $l$, under the bottom, and passes through tubes, $m m$, anto a cone, $n$, surrounding the upper portion of the
the Scientific American Patent Agency, March 11,
1862, and further information in relation to it may be obtained by addressing Colvin \& Gardner, 118 N. Broad street, Philadelphia, Pa.
Important to those who use Steam Boilers in New York.
An act conferring additional powers on the Metropolitan Police, relating to the inspection of steam boilers, was passed last month, and by its provisions all persons owning or using any stationary steam boiler in the Metropolitan Police District, except those connected with ranges in private dwellings, are required to report to the Board of Police, in writing, before the 30 th inst., the location of such boiler or boilers so used by them, and the business or purpose for which such boilers are used, and thereafter, in case of any removal of a steam boiler, or the erection of a new one, a like report shall be made forthwith; and all persons are requested to have a nipple and cock, $1_{4}^{1}$ inches in diameter, put in some convenient part of their steam boiler, so that the Inspector will have no delay in making inspection for testing.

The "Merrimac" Patented Forty-Eight Years Ago. In the course of our investigations at the Patent Office we have come across a patent granted to Thomas Gregg, on the 19th of March, 1814—forty-eight years ago-for an invention of a " Ball-proof vessel, to be propelled by steam," which, on examination, proves to be an almost exact model of the Merrimac. The sides were to be plated with iron, inclined at an angle of $18^{\circ}$ and the drawings show a sharp, iron prow, evidently to be used as a ram. This prototype of the latest triumph in naval architecture, it will be observed, was patented only seven years after the introduction of steam navigation. We shall publish
time, when the sole-cuttirg machine began to come into use-say about twelve years ago. Manufacturers had found in the course of their business, that to get the sole leather which they wanted, they had to purchase, in buying whole hides, much that they could not use to advantage, and in this way were obliged to charge a higher rate for shoes or suffer loss. And in particular was this the case with small manufacturers. Hence, the idea of a separate branch of business, for purchasing and cutting up the leather into soles, assorting it into different qualities, and quantities as they might want.

We believe Mr. Perry Newhall, who is now in the business, was the first one to carry, to any extent, this idea into effect. He has now been engaged in the business some ten or twelve years, and the amount of his sales has reached, we believe, some years to about $\$ 100,000$.
The advantages of such an establishment are so apparent that they need not be particularly pointed out. One, however, to manufacturers of small capital, is worthy of special notice. It is this, that it requires less capital to do business by purchasing just what you want and no more than on the old plan, when manufacturers were obliged to buy what they did not want to secure what they did.
L. Perkins, of London, has an engine of 60 -horse power, working with a pressure of 500 Abs . on the square inch of piston. The consumption of fuel is only from 1 to $1 \frac{1}{4} \mathrm{Bs}$. of coal per horse power per hour.

Common plumbago, according to recent researches of Dr. Calvert, is composed of 91 per cent of a subcarbide of iron, $8 \frac{1}{2}$ per cent of a nitride of silicium, with traces of phosphorus and sulphur.


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## EXTENSION OF PATENTS---FOR WHOSE BENEFIT

 THEY ARE GRANTED.There seems to be an impression among inventors that, since the law of March 4, 1861, went into force the previous law in respect to extending patents for seven years was abrogated. This is not so in regard to cases which were patented under the old law. Any patent which was granted prior to March 4, 1861, may be extended for seven years on proper application to the Patent Office, provided the patentee has not already been amply remunerated for his invention and proves to the satisfaction of the Commissioner that he has used proper diligence in attempting to realize gains from his patent. The patentecs of 1848 and 1849 should lose no time in making out a statement of their profits and losses in consequence of their pattents, and in seeing counsel in regard to an extension, if they wish the term of these expiring patents continued for another seven years.
It is often the case that the extended term of a patent produces to the patentee a ten-fold profit over the amount realized during the first fourteen years of its existence. The assignees of a patent cannot obtain this extension; it must be done at the instance of the inventor, for whose sole benefit it is granted.

For full particulars concerning extension, address
Munn \& Co.,
Editors and Proprietors of the Scientific American 37 Park-row, New York.

## ARE IRON-PLATED SHIPS INVULNERABLE?

The London Times has made the remark repeatedly that a struggle was going on in England between the Navy and War Departments; the Admiralty endeavoring to construct vessels which no shot could penetrate, and the ordnance officers of the War Department striving to make guns that would pierce the sides of any ship.

This contest is a sample and a portion of the struggle that is going on in all countries and at all times. In the perpetual efforts which men are making to obtain power over their fellow men ingenuity is constantly exercised to devise means for injuring others and for protecting ourselves. All the complicated engines of war are but equivalents for the shield and spear.

From the begirming of war--since Cain killed his brother-the power of destruction has always had the supremacy over that of defense. It is easy to destroy. Months of labor are required by scores of laborers to erect a building which a child, by dropping a lighted match into a heap of shavings, may sweep away in an hour. Very few are the impregnable fortifications on our globe, and those are inaccessible. As a general rule, however carefully or laboriously a fort may be constructed, its capture, by a competent force, requires but a limited number of days.
This law applies with peculiar force to structures floating upon the water. Here new means of destruction are brought into action, and the difficulty of preservation is greatly augmented. A hole of moderate size made in the bottom of the structure causes it to sink down in the fluid, and the blowing of the wind very frequently so disturbs the water as to shake the fabric to pieces.

We have recently called attention to the fact that
the most powerful artillery in use has never been tried upon iron plates; but if naval constructors should succeed in building ships that would resist the heaviest cannon that can be made they would have triumphed over only one kind of destructive enginery. Their ships would be exposed to the attack of large vessels smashing against them as rams, or they might be pierced by protruding prows; or, more formidable still, they might be blown up by mines of powder under their keels. We know that "torpedos" have never operated very successfully, but this has always been owing to imperfection in the arrangements. It is only necessary to place a hogshead of fulminating mercury and gunpowder against a vessel's bottom, and to explode it there, in order to destroy any structure which man can make to float upon the water.
We have already shown that the fight between the Merrimac and Monitor did not teach the lesson which has been drawn from it in regard to the impregnability of iron-plated ships; it is also true that the conquests over our sea-coast forts by our wooden ships do not show any superiority of naval over land artillery. Those forts were armed merely with small guns. Had their armaments consisted of even 11inch columbiads, with supplies of suitable ammunition, there can be no reasonable doubt that every wooden ship which came within fair range of them would have been blown to pieces.
It is a curious fact that we are fighting this great war to a large extent with arms that have become obsolete, and the results of its battles consequently throw no light upon the present relations of the powers of attack and resistance. And even if these relations cauld be shown with perfect precision at the present time, the knowledge would afford a very poor criterion to judge of them at any future time, however near. In the intenseactivity which now prevails in the invention of the enginery of war, the conditions are shifting almost daily, and 10 human foresight can reasonably predict what they will be a month hence.
Judging, however, from the difficulty of constructing and preserving, and the ease of destroying, especially with the forces which modern chemistry has placed in our hands, it is not probable that human skill will ever produce a vessel which will prove in vulnerable.

## CONVENTION OF SORGHUM SUGAR MANUFAC TURERS.

We have received a report of a very large and interesting convention of sugar cane growers and manufacturers, held at Adrian, Michigan, on the 16 th and 17 th ult. Representatives from Ohio, Michigan, Indiana, Illinois, Missouri and Iowa were present, and many interesting facts were related in connection with the culture of the cane, and the treatment of its juice to obtain sirup and sugar. Many specimens of sirup and samples of sugar were exhibited. There was also an exhibition of seven evaporators, namely, that of H. G. Bulkley, Kalamazoo, Michigan ; C. Cory, Lima, Indiana ; Eagle Works Manufacturing Company, Chicago, Illinois ; O. N. Brainard, Marion County, Iowa; D. D. Tooker, Napoleon, Michigan; John Miller, Rolling Prairie, Indiana ; Cook's portable, by J. Richards, Raisen, Michigan. A committee of the convention was appointed to examine these evaporators and decide upon their merits; C. Cory's apparatus, called "Cook's Evaporator with Cory's Imprcvement," received the preference of the judges. The nature of this invention, as described in a previous volume of the Scientific American, consists in the arrangements of an elevated partition extended from one side of the pan to the other, in combination with a gate, in such a manner that the circulation of the evaporating fluid can be detained or regulated at pleasure, and that the sirup in its clarified state, and while separated from its scum by continuous active ebullition, can be passed into the finishing part of the pan. We have received two samples of beautiful pale yellow sugar made in this evaporator they formed parts of parcels for which prizes were awarded.
Mr. Cory, in a communication to the convention, gave some useful information respecting the culture of the sorghum and the treatment of its juice. He stated that light sandy soils produce lighter-colored and better-flavored sweets, but for the sake of larger
gains his preference is for richer soils, abounding in good corn growing qualities. The opinion often published, that Chinese cane is best for sirup and imphee for sugar, is probably correct. Early planting is desirable; the seeds should be first moistened and nearly sprouted ; they should be thinly covered, and lightly pressed down, as planted; the ground, if inclined to be wet, should be ridged; the crop is most easily tended when in rows, nearly four feet apart each way ; early and frequent cultivation is desirable; a mix ture of ashes, lime and gypsum applied to the hills in suitable quantities during the early stages of its growth, is beneficial in many respects, stimulating its growth, and destroying and preventing the existence of multitudes of parasites. When the crop is gathered before proper maturity it should remain a few days, protected from heat and cold, to ripen, before the cane is crushed.
The juice of the samples of sugar exhibited was pressed from the cane by rollers in the ordinary manner. It was then passed to the receiving tub at the head of the evaporating pan, and a small amount of freshly-slacked lime added in a diluted state, to neutralize, in part, the acidity of the juice, and to aid in its defecation. The pan used is of copper, three feet eight inches wide and ten feet long. This is placed on a stationary brick arch, and is divided into apartments. In the first division a most perfect defecation is secured, after which, in a clarified state, and entirely freed from scum, the sirup is passed into the finishing portion of the pan, and subjected to a continued intense heat, till sufficiently cooked at the further end of the pan, at which point it is passed off at the speed of from eight to twelve gallons per hour through the day. Nothing but the small quantity of lime added to the juice was employed in treating the sugar that we have examined.
Samples of sorghum sirup, analyzed at Belcher's re fincry in Chicago, presented the following results :-


Judging from the interest now taken in the cultivation of sorghum, imphee and beet root by our Western agriculturists, and from the energy and ingenuity displayed to invent improved apparatus for manufacturing sirup and sugar, we conclude that a new and profitable branch of industry is about to be estab lished in our country.
REPORTS OF OUR MILITARY COMMISSION TO EUROPE.

On the 2d day of April, 1855, Jefferson Davis, then Secretary of War of the United States, signed a commission appointing Major R. Delafield, of the Corpa of Engineers, Major A. Mordecai, of the Ordnance Department, and Capt. G. B. McClellan, of the Cavalry, of the United States Army, commissioners to visit the theater of the war which was then in progress between England, France, Turkey and Sardinia on the one side, and Russia on the other.
The object of the visit was to " obtain information with regard to the military service in general, and especially the practical working of the changes that have been introduced of late years into the military systems of the principal nations of Europe."
Each of the three members of the commission made an elaborate report of his observations, and a few copics of the reports were printed at the time. Since the breaking out of the war in our country a large demand has arisen for these reports, and when General McClellan was appointed to the chief command of the army, a Philadelphia publisher issued an ediion of his report in convenient form for circulation. An extended notice of this book, with illustrated extracts, has appeared in our columns.
On the 2d day of March, 1861, the House of Representatives ordered the printing of 20,000 copies of the reports of Majors Mordecai and Delafield, and to the politeness of the Hon. William Kellogg we are indebted for a copy of each.
These books are far superior in paper and printing to most of the work executed by order of Congress, and the superiority of the illustrations is still more marked. They are principally lithographs by E. R. Jewett \& Co., of Buffalo, N. Y., the same parties who have for a few years executed the engravings for the

Patent Olliee reports, which we have so much admired. We are glad to see this improvement in government printing and engraving, and we hope that it will bo carried forward until this class of work is done as well for the nation as it is for private individuds.

THE COLORS FROR COAE TAR.

Blue Colors.-. We have aheady described the purple, red and crimson color derived from aniline. On the 30th of Juiy, 1861, G. E. C. Delaire, of Paris, France, obtainel an American patent for an aniline blue and violet. The following is an extract from the patent :
Take ordinay anitine-red-purify and mix it with an equal quantity of pare aniline. This mixture is maintigrade. It then becomes a violet color, is mixed with witer and hydrochloric acid. and is brought to the boiling point. The excess of the red aiiling mixture that does not become a violet color is thereby dissolved; the residue that remans is bo boiled successively with hydrochloric acid diluted with a small quantity of water, and then washed in boil wh water, a precipitate will be produced of a blue color with a copper tinge on its surface.
The claim is for the methed described of converting the red of aniline into the blue and violet of aniline, by treating the former with pure aniline, in the manner substantintiy as set loth.
Blue de l'aris is promed by heating, for thirty hours, in a sealed tabe, at a temperature of $365^{\circ}$, one part of anhydrous bichloride of mercury with two parts of aniline. This color resists the action of weak acids and akkalies, but it assumes a red hue when acted upon by these agents in a concentrated state. It dyes animal filers with facility. This blue was discovered by M. M. Persoz, De Laynes and Salvetat, of Paris.

White gum lac in powder, boiled with carbonate of soda and inn alcoholic solution of red aniline, forms a blue for printing on calicoes.

Green Colors.-Messrs. S. Chili, ('. Lowe and Dr. Calvert, of Manchester, Rngland, obtinised a patent June 11, 1860, for poducing a green aniline color called emeraldine, on cotton fabrics. The process consists in printing an acid chloride of aniline on cotton cloth which has been prepared with a mordant of chlorate of potash. In a few hours after the aniline is printed on the cloth a beautiful bright green color grodually appears. If this green-colored fabric is then passed through a solution of the bichromate of potash, the color becomes a dark blue, called azurine.
Naphthaline Culors.-That Leauiful, colorless solid hydrocarbon naphthalinc, has lately been smbjecte! to many experiments, for the purpose of obtaining colors from it, and considerable success has attended these efforts. It unites with nitric acid, forming binitronaphthaline. This is boiled with sulphuric acid, and granulatea zinc is adhed in small purtions. The temperature is gradually raised to $392^{\circ}$, and the liquid becomes a deep red color. About eight volumes of water are now added, and the whole allowed to boil for a few moments, then permitted to cool down, when it deposits beautiful red and oramge-colored crystats. According to \% Rotissin, a French chemist, it is of neniy of the same matere as alzarine obtained from madder. It colors a led on cotion by using a mordant of alam in preparing the fabic. Praple color can also be obtained from naphthatine ly employng oxide of iron for a mordant. Naphthane colore are but in their infane and not yet conmercial products, but they may ultimately superste many other colors.

Getcandine - -inis is a new and perfectly white base, obtaned from pure rosibhine, by Dr. Hotman, of London. Thsumbitu is risidy attacked by bydogen in a nascent state, or by sulphureted hydrogen, and two equivalents of hydrogen are supplied to it, forming leucaniline. Its composition is $\mathrm{C}_{20} \mathrm{IH}_{21} \quad \mathrm{~N}_{3}$; pure rosaniline, $\mathrm{C}_{20} \mathrm{H}_{19} \mathrm{~N}_{3}$. Thas, by supplying but two equivalents of hydrogen to the rose colored substance derived from aniline, a white product is obtimed, which is anhydrons, but soluble in aleohol. It is converted into a chioride when boiled wich hydrochioric acid. This salt is of dazzling whiteness. It unites in solution with the bichloride of platinum and forms a salt, the crystals of whieh are of a brilliant onage color. Leucaniline unites with nitric acid, fomming the nitrate of leucaniline, which is a white salt, soluble in water. It unites with a large number of agents, such as bisulphate of carbon, chlo-
ride of benzole, \&c., forming new compounds. There seems to be a chemical relationship between indigo and these aniline colors. 'There is, for example, white indigo, the composition of which is $\mathrm{C}_{16} \mathrm{H}_{12} \mathrm{~N}_{2} \mathrm{O}_{2}$, and blue indigo $\mathrm{C}_{11} ; \mathrm{H}_{10} \mathrm{~N}_{2} \mathrm{O}_{22}$. These two equivalents of hydrogen make the whole difference between while and blue indigo, and two equivalents of hydrogen make the difference between rosaniline and white aniline (leucaniline). By supplying an oxidizing actnt to leucaniline it becomes a deep red again. The peroxide of barium, perchloride of iron, and especially the chromate of potash, produce this change. When rosaniline is builed for a long period with compounds rich in oxigen, it changes into an amorphous powder of a dark brown color. A fulminating com pound is produced with the nitrate of leacaniline and the bichloride of platinum.

## The Pleasures of Business.

Such complimentary letters as we receive from those for whom we act as attorneys fully compensate us for all the troubles and vexations attendant upon the management of a large business. The following lavors of this kind were received by a single mail last week. Read them.--EDs. $]$
Mesins. Mrex \& Co.:-Permit me to express my sincere thanks ior the very able manner in which you have
managed my claims for improvements in Rotary Pumps, bringing them to a successful issue. Very probably I should never have brought my invention before the public had it not beein for the advice and encouragement received from you. It is win old adage that " necessity is the mother of invention," and I think there is much truth in the saying.
Our national troubles the past year have deprived many mechanics of the greater part of their employment; necessity compels them to scek other channels for support. The inventive mind strives to bring to light something new that will enable him to establisin a business for himself that his tuture weliare may not be so entirely dependant upon the caprice of others. And if there is one thing to encourage him more than another, it is to know that the
can obtain such valuable information and advice as your long experience affords. Your institution is"to the inventor what the beacon light is to the mariner-a sure guide to a a sate haven. One of the many advantages to le derived from the employment of your Agency is, that it recquires no personal attention after the mater is placed in your inatis. I am satisfied that you make the interest of the inventor your own. My experience in the rotary pump
busness for the past ten years convinces me that the one on which, as you inform me, a patent is ordered to issne will make the best practical working machme in the world and the easicst regulated and kept in order. I shall, at an early day, empioy you to obtain a patent for the other devices of mine now in your possession. Before closing this Tong letter, permit me again to thank you for discharging my business with so much fidelity. With my best wish Brockport, Ill., May 6, 1862.

Messis. Mins $\hat{8}$ (o, :-- Kirs--1 suppose you would like to hear how one of your old customers is getting along with an instrument he had patented for cutting the noses of swine to bievent then rooting. To this i can say, first rate. I have sold over two thousand dollars' worth alreanty and 1 am seling more or less territorial rights every thousand obligations to you for favors in connection therewith, and i shall soon apply to you for services in getting out another patent. Respectfully, yours, Relben Iltio.
Spring Hill, Hil., May 5, 1.862.
Mismik. Muns \& Co.:-Through your Agency we have obtanci our patent, and for your kindness we return you
our most sincere thanks. If I am prospered I shall en-
 for another and different object altogether, and I shall unely amily to your Agency in preference to any other. I have jusi reevived a number of circulars from Washington ;otting torth what certain parties there will do for me, but a canot help then nor hall I permit them to help me
Truly, yonis,
C. M. Fhencri. Weedsport, N. Y., May 3, $1 \times 62$.

Conservatory in the Central Park.
The Central Park Commissioners have contracted with Messis. Parsons \& Co., of Flushing, for the construction of a grand conservatory, the largest in the United States, upon the jark grounds. The building is to be a "Crystal l'alace," of iron and glass, 200 feet long, 70 fect wide, and about 50 feet high. Its base will be a parallelogram, and there will be three stories, curving inward like the successive folds of a turban. The conservatory will front Fifth avenue; its center leing opposite Screnty-fourth strcet ; and directly in its rear will bo a beatiful little pond, with walled sithes of a symmetrical shape, which will be built during the coming two years. When the Fifth Avenue is graded to its proper hight, it will be on a level with the second story of the proposed conservatory; and the main entrance to the edifice will therefore be on that story. Stairs and balconics will give access to every portion of the building. The contract provides that the grantees must erect the building entirely at their own expense, after the plans already agreed upon; that they must place
in it nothing but flowers or rare trees or plants; that they shall be allowed to sell bougnets, \&c., to visitors; that the public shall always be admitted free; that good order shall always be maintained inside, at the expense of the grantees: and that the work shall be completed by the first of January, 1864. The specifications of the contract are minute, and are believed to cover the objections which might be made to the granting of a monopoly of such a character. The grantees on their parts, agree to pay a rent which will add considerably to the revenues of the Park. The conservatory will cost about $\$ 50,000$.

## A Yankee Soldier.

The following characteristic sketch is from the Commercial Advertiser, Honolulu, Hawaiian Island :-We heard a few days since an anecdote which well illustrates the character of a large class of the American people, and the readiness with which the peaceful citizen becomes changed into the soldier. Most of our townsmen will remember Mr. J. Griswold, who came to Honolulu some two years since, and made one or two voyages to the Phonix group and other islands, searching for guano. Hearing of the rebellion, he returned immediately to Honolulu from one of his expeditions, having determined to enlist in the army. Procuring a book on army tactics, he went through a series of daily drills under the tutelage of Captain J. H. Brown, the experienced commander of the Honolulu Rifles, until the sailing of the packet for San irrancisco. On the passage home, he applied himself to the study of military tactics, and on reaching New York immediately offerel his services, was examined and accepted as a captain, and within ninety days after leaving Honolula, embarked to take an active part in the famous lurnside expedition to North Carolina, which has just gained a victory in the capture of Roanoke Island, and a half dozen towns and villages in the neighborhood, and promises soon to capiure Richmond. This instance will show how readily, if necessary, the Americans can and will raise an army of a million soldiers to meet their foes, whether from within or without.

## Cost of Raising Sorghum.

S. Ward communicates to the Prairie Furmer the following statement of the expense of raising Chinter sugar cane, and manufacturing the sirup, the result of his own experience --


Use of mill.......................................................... 800

Prolit per acre. 22400
Or, 160 gallons sirup at 25 cents per galloz.
If a farmer should get his sirup made on shares the cost, according to the above account, of raising and drawing to a mill (if near by) would be $\$ 18$.

Receives 80 grallons sirup.
Cost.
Profitper acre................................. 60
Or, 80 gallons sirup, costing 2.2 cents per gallon.

The "London Quarterly" on the "Monitor."
We have received from the publishers, Leonard Scott \& Co., the April numbers of the "Lomion quarterly" and "Westminster Roviews." The "London Quarterly" has an able article on the bigh between the Monitor and the Merrimac, in which the writer takes the stime ground that was taken at the time by the Somemma Ambrican. The English Parliammit and people are rebuked for their foolish excitement on the subject, and the superiority of stationatiy oves floating fortifications is plainly shown. It is stated that the expense of a gun on a steamex is nearly four times greater than that of a gun in a fort. The writer also remarks that iron forts will be little if any more costly than those of granite, from the thinnes: of iron walls and the alsengee of internel piens.

## RECENT FOREIGN INVENTIONS AND DISCOV-

 ERIES.Manufacture of Alum.-The common mode of making sulphate of alumina (alum) from shale or china clay, is by mixing the aluminous earth with dilute sulphuric acid and applying a gentle heat. The process is tedious. A quicker method of manufacturing alum has leen patented by A. A. Croll, of London. It consists in reducing the aluminous shale or china clay to powder, heating it to about $300^{\circ}$ Fah., then causing an equal quantity by weight of strong sulphuric acid previously heated to $300^{\circ}$ Fah., to flow into the vessel containing the heated shale. The mass is then stirred and allowed to stand until the temperature is reduced to about 1500 . The sulphuric acid unites with the alumina in the clay forming alum. The mass is now treated witi boiling water which dissolves the sulphate of alumina, and the liquor is then rum off into another vessel in which it crystalizes, forming the alum of commerce.

Woolen Substitute for Sponge.-J. Mason, of Nottingham, England., has obtained a patent for making a looped fabric of fleecy wool, to be used as a substitute for sponge. A chain of loops is first knit, corresponding with the size of the sponge required. The ends of the ring of loops thus obtained are then united together, and succeeding rows are formed within the first row, progressively narrowing as the knitting proceeds until the center is gained. This forms the inner surface of the woolen sponge. Layer upon layer of loops are formed in this manner until the desired size is oltained. To prevent the wool from felting it may be mixed with cotton. Woolen sponges may thus be made of any form or size.
New Chernical for Tunners..-In treating skins to open their pores after they are unhaired, they are placed in a bath of pigeons' and dogs' excrements. It is quite difficult sometimes to obtain these peculiar substances for the purpose stated, therefore substitutes have been frequently sought, but hitherto we believe without success until now: The substitute discovered for it is propared by soaking fish in water heated to $212^{\circ}$ in a close vessel for about three hours, then running off the contents of the vessel into a vat and allowing them to.stand for about twenty days; the liquor is next run through a sieve to separate the solid particles, and it is then employed for the purposes stated. A patent has been obtained for this preduct by James Steart, of London. The product may be of great use to some of our morocco and sheepskin leather dressers.

Preserving Timber. - A patent has been obtained by I. Cobley, of Meerholz, Hesse, for treating wood to render it uninflammable and more enduring, as follows :-A strong solution of potash, baryta, lime, strontia, or any of their salts, are forced into the pores of timber in a close iron vessel by a pump. After this operation the liquid is run ofir from the timber, and hydro-fluo-silicic acid is forced in, which, uniting with the salts in the timber, forms an insoluble compound, capable of rendering the wood uninflammable.
Thluo Silicate of Tin and Zinc.-Mr. Cobley has also taken out a patent for making pigments for glazing and enameling by dissolving the oxide of tin or zinc in fluo-silicic acid, then acting upon the tin with sulphureted hydrogen, which produces a sulphide that may be applied as a beautiful enamel in the manufacture of porcelain. The fluo-silicate of zinc is formed by dissolving the oxide of zinc in fluo-silicic acid, then drying the precipitate and using it by itself or mixed with baryta, as a pigment or enamel, on porcelain. It is also found to be a good substitute for lead in the manufacture of glass. The patentee states that the glass made with this flux is very pure and free from veins.
Making Tubes of Paper.--A patent has been obtained by W. H. Crispin, of Stratford, Essex, England, for making curved tubes of paper as follows:- The improvement is intended to obviate difficulties which have heretufore attended the manufacture of such tubes In order to form curved paper tubes the paper is, in the first instance, covered with a coating of pitch. This is conveniently done by reducing the pitch to a state of powder, which is sifted or distributed over the surface of the paper, the latter being exposed by means of hot metallic plates or otherwise to the action of a sufficient degree of heat to melt the pitch. The paper thus receives a perfect and even
coating of bituminous substance. The paper having been thus prepared, strips thereof are wound spirally around mandrels of the size and form of the tubes which it is desired to manufacture. The mandrels employed are of metal, and may be cither solid or hollow. In the latter case heat may be imparted to the interior by means of hot water, steam or hot air. Upon the prepared paper being twisted round the mandrel, as mentioned, the pitch with which the former is coated is partially melted, causing the convolutions of the paper to adhere together, the compression being continued until the tube or pipe is of sufficient thickness, a coating of pitch being given from time to time as may be deemed requisite, while per fect smoothness and regularity of form may be ob tained by molding with the hand or by means of suitable tools. The mandrels should be covered with grease or some other substance which will prevent adhesion of the paper, and the curves employed should, in all cases, be portions of true circles in order that the mandrils may be withdrawn without in. juring the tubes. If considered requisite, greater strength and hardness may be given to the tubes by employing external pressure during the process of manufacture, and extra layers of paper may be used at those parts which require greater strength, and, in somé cases, layers of canvas or calico may be added for the like purpose.

## RECENT AMERICAN INVENTIONS.

Oil Press.-This invention consists in the employment of a slide passing over the top of the several press boxes, and through slots formed in the upper portions of the sliding plates, in such a manner that by inserting said slide the several press boxes are perfectly closed on the top and an additional guide for the sliding plates is obtained. It consists further in the employment of a sliding key passing through slots in the lower parts of the sliding plates, in combination with the hinged doors at the bottom of the several press boxes, in such a manner that, by the action of the key, the doors are prevented being forced open when the operation of pressing commences, and they are not liable to become injured by catching against the followers. Invented by W. V. Mckenzie, of Jersey City, N. J.
I'ress for Baling.--This invention, by Isaac S. Schuyler, of New York City, relates to an im. provement in that class of presses in which racks and pinions are employed for operating the plunger and follower. The object of the invention is to obtain a press of the class specified, which will admit of having its plunger or follower operated by a direct application of power to the driving shaft by means of cranks so that speed may be obtained when pressure is not required, as, for instance, in moving the plunger or follower to and from its work, and also admit of having the power applied through the medium of levers arranged with clutches in such a manner that the operators may work at opposite sides of the driving shaft and one pass upward while the other passes downward, in order to operate it and thereby obtain a more uniform application of the power when pressure is required, or when the plunger or follower is at work. This invention is assigned in fuil to J. J. Echel, of New York City.
Ordnance.-This invention, by R. P. Parrott, of Cold Spring, N. Y., is more particularly designed for guns with rifled bore, the object being to obtain great strength and safety with simplicity of manufacture and at moderate cost. It consists in providing a gun having a cast-iron body with a peculiarly-applied reënforce of wrought iron ; and it further consists in permanently closing the rear of a so-reënforced gun for muzzle loading, with a solid screw plug of larger diameter than the bore screwed into the rear of the body, the body having had the bore continued through the rear, and having been counterbored and a female crew having been cut in the counterbore for the reception of the said plug. This is the colebrated Parrott gun.
Cut-Off.-This invention relites to that class of cutoffs in which the cut-off valve is fitted to the back of a main slide valve through which the induction and eduction of steam to and from the cylinder of the engine is effected. It consists in the construction of the cut-off valve with its ends oblique to the direction of the movement of the main valve, and in so appiying the said valve to the back of the main valve
that it may work transversely thereto without interfering with the longitudinal movement of the latter valve, which has the outer orifices of its steam ports arranged obliquely to correspond with the oblique ends of the cut-off valve. This construction of the valve. seat and ports permits the point of cutting ofi to be varied throughout the whole length of the stroke of the piston by a transverse movement of the cut-off valve, either by hand or by the governor. A. K. Rider, of Hydeville, Vt., inventor.

IIydrometer.--To ascertain the specific gravity of a liquid correctly by the ordinary hydrometer, it is necessary to have the liquid exactly at a certain temperature, as the instrument can only indicate correctly at one temperature. When, therefore, it is desirable to test the density or strength of a hot or warm liquid or solution, as it is very frequently in the process of refining sugar, and in other manufacturing processes, a portion of the liquid or solution has to be cooled, and so much difficulty is experienced in bringing it to the exact temperature to suit the hydrometer, that an absolutely perfect test is seldom obtained. This invention consists in a hydremeter by which the specific gravities of liquids can be ascertained at any temperature, such hydrometer being composed simply of a tube having its lower ead closed by a flexible diaphragm. This tube being filled Qith water to a certain point while placed in a vessel of water, and afterward plunged up to that point in the liquid to be tested, will quickly have the water contained within it brought to the same temperature as the surrounding liquid, and according as the specific gravity of such liquid, which is in contact with one side of the flexible diaphragm, is greater or less than that of the water in the tube, which is on the other side of the said diaphragm, the column of water in the tube will be thereby caused to rise or fall, and the tube being properly graduated, will have the specific gravity of the liquid indicated within it by the hight of the column of water. The invention also consists in the arrangement of the so-constructed hydrometer within an in verted syphon, through which the liquid to be tested may flow constantly, so that the specific gravity of the said liquid can be ascertained at any time without any manipulation what ever, by mereiy looking at the tube. The patentee of this invention is Peter Hogg, of Brooklyn, N. Y.

Vocuum Tank.-The object of this invention, patented to Joseph P. Walter, of Brooklyn, N. Y., is to save the time required to carry vacuum tanks, such as are used for emptying privies or sinks, back to the yard or station, and also the expensive machinery required for exhausting the air ; and the invention consists in the application to each tank of one or more air pumps, which are operated by a working beam recciving its motion from an eccentric attached to one of the wheels of the truck supporting the tank, in such ia manner that the air from the tank can be exhausted, while the same is driven through the streets, and that each tank, when emptied, can be driven back directly for a new charge without interruption. It consists also in the arrangement of one or more reservoirs containing suitable acids or chemicals, in combination with said air pump, and with the vacuum tank in such a manuer that the nauceous gases exhausted from the tank, after the same has been discharged, are forced through said acid or chemicals, thereby depriving them of the bad mell which otherwise would render it a nuisance to exhaust the tank in the public streets of a city.

Chalent for Joints or Petroleum Stills. - a corre pondent states that retiners of petroleum are much roubled to obtain a suitable cement for their stills o as to form a tight and durable joint. The cement used for cast iron, made with iron filings, sal ammoniac and sulphur, has been tried and found wanting ; Lead makes a tight joint, but is liable to melt out with the high heat used. Copper also makes a tight oint, but it soon corrodes and becomes useless. Yiarious cements have been tried, but a perfect one has not yet been obtained.

Substicute for Ivory.-The Bitish Journal of Denbal Science stattes that dry collodion, when mixed with gutta percha, or india rubber, forms a compound of great hardness and elasticity. It may be used in the arts as a substitute for horn, ivory, and such-like materials, and billizerd balls, buttons, \&e, may bo made of it.


ISSUED FROM THE UNITED STATES PATENT OFFICE for the weer ending may 6, 1862. Reported $O_{i}$ ficially for the Scientific American
** Pamphlets giving full particulars, of the mode of applying for
 infentors, may be had gratis by addressing MUNN \&CO., Publisher
of he ECIENTIFIC AmRRICAN, New York.
35,132.-John Absterdam, of New York City, for Improved Composition for forming Journal Boxes, Bear


 35,133.-S. W. Baker, of Providence, R. I., for Printers Clapping:


 :sriven, so as to operate in the manner and for the purposes set forth. ment in Grain Separators :
I climim the combination with the raking apparatus deseribed of the
 35,135.-O. M. Buttles, of Milwaukie, Wis., for ImproveI lexim the arrangement of the circular fine, $E$, at the top of the
suove, and in such a position with reararit to the exit flue as that a com-
 ${ }^{\text {sentet. }}$,136._J. G. Cain, of Smith's Mills, Pa., for Improved Combination of Table and Sink

in the veculiar manner shown and described.
[The object of this invention is to combine with a dining table, of any size and shape, a sink, in which disles., \&c., may be washed after they have been used on the table, thereby obviating the necessity of
moving the dis hes about from place to place for the purpose of washmoring the dishes about from place to place for the purpsese or wash
ing them, and also affording convenience and cleanliness in the opera tion. 1
35, 137.-J. H. Calkin, of Troy, Pa., for Improvement in Iubricating Axles of Wheels

 constricted ant
pose speceitied.
[The object of this invention is to obtain an oiling or lubricating de vice which will be capable of being so adjusted that it can be applied to hubs of different sizes or dizmeters, and operate equally as well as
if made for hubs of a speciicic sizco and admit or the axle beng lubriif made for hubs of a speciitic size, and almit of the asle beng lubri-
cated with the hub attachecl to it, and be also capable of heing percated with the hub attached to it, and be also capable of hefing per-
fectly protected from dust, so that none can come in contaict with the rectly protected from dust, so that none
oil and be conveyed by it to the axle.]
35,138.-Mary P. Carpenter, of Buffalo, N. Y., for Im-


pose sibstancially as deseribed - Third, The the purpose and sublbstantially as described.
35,139.- Gardner Chilson, of Boston, Mass., for Improvement in Sad-Iron Heaters:


 sel forth 1 Inslo clam a sad-iron heater, composed of the horlow, pyra midal
 35,140. Edward Court
35,140.-Edward Court, of Coeymans, N. Y., for Improvement in Brake for Wheel Velicles
claim the slide. F, itited to the perch or res.


[This invention relates to an improved brake for wheel vehicles, of that class which are commonly termed self-acting. The object of the invention is to obtain a brake of the class specified, which will operate with certainty, and be capable of being applied to all wheel vehi-
cles, whether constructed with a view to its application or not, be less liable to get out of repair, less cumbersome than usual, and admit of being so attached to the vehicle as not in the least to interfere with the operation of the running gear of the same.
35,141.-E. J. Cridge, of Troy, N. Y., for Improvement in Cooking Stoves
 vided with a valve or damper, W, is specified and shown.
I likewise claim the arrangement of the detlecting plates, d $d$, in the
unight
 nication with the open air, the oven and the nire chamber above the
fuel, , the the apertures or air passages, ro p and a , respectively, as and
for the purpose shown and specified. 35,142.-W. H. Doane, of Chicago, Ill., for Improvement in Stave Machines:
I claim, first, The combinati
I claim, first, The combination of the india-rubber strip, F, plates, i
and $j$, and screws, $k$ and 1 , for setting the same, both vertically and and j, and screws, $k$ and 1 for setting the same, both vertically and
horizontally, when the saidparts are so arranged in connection with


 manner and for the purposes specified.
(By this invention the osis
[By this invention the kmie is made to cut against an elastic cushion, which is adjustable both vertically and horizontally, so that its suriace is always kept level with that of the table, and in correct position to fforled to the belt on both sides of the cushion. The rolld bearing is thestaveis kept diustable so as to suit staves of any thickness.]
35,143.-J. N. Dudley, of Mitchell, Iowa, for Improvement in Portable Calenders
I claim the combination of the several removable rings, b c d e, with
the column of figures, B , arranged on a stem, A , substantially as and
for the purposes set forth. or the purposes set forth.
[The object of this invent
The object of this invention is to produce a simple and cheap calen head of a cane, watch-seal, key or to a pencil-case-match box, to the head of a cane, watch-seal, key, or other similar articles, and mad 35,144.-O. P. Drake, of Boston, Mass., for Improved Ap paratus for Carbureting Air
an ar-forciug apparat ths a nd an airometer, the whent being constrict ed to operate together, snl stantially as described.
I also claim the spectied arrangement of the vaporizer and the air I also chaim thiespectied a rrangement of the vaporizer and he air-
orcing apparatus, whereby the shaft of the rotary frame of the vapor-
zer may be connected to and put in motion by the shaft of the rotary zer may be connected to and put in motion by the shaft of the rotary
drum of the air-forcingaparatus.
Ialso chiam the air-inlet box $Q$ as made and appled to Cnd its matt, and as provided with a pine, $R$, to operate as specified.
$I$ also claim the combintion I also claim the combination of the andililiry air pipe, 33 , with the
erometer and the vaporizing and aerating apparatus, substantiaty I also claim the combination of the annular air vessel, $g$, , with the
I
aerometer, when combined with a vaporizerand an aerating apparaerometer, when combined with a vaporizerand an aerating appara 5,145.-James Eaton, of Boston, Mass., for Improvement in Spindles for Spinning:
I claim, as an improvement in spindles, in so forming the point that
the thiread will draw from the axes or center of the spindle, substan-
tially as set lorth
tially as set forth.
35,146.-Jacob Edson, of Boston, Mass., for Improvement in Gas Regulators.
I claim, first, The combination of the floating disk or diaphragm, d,
and hollow die cut-of or valve rod, , with any suitable-shiped recep and or reservoir of the nduction pipe, fort the sur purpose specitied, and
tacte
arranged therein. and operating sulstintially as described. arranged therein. and operating substantialy as described.
Second, Constructing the cut-off in a hollow shape by means of
which it can be readily increased or lessenecl in weight, at pleasure, Tr he parposes set forth
Third, The adjustable
Fourth, In so constructing the die cut-off and arme Fourth, In so constructing the die cut-onf, and arranging it in the
iduction aperture of the apparatus that when pulled or forced up nduction aperture of the apparatus that when pulled or forced up
hroogh the same it will scrape or cut of the coal tar, $\& \mathrm{c}$., deposited
or collected upon their surfaces. 35,147-E. T. Ford, of Stillwater, N. Y., for ${ }^{-8}$ Improved
Plow Bcam : Plow Beam:

1. claim the pectiar arrangement and construction of a truss plow
beam, consisting of the secional pats, the rear section, gitont sec
 35,148.-Thomas Fowlds, of Treverton, Pa., for Improve ment in Ordnance
I claim, , first, The combliation of the narrow screw thread, sh, of
the cap nipple, E, and the wide screw grooves, $f$, of the screw pin, D, with a cannon, substantially as and for the purposes set forth.
Second, The combination of the sharp point, $r$, with a hollow screw in, $\mathrm{D} \mathrm{D}^{j}$, substantially as and for the purpose set forth.
Third,
The combination of the shoulder, $i$, and
ollow sc rew pin, D D', substantially as and for the purpose set forth.
,149.-L. F. and F. W. Letmate, of New York City, for
Improved Composition for making Printers' Inking
Rollers:
Re claim the
We elaim the use or enployment of oflue, properly combined with
lycerine and castor oil, or any of the aceid oils, to form a composition
35,150 .-Kasson Frazer, of Syracuse, N. Y., for Improve-
ment in Buckles, Rings, \&c.:
I claim the method described of connecting the ends of wire rod
used in forming buckle frameand rings ; that is, when the two ends are firmly joined together by interlocking, substantially as statell and
for the purpose set forth. 35,151.-William Fulton, of Elizabeth City, N. J., for Improved Coal-Oil Lamp Cone :
I clai in, first, The perforated spring plat
I clain, first, The perforated spring plate, D, as shown, or its equiv-
alent, for regalating the elastic force of the air, so that it may be presented evenly to the flame, and as a rest, whichac:ommodates itself to Second, I Itaim the construction of cone. $B$, as shown, in combina-
tion with the perforated shell, $K$, as shown, and the gauze wire, $P$, as tion with the perforated shell, K, as shown, and the ganze wire, P , as
shown, he whole being arranged substantially as and for the purpose
set forth. 35,152.-Peter Hogg, of Brooklyn, N. Y., for Improvement in Hydrometers :
I claim, first, A hydrometer, composed of a tube for containing wa-
er or other liqud, fitted with a flexible diaphragm, and operating substantially as specitied.
Second, The employment, in combination, with the tube, $A$, and dia
phragm, B, of an inverted siphon pipe, $\mathbf{E}^{\prime}$, the whoe eonstituting a phragm, B, of an inverted siphon pipe, E E
statonary apparatus Ior testing the densit,
essentially as and tor the purpose specified.
35,153.-B. B. Hotchkiss, of Sharon, Conn., for Improvement in Explosive Projectiles
claim, first, An explosive projectie,
I claim, first, An explosive projectiie, in which the contents are
solidified, substantially in the manner and so as to secure the advanIages set, forth.
Second, $I$ also claim the employment in such projectile of an adhe-
sive lining $\mathbf{C}$, sulbstantially as described, so as to increase the adhesive lining, C, sulstatat tially as described, so as to increase the adhe-
sion of the solidified contents to the interior of the shell. 35,154.-T. W. Houchin, of Morrisania, N. Y., for Improvement in Night Lamps
First I i claim the use or employment:of a wick sustainer, construct-
ed as shown in Fig. 3, C, for the purpose specified.
 The purpose shown.
Third, Combining a wick sustainer, I, constructed as shown in Fig.
4, with a circular float, J, of cork or other suitable material, for the purpose described.
35,155.--Charles Howlett, of Hartford, Conn., for Improvement in Balances :
I claim the combination of the bearing points, C C, weight, F, and
indicator,
scribed. arranged as a self-i noica ting balance, substantially as de$35,156 .-H$. W. Hunter, of New York City, for Improvement in Magnetic Compasses :
I claim a floating compass card, $B$, form
 divided inte one-halif white and the other black, with the excep-
tion of the star-point lines, $\mathrm{c}^{\prime} \mathrm{c}^{t^{\prime},}$ which are black on the write
and white on the black section, as described and for the purposes set
for
forth.
$35,157 .-$ H. C. Hatchinson, of Cayuga, N. Y., for Improve$\underset{\text { First, A central draught entering above the lamp, through the later }}{\text { ment in Burners for Lamps }}$
al air tubes, E E, leading to the inner chamber, G, closed at the bot Second, The perforated bask at the top. C , so constructed as to cause a
counterpoise air pressure when the lamp is suddenly raisised.
Tlird, A round or oval hollow wick formed around the central tube of the burner from two fat strips hanging loose in the lamp.
Fourth, The screen or perforated guard, $K$, made in a flat, conical or 35,158.-J. H. Irwin, of Beardstown, Ill., for Improvement in Coal Oil Lamps :

## conpartments by partition plates, b, or $\mathrm{b}^{\prime}$, so arranged as to prevent

 conpartments by partition plates, b, or b', so arranged as to preventhorizontal or lateral currents of arir throukh the dranght passage or
burlier below the flame, substantially as and for the purpose set torth. burler below the 1 tame, substantially as and for the purpose set torth.
second, Having the upperend of the wick tube, C, made of ronnded
or scollope form in or scolloped form, in combination with a cone or deflector, B, having
its apex or top around its slot, f, made of corresponding form, as and its apex or top around its
for the purpose set forth.
[This invention relates to an improvement in that class of lamps Which are designed for burning coal oils and other similar hydrocarcess of oxygen to support proper combustion for illuminating pirposes. Mr. Irwin's present address is box 334, Chicago, Ill.
35,159.-John Iseman, of Rosston, Pa., for Improvement in Joiners' Squares
I claim the combination of the square, $A$, and straight edge, $B$, ar-
ranged and connected together as and for the purpose set lorth. [This invention consists in inserting in a straight wooden stock or the lenged of ajors or carpenter's square in ample mand he pash rater for may, by a very simp for roof and the length of the span being given; the implement also baing capable ot being used as a trying square, T-square or miter.]
35,160 -A. H. Leplay and J. F. J. Cuisinier, of Paris,
France, for Improvement in Revivifying Animal Char coal for Refining Sugar:
e eaim, hirst, The method described of revivifying animal black or
harcoal by hot water or steam, in combination with milk of lime used
n the filtering vessels, substantially 1 l the manner and in the fitering vessels, suthstantially in the manner and for the pur-
poses set forth.
Second, The method described of clarifying saccharine liquors, juices Second, 'The method described of clarifying saccharine liquors, juice.
and sirups by means oo phosphates, snbstantially as set forth.
Third, The manner of operating and effecting by means of the dif Prent processes described, the revivification of animal black or char evivification.
35,161.-C. C. Lewis, of White Water, Wis., for Improved I claim the use of the specified ingredients for the purpose of mak-
ing soap, substantially in the specified proportions and for the purpose
sef forth. ing soap,
set forth.
35,162.-W. A. Lighthall, of New York City, for Improvement in Refrigerators for Steam Engines :
I claim the combination of the diaphragm plates, $F \mathrm{~F}^{\prime}$, with the
nubes, C , and division plates, B , arranged and to be operated as and
or the purpose set forth.
35,163.-Henry Loewenberg, of Boston, Mass., for Improvement in Mode of Making Button Holes:
I chim the new method, substantially ins deserribed, of making either.
buton or evelet hotes, sne h invorving the employment of dies, heat pressure and
as specified.
35,164--S. M. Logan and P. E. Baker, of New Carlisle,
Ohio, for Improvement in T. Ohio, for Improvement in Terra Cotta Roofing
I claum, first, The use of the caps, a a, for covering the joints in the Second, The caps, in combination with the laps, b b, in the manner
and for the purpose set forth and described. 35,165.-Gordon McKay, of Boston, Mass., for Improved
I claim the described process, in sewing the soles upon boots or
shos, of changing relatively the positions of the boot or shoe and the
horn, substantially as described.
35,166 - A. Gr. Wilkins, of Cooperstown, Pa., for Improved Washing Machine
I claim, first, The arrangement of the larger roller, B , smaller end
rollee, C central lited roller, D , and inclined slatted carrier, F , with-
na wash tub, in lhe mand n a wash tub, in the manner and for the purpose, substantially as
 moss, deseribed vertical screw arms, $g \mathrm{~g}$, in the manner and for the pur-
pose dird, The arrangement of the clothes-confining cords, a, across the Thrs, The arrangement of the clothes-confining cords, a, across the
slotted carrier, in an organizaition such as described, for the purpose set forth.
35, 167.-Edmund Maher, of New York City, for Improvement in Repeating Firearms :
I claim, first, The combination of the rib, A, flanched and grooved
hub, $\mathrm{F}^{\prime} \mathrm{C}^{\prime}$, and recesses or sroves, S , of the chambered bar, C , sub. stantially in the manner and for the purpose described.
Second, Combining with the gun, the ring, , friction pall, $K$, with
otted arm, and the parts attached thereto, Tor civing a slight move ment to the gun on its pivot, at every revolution of the transverse
shaft, F , as fully set forth. 35,168.-W. V. McKenzie, of Jersey City, N. J., for Ímprovement in Oil Presses :
I clitim, first, The employmen. of the slide, (a, in combination with
the press boxes, $A^{\prime} B^{\prime} C^{\prime}$, constructed and operating as and for the
 hinged dors, $a^{\prime} b^{\prime} c^{\prime}$, at the bottom of the press boses, $A^{\prime} B^{\prime} 0^{\prime}$, con-
structed and operating as and tor the purpose specified. 35,169.-Matthias Mead (assignor to Samuel Randall), of Lowell, Mass., for Improvement in Drawing Cans for
Cotto Rovins. Cotton Rovings
First, escribed. purpose described.
Second, I llam forming the bottom of a drawing can of one piece of
raw or green hide, substantially as and for the purpose described. 35,170.-A. A. Peatt, of Greenfield, Mass., for ImproveI claim the iron, A, provided with the hook, B, in comlination with
the eye, D, and the bolts, C C, or their equivalents, substantially as and for the purpose set forth.
[The object of this invention is to obtain a shackle or thill coupling wection and in case of breakage, posses in itself a means to form temporary connection to prevent the detachment of the thills from the axle, so as to avoid the application or use of the ordinary " safety straps" now employed to prevent the thills, in case of such a contingency, coming in contact with the heels of the horseand frighteving him.]
35,171-R. P. Parrott, of Cold Spring, N. Y., for Improvement in Hooped Ordnance. Ante-dated Now 6, 1861 : I claim a gun made as shown and described.
I claim the arrangement of the screw plug,
with the sid gitan
35,172.-Samuel Rainbird, of Norwich, England, for Improvement in Crappling and Raising Sunken Vessels, \&c.:
I claimb, thist, The mode or modes of grappling sumken vessels and
other submerged bodies, by the peculiar arrangement of chains, as described. The mode or modes described of raising sunken vessels and other sulmerged bodies by balancing a portion only of the weigbt by
air ressels and then raising the sunken vessels, ,r ot or submerged
bodies, by means of winditsses or similar machinery.

Third, The apparatus described, consisting of air cylinders or vessels
divided into compartments rraverved by tubes with stoppers for secur-


 bodies, by stch combined apparatus as described. 35,173.-C. E. Rankin, of New York City, for Album

 ['This invention is a good impryvement on the ordinary photggraphic album, and it consists in combining two ordinary daguerreotype cases with a book cover and a series of split leaves made to receive photographic or other portraits, in such a manner that an album case is
obtained in which daguerreotypes or ambrotypes, as well as photoobtained in which daguerreotypes
graphic pictures, can be preserved
35,174.-J. H. Redstone and A. E. Redstone, of Indianapolis, Ind., for Improvement in Valves for Steam En$\underset{\text { We claim, }}{\text { gines }}$ We claim, tirst, The hollow valve, A, when constructed as set forth
and operated in connection wiht the steam passages, II I , and K . Second, The valver, $F$ and $G$, when constructal and operated as set
forth. 35,175._F._B. B. Requa, of Jersey City, N. J., for Improved Lamp:
I clam, iirst, The :combination of the two tubes, G J, one placed
thin the other, and the inner one inclosing the wick tube, E, when Wthin the other, and the inner one inclosing the wick tube, E, when
sitid tubesareprovidel erpertively wibibone or dellectors, II I, so
constructed as to admit of a space, e, between them, having a narrow passage, $e^{\prime}$, to increase the rapidity of he dranght, and cause a quick
current of air to impinge against the sides of the tlame, j, substantially as and tor the purpose set torth.
Second, Providing the the wick tube, E, with a cap, F, tction with the tube, G, applied to the burner, D, the latter screwed
 ple device to atmit or he nime bengs supplied
tity of arr at tits base, and by a curent which p.
tain, A, to keep its contents cool, its described.
 tor the purpore of preventing, the heat being conducted down to the
burner and fivtutant, an set forth. Fourh, The combination of the two tubes, G J, cones, II I, wick
tabe, E, cap, F , burner, D , tanch, g, jacket r , case, B , and fountann,
A, all arranged as and for the purpose specified. IThis invention relates to an improved lamp of that class designed the burner of the lamp in such a manner that the flame wiil be supplied with a eernisite amome of oxygen to insure perfect combustion and at the same time be capable of being adapted or applied to any of the lamps in general use, withont heating and vaporizing the oil in the lamp to canse an explosion thereof, and witiout obstructing the rays of light or casting a shade around the lamp.]
3i,176...A. K. Rider, of Hydeville, Vt., for Improved
Cut-oft Valve: I clanm, tirst, The cut-ofr ralve, G, having its end or ends oblicue to
the dirpoction of the movement of the main ralve and applied to the
 orilices of the nann valve ports fior the purpose sel forth.
Second. Combining the stem, fof the so constructed
 purpose described.
35,177.-EE. Y. Robbins, of Cincinnati, Ohio, for Improvement in Ventilation



 romm substantally as set forth the fire in the lower story, I clam the arrengement of an inner
sinoke fllue within the trick the or cliname E, Fig. 3 , and the dia-
phragm, Fig. 5 , for turning the current of hiot air rising between this

 and of diferent shapes, so that thell conducting and radiating power
shall increase as the distance from the turnace or sinure of heat in
creates, and as the temperature of the air within them dile
 throngrout
35,178.-H. E. Robbins, of Hartford, Conn., for Improve-- ment in Tobacco Cases .

I chain, as a new article of manufacture, a pocket tobacco box, con-
structed substantiuniy in the manne: as ind fur the parpose as de-
scribed. structed.
35,179.-Watson Sanford, of Brooklyn, N. Y., for Improvement in Dampers :
I clain the valve or register, C, when compined with the pipe collar
and itit flange and applied to a stove or heater for the purposes and
substantidily in the manner described.
35,180. - Watson Sanford, of Brooklyn, N.Y., for Improvement in Hot-air Furnaces

 or pipes
scribed
Second. Second Forming the fire pot as well as the lower section of the
dome with corrugitions whilich hall be comlinatikns of eath the interime conceve yarts of which form the exis for thae smoke on furih. Prowing the furnace or heater with an eularged dome, b ,
Third, Providing
in conmination with the extension of the corrugations or smohe tlues,

 smoke thes so located, that is, extending down to or below the sur-
face of thit fuel charcc, the distribution of the smoke eeits aut hround
the body of the tire pot and near together so as wo make regular cor-35,181.-Watson Sanford, of Brooklyn, N. Y., for Improvement in Stove Linings:
Tlaim, irst, The pins, b , as and for the purpose specified.


 of the stove or hurnace, as set forth.
35,182.-John Shaefer, of Lancaster, Pa., for Improved
Attachment for Bedstead liails : Attachment for Bedstead hail

35, 18:\%.-D. C. Smith and W. P. Walling, of Adrian, Mich.,
for Improvement in Water Elevators and Conveyers We clath the combination with carriage, $K$, of the plate, $M$, arrang
 second, we a
2, rod, 3, mind c.
pose sulucified.
35,184.-H. J. Smith and Woodruff Jones, of Philadelphia, Pa., for Improvement in Apparatus for Testing Coal Oils and other Mixed Liquids
We claim determining the anownt of volatile intlammate matter in
compond lic mds by means of a thermometer amd a flame, the ther--
 latter and the vapur gener
sulstantially as set forlit.
35,185.-J. P. Smith, of Hummelstown, Pa., for Improvement in Corn Shellers :
ination with she shelling cyinder, $d$, substantially as and for the purpose specified.
I alsococlaim the combination of the shelling bar, $j$, with the shelling
cyinder, $d$, and shifting brest beam, 35,186 .-O. W. Stearns, of Johnson, Vt., for Improvement In Wooden Tubing
 and wre, F F, or its equivalent, substantially as described.
35,187 .-R. Van Ormer and W. J. Bell, of McAllisterville, Pa., for Improvement in Balancing Mill Stones:
We claim the comblnation of the rods, $R R^{\prime}$, spring, $S$, and screw, $\mathrm{S}^{\prime}$, in the manner and for the purpose shown and described.
35,188 .-W. H. White, of Woodbury. Conn., for Improvement in Sheep Shears
I chaint the described irticice called a sheep shears made substantial-
ly in the manner described, and consisting of a steel bow, iron hand les y in the manner described, and conssting of a steel bow, iron handles
and cutting edges. arranged and attachest to each other substantially
in the manner set forth. 35,189.-J. P. Walter, of Brooklyn, N. Y., for Improvement in Vacuum Tanks :
I claim, first, The arrangement of one or more air pumps, $B$, in
combination with the wheels, $D D^{\prime}$, eccentrics, $i$ and working beans
 scribed. The tringutment of one or more reservoirs, E, containing suittoble chemicals in combination writh hie aire reservoirs, E, contaning
substantally is and for the purpose set forth. 35,190.-Chas. Wadsworth, of New York City, for Improvement in Car Ventilators:
I claim the combination of the air fitering screen, I, and air cham I claim the combination of the air fittering screen, I, and air cham
ber, d, with the air-foring bellows, substantually as and for the pur-
pose shown and described. IThis invention consists
pure air through the medium of ong or injecting into a rairoad car pipes or pipes.]
35,191.-J. B. Winchell, of Chicago, Ill., for Improvement in Sewing Machines
I clatm, first, $A$ sewing machine organization which will interlock
two threads and sew continuusty mi hee same direction withont changinty the direction offeed or the character of sewnge, winh a single
painted hook or interlocking device, substantially as describel, wheth. er the connecting mechanism iniermediate between the upper needle
and the hook or interlocking device is set in motion by either a back
 specified disks between which it is arranged, and all the remauing
specified operative parts of neclanism, silustantially as and for the parpase set forth1
Third, The eombinam of the angular slotted extension of the needle O', and pinion, $N$, or their equivatents, substantially as and for the
purposes sut forth. 35,192.-G. L. Witsil, of Philadelphia, Pa., for Improved Nutmeg Grater
 cr described and set forth
35,193.-.J. J. Woodbury, of West Roxbury, Mass., for Improvement in Arming War Vessels
Cain, first The employuent of a gun or guns constructed and
operating substantially at described, in a ship, so construeted and de-
 promeh an enenyy with reasonable satety, substantally in the mamner
and for the purpoe described.
Scond, Combining a gun, constracted and empioyed in a, vessel as described, with an appropriate plun carriage to support the breech ; at
sonket and stuming box in the side of the hull to support the muzzie and an external pirt or sinter. or other devices equivalent thereto, to
enable the gun to be worked sibstantially as described.
Third, Disllacing the water from the bore of the gan between the charge and marzhn by means of air-tight displacing case, or its equuv-35,194.-A E Young of D
35,194.-A. E. Young, of Dorchester, Mass., for Reflecting
Lantern:
laaim a glass lantern body as constructed, with a lateral neck and
opening or socket, arranged relatively to its tup and botom necks and
openngs and forthe reception and fixation of a reflector, substantially opemngs and
as specilied.
35,195.-Erastus Young, of Penataquit, N. Y., for Improved Washing Machine :
I claim the arrangement of the adjustable fulcrum pin, f, in combi-
nation with the hand lever, C, toggle arms, D, pressure board, B, and nation with the hand lever, C , toggle arms, D, pressure board, B, and
sids box, A, all constructed and operating as and for the purpose set
forth.
t'This mention consists in the arrangement of a hand lever with an adjustable fulcrum in combination with toggle arms and with an os cillating pressure board, in such a manner that by changing the position of the fulcrum of the hand lever the pressure board can be ad $j^{\text {usted for chothes of different size and of different fabric, and that the }}$ ing eflected without much exertion of the operator and without the leas.st injury to the fabric. 1
35,196.-C. F'. Allen (assignor to himself and C. B. Beebe and H. Taylor), of Paw Paw, Mich., for Improvement laim Car Bumper and Draw-head Springs :
I claim a car, bunnper or draw- head spring, con
y in the manner and lor the purpose set torth.
35,197.-Victor Baron, of Tabanco, St. Salvador, assignor for Improvement in Concentrating and Clepina, Pa. I clann concentrating and cleansing ground or pulverized ores by
causing it to pass along an agitated channel submeryed in water, sub)
stantially as set forth.
35,198. - Hiram Carpenter (assignor to H. V. Gahagan)
of New York City, for Improvement in Construction of New York City, for Improvement in Construction
I claim the combsination of the pedestals with wrought-iron cross
and chairs, or their equivalents, and either with or wilhout the
 35,199--H. B. Gill (assignor to Erastus 'Jarbox), of Og-
den, N. Y., for Improvement in Machine for Packing den, N. Y., for Improvement in Machine for Packing
Apples : I claim ihe eombination of the spring hook clamps, B B, with the
crous heads, A, screw, D, and follower, E, substantially as and for the
purpuses specified.
35,200.-C. D. Ingraham (assignor to himself and C. A. and A. Bardwell), of Suath Falls, Mass., for Improve-
ment in Straw and Hay Cutters:
I claim a cylinder of knives formed by having the knives arranged
sets or pails which are shorter than the cylinder, and attached
thereto in such a manner that the knives of one set or par will be out
ot line with, or in different panes rom those of the other set or
numr, and used me comection with a evlinder
tially and for the purpose set torth.
[This invention relates to that class of straw and hay cutters in Which a cylinder of knives is employed in connection with a rotating cylinder to form a bearing for the cutting edges of the knives. The work or operate with the usun rapdity or cut the hay or stran much longer than those hitherto constructed, and still be selli-feeding. 1 35,201, ...Josiah Mason, of Timingham, England, assignol
to E. C. and J. H. Pratt, of Philadelphia, Pa., for Im


$35,202 .-J o s e p h$ Moore (assignor to the Vulcan Iron Works
Co.), of St. Francisco, Cal., for Improvement in Ore I claim, fid

 35,203.-I. S. Schuyler (assignor to J. J. Eckel), of New York City, for Improvement in Baling Press:

 substantinly as shown, when ande ollars are und in connection with
the gearing turd rack bars described, as and for the purposes specitied. $35,204 .-$ E. W. Seymour, of Lisle, N. Y., for Improvement in Method of Constructing Carriages :



1,572.-J. W. Bush, of New York City, for Design for Auk-1,573.-G. B. Owen, of New York City, for Design fur a Clock Case.
1,574.-W. (i. Phelps, of Newport, Del., for Design for an 1,575.-Henry Terhune, of New York City, for Design for
a Clock Case. a Clock Case.

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ali parties who are concerned in new inventions.
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T. T., of N. Y.--We think you are on the right track. Suhmarine vessels must yet occupy an important place in the destruction of maval vessels. The subject is worthy of much atten tion, and other parties are at work tryingt.o derise some effectiv vessels of this character.
A Miller, of Ohio.-Your reply to "A"Young Miller, is re ceived, but as the same grom has been taken before you, we do not publish it. We have already publishes enough on the subject. C. 13., of Conn.-We are impressed favorably with your projectle, and should think a patent might be obtained for it
M. F., of Ill.-Your shell filled with chloroform and cayenne pepper would be a very harmless aftia
W. H. S., of Mass.-There are projectiles in the service J. C. A., of Mass.-We have bushels of communications, and when one is exumined and passed upon, it goes to the pape makers, and we can see it no more. A patent could probably be obtrianed for your comprosition
C. E. W. S., of Wis.-It takes one-horse power to raise $33,000 \mathrm{lbs}$. one foot high per minute. A cubic foot of water weighs $621 / 2 \mathrm{lbs}$., and the area of the cross section of a pipe 6 -inches in diam. eter is 28,274 inches. We shonld want to know the velocity of your stream in order to answer your question ; but from the above data you can make the calculation by the simple rules of arithmetic.
A. J. S., of Pa.-Magnetic electric machines produce a current of electricity which, passing through a helical wre, induces magnetism in a picce of soft irom in the core. No acid or otherliquid is nsed, but power is required to turn the machine. See illustration of Beardslee's magneto-electric machine on page 3.53, Vol. V. Schen tific American, ,
city in relation to
C. M. B., of Me.-The substance that you send us is kaolin and if you have a large bed of it of a quality equal th this sample it is valuable.
J. B., of Wis.-The idea of exhansting the air from the bore of a gun is a very old one and not patentable
f. I. B., of N. Y.-The operating of a melodeon bellows by means of a weight instead of by the foot would not be patentalle ; neither would the use of a spring, from the fact that both plans are in other analogous pieses or mechanism.
E. HI., of Mass.-Your thermometer appears to be new and usefnl, and we think a patent can be oltained on it. A mode is necessary, and when you send it state as nearly as possible the proportion hetween the he
the actual heat of the metal
. W., of N. Y.-You will find the Foumeyron and Jonval wheel described on page 212 present Vol. Scievtific Amprican.
The Fonneyron wheel, does not discharge, on the underside, lik The Foume
the Jonval.
the Jonval
. S., of N. Y.--It would recpuire a considerable amount of power to wind up a spring to churn a large quantity of milk, but a small churn, we think, may be continnally operated by spring. You cam easily make the experiment without incurring much expense.
W. F. R., of R. I.-You state that in your opinion plaited wire of "suflicient thickness" would resist shot and shell. We have no doubt of it, but what do yourequire as a"sulficient thick ness" for this purpose?
J. C. C., of Ill.-A bullet shot vertically will return to the muzzle of the musket with the same force with which it left it minus the loss of force sustained by the resistance of the atmo
sphere. The spaces passed through by falling bodies are mropor-
 second, and so on. A feather and a piece of metal will fall with the same velocity in a vacuum.
T. A. McD., of Mich.-The manufacturers of " oreide.' an imitation of gold which does not readily tarnish, are Messrs Holmes, Booth and Hayden, of Waterbury, Conn. They have Holmes, Booth and Hayden, of Waterbury,
warehouse at No. 81 Chamber street, this city.
F. D. P., of Wis.-The largest importer of music boxes known to us is Marins J. Paillard, 21 Maiden Lane, this city. He
has instruments whicin play from two to thirty-six tunes and the prices vary from $\$ 2$ to $\$ 1,000$ acmording to the number of tues, and quality of the instrument
H. M. D., of Ohio.-A series of paddles secured on an midess chain and passing over tro eroven pulleys on the side of a teamon, is an old mode of propulsion. Foll will find this system Ihastrated on page $152, \mathrm{Vol}$. V . (old series) Schexpmed Ambican Yon will also find Thumsey's mode of propeiling, by ejecting a aur-
rent of water from the stern of a boat itlustratem on page 112 same olume
. \& Co., of Mass.--Iron may be coated with copper by frst covering it with a skin of tin. After being tinned, the iron diped into a bath of molten copper, the surface of which should be covered with a layer of ground glass or sand.
L. P. B., of Ind.- A very dark blue may be dyed on wool with one onnce of the prussiate of potash, half :an ounce of the sulphate of iron, one gill of the muriate of tin, and the extract of two pounds of chip logw.
quarters of an hour.
J. P. J., of Wis.--We have given our reasons in former volumes of the Scimpific Ansricas, why hot-air engines are ont adapted for lucomotives and large moturs. Small air engines are very convenient for some purposes.

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Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Oflice from May 7 to Wednesday, May 14, 1862 -
O. H., of N. Y.; T. R. B., of Towa: A. C. F , of Iowa; J. M. D., of N. Y.; G. M. T., of N. Y.; A. and M., of Wis.; II. B., of Wis.; J. L. ., of N. Y.; F. and J., of England; T. B. B., of N. Y.; J. N. B., of rowa; C. O. G., of Mich.; W. H. MCN., of N. Y.; P. K., of Conn.; J. 3., of Ind.; H. C. R., of Pa., (2 cases); W. and F. K., of N. J.; H. D. A. B. C., of Iowa; M. F., of Comin. S. T. W. P', of N. Y.; S. G. Mc.M.,

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## Improved Ventilator for Houses.

The annexed engravings represent a device for ventilating houses, which, from its simplicity, is very little liable to become disarranged, while it is operated with great facility.
Fig. 1, shows the ventilator turned down in a horizontal position, Fig. 2, is a back view in its normal position, and Fig. 3, is a perspective. A circular opening is cut through the wall, and is covered by the wheel, B , which is fixed rigidly in place. The central portion of this wheel is crossed by radial arms, and half of the segments between these arms
silvering looking glasses. Lead and mercury unite readily in various proportions. An amalgam of 3 parts mercury, 1 of lead, and 1 of bismuth, is remarkable for its fluidity, and it may be squeezed through leather without separation of the clements. It is employed for silvering the interior of hollow glass spheres, previously made clean and warm. All amalgams may be decomposed at a moderate heat. Advantage is taken of this property in what is called water gilding, or gilding metallic articles, such as brass buttons. A small portion of gold is dissolved in a large quantity of mercury, the brass articles to


WILLIAMS'S VENTILATOR FOR HOUSES.
are filled with plates of window glass ; each alternate gegment being glazed and the others left open.
'through the axis of the wheel, B, a spindle is passed, and upon the outer end of this spindle a second wheel, A, is hung in immediate contact with the wheel, B. 'I'his outer wheel has its alternate segments glazed in the same manner as its fellow, and it will be seen that when the wheel, $B$, is turned so that its open segments are opposite the open segments in the wheel, A, the air may pass freely through both wheele, but when it is so turned that its glazed segments are opposite the open segments of the wheel, A, then no air can pass.
The wheel, $B$, is usually kept in position to close the ventilator by a weight, $D$, fastened upon one side, and swinging in a recess or slot made for the purpose in wheel, $A$.
To facilitate the opening of the ventilator, a cord, $a$, is attached to a projection, $o$, on the wheel, $B$, and passed around pulleys, $c c$, into the room. By pulling this cord, the wheel, $B$, is turned upon its axis; and a stop is provided to arrest the turning at such point as will cause the open segments of the two wheels exactly to coincide. The cord may be wound around a pin or othorwise secured to hold the ventilator open.
This ventilator works very freely and smoothly, and it is not likely to get out of order.
The patent for this invention was granted september 17, 1861, and further information in relation to it may be obtained by addressing the inventor, Samuel W. Williams, at Centreville, N. Y.

## Amalgam Applications.

Mercury pessesses the quality of uniting with a number of metals, forming a class of metallic compounds called amalgams, some of which are brittle, others soft. Under ordinary circumstances, iron and mercury do not unite, therefore the fluid metal is transported, and kept stored in iron flasks. An amalgam of tin is easily formed by triturating the two metals together in a suitable mortar, or by fusion at a gentle heat. This is the amalgam which is used for
o gilt, being inade perfectly clean, are anointed with the amalgam, and then placed in a furnace and heated. The heat drives off the mercury, leaving the gold adhering to the brass in a thin, frosty film. The luster is developed by burnishing. Brass articles may be silvered in the same manner. Cast iron, wrought iron, steel, copper or brass may be tinned with a soft amalgam of tin and mercury. The articles are scoured bright with acid, sand or emery. No oxide, or grease must be on the surface of the article to be tinned. The amalgam is then rubbed on with a piece of coarse cotton cloth, moistened with dilute hydrochloric (muriatic) acid. All the parts of the brass, or whatever other metal it may be, thus treated become thoroughly coated with the amalgam.
Iron may be coated with zinc by a peculiar amal gam process, patented several years since, in England by Mr. Mallett. It was invented for the purpose of being applied to iron ships, to prevent their corrosion. The iron is first immersed in a cleansing bath, formed of equal parts sulphuric acid or hydrochloric acid and water, used warm. The metal is then hammered and scrubbed with emery and sand, to detach the scales of oxide, and to produce a thoroughly clean surface. The metal is next immersed in a preparing bath, consisting of a saturated solution of hydrochlorate of zinc and sulphate of ammonia; and, lastly, it is transferred to a metallic bath, composed of 202 parts mercury and 1,292 parts zinc, both by weight. To every tun weight of this alioy is added 1 Hb . of potassium or of sodium, the latter being preferred. As soon as the cleaned iron has attained the point of fusion of this triple alloy, viz., $680^{\circ}$, it is removed, and is found to be thoroughly coated with zinc. The affinity of this alloy for iron is so intense that at the fusing heat of $680^{\circ}$ it will dissolve a plate of wrought iron one-eighth of an inch thick in a few seconds. When the articles to be covered are small, or the parts minute, as for example, wire, nails or small chains, it is necessary before immersing them to permit the triple alloy to dissolve, or combine with some wrought iron, in order that its great affinity for the articles may be partially diminished.

A good amalgam for the use of the electrical machine is formed of 4 parts mercury, 2 parts zinc and 1 part tin. The zinc should be melted in an iron ladle, the tin added, and afterward the mercury, previously heated in another iron ladle, stirring the mixture with an iron rod. The amalgam should be poured, just before it solidifies, into a wooden or iron box, and be constantly agitated, by shaking until cold. It should then be triturated in an iron mortar, and sifted through a small muslin sieve, so as to obtain an extremely fine powder ; this being rubbed up with a little lard, is to be spread on the rubber of the electrical machine with a pallet knife.

When a sheet of white paper is moistened with benzole it becomes temporarily transparent, and any iines may be traced through it. In a few hours the benzole evaporates, and the paper becomes opaque, as before.

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