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$\left\{^{88 \text { Ber Annim }}\right.$
Impreved Steam Engine.
The cut-off patented by Noble T. Greene has been favora bly known for many years, its simplicity and durability, its economy and sensitive regularity ranking it among those improvements which are conceded to represent the highest state of the art. In March, 1869, the patent was extended and passed into possession of the Providence Steam Engine Company, who, it is stated, are now unable to build the engines fast enough to supply the demand.
The following improvements have been made: A new bed plate has been de signed; access is had to the exhaust valves by removing the cylinder heads, as shown in Fig. 1; an intermittent movement allows these valves toremain at rest through nearly seven eighth of the atroke, and the mechanism actuating both steam and ex haust valves is now placed outside of the steam chest. The prin ciple of the original Greene engine is not changed, but the parts retained, after recon struction, are more durable, have larger bearing surfaces, and are made easy of access to the engi neer.
The engine is of that class which does not require a throttle valve. The steam en ters the cylinder at boiler pressure, and the governor fixesthe period of time dur ing which the steam valves shall remain open, allowing more or less steam to flow into the cylinder as there is more or less load to be driven. There are four flat slide valves, one (as shown in Fig. 3) at each end on the top to let in one the and one (as Rhown in and one (as shown in Fig. 4) at each end on the bottom the exhaust, and with as little clearance as the thickness of metal in the cylinder will
allow.
While one valve is admitting and cutting off the steam, the other three are entirely at rest until just before the completion of the stroke, when the exhaust valves instantly re arrange themselves, opening the "exhaust on one side of the piston and closing it on the other. The return stroke then commences, and the operation is repeated.
The short space of time during which the exhaust valves are moving is when the pressure upon them is the least, and,

by an arrangement of cushioning the steam, the induction valve is at all times nearly balanced.
The power which moves, the valves is applied parallel to, and nearly in line with, their seats, so that they cannot rock
or twist, thus greatly reducing any tendency to wear. One end of each valve stem being in the steam chest, the whole boiler pressure acts upon it to aid the weight in closing the valve when tripped, and the valve stem is made large in diameter to obtain the full benefit derived from cut-off valves elosed by steam pressure. The governor can adjust the point of cut-off over a range of three fourths the entire stroke. The working of the valve gear will be understood by re-
the tappets moving in a straight line while the toe describes the tappets moving in a straight line while the toe describes
the arc of a circle, the tappet will pass by, liberating the toe, which is brought back toits original position by a weight, I, Fig. 2, and the steam pressure on the valve stem, thus closing the valve and cutting off the steam. This libera tion will take place sooner or later, according to the elevation of the tappets; that is, the lower the tappets are, the sooner the toes'will be liberated, and vice verst, ; and so, by simply ele
vating or depressing the gage bar, F, Fig. 5, the period of closing the valves can be changed, while the period of opening them remains the same. The adjust ment of the gage bar is effected by the governor, and the steam is cut off sooner or later according to the amount of load.
The exhaust valves J, Figs. 1 and 4, which lie in the bottom of the cylinder, are con nected at their outer ends by parallel rods K , which are tied to gether by a crossbar in the inside.
The exhaust rock shaft arm, L, is a jaw as shown in Fig. 1, just under the-cylinder. One side of this aw comes in contac with a lug, M, on the crossbar, and moves valvessimultaneously valverminataneously opent the one clos ing the other. While he exhaust eccentri is taking up the los side , between the des of the jaw, the aust valves remain rest. The other side of the jaw coming in contact with the crossbar,the exhaust valves receive a reverse mo tion. The lug on the crossbar is so shaped that it receives no blow from the jaw, L but takes a graduall accelerated motion.
The strength, sim plicity, and durability of this engine is very noticeable, and it em bodies all the advanced views in stationary engineering which

## THE GREENE ENGINE.

views of the cylinder and valve gear, Fig. 1 having certain Th ever shafts, stems, C. Below the rock levers, D, is a sliding bar, E, re ceiving a reciprocating motion from an eccentric on the main shaft. Behind the sliding bar is a gage bar, F, Fig. 5, connected with the governor, which bar receives an up and down otion from a corresponding movement of the governo balls. The adjustabie tappets, G, Fig. 5 , in the sliding bar are kept up in contact with the gage bar, F, and are made to move up and down in unison with it by the springs, H, Figs 1 and 5.
It will be seen from this description that, as the sliding bar moves in the direction of the arrow, Fig. 5, one of the tappets is brought in contact with the inner face of the toe on the rock lever, causing it to turn on itsaxis, thereby opening tbe steam valve at one end of the cylinder, the other tappet meanwhile passing under the other rock lever without moving it, the toe and tappet being so beveled that the tappet will be forced down against the action of this spring un til it has passed by the toe, when the spring causes it to fly up to its original position, ready to open the induction valve at the opposite end. As a result of this motion, the two tap pets always open the steam valves at the same period, bat,
have stood the test of actual practice.
Its finish is also neat and tasty, and, with the improve ments described, it thus embodies all the essentials necessa to extend the wide popularity the original engine en joyed.


In these days of active competition, any marked improvement upon the construction of a steam engine is of imporfance not only to purchasers but to manufacturers. As the use of steam expansively is now well nigh universal, the
value of a variable cut off that combines, in so great a degree as this does, delicacy of action with strength and dura bility, is sufficiently obvious.
For circulars and other information, address Providence Steam Engine Company, Providence, R. I.

## Japanese Textile Art,

Some years ago, there existed a law in Japan forbidding the exportation of high class textile fabrics, and judging by the few examples of any sort one sees at the present time, it is likely that the restriction still remains in force. The first time Europeans had an opportunity of forming definits ideas, regarding the state of the textile arts of Japan, wa during the Paris Exhibition of 1867, where a remarkable se ries of samples was shown, and for the exportation of which, no doubt, special license was given to the Japanese Commis sioners. At a recent meeting in London, Mr. Audsley Was enabled to show several of the best fare
Paris collection. The finest silks of Japan are Paris collection. The finest silks of Japan are manufactured on a small barren island, by high born exiles who adopt the art of silk weaving as their means of procuring the necessaries of life. Ships convey provisions and raw materi als to the island, and return with the product of its looms. There is little doubt that the fabrics so produced and protected are used exclusively by the Mikado and princes of the land. The materials employed are silk, gilded paper, and some strong fiber. The gilded paper is of a very tough nature, and is cut into narrow ribbons: in this state it is woven into the fabrics and presents a most brilliant appearance. The silk is of rich quality, and is worked in cut and silk is of rich quality, and is worked ine the faiber terry velvets, satins, and dead grains. The fiber
is only introduced to render the material stiff. The designs of these fabrics are remarkable for The designs of these fabrics are remarkable for
their boldness, and the coloring is of the most their boldness, and the coloring is of the most
vigorous character. The ideas for the ornamenvigorous character. The ideas for the ornamen-
tation are in nearly all cases derived from natutation are in nearly all cases derived from natu-
ral objects, and are handled in a masterly manner, and in strict accordance with the principles of decorative art. Turning to the lowest grade of the scale of textile fabrics, the common towels used by the peasantry of Japan (worth about a penny each in Japan) show more clearly than the costly silk fabrics do that the appreciation of and love for art is inherent in the Japanese mind, and that it is cultivated by all classes of the people, and carried into even the smallest and commonest articles of daily use. We can never correctly estimate a people by its great never correctly estimate a people by its great
works, or the true wealth of a nation by the works, or the true wealth of a nation by the
luxury of its princes. The towels are poor in luxury of its princes. The towels are poor in
material, and very trifling in cost, but they are material, and very trifling in cost, but they are
ornamented in a most artistic and thoroughly ornamented in a
original manner.

## Preserving Nuts

H. J. S. is one of our tree enthusiasts. His is an enthiusiasm tbat never wanes; he never wea jies of experiments to find out the best methods of culture. For years he has been at work on the problem, How can chestnuts, hickory nuts, and hazel nuts be kept over winter in the best condition? His experiment the past winter was quite satisfactory, and is given by him as follows
" Last fall I had about six quarts of fine large chestnuts and a few walnuts. Half of them I put into a bucket of moist sand as usual, but the other half I determined to ex-
periment with. I had often picked up chestnuts, in the spring periment with. I had often picked up chestnuts, in the spring,
from among the leaves, that appeared as fresh as when they dropped from the trees. Following this clue, I leveled back the earth on a plowed field where there was no vegetation or covert to attract the mice. On this level plot I strewed a quantity of leaves. On these I deposited my chestnuts, not so close as to touch one another. On these I deposited more leaves, and, top of the whole, I put some boards to hold them down. Around the border I threw up some dirt to discourage any vagabond mouse that might chance to stray that way; and then left them with my blessing. The result was that when I examined my treasures, about the twentieth of April, I found those in the bucket of sand were soft brown, moldy and lifeless, as usual, while those under the leaves were as fresh and hard as ever; and where the spring warmth had come near them, they were already sprouted. mention these circumstances with the hope that others will be encouraged to try the experiment,"-Oneida Circular.

## BIRMINGHAM GUN MAKERS' AND INVENTORS' CLUB:

At a recent meeting of the above club, according to the Mechanics' Magazine, Mr. Samuel Smith, of Weaman street Birmingham, gun barrel maker, read a paper on the manu facture of gun barrels, of which the following is an ab stract:
The material used for gun barrels was mostly charcoal iron. For plain and figured barrels, at the date of which I am speaking-namely, 1793-the iron used was stub, stub twist, wire twist, and Damascus. Stub twist was first made as plain stub, but, instead of being hammered into a "skelp" or flat plate, it was drawn into a strip, coiled around a man drel, and welded in the usual way. Stub twist is now made of old horse shoe nails and steel cuttings, about 2 inches long $\frac{1}{4}$ inch in breadth, and the same in thickness. The two are mixed up together and " balled" in a furnace, and the bloom
drawn out under the forge hammer. It is then rolled into a


THE GREENE ENGINE.-Fig. 2. (See Preceding Page.)
three of these are welded together, and then rolled down to rods of the size required. These are then coiled round a man drel, and welded in the usual way.
There is another iron, called silver steel. It was first made about forty years ago, I believe, by Mr. Whitehouse, o Wednesbury, by laminating Swedish iron and steel, like Damascus, but not with so many layers. It is very good. The figure is not much better than the iron that is now called sin gle iron Damascus, but it was a very strong iron. The silve steel that is now made is rolled into a square of $7-16$ inch and worked like Damascus. Two rods are welded together and rolled down to the size required, and welded in the same way as other twisted barrels. This iron is now made both at Adams' and J. Clive's. There is not so much used as formerly.
About 45 years ago, J. Clive began to make iron for gun barrels, and the best iron is now made by Mr. G. Adams and J. Clive, who may be said to be indeed the only makers of " best twist" gun iron. The iron now in use is of six quali ies-1st, skelp twist, price 2d. per 1b.; 2d., iron twist, 3d. pe $\mathrm{lb} . ; 3 \mathrm{~d}$, fourpenny stub, 4 d . per 1 lb .; 4th, fivepenny stub, 5 d per lb.; 5th, silver steel, 7d. per 1b.; 6th, Damascus, 7d. per lb. No. 2 is twisted into a screw, like Damascus, and is called iron Damascus. This is worked in single rod and double rod-that is, two rods put together and rolled into a strip. The same is done with fourpenny and fivepenny stub and the result is called stub Damascus, but cheap guns are chiefly made of the iron Damascus. This is the cheapest fig ured iron. It contains no steel, being generally made of waste screws mixed with other scrap. It requires experience to distinguish it from the true steel Damascus.
Welding: Best barrels are welded by coiling the strip round a mandrel, and then heating it to a welding heat in a smith's fire; it is then taken out and jumped up on an iron plate on the floor, then put in a swage with a "stamp" or mandrel inside, and hammered down. About three inches are welded at a time. Here I may observe that there are
very few welders who use the "stamp" except for a few inches at each end; but best barrels ought to be welded on tamp throughout.
History of gun iron: Mr. R. Adams began to make
twist iron about the year 1815. He was before that time tilter of barrel skelps or plates for making plain iron barrels At that time a great deal of iron was made from swaff or filings, which were first washed and then mixed with scrap made into a ball, and welded in a smith's forge; this was called "swaff ball drawing." It made very good iron, and was used by lock forgers, breech forgers, and occasionally made into barrels for fowling pieces. In the early time of the barrel trade, there were a number of small forges for making barrel skelps by tilting; one in particular was at Wednesbury Bridge, and here Mr. R. Adams, above mention ed, worked; and there is no doubt that he saw what the rade required. At the close of the French war, he began to make twist iron as a trade. Before this time, it had been made at various forges, but no one made a specialty of this kind of iron. Mr. Adams continued working at Wednesbury till unfortunately killed by the bursting of a boiler, after which Mr. G. Adams took up the business, and continues to make twist gun iron at his new works, in Church lane, West Bromwich, up to the present day.
Boring: After the barrels are welded, they go to the mill. They are first rough bored. This is done by fasten them in a socket or holder; the "bit" is a square stee rimer," of suitable length, running at about 500 revolu tions per minute, which is forced through the barrel. - The fine borer then examines the barrcl, "sets" or straightens it, and then it is " spilled up," a process the same as rough boring, except that the bit does not cut on all the edges; it has a "spill," or piece of oak wood, put on one side, which causes it to cut much more evenly. The workman then "sets" the barrel, and finishes the boring, which is done at speed of 70 to 80 revolutions per minute. The bit only cuts on one edge, which is left sharp, and a deal spill is used packed up with strips of paper as the boring proceeds. The barrel is examined, and "set" several times during the operation. The setting is done by the shade or reflection, own the inside of the barrel, from the top of the window It is an art that can only be acquired by long practice and lives, and men have worked at the trade all thei lives, and have never learned to set a barrel cor-
rectly. The same process is used for sporting and military barrels up to the fine boring. After fine boring, the military barrels are turned, or stripped as it is called, which is done by a self-acting slide lathe, which takes off the thick side, if they have any. The grinder then finishes them to the gage. The history of boring and setting I cannot attempt to state, but setting, I think, does not go back much more than 100 years. My father began to work as a fine borer in the year 1793. Setting was known then, but nct generally. He had to pay for the secret. According to my father, a man named P. Parsons was the first to set barrels that he had heard of. He worked at Duddeston Mill, being what was called a "best workman" at sporting barrels. This Mr. Parsous used at first, for the purpose of setting, a string or wire which was drawn tight by a bow, or otherwise, and applied to the inside of the barrel. By this means he discovered the crooks, and then corrected them with a hammer. The process of fine boring is the same now as it was in 1793 ; thatis, it is done with a square bit, but only two edges cut, and only one at a time. The advantage of taking off the edges was said to be discovered about 1790, by Mr. Beesley, and this was kept a secret among good workmen for a leng time. I think we may be sure that boring and for a leng time. I think we may be sure their present perfection until the besetting had not attained their pr
ginning of the present century.
In the year 1787, there were 27 gunmakers in Birmingham, and barrels were made, bored, and ground at water milis all round the town. Such mills still exist, chiefly in the neighborhood of Hales Owen, where large numbers of barrels are now made. I have not touched on the subject of rolled bar rels, which are chiefly used for military firearms and the commoner sort of sporting guns. The rolling of barrels from short taper skelps, a foot or more in length, is comparatively a recent process. The barrel is drawn over an oval headed mandrel, so fixed that its head is immediately between the grooves of the upper and under roll. These grooves are of a shape corresponding to the outline of the barrel. Of late years, steel barrels have come very much into use for rifles, but to a very small extent for sporting guns as well, the want of " figure" operating much against them. Steel rifle barrels are sometimes drilled out of a solid bar, which must be " set" from time to time, as the drill is ertain to run out. As there is usually more to turn off one sile, they are generally of unequal hardness, and is a difficult matter to keep them straight. Steel barrels are now usually rolled from 12 to 15 inch drilled blanks, the hole in which is much larger than the intended bore. The punching of shorter blanks, which were afterwards rolled out into a bar rel by two rollings, constituting the patent of Deakin and Johnson, appears now to be discontinued, though very good barrels were made by the process.
The reading of Mr. Smith's paper was accompanied by practical illustrations of the method of "shading" barrols, or detecting internal or external irregularities. Barrels, traight and bent, were supported at each end, and Mr. Smith explained the entire process, which has been kept very much as a secret by the very few who really understand it. So delicate is this test that the distortion, produced by warming one side of the barrel with a common candle, was distinctly perceptible. Independently of its practical utility, the "shading" of a gun barrel is an exceedingly interesting optical problem, which has never yet been investigated.

How Genuine Pearls are Prepared in China. Imperfect and contradictory accounts of the mode of pro-
ducing pearls in mussels having at different times appeared, ducing pearls in mussels having at different times appeared, and as the only place of culture is within a few days' journey from Ningpo, Mr. Consul Hague and myself, says Dr. Macgowan, despatched an intelligent native to make enquiries on the spot concerning the art, and to procure specimens in different stages of growth. The following result of these investigations, made on two successive journeys, may be relied on as authentic:
The practice of the art is confined to two conterminous vilThe practice of the art is confined to two conterminous vil-
lages near the district of Teh-sing, in the northern part of lages near the district of Teh-sing, in the northern part of
Chih-kiang, in a silk producing region. In the month of May Chilh-kiang, in a silk producing region. In the month of May
or June large quantities of the mussels (mytilus cygnus) are or June large quantities of the mussels (mytilus cygnus) are
brought in baskets from the Tahu, a lake in Kiang-su about brought in baskets from the Tahu, a lake in Kiang-su about
thirty miles distant, the largest among the full grown being specially selected. As their health suffers on the journey, they are allowed a few days' respite in bamboo cages in the water before tortured for the sake of human vanity, when they are taken out to receive the matrices. These are various in form and material, the most common being pellets made of mud taken from the bottom of water courses, dried, powdered with the juice of camphor tree seeds, and formed into pills which, when dry, are fit for introduction into the unfortunate subject. Molds which best exhibit the nacreous deposit are brought from Canton, and appear to be made from the shell of the pearl oyster; the irregular fragments thus produced are triturated with sand in an iron mortar, until they become smooth and globular. Another class of molds consists of small images, generally of Buddha in the usual sitting posture, or sometimes of fish; they are made of lead, cast very thin by pouring on a board having the impression. Pearls having these forms have excited much surprise
since they first attracted the attention of foreigners a few since they fi
The introduction of the pearl nuclei is an operation of considerable delicacy. The shell is gently opened with a spatula of mother of pearl, and the free portion of mollusc carefully separated from one surface of the shell with an iron probe; the foreign bodies are then successively introduced, at the point of bifurcated bamboo sticks, and placed in two parallel rows upon the mantled or fleshy surface of the animal; a sufficient number having been placed on one side, the operation is repeated on the other. Stimulated by the irritating bodies, the suffering animal spasmodically presses against both sides of its testaceous skeleton, keeping the matrices in place. This being done, the mussels are deposit ed one by one in canals or streams, or pools connected therewith, five or six inches apart, at depths of from two to five feet, in lots of from five thousand to fifty thousand
If taken up a few days after the introduction of the mold these will be found attached to the shell by a membranous section, which at a later period appears as if impregnated with calcareous matter; and finally, layers of nacre are deposited around each nucleus, the process being analogous to the formation of calculary concretions in animals of a higher development. A ridge of nacre generally extends from pearly tumor to another, connecting them all together.
About six times in the course of the season, several tubs of night soil are thrown into the reservoir for the nourishment failing in, as it is highly detrimental to the mussels, preventing the secretion of good nacre or killing them, as the quantity may be great or small.

In November, the shelis are carefully collected by the hand, the muscular portion removed and the pearls detached by a sharp knife. If the basis of the pearl be of nacre, it is not re moved, but the earthen and metallic matrices are cut away, melted yellow resin poured into the cavity and the orifice artfully covered by a piece of mother of pearl. In this state, these more than semi-orbicular pearly pellicles have much of the luster and beauty of the solid gem, and are furnished at a rate so cheap as to be procurable by all who care to possess them. They are generally purchased by jewellers and others, who set them in tiaras, circlets and various ornaments finished in the same manner, and are used as ornaments and amulets on the caps of young children. A few shells are retained with their adhering pearls, for salg to the curious and superstitious, specimens of which have by this time found their way into the principal public and private cabinets of Europe and America. They are generally about seven inches long and five broad, containing a doable or triple row of long and five broad, containing a do ible or triple row of
pearls or images, as many as twenty five of the former and sixteen of the latter to each valve! That the animals should survive the introduction of so many irritating bodies, and in such a brief period secrete a covering of nacre over them all, is certainly a striking physiological fact. Some naturalists, indeed, have expressed strong doubts as to its possibility, supposing the pearls were made to adhere to the shell by some composition; but the examination of living specimens in
different stages of growth, having both valves studded with pearls, has fully demonstrated its truth. A tinge of yellow is found over the whole inner surface of some shells, showing that the more recent secretion of nacre by the suffering nimals was unnatural. The flesh of all, however, is eaten About five thousand families are represented as being en-
aged in this singular branch of industry in the villages of gaged in this singular branch of industry in the villages of
Chung-kwan and Sian-Chang-Ngan; they, however, mainly Chung-kwan and Sian-Chang-Ngan; they, however, mainly
derive their support from cultivating the mulberry and in rearing silkworms and other agricultural occupations. Those who are not expert in the management of the shells lose 10 or 15 per cent by deaths; others, none in the whole season.

Biborate of soda dissolved in water, used as a lotion will remove prickly heat.

The Sun a Probable Cause of Terrestrial Magnetism.
If an electrified body were placed near a moving conductor so as to induce an opposite charge in the moving body, this charge would move on the surface of the conductor so as io remain opposite the electrified body, whatever the motion might be. Suppose the moving conductor to be an endless metal band running past a body negatively charged, the positive charge would be on the surface of the band opposite to the negative body, and here it would remain whatever might be the velocity of the band. Now the effect of the motion of this negative electricity on the conductor would be the of this negative electricity on the conductor would be the ame as that of an electric
o the motion of the band.
o the motion of the band.
If instead of a band the
If instead of a band the moving body consists of a steel or ron top spinning near the charged body, the effect of the electricity on the top would be the same as that of a current round it in the opposite direction to that in which it was spinning.
It might be that the electricity in the inducing body would produce an opposite magnetic effect on the top; but even if
this were so, its effect, owing to its distance, would be much this were so, its effect, owing to its distance, would be much less than that of the ele stricity on the very surface of the top.
If we take no account of the effect of the inducing body, the If we take no account of the effect of the inducing body, the current round the top would be of such strength that it every revithe electricity ind to east by south, it would be rendered magnetic with positive pole uppermost, that is, the pole corresponding to the north pole in the earth or the south pole of the needle.
In order to show that such a current might be produced, a In order to show that such a current might be produced, a
glass cylinder, twelve inches long and four across, was covglass cylinder, twelve inches long and four across, was cov-
ered with strips of tinfoil, parallel to the axis, with very ered with strips of tinfoil, parallel to the axis, with very
small intervals betwean them. These strips were about six inches long and one half inch wide, and the intervals between them the two hundredth of an inch. In one place there was a wider interval, and from the strips adjacent to this, wires were connected by means of a commutator with the wires of a very delicate galvanometer. This cylinder was mounted so that it could be turned twelve hundred revolutions in a minute, and brought near the conductor of an electrical ma-, chine. This apparatus, after it had been thoroughly tested, was found to give very decided results. As much as $20^{\circ}$ deflection was obtained in the needle, and the direction of this deflection depended on the direction in which the cylinder was turned, and on the nature of the charge in the conductor. When this was negative, the current was in the opposite direction to that of rotation. It may be objected that the measurement was not actually made on the cylinder. It must, however, be remembered that it was made in the circuit of metal round the cylinder, and that my object was to find the relative motion of the cylinder and the electricity. Altogether, no doubt it may be taken as experimental proof,
of the fact previously stated, that if a steel top were spin of the fact previously stated, that if a steel top were spin
ning under the inductive influence of a body charged with negative electricity, the effect would be that of a current round the top such as would render it magnetic.
The cause of terrestrial magnetism has not been the subject of so much speculation as many much less important original na. It seems to have been regarded as part of the the sun, as a cause from which other phenomena might result, but not as itself the result of other causes.
Yet, when we come to think of it, it has none of the characteristics of a fundamental fact; it appears intimately connected with other things, and when two phenomena have a relation to each other, there is good reason for believing them to be connected, either as parent and child, or else as brother and sister-the one to be derived from the other, or lse both to spring from the same cause.
Now the direction of the earth's magnetism bears a marked relation to the earth's figure, and yet it can have had no hand in giving the earth its shape, which is fully explained as the result of other causes; therefore, we must assume that the figure of the earth has something to do with its magnetism, or what is more likely, that the rotation which causes the earth to keep its shape also causes it to be magnetic.
If this is the case, then there must be some influence work with which we are as yet unacquainted-some cause wich, coupled with the rotation of the earth, results in mag magnetism, we influence which the sun exerts on this cause. Yet the cause itself cannot be the result of either the sun's heat, light, or attraction. What other influence then can the sun exert on the earth?
The analogy, between the magnetism produced in a spin ing top, by the inductive action of a distant body charged with electricity, and the magnetism in the rotating earth, probably caused by the influence of the sun, which influence is not its mass or heat, seems to suggest what the nfluence which the sun exerts is. If the sun were charged with negative electricity, it seems to follow, from what
the experiments described establish, that its inductive effect the experiments described establer it magnetic, the poles be ing as they are.
The only other way in which the sun could act to pro duce or influence terrestrial magnetism would be by its own magnetism. If the sun is a magnet, it would magnetise the o those of the the , soposite of magnetism would or might, if its materials are magnetic be caused by the rotation of the sun under the inductive action of the earth.and planets in exactly the same way as that caused in the earth by the inductive action of the sun. A thedirection of rotation is the same in both bodies and the
electricities are of the opposite kind, the magnetism would be
of the opposite kind also. So that on this hypothesis it is probable the sun would act by both causes.-Professor Os borne Reynolds, in the Mechanics' Magazine.

## The Hartford Steam Eoiler Inspection and In

 surance CompanyThe Hartford Steam Boiler Inspection and Insurance Com pany makes the following report of its inspections in the month of March, 1872 :
During the month 896 visits of inspection were made, and 1,870 boilers were examined-1,794 externally, and 589 inter-nally-while 174 were tested by hydraulic pressure. The number of defects in all discovered was 1,113 , of which $2^{271}$ were regarded as dangerous. These defects, in detail, are as follows:
Furnaces in bad condition, 45-12 dangerous; fractures of plates, 122-63 dangerous; burned plates, 78- 30 dangerous; blistered plates, 130-13 dangerous; sediment and deposit, 110-18 in dangerous condition; incrustation and scale, 19317 dangerous; external corrosion, 73-17 dangerous ; internal corrosion, 25-7 dangerous; internal grooving, 15-3 dangerous; water gages defective, 59-8 dangerous; blow out defec tive, 19-5 dangerous; safety valves overloaded and in dan gerous condition, 32 ; pressure gages defective, 147-19 dan gerous; these varying from -20 to +10 . Boilers without gages, 9 ; deficiency of water, 16-4 dangerous; broken braces and stays, $60-30$ dangerous; boilers condemned, 12. When such an array of defects and defective fittings as the above is presented, we are aware that some will inquire, above is presented, we are aware that some will inquire,
"What proof have we that they are correct?" All we can say is that each inspector employed by the company is resay is that each inspector employed by the company is required to make report of every defect coming under his
notice, and to sign his name to the same. These reports are notice, and to sign his name to the same. These reports are
kept on file in the company's office, and can be referred to at kept on file in the company's office, and can be referred to at
any time, and each individual defect can be traced out. It any time, and each individual defect can be traced out. It
will be noticed, by reference to these reports, that fractured will be noticed, by reference to these reports, that fractured
plates and blistered plates usually figure high. This can only be accounted for on the ground that much of the iron used in the construction of boilers is of inferior quality. In a recent number of the " Locornotive," we remarked at some length on the subject of laminated iron, showing that, in consequence of that condition, blisters and other weaknesses were developed in the plates of boilers. If care is not used in piling the bars preparatory to rolling, or if the bars are not free from rust and scoria, there will be imperfect welding of the parts, and consequent weakness. It is true that boilers constructed of the best of iron are frequently fractured, and nearly or quite ruined from injudicious managetured, and nearly or quite ruined from injudicious manage-
ment. Requiring more work from a boiler than it is con ment. Requiring more work from a boiler than it is con
structed to bear is a fruitful source of trouble. The only structed to bear is a fruitful source of trouble. The only
safe rule to follow is, "Get the best, both in material and safe rule to follow is. "Get the best, b
workmanship, and take good care of it."

## Gas Mieters.

Wet gas meters are the most convenient and generally used in France, but for many years the introduction of dry meters has been attempted.
The comparative merits of both systems have been often discussed ; one thing is certain, that neither assures a perfect registration. 'The opponents of wet meters argue that the water level should be kept constant, and that the meters must be periodically filled. If too much water is introduced, the flow of gas is checked, and by letting these become too dry the gas does not flow at all.

Between these two limits moreover, the meters vary three or five per cent from the actual consumption. On the other hand, it is urged against the dry meters that their action is
irregular, and that still greater uncertainty is inseparable irregular, and that still greater uncertainty is
from them than is found with the wet meters.
The Parisian Gas Company has undertaken a series of comparative experiments on both classes of meter. At the con clusion of these trials, which have lasted over several years, the company applied to the municipal authorities of the city definitively to suppress the use of the dry meter.
This demand has been complied with, and the Prefect of the Seine has recently issued a decree forbidding the employment of dry meters amongst the gas consumers of the ploym
city.

At the Victoria Institute, recently, Dr. Bateman having called attention to Mr. Darwin's statement that the difference between man and the higher animals was only one of degree and not of kind, he proceeded to show that such could not be the fact, and instanced the faculty of articulate language, a distinctive attribute of which there was no trace in the ape or other animals. After defining articulate language, he demonstrated that it was exclusively man's prerogative, and there was no analogy between it and the forms of expression common to the lower animals. He then stated that it had been thought that a particular part of the brain was the seat of language, and, if it were so, the Darwinian might contend that, as there was a certain similarity between the brain of man and of the ape and other animals, that the latter had the germs of the faculty. He then cited many cases, which had been brought under the notice of German, French, American, English and other surgeons, to show that even whered, the faculty of speech remained. He concluded by stating that the faculty of articulate speech seemed to be an attribute, the comprehension of which was at present beyond us.
THE Adriatic is the name of a new and splendid screw steamship plying between New York, Cork, and Liverpool She belongs to the White Star line. On her first passage to this city, recently, the time made was 8 days 14 hóurs. The
Adriatic is believed to be the fastest ocean steamer afloat.

New Method of Propelling Canal Boats. Notwithstanding the numerous attempts to substitut something better for canal boat propulsion than the wheel or screw, it may be safely said that the majority of mechan ics and engineers still adhere to these time honored devices as being superior to anything else yet produced or likely to be produced for the purpose. The question of position is, however, still a moot-point. Side, bow, and stern have each their advocates, and arguments pro and con are not wanting for either of these positions. Resort to practica experiment can only determine which is the best, and this will, no doubt, soon be brought about, by the action of the New York State Commission and the alluring prize it has a its disposal for the successful competitor.
The inventor of the method illustrated in the accompanying engraving believes the bow is the position for either a propelling wheel or screw, and in order to produce direct longitudinal displacement and obviate side swelle, he proposes to combine one or other of the devices referred to with a tube or passage from bow to stern of the boat tbrough which the displaced water shall pass, while the boat is made to advance correspondingly.
Although we have shown in our engrav ing only the screw thus applied, the ap. plication of a paddle wheel instead will easily be comprehended. No special peculiarity in the engine or construction of the boat is involved, with the excep tion of the longitudinal tube or passage. Ton of the logronal The most appron gineering can, thercore, be applied in the construction of the engine, and its application to driving the propelling wheel or screw. There can be no doubt that the displacement taking place through the tube will obviate side swells. How far power can be economically applied to propulsion in this way can only be settled by actual trial. The inventor desires to enlist capital to enable lim to make such a trial and to compete for the prize offered. Those who would like fuether information or to correspond with the inventor, Dr. L. Heins, can address him till the 20th May at 36 Platt street, New York, care of Sprague and Close, or, after that date, a his residence, Brunswick, Ga.

## Chinese by Telegraph.

The managers of a telegraph company in China have recently solved the problem of how to transmit telegraphic messages in Chinese. At first sight the difficulty of an al phabet which is made up of about fifty thousand distinc characters appears almost insurmountable, but the obstacles have been overcome, and A-Fat at HongKong encounters no more difficulty, in communicating with A.Chum at Shanghai, than does Brown with Jones under similar circumstances The plan adopted is this: Some few thousands of the more common Chinese characters are cut on wooden blocks after the manner of type, and on the reverse end of each is a num ber cut in the same way. Now A-Fat, having handel in his message written in Chinese, the native clerk selects in order the corresponding blocks from the case, and prints off the numbers on their reverse. This he hands to his English col league, who telegraphs the numbers to the destination de sired. Here the reverse process is gone through, and, the numbers having been taken from the cases, the characters ar stamped on paper, and thus A-Chum is put in possession o the cherished wishes of A.Fat through the medium of his na tive language.

## POCKET BOOTJACK.

This device consists simply of a leather strap about an inch in width and eighteen inches in length, which is united at its ends, and slit as shown. The foot, upon which is the boot to be removed, being put through the slit, a pull on the

part, B, by the other foot, is claimed to readily remove the boot. If this invention is effective, there will be a large de mand for it foom travelers and others, who desire an article of this kind which occupies only a small space. Patented Feb. 8, 1870, by Charles Brown, Charlotteville, Va.

Iron Telegraph Pole.
A galvanized iron pole comprising two sections jointed together where the upper one, which is the smallest, screws into the top of the other, has its base set in a box and packed in with cement, concrete, etc. The box is to be planted
in the ground for holding the pole erect. At the top of the box is provided a hub, with arms, extending laterally to the edges of the box; and at the upper entl of this section is ring or collar, for the connection of the upper ends of guys whose lower ends are connected to the lower end of the lower section; while near the center the said guys are stretched over the two ends of a cross tree used for bracing the section Below the collar is a screw threaded ring or collar, employed for forcing the collar upward for straining the guys; and below this ring is another hub, with arms for straining an other set of guys, which are connected at the lower ends of the hub and at the top of the upper section. These guys may be tightened like the others by an adjustable collar, or


## EINS' METHOD OF PROPELLING CANAL BOATS

 burning it in.they may have swivels for tightening them. Any number and lengths of sections may be used, and the tube constituting wise or any be used side by side, and confined together by a band or hoop for strengthening one by the other. If the pole is not to be more thân fifteen or twonty feet high, one section of tube will do, with one stt of guys; but if higher, it will be better o have two sets. The box may have a bottom, as shown in he drawing, for holding the lower end of the pole resting on and connected to it, and the lower hub and arms may be ttached to the top of the box by straps of iron bent ove and nailed to it. But instead of having the box for holding he pole, it may be mounted on a stone or other suitabl base or planted in the ground. The arms at the top of the pole for holding the insulators may be insulated by means of an inverted cap, mounted on the top of a wood, glass, ndia rubber, or other block, placed in the top of the uppe tube. In the top of this cap is placed a composition poin owhich a copper rod or wire is a.ttached with its lower en anchored in the ground to convey away the electricity and onduct pole from becoming a conducole, if preferred If, however, it be desired to use the pole as a conductor, the insulators at the top will be dispensed with, and in this cas the hub at the top of the pole will serve both as a suppor for the message wires and for tightening the guy rods, which may then be connected to it
The message wire supporter and cap which cover the in sulators may be made of malleable cast iron or other suita ble material. The cap is made larger than the cup, at the top of the pole, which holds the insulators and fits over it o as to shed rain.
Mr. Alfred Homer Trego, of Philadelphia, Pa., is the in ventor.

Substitute for Lithographic stone.
A substitute for lithographic stone has been introduced For the purpose in question, the inventor takes a block or slab of slate, or other material, which is to be made per fectly smooth and true, and then coated with glue or othe elatinous matter. In some instances he adds a solution of silicate of soda and bichromate of potash, or uses this solu tion alone. The coated block is exposed to sunlight, and hen washed to remove the superfluous coating; and after being dried, it is ready for drawing or writing upon. The ink or pigment is prepared with albumen or other gelatinou matter, dissolved in a saturated solution of bichromate of potash, either with or without chrome alum, and with mall quantity of ivory black, to render the ink visible. The picture is drawn upon the prepared block with this ink, an exposed to sunlight, and afterwards the surface is covered with gum or glycerin. The block is then ready for the printer. Another method consists in using, as substitutes, metallic substances, as tin, brass or zinc, preparing them first by rubbing with a solution formed of one ounce of hydrochloric acid, one fourth of an ounce of zinc, and one ram of glacial acetic acid. After the plate has received the impression from the stone or wood in an ordinary litho raphic press, or by means of a "transfer," the ink thereon dried by heating the plate, which is afterwards plunged while still hot into cold water; this latter operation being
supposed to confer permanency upon the impression. The ordinary ink is used in this process, which appears to con sist, in reality, of "soldering" the design on the plate and

Underground Rope Tramways in Cermany
The coal mines of the Saar are situated in a hilly district, and this configuration of the country, and the circumstance that the coal measures come up to the surface over a large rea of the district, is singularly favorable for adits and levels, instead of shafts; and although a great part of the coal eds above these adits is already exhausted, they are still used to bring the coal on the surface to the smaller valleys. The wagons or tubs used to be drawn by horses in trains of 15 to 20 ; but this sysem is now abandoned, and the wagons re drawn by stationary steam engines, after being fastened to long ropes or chains. There are now three different ystems of rope tramways in use. The counter rope system has been adopted in ne mine, in an adit 1,024 fathoms long, and in another, 1,420 fathoms; it is also used at a third mine for a length of 800 fathoms. This system consists of two engines-one in the mine, one outside, alternately pulling a train of 30 to 36 wagons out or in, when the end rope runs freely off the winding drum, which is for time disconnected from its engine. The tail rope system, used also at some collieries near Newcastle and Durham, has been adopted in two other places, for 1,400 and 1,020 fathoms of length respectively. With this system a single steam engine is required, which drives two drums in op. posite directions-one hauling in the rope, the other paying it out, when the rope at each end of the tramway.is carried round a sheave back to the engine. The train being connected to one branch of the rope, and the empty wagons to the other branch, the engine pulls the loaded train out, and drags the empty one into me mine, and is reversed after every journey. The endless rope system is in use elsewhere, and consists in one engine driving a rope continuously round in the same direction, when loaded trains are fastened to it on the way out and empty trains on the way in. This system is adapted to short distances. Instead of attaching the wagons in trains it is now found more useful to fasten them singly at certain intervals, so that the tipmen have time to empty one wagon over the or 1 creen before the next arrives. The advanages of the single only in connection with the endless system they can be fully developed. The difficulty of the increasing dead weight of the rope for great distances must be overcome by the adopion of auxiliary engines, and the regulation of their speed can be effected by the use of telegraphs and self acting brakes and governors. The underground transport through the road ways has always been a heavy item in colfieries. There is much still to be done in this matter, and the use of electric telegraphic apparatus in connection with underground trans port is at present far too little valued.

Potash from Corn Cobs.-Dr. Herbert Hazard suggests the use of corn cobs for supplying potash, the ordinary sources of which are rapidly failing. He states that the average yield of corn cobs is 7.62 parts of carbonate of potash in 1,000 parts of the cobs, which is nearly twice as much as the best specimens of wood furnish. The present corn crop of this country will supply $15,400,000,000 \mathrm{lbs}$. of cobs, from which $115,500,000 \mathrm{lbs}$. of potash can easily be manufactured.

GARDENER'S STOOL.
This invention, recently patented by Eliphalet Whittlesey of Mullica, N. J., is intended to afford a convenient support to gardeners in such operations as, without it, would require continued stooping.


The stool is strapped to, and carried by, the foot, leaving the hands free, so that whenever the operator desires he may sit upon the pad or seat. The same device is applicable as a milking stool, and perhaps for other purposes where it is desirable to avoid the fatigue of continued or of ten repeated stooping.

The Engineer states that the oxyhydric light has not proved a success in Paris, and that it has been discontinued in the public lamps on the Boulevard des Italiens.

Narrow Gage in the United States.
Engineering, in an editorial on "Narrow Gage Progress," says: "It is less than a year since the advantages of narrow gage became firmly fixed in the Western American mind; yet to-day nearly all the new lines being constructed or projected in the West are narrow gage.
It is, of course, not to be expected that an English journal should have complete and minute information concerning American railroads; still this extraordinary statement is quite unaccountable.
We make it our business to obtain (and give) information concerning the progress of all new lines whatsoever, and we are very sure that not one twentieth-and probably not one fiftieth-of the lines in progress are narrow gage roads. We are likely to lay track on six or seven and perhaps eight thousand miles of new railroad during the year 1872, three fourths of it in the West. Of this probably not more than from two to three hundred miles will be narrow gage
That there are projected narrow gage railroads to the amount of several thousand miles is not improbable; but then there are probably a million or two miles of standard gage railroads projected, there being not many townships in the United States which have not a projected railroad. We are accustomed, however, to count the railroad only when the rails are laid, the organization of a company signifying little; the letting of a contract, not much; the completion of considerable grading, even, only a prolability (as hundreds of miles of old road beds testify). The slips between the cup and the lip are increased in the case of a narrow gage railroad by the possibility that after all it may be made of the standard gage-a fate that has befallen several promis ing narrow gage projects.
As for the history of the narrow gage movement in this country, not nearly so many lines of that gage are being projected now as were a year ago. Then most of the narrow gage companies were organized by men with no knowledge either of engineering or railroad operation. When these companies have come into the control of experienced rail road men, as they have occasionally, their first step frequent ly has been to adopt the standard gage.-Railroad Gazette.

## mprovement of the Steam Engine.

In a paper read before the Polytechnic Association of the American Institute by Professor Thurston, on the above subject, he summed up his conclusions in the following state ments:

The direction which improvement seems now to be taking, and the proper direction, as indicated by an examination of the principles of science, as well as by our review of the steps already taken, would seem to be:
Stean must enter the machine at the highest possible temperature, must be protected from waste and must retain at the moment before exhaust, the least possible amount of heat. He whose inventive genius, or mechanical skill, contributes to effect either the use of higher steam with safety and without waste, or the reduction of the temperature of discharge, confers a boon upon mankind.
In detail: In the engine, the tendency is, and may probably be expected to continue, in the near future at least, toward higher steam pressure, greater expansion in more than one cylinder, steam jacketing, superheating, a careful use of nonconducting protectors against waste, and the adoption of higher piston speeds.

In the boiler, more complete combustion without excess of air passing through the furnace, and more thorough absorp tion of heat from the furnace gases. The latter, I am in clined to suppose, will be ultimately effected by the use of a mechanically produced draught, in place of $\mathrm{t}^{l}$ e far more wasteful method of obtaining it by the expenditure of heat in the chimney.
In construction, we may anticipate the use of better ma terials and more careful workmanship, especially in the the boiler, and much improvement in forms and proportions of details.
In management, there is a wide field for improvement which improvement, we may feel assured will rapidly take place, as it has now become well understood that great care skill and intelligence are important essentials to the economi cal management of the steam engine, and that they repay liberally all of the expense in time and money that are re quisite to secure them.

A correspondent of the Birmingham Post writes that re cently one of the trains from Liverpool, "which usually stops at Northwich, did not stop there; but on arriving at a point on the line between Northwich and Middlewicb, it slackened speed and finally stopped. After some delay the passengers felt uneasy, and one gentleman walked up to the engine to ascertain the cause of the stoppage, when he found both driver and fireman drunk and lying asleep on the for plates of the locomotive, the steam exhausted, and the fire out." The correspondent added that the driver and fireman have both been suspended. Most reacers will feel that if they had received their deserts, their suspension would have been by their necks.

The Western and Southern Railway Association, at its re cent session in Atlanta, Ga., discussed the questions appointed for the meeting and adjourned to meet at the Kennard House, Cleveland, July 9. Among the questions discussed were: The best means of preventing accidents; responsi biity of railroads for injuries to employees; interchange of cars, mileage and demurrage; the maintenance of agreed rates and contracts; sleeping cars and express contracts brakes and platforms; hight of car buffers; breakage of rails and axles; national time; repairs of foreign cars, etc.

Hydromotor for Ships, Pumps, and other Purposes. The following system, for utilizing the motion of rocking vessels for the pumping and ventilation of sbips, is commu nicated by Mr. Henry Baudouin, of Grass Valley, Cal. In many respects, it is analogous to the system published and il

lustrated on page 15, current volume of this journal; but differs considerably in detail, and, in the employment of com pressed air as an intermediate motor for pumps, adds a new feature which seems valuable. Mr. Baudouin thas describe his method:


In Fig. 1, A is a curved tube, containing a certain quantity of liquid, water or mercury. The two branches of the tube re terminated by two cylinders, of which the upper part is open. In these cylinders are placed two pistons, C, resting on the liquid. The rods of these pistons are fixed to the arms


B, D, of two pumps, P. Below each pump cylinder, E, ar laced two valves, B. According to the principle of the equilibrium of liquids, whatever position the ship may take the tendency of the liquid in the tube A to remain at th

me level, whether the ship roll to one side or the other will cause the pistons to move in the cylinders, E, and so to ork the pumps.
The pressure of the liquid can be directly employed to
work the pumps by terminating the rod of the piston in the cylinder by a T, to the two arms of which are fixed the rods of the pumps placed one on each side. By this means a longer stroke of the pump piston is obtained, but the power is diminished.
In Fig. 2, the cylinders, 1 and 2, perform the functions of ex haustion and force pumps. The pistons, B , have no rods; and to the upper part of each cylinder is attached a tube, $T$, descending to the botiom of the vessel. Two other tubes, C communicate with the externalair; these tubes are furnished with valves, as shown. Supposing the ship to be resting on the keel, with one piston, B , at the bottom and the other at the top of its course: when the ship's side lifts and she roll the the stard, the pre liquid will can to the starboard, the pressure of the liquid will cause the piston in one cylinder to rise, the compressed air between the piston and the upper part of the cylinder will open the outer valve and will close the inner one, while in the cylinder op posite the contrary will take place. When the ship returns on to the port side, the action is reversed; and this will take place at each rolling motion until the water comes into the cylinders, whence it will flow out. We thus have two exhaustion and force pumps, to the pistons of which we can give long strokes.
Fig. 3. As the movements of a ship are far from being reg ular, the power of the liquid can be used to compress the air in a receiver, and this compressed air can be used, as steam is, to work the pumps with regularity. In this case, each cylinder acts as a machine for compression, the pistons have no rods, and the valves act as represented in Fig. 3. The air which flows into the reservoir performs the office of the boiler of a steam engine, the pressure of the compressed air on the inner valves forcing them to remain closed, and the air being led to the engines through a pipe from the top of the reservoir.
Fig. 4. In place of a tube full of liquid, the lower part of the cylinders can be made to open into the sea; placing two cylinders on each side of the ship, in front and behind, a coniderable force for compression can be obtained, and at the ame time the rolling and pitching of the vessel can be util ized. With several cylinders on each side, all along the ship a larger force can be obtained.
I leave to those who have the necessary time and money the work of carrying out this problem. Awaiting this, I suggest the compressed air: 1st, for improving the ventilation dd, for working the pumps; 3d, in substitution of steam for the fog whistles on board of sailing ships.

## Vesuvius and other Volcanoes.

The volcano of Mount Vesuvius, near Naples, in Italy, has lately broken out with violent eruptions of lava, the nolten streams of which had, at the latest accounts, completely destroyed some of the mountain villages, while others were threatened. The lava streams advanced at the rate of three fifths of a mile per hour
The eruption was accompanied by fearful electrical phonomena. Lightning darted incessantly from the summit of the volcano, the quakings of the mountain were violent and trequent, and thunder continuous. Burning cinders, stones, and scorim fell fast and thick in the surrounding towns.
At Naples, ten miles distant from the volcano, dense clouds of smoke and ashes covered the city. The ashes fell in the streets like snow, and reached a depth of two or three inches. The people made use of umbrellas to protect themselves from the ashes. The Bourse was closed and business generally suspended.
The present is the most destructive eruption that has taken place since 1631. The town of Torre del Greco, which is now mentioned as threatened, was, in 1794, utterly over whelmed by a stream of lava which contained upwards of $46,000,000$ of cubic feet. Thick sulphurous smoke, white as snow, resembling the fumes of gunpowder, at that time en veloped the side of the burning mountain, and sometimes rose up in solid masses to an altitude of 14,000 feet, present ing at night time, when lighted up by the lurid columns of fire from the crater, a spectacle of extraordinary magnificence.
The phenomena of volcanic eruptions seem to be chiefly limited to certain regions of the earth whose area is well defined. In some of these, there are continual burstinge forth of flame and smoke, scoriæ and lava, like Stromboli in the Mediterranean, on the coast of Sicily.
Stromboli discharges lava every hour with unceasing regularity, and has done so for the last 2,000 years. Mauna Loa, in the island of Hawaii, is famous for the enormous size of its crater and the incalculable quantities of lava it size of its crater and the incalcula
discharges at irregular intervals.
Sangay, a volcano in Chili, 17,000 feet high, has an erup tion every quarter of an hour, belching out scoriæ and lava with a hideous roar
In the island of Java, there are some forty-six volcanoes, and eruptions are constantly going on.
Iron shipbuilding appears to be rapidly becoming an im portant branch of industry in Denmark. Although for the last fifteen years small iron vessels, designed for trading be $t$ ween the various Baltic ports, have been built at Copenha gen, it is only recently that the construction of large steamers has been attempted. At presentseveral of 1,000 tuns are being built, and one of these, it is stated, will be employed in laying down the telegraph cable between China and Japan. Two steamers, each of nearly 900 tuns-the Rolfe and the Thorwaldsen-have just made the passage to New York
M. Champouillon avers that putrefaction is much more rapid in the dead bodies of alcoholized subjects than in those of comparatively sober individuals.

## Curreymandence

## The Eiditor's are not responsible for the opinions expressed by thetr cor

## New Astronomical Instrument

To the Editor of the Scientific American
At the last meeting of the Natural History Society in this city, Professor Bushee exhibited a new instrument, of his invention, for illustrating the precession of the equinoxes, or in other words, the deviation of the axis of the earth from an exact parallelism with itself; this deviation is about $50^{\prime \prime}$ year, hence the equinoctial points will make (as is well known) an entire revolution in about 25,000 years; and hence also the circuit of our North star is gradually widening and will, in the course of distant future, cease to be our North star and, in about 12,000 years, will appear to move in a circle more than $45^{\circ}$ radius.
The instrument is a skeleton model of our celestial sphere about 18 inches diameter, composed of several light bras rings arranged as meridians and parallels, and one flat ring, with its signs and divisions representing the ecliptic or celes tial equator; within this skeleton sphere, a model sun is ad justed, around which a model earth, with its extended north pole, is made to move by means of appropriate gearing; so that, by the turning of a crank, the principle or modus oper andi of this immense sweep of the terrestrial around the ce lestial pole is clearly made manifest to the observer. Of course no degree of accuracy as to time or proportion can be expected in a model of this íind, yet such instruments are great help to our comprehension of the vast movement going on in the universe
While listening to the lucid explanation and lecture of the Professor, it occurred to me that, to say nothing of our igno rance of celestial things, mankind generally have but a vague conception of the comparative significance or importance of various matters upon the earth. For instance, a model earth 21 feet diameter gives us only one thirty-second of an inch to a mile; on such a globe, one hundred acre farms would of course be utterly invisible to the naked eye, and the lofti est ranges of mountains might be represented by a few grains of rifle powder ; and the entire human family, estimated at one thousand millions, might be gathered without uncom fortable crowding, upon a spot less than one $t$ welfth of a su perficial inch. And the greatest depths which man has yet been able to reach, in the way of mining or otherwise, would ot exceed the thickness of thin card board, and the entir animal portion of the earth now living would scarcely fill child's thimble. The extent of the sensible atmosphere would not exceed one inch and a quarter; and if man shal ever be able to penetrate the earth to the depth of ten miles, it would be but little more than a quarter of an inch on thi 21 feet model; hence the model earth must be many time 21 feet in diameter in order to show to the naked eye any of the great works of mankind on a like scale.
Boston, Mass.
F. G. W.

## Wovernor Evans on Sea Sickness.--Practical

 To the Editor of the Scientific American:Your favor notifying me that a patent had been allowe on my plan for a ship's berth and chair to prevent sea sick ess is received, and I am daily expecting the documents from the Patent Office.
It may be of interest to you to have its history.
A remarkable fact is that my residence is as far removed from the sea and from all connections with navigation as any place on the continent. And although, while Governor of Colorado, in reply to Secretary Stanton's complaint that I, be ing simply a civilian, had noright to press my views, of our de ences against the Indians, on the War Department, I claimed oo be " Commander in Chief of the Army and Navy of Colora o," no sail vessel or steamer ever comes within four hundre miles of the Territory. So you see that it was not familiarity with the sea that directed my attention to the means of voiding sea sickness.
In June, 1869, my wife sailed from New York to Liverpool, in the Cunard ship China, in good health. Though the voyage was by no means a stormy one, she suffered so much rom sea sickness that before landing she was greatly pros rated, and for a month after was confined to bed, and a con siderable part of the time was unconscious and not expected to live. After eighteen months of the best care and medical attention, she remained so feeble that I was satisfied that for her to return home across the ocean, without some efficien means of preventing sea sickness, would be fatal-it would have been little short of suicide. I therefore instituted a general enquiry for some means of avoiding the influence of the motion of the ship in producing sea sickness. To this nquiry, I got uniformly the assurance that it could not be done, a; everything had been tried and failed. The question with me had resolved itself into this shape: I must eithe ave my wife permanently on the other side of the Atlantic ave more to prontic And finding that no reliphl means had ben devised, And finding that no reliable means had been devised, I had no hope except in my own ingenuity. In November, last went to an ingenious mechanic in London and described to him the berth for which you have secured meletters paten He told me it would not answer the purpose, and declined to make one on that account. But from my observation of the sickness on ship board being increased, by the rolling and pitching of the vessel and its subsidence when the sea be came calm, I was satisfied that sea sickness was caused en tirely by the deviations from a horizontal position of the support of the patient, caused by the rolling and pitching o the ship-and that the berth I proposed, by keeping the pa tient, or his or her support, constantly in a horizontal position,
would prevent the sickness. I therefore, with the permission of the mechanic, went to his workmen and had a berth con structed as represented in the application made to you for a patent. I had it putin the place of one of the ordinary berth on the steamship Russia, and my wife came over on it last December. Although the passage was a very stormy one and a large number of the passengers suffered greatly frnm sea sickness, she came over without suffering the slightes f any change in her predisposition to suff from sea sick ess was proved by the fact that her head would immediat commeniming when she would get out her if the ship was rolling, and it would only cease when she re turned to her berth. The berth kept her supported in a horizontal position during all the varied motions of the ship, and aved her from any sickness, and I have no doubt saved he saved her from any sickness, and I have no doubt saved her
life. Necessity was, emphatically, the mother of this inven ion, and I doubt not it will prove a great blessing to all who suffer sickness from crossing the ocean. Its successful oper ation, during the voyage, was witnessed by a large part of the passengers and officers of the ship, Senator Stewart of Ne vada, Governor Ward of New Jersey, Governor McCook of Colorado, and other prominent persons being among the number. It has already been patented in Great Britain France, Italy, and the United States.
As the berth takes little more room than those in ordinary ase, and can easily be putin all vessels of ordinary construcion at a moderate expense, I feel confident of its early in roduction into general use. I have already the offer of the officers, of one of the popular lines of steamships plying be tween New York and Liverpool, to put the berths in thei hips.
Denver, Col.
John Evans.
Swing Machines and their Efect upon Health To the Editor of the Scientific American:
Reading your article, in No. 16 of the current volume, with the above title induced me to write the following, in the ope that it may benefit those interested. My objection after an experience of five years, to some machines, ar hese
1st. Many makers place the machines too far back from he front of the table, causing the operator to lean towar , particularly when near sighted.
2 d . In many machines, the fly wheels are too light for the power required to keep up the momentum, making it a con inual effort to keep the machine in motion
3d. Any machine in which the work runs across the fron of the table, instead of from the operator, is very objectiona le, as persons unconsciously lean over the machine to direc heir work, producing a pain in the back or neck; beside which, having to pass large articles over the lap is very ncomfortable and fatiguing in warm weather.
These objections can be remedied by makers who will leave the old beaten track and construct machines on more hysiological principles.
Until such changes are made, I would suggest that some one invent a sewing machine chair, to be made inexpensivel with cane seat, which can be raised or lowered with a screw like a piano stool, and with a moderately low back, like school chair. This would permit one to lean well backwar o rest while basting, etc. The revolving seat allows a per son to turn to or from the machine, avoiding lifting th chair each time, and the seat should be raised until the la nclines downward to the knees, which position allows the ower muscles their full action. A chair of this kind can e set much closer to a machine than any other, if the base made like a tripod
Persons who use a piano stool find it preferable to an or dinary chair. By carefully cleaning and oiling both the motive and operative parts of the machine regularly, and using this improved chair, keeping the body erect, almost any one would be able to sew continuously with little fa tigue.
Three to five minutes, each morning, spent in cleaning the machine will give an operator an ad rantage of an hour r more in a day by economizing strength. Sewing will hus be more beneficial than otherwise.

A Texas Subscriber.

## merican Silk Manufacturing, Silk Throwing Weaving, and Locomotive Building, at Paterson, N. J.

To the Editor of the Scientific American
During the last few years, rapid advances have been made in this country in the manufacture of silk goods. Whil topping for a day at Paterson, N. J., accompanied and guided by Mr. Frederic Baare, of the Baare Silk Manufac uring Company, I saw more of this manufacture going on than 1
We first entered a room, where girls were engaged in assorting the skeins of raw silk, taken from the sacks in which it was imported from Japan, China, Italy or France. he raw silk differs as much as wool in size and quality of read. Before it can be wound, it is necessary to remove he gum which is left on it by the silkworm. This is done by soaking it in soap and water. To remove the soapy wate without injuring the silk has, until recently, been a very difficult matter. This difficulty has been entirely overcome by a machine, the invention of a member of the French Academy, lately deceased. The essential portion of the ma chine is a tub, similar in shape to a large wash tub, the ides of which are a series of rings one above another with pen spaces between. The skeins are carefully lifted from the vats and laid into this tub around the edge. The tub is
hen made to revolve rapidly around a vertical shaft, and he water is driven out, by centrifugal force, through the chinks in the sides. To keep the water within bounds, the revolving tub is cased with another having close sides and perforated bottom. By this means the silk is quickly mad ufficiently dry for winding. A similar application of the entrifugal force I lately saw at Herkimer, N. Y., in a con rivance for extracting honey from the comb without break ing the latter, thus enabling the bees to "gather honey all the day " without the loss of six days in seven in making wax. In the winding room, the skeins are put upon reels rom which the silk is wound off upon bobbins. In the room isited were nearly 5,000 reels, arranged in rows on long rames, 224 on a frame two persons attending to one frame From the winding room, the bobbins are taken to the oubling room, where the silk from two, three, or four bob ins is wound together upon one. The spinning follows, which is done on what are called three deckers, or thre tory spinners, on which 12,000 spindles made music enough or a Boston jubilee, and not less melodious, perhaps, i ightly heard, than the harmony of which the Rev. Rober Collyer speaks as resulting from 2,000 discords. The pro Cesses above mentioned, by which the silk is prepared for he loom, form a distinct branch of the silk business; those ngaged in it are called throwsters. In this instance, the eminine termination, ster, has not, as in many cases, lost it significance, the employees being mostly females. The establishment visited was that of the Ryle Silk Manufactu ring Company.
We next visited the works of the Baare Manufacturing Company, where we witnessed the operations of warpin and weaving broad silks. They have some forty looms, and re now engaged in making plaid silks of various pattern or ladies' scarfs. Mr. Baare is one of the pioneers in th silk business in this country. Several years ago, he started factory in Schoharie county, N. Y.; but afterwards, in orde o secure better facilities, he removed his machinery to Pat rson, N. J. He showed me some pieces of beautiful dress ilk of his own manuifacture.
In the same mill is the ribbon factory of John Day \& Co Here are 46 long looms, on each of which from 10 to 40 rib bons are woven at once, the exact number depending upon the width of the ribbon. There is a distinct shuttle for each ibbon, but they all move simultaneously. Ten yards is bout the average daily product per shuttle, and the entir weight of silk used per day, about 100 pounds. In one loom was the warp for 14 six inch ribbons, each 240 yards long Mr. Day has lately patented an improvement in ribbon looms y which all strain on the thread of the warp is obviated
Mr. Strange, of the firm of William Strange \& Co., Secretar of the American Silk Manufacturers' Association, took me hrough his factory, and gave me some interesting fact This factory employs about 500 operatives, and combines th hrowing of silk and the making of ribbons, trams, and or anzines, running 100 looms. It is estimated that 6,000 pe ons are employed, that $\$ 2,000,000$ wages are annually paid and that some $\$ 10,000,000$ capital is invested in the Paterso ilk factories.
Paterson has other extensive manufacturing establish ments. I spent half an hour in a hasty walk through the Rogers locomotive works, where I saw the various piece which form the "iron horse" being shaped and fitted for heir places.
The Falls of the Passaic, the water works, and the hight which overlook the busy, thriving city occupied our atten ion for an hour, in pleasant contrast to the din and bustle of he factories.
Paterson, N. J
c. h. Dann.

## To the Editor of the Scientific American:

A short time since, I noticed an article in your paper rela tive to the production of a concentrated extract of hemlock or oak bark. Every chemist knows that the reduction of annin into gallic acid is due to the action of ox.ygen. With out going into a detailed discussion on the modus operandi llow me to say that if a suitable vessel (not iron) is used nd the tan liquor is placed therein, covered with a dee layer of hydrocarbon oil or paraffin (sufficient to protect rom the action of air), and heat applied, a superior extrac is procured. Heavy oils that have a high boiling point only are to be used, and any degree of concentration may be se ured. I have repeatedly carried out this experiment, and now give it to the public, having no facilities for engaging in the manufacture, and believing it to be, valuable to those ho have.
Troy, N. Y
George Vining, M.D

Frozen Beef Essence.-Dr. H. B. Hare (Philadelphia Medical Journal) writes that, in a case of scarlet fever in a child, the patient could not be induced to swallow the bee ea which his condition required. As he took ice with avidity, the father suggested that if the beef tea were froze he might then be induced to take it in that form. The sug estion was carried out, and the child took the frozen bee tea readily. This expedient may, in many cases, be advan tageously adopted.

AT some of the English works, slag is now broken up by Blake's stone breaker, and sold for road making; and we ar told that the Bessemer slags, from the iron ore known a hematite, make excellent concrete, because of the large quan tity of lime they contain; for which reason, and for the sili ca which they also contain, they make excellent manure for
potatoes and barley. In the fields, the broken slag crumbles to powder.

## biscuit mandaficture.

Civilization and biscuits go together; indeed, it is only in very highly civilized countries that biscuits are made, although we are unable to call to mind the name of any nation, civilized or savage, by which they are not more or less highly appreciated. Messrs. Huntley and Palmer, of Reading, England, are perhaps the largest producers of biscuits in the world. Their buildings cover a very extensive area; at present not less than 1,800 persons find full.occupation, while in busy seasons-as, for example, about Christmas-as many as 2,000 have been at work.
About 100 different varieties of biscuit are made by Huntley and Palmer; and they are continually inventing new biscuits and cakes. Speaking of cakes, we may add here that the firm turn out fabulous quantities of tea cakes, forty tuns being no uncommon order, Bristol cakes, sponge and supper cakes, with which they supply confectioners' shops all over England. With one or two exceptions all biscuits are produced in the same way. A dough is first made, and this is then stamped into biscuits, which are subsequently baked, boiled, and variously manipulated, according to the species. We first enter the mixing room, in which are five or six machines used for making fancy doughs, and about as many used for plain biscuits. The "fancy" machines consist each of a miniature mortar mill, the cast iron pan of which is about 4 feet 6 inches diameter, and a foot deep. This revolves at some fifty revolations per minute under a single heavy roller, nearly as wide as the semi diameter of the pan. In some cases the rollers are smooth, in others grooved. An. attendant stands by each pan, and is supplied with the requisite proportions of treacle, sugar, butter, lard, whipped eggs, milk, etc., in large round iron buckets or drums. Over each pan is a canvas shoot, down which the requisite quantity of flour for one batch descends when required. The attendant is armed with a great wooden spatula or shovel, with which he turns over and mixes the materials, which are quickly reduced to a emooth homogeneous mass by the roller. From the pan the mass is transferred to barrows, where we shall leave it for a moment
The "plain" mixers are horizontal cylinders, about 3 feet diameter and 4 feet long, traversed by a horizontal shaft armed with knives, by the rotation of which the body of materials is quickly reduced to the condition of dough. The bottom of the cylinder is then allowed to fall down by a very ingenious piece of mechanism, and the contents put in barrows.
The next process consists in converting the dough into sheets and stamping it into biscuits. The machinery used is ingenious and perfect.
The dough is passed between a pair of breaking rollers, under which runs an endless web of pure white felt. As it passes through the rollers it falls on the web, and is carried back to the attendant, who, again seizing the end of the sheet of paste, puts it between the rollers. This operation is re peated twice. The third time, after the dough-now in a sheet some 8 feet long, and 2 feet 6 inches wide-has just begun to issue from the breaking rollers, it is laid hold of by a
boy and placed on a second endless band running up an in boy and placed on a second endless band running up an in cline and lying at a higher level than the endless belt just named. This second belt is of a very thick pure white felt. It travels round a roller, about 12 inches in diameter, 8 roller. Round the belt roller the sheet of dough, clinging closely to the felt, is earried. Opposite the roller is a vertical frame oscillating on pins at the lower end. The upper end of this frame carries a set of swing stamps. The frame, recedes from the roller. As it approaches, the swing stamps recedes from the roller. As it approaches, the swing stamps
assume a horizontal position and strike the sheet of dough, assume a horizontal position and strike the sheet of dough,
which is caught between the stamps and the roller. The former each cut out a complete biscuit of the required form. As the swing frame retreats, the stamps assume a vertical position and deposit the biscuits on a third endless band, by which they are carried to a set of open wire trays on which to be baked. They are quickly arranged on these by a boy. It is obvious that, as the biscuits are of various irregular shapes, much of the dough is left between the stamps. This falls on a short endless web under the machine, by which it is carried to an attendant who takes it away to be worked but before proceeding to the tremely curious way in which some of the smaller biscuits such as "ratafias," "cocoa nut," and one or two others, are made by hand.
The dough for such biscuits is incorporated in special mixers, simply large wooden boxes within which a horizonta shaft armed with paddles or spades rotates slowly, thoroughly incorporating the ingredients. The resulting dough, un like that used for ordinary biscuit-which is very hard and
leathery in consistence, the smallest possible quantity of fluid being used in its preparation in order to insure crisp ness-is, in the case of "ratafias," "cocoa nuts," etc., semi fluid. In other words, it is a thick paste. Proceeding to another department but a few yards off, we find eight or ten
white capped, white aproned men hard at work making the white capped, white aproned men hard at work making the vided with a kind of waterproof bag, capable of holding a pound or so of dough. The bag has at the lower end two tin orifices, jets, or tubes. The bag being supplied with the proper cuantity of dough, the upper end or mouth is $t$ wisted up to close it. The bag is then grasped by the workman in a way impossible to describe. By squeezing the bag, the dough can be made to flow out of the tubular orifices. Op-
posite each man is a sheet of that peculiarly thin paper with posite each man is a sheet of that peculiarly thin paper with
which everybody who eats sweet biscuits is, no doubt, famil-
iar. Holding the dough bag over this sheet of paper, the
workman, beginning at the left hand side of the sheet of workman, beginning at the left hand side of the sheet of
paper, squeezes the bag gently, and thereby forces out $!\mathrm{wo}$ big the bag, and behold two ratafias on the paper ready to be baked. A slight motion of the hand to the right, another squeeze and a jerk, and two more biscuits lie in a line with the first, and so the operative proceeds line after line till his paper is filled. The operation is very simple to look at, but it requires great sleight of hand, to work at a high speed and yet make all the biscuits as nearly as possible of the and yet make all s apidity with which a man will cover a large same size. The rapidity withwhich a man will cover a large
sheet of paper with little dabs of biscuit dough is really resheet of paper with little dabs of biscuit dough is really re-
markable. The whole operation constitutes one of those markable. The whole operation constitutes one of those
feats of manipulation, perfection in which can only result from long and careful practice.
We may now proceed to consider the means by which the biscuits are baked. On the ground floor are eight or ten ovens of very large dimensions. These are all heated by hot air flues from separate furnaces. The general principle consists in depositing the unbaked biscuits on an endless web of wire or of flat bars of iron, which, continually moving through the oven at a velocity regulated by the size and nature of the biscuits to be baked, carries them through in from five to ten minutes. The biscuits are continually fed in at one end, and are continuously delivered into hoppers or boxes placed to receive them at the other. The delivery ends of the ovens open into the sides of a long and rather dark passage. No machinery is to be seen here, nor any trace of fire-nothing, in short, but a series of long, narrow, horizontal openings, like that of a gigantio letter box, in the walls, and beneath these the boxes to receive the biscuits. These last come tumbling through the wall without visible cause, at short intervals, in ten or a dozen at a time, just as though the street ran outside the wall and a great public, who used biscuits instead of letters as a means of corresponding with their friends, kept on posting biscuits all day. The incautious visitor who picks up one of these in coming morsels is likely to feel sensations of keen regret immediately afterwards, the biscuits being quite hot enough to inflict a mild burn.
A very large proportion of the biscuits thus made are fin ished as soon as they are baked, but this is not true of allsome require to be ornamented. This o-namenting is effect ed in various ways. In some cases a glaze of sugar properly colored is put on before they are baked; in others the biscuits proceed to the fine art department. Here we have a light, airy studio, in which we find four or five artists-we can find no more suitable title-some engaged in decorating supper
cakes, others building up a magnificent wedding cake, care cakes, others building up a magnificent wedding cake, carefully preserved, during such time as the builder is not at
work, under a class shade; others again are at work on bis work, under a glass shade; others again are at work on bis-
cuits-pretty little things for dessert; some of these have a bright red sugar glaze on them; these are being decorated with ships, swans, roses, branches, or geometrical patterns. The pencil used by the artist is simply a bag, similar to that used in making ratafias and already described, with the ex ception that it is very much smaller, and fitted with but one small nozzle, the hole in which is less than a sixteenth of an inch in diameter. The white thick pigment used by the ar tist is simply a preparation of white sugar, and with this pencil he turns out all manner of dainty devices, with a skill, aste, artistic feeling, and endless powers of invention which nust be seen to be appreciated as they deserve.
We have stated already that biscuits are sometimes boiled Two or three sorts are thus treated; of these we may parti cularise the very light crisp cracknels, triangular in shape
with the corners turned up. The boiling process is one of with the corners turned up. The boiling process is one of
the most curious conducted by Messrs. Huntley and Palmer. $t$ the top of the house, in a little out of the way room, we find a large cauldron, heated by steam and nearly full of wa ter boiling away merrily. Into this cauldron the cracknels are thrown just as they come from the stamping machines, hey sink at once to the bottom, where they remain for they float up to the top, and are skimmed off with a wire skimmer. They are then sent down stairs to be baked.
A very large portion of Messrs. Huntley and Palmer works is devoted to the operations of sorting, packing, and ending out goods to all parts of the world. We cannot give better idea of the magnitude of the trade than by stating that the average output of biscuits suffices to occupy
fewer than thirty railway trucks per day.-Engineer.

## Soap a Source of Skin Diseases.

Obscure affections of the skin, of the face of men especially are well known to specialists to be widely spread. They are commonly classed as elzzema, and, while causing great dis omfort, ispecially at night, show nothing, or almost nothing to the eye, if the patient be otherwise in good health. Skin
specialists frequently ask patients whether they have been using any new sort of soap, but no one seems hithert to have traced any distinct communication between soap and this troublesome disease.
It is a fact, bat very little known to the multitude of both sezes who use the "Prime Old Brown Windsor Soap" of the perfumers' shops, that by far the largest proportion of it is manufactured from "bone grease." Few more beautiful examples of chemical transformation are to be found in the whole range of chemical manufacture than this one. At one end of a long range of buildings, we find a huge shed heaped up with bones, usually such as are of little value to the bone turner or brush maker, in all stages of putrefaction as to the adherent or inherent portions of softer animal These are crushed and ground to $a$, coarse powder, exposed
mater attached to them, the odor or
to the action of boiling water under pressure, sometimes of team, until the grease and marrow are extracted.
We need not here pursue the subsequent treatment of the rest of the material from which bone glue and "patent isinglass " are prepared, the latter of which we often eat in the soups and jellies of the pastrycooks, and finally to the "bone dust" or phosphate of lime, nearly free from animal matter, which is produced for the use of the assayer and the china manufacturer, etc., as well as for other purposes in the china
arts.
But

But let us follow up the bone grease, which is of a dark arry brown color, and of an abominable odor.
By various processes it is more or less defæcated, bleached and deodorized, and is separated into two or three different qualities, the most inferior of which goes to the formation of railway or other machinery greases, and the latter is saponified, and becomes, when well manufactured, a hard brown soap, still, however, retaining an unpleasant smell. It is now, after being remelted, strongly perfumed, so that, like the clothes and persons of the magnates of the Middle Ages, its own evil odor is hidden by the artificial perfume.
This is the "Fine Old Brown Windsor Soap" of most of our shops. The natural brown color of the grease gives it the right tint in the cheapest way, without the coloring by caramel, which was the original method of the manufacturer Like all other things, there are cheap and dear Windsor soaps; and for the production of the former, little is done be yond saponifying and casting into blocks or bars. Were we to rely upon the many experiments that have been made as to the degree of elevation of temperature at which putrescent or other contagious matter is deprived of its morbific power, we might conclude that boiling and saponifying had made this hitherto putrescent grease innocuous.
It seems, however, more than doubtful that such is the fact in this case, for the soap thus made seems to be capable of communicating skin diseases when rubbed on the face for use in shaving.
But another promoter of irritation is not unfrequently also found. Whether it be that it is more profitable to the soapmaker to have a liberal proportion of the finer particles of the ground bone made up with the soap, or that these are difficult to separate completely, the fact is that bars of this "Brown Windsor" soap are to be bought containing a rich mixture of those small sharp angular fragments of bone which before boiling was putrid. When a piece of such soap is rubbed hard to a man's face, the skin is more or less cut and scored by these bony particles held in the coap like emery in a head "lap," and thus the skin is placed in the most favorable state to absorb whatever there may be of irritant, or contagious, or putrid in the soap itself. The ex istence of the bone fragments is easily verified by solution
of the soap in water or alcohol, and examination of the unof the soup in water or alcohol, and examination of the un
dissolved particles with a lens; and I can readily, if need be, dissolved particles with a lens; and I can readi
send you a piece of such soap for examination.
Now, without occupying too much of your space, I may just state that I have, while using such shaving soap, thrice suffered from ekzema of the face. On the first occasion, d srived no benefit from treatment by the two most celebrated dermal surgeons in London, and at last the disease went away of itself after giving up shaving for a time. I had by me a quantity of this brown soap, and through. inadvertence took to using it again, for a time without effect; but when dry and hot weather came, with it came a recurrence of the skin disease, which also again, after some months of discomfort went away. Curious to make sure whether or not the soap as the real cause, I a third time employed the soap delib erately to see if the ekzems was due to it. I was in excellent health, and in about three weeks I found the disease re established, so that I think the soap must be viewed as found
guilty. Good white unscented curd soap is now my resource, guilty. Good white un
and with no ill effects.
Ekzema is always a distressing complaint even when af fecting those in the most robust health. With those of bad constitution or lowered health, however, it seems to debly this no bad or inractaled deemed useless or uncalled for $-R$. M., in Nature.

Test for Sulphur and Phosphorus in Iron.-M. K. Meincke recommends the use of chloride of copper in place of that of iron, the former presenting the advantages of much greater facility in filtering the various solutions and liquids, and of producing more precise results. The method mployed differs little from that in use by metallurgical chemists. The iron, finely divided, is dissolved in the chloride of copper, then the metallic copper is separated by means of an excess of chloride of copper and common salt the solution is then filtered through asbestos, which detains the in-
soluble particles, and the latter are then oxidized by means soluble particles, and the latter are then oxidized by means evaporate with hydrochloric acid; lastly, the sulphur is precipitated by barytes in the form of sulphate, and the phos my modic a

A Museum of Working Models.-A correspondent, E. J. ., suggests, as an addition to the art museums the erection ions of working models of machinery. He maintains that such an exhibition would be a popular sight and a pecuniary success; and he believes that profits would be realized sufficient to make a dividend among the exhibitors. This scheme has been frequently proposed, and in a few instances tried, with pecuniary loss. There is so much working machinery to be seen in every town and village that it is doubtful whether a permanent exhibition, such as proposed, would pay expenses.

## Improved Water Gate.

Our engraving illustrates the construction of an improved water gate, which comprises valuable and new features and to which we call the attention of hydraulic engineers as probably being, for some parposes, superior to others which have preceded it. The water flows through a straight passage, and the construction is such that, with minimum size, a large proportional flow is obtained. The parts are accessible and easy of adjustment, and the whole combination will, we think, commend itself to those competent to judge of such matters. The valve can be used for gas or steam, and has much to recommend it for these purposes. The gate, as will be seen by the description of details below, is easily operated, even under great pressures. The extreme compactness of this gate, its automatic drain, and the peculiarly constructed resting place of the double wedge ing place of the double wedge,
whereby an unobstructed rewhereby an unobstructed re
cess for sediment is secured cess for sediment is secured are also features which will impress those of our readers who are familiar with the re quirements of a good water gate. The stem packing is re markable for its compactness, durability, and effectiveness.
A, Figs. 1 and 2, denotes the shell or case of the valve through which a straight pas sage for the flow of water or steam is made. Two seats, $a$ Fig. 1, are formed on the in Fig. 1, are formed on the internal opposite sides of the passage, against which the two valve disks, $b$, close. $B$ is the bonnet, the flanged base o which is connected with the flanged top of the shell by means of bolts or screws, $c$ passing through the two flang es. C is the stem, which extends down through the neck of the bonnet and carries on its lower end a flanged traversing nut, $D$, to which the valve disks, $b$, Fig. 1, are affixed. On the stem is an annular collar $d$, which is disposed within the neck, $e$ of the bonnet and rests neck, $e$, of the bonnet and ress upon a brass or metallic wash. er, $f$, which, of the chamber, $g$ the bottom of the chamber, $g$, of the neck. I is a screw nut,
which screws into the neck which screws into the neck
and down upon the collar, $d$, serving to prevent any longi tudinal movement of the stem, while it allows it to rotate upon its axis. For the purpose of perfectly packing the stem there is formed on the lower surface of the screw, I, a circular V shaped rib, $i$, which fits into a correspondingly formed depression or groove made in the upper surface of the collar, $d$. A similar shaped annulus or rib, $k$, and a cor responding channel are formed respectively on the under surface of the collar and the top surface of the washer, $f$.

Anotier and similar annular rib, $r$, and fellow groove are formed respectively on the under surface of the washer and the bottom of the chamber, $g$. All the series of annular ribs are ground and so formed that the apices of their angles shall not impinge against the bottom of the grooves, but so made that each shall have tiwo bearing surfaces upon oppos ite walls thereof, whereby a double protection is afforded at each joint. These ribs being forced down upon their seats by means of the screw, $I$, with any desirable, degree of force, a most perfect steam or water tight connection is insured. The disks, $b$, are guided in their vertical movements by means of channels, formed respectively on the opposite sides of the disks, operating in conjunction with vertical ribs, $m$ disposed on opposite walls of the shell, as shown in Fig. 2 Each of the disks is connected independently and loosely with the flanged traversing nut, $D$, and each has two inclined with thes 0 Figs 1 and 2 formel in its inner face to receive recesses, o, Fgs. 1 and 2, for tho two wedges, $n$, plate, E , through which the stem slides, this plate being stopped in its downward movement by means of projections
or lugs, $l$, disposed on the inner surface of the valve shell, or lugs, $l$, disposed on the inner surface of the valve shell, as shown in Fig. 2. G is a recess or chamber, formed underneath the disks when at their lowest position, which receives any sediment which may be in the water or which may be re moved from the valve seats by the closing of the disks.
The employment of the double wedges is designed for large sized water gates, they being especially useful when the valve plates used are more than a foot in diameter, as a single wedge arranged centrally between the two disks would admit of too great oscillation of the diskswhile being opened and closed.
The operation of the disks and wedges is as follows:
To close the valve or the disks upon their seats, we have simply to rotate the screw stem in the proper direction. The disks being hung to the traversing nut, D , and carrying the wedge plate and wedges between them, will be forced downward until the projecting ends of the wedge plate strike upon the lugs, when the wedges become stationary and, by their action against the inclines on the inner faces of the disks, the latter will be forced in close contact with their seats. To open the digks; the stem id to bo xotsted in the opposits

begin to start, they are instantaneously relieved from thei pressure against their seats, so as to produce but little fric- bil tion or wear of either the disks or their seats. The employ ment of the two wedges, arranged as described, serves to preserve the disks from too great lateral play under the pressure of the water or steam while being operated.
The automatic drain is constructed as follows
H represents a rubber spring fitted into a boss cast on the bottom of the shell; this spring is enough smaller than the hole in the boss to leave the drain, K. F is a white metal washer with a conical shaped seat fitted to the size and shape of the upper end of the rubber spring. $P$ is an iron pin firm y fitted into the top of the spring; this pin is of sufficient
and who have thereby made a notable reduction in their coa
bills. bills.
It is claimed that, while one third or more of the fuel ordinarily used for heating or cooking may be saved, other con veniences, such as the perfect control of the heat and the easy preservation of the fire during the night, etc., are secured by the device, which costs little and requires very little attention to operate it.
Fig. 1 is a perspective view, and Fig. 2, a section of the ap paratus. It consists of an external and internal sheet iron ase, the annular space between which is filled with some solid material in lumps, hard coal being the handiest and most preferable substance for the purpose. There are two dampers, as shown. When both are open, the gases of com bustion escape through the center of the regulator directly to the chimney. When the upper oneis closed and the lower one opened, the gases take the direction of the arrows, passing into the annular space through slots in the inner shell and traversing the interstices between the lumps of coal, and are retarded in their course, thus being rendered less sensitive to external winds and currents than would be the case if than woussed be the case if they passed directly to the chimney. The draft thus produced is steady instead of fitful, and the coal, becoming heated, radiates its heat into the apartment. The radiating surface is large, owing to the fragmentary state of the material, and the extraction of the heat from the gases can be carried to the utmost extent consistent with the continuation of the draft.
The lower damper, when used, lengthens the distance which the gases must traverse through the interstices; and by the proper adjustment of the two, the consumption of fuel is controlled without danger of extinguishing the fire. Patented Feb. 7, 1871. For further information address S. H. Twitchell, 27 Bedford avenue, Williamsburgh, N. Y. [See advertisement on an-

PEET'S IMPROVED WATER GATE.
way when the valve is open or the disks sufficiently raised. nut, $T$.
This invention was patented March 19, 1872, and further information may be had by addressing the Peet Valve Co 152 Hampden street, Boston, Mass.

TWITCHELL'S DRAFT REGULATOR AND HEAT ECONOMIZER
The accompanying engraving illustrates an attachment pplicable to any kind of stove or range, the object being to

regulate the draft and more fully extract the heat from the gases of combustion than is done by the ordinary dampers in | use. |
| :--- |
| The | iple on which it operater must c , whie, we judge, the prin claimed for it. Thers clalmast are suetained by a large ntom-


 The attachment is neat in design, while, we judge, the prin.
other page.]

## COMPRESSED AIR LOCOMOTIVES.

In a recent article on the use of compressed air engines, the editor of Engineering expresses the opinion that the proper way, to prevent the great reduction of temperature which necessarily attends the expansion of air, through the engine, from its compressed state, is to apply heat to thy main reservoir and to the engine cylinders; and that the best way to do this is by means of a jacket supplied with hot water. On a street car, weighing with load six tuns, it is estimated that 318 pounds of hot water would furnish the necessary temperature. It is also estimated that to drive such a car, for a distance of four miles at the rate of eight miles per hour, will require the employment of 170 cubic feet of air condensed to an initial pressure of 300 pounds to the square inch. This supply of air could be packed into thirty-four wrought iron tubes 10 feet each in length and 95 inches interior diameter. Such a locomotive length and $9 \frac{5}{8}$ inches interior diameter. Such a locomotive pared with steam, but might be highly advantageous where pared with steam, but might be highly advantageous where
steam cannot be used, as, for example, on street railways or steam cannot be used,
city railway tunnels.

## Minatacture of American Sewing Machines in

Scotland.
The Howe Sewing Machine Company of Glasgow, Scot land, has recently held in that city the first annual social meeting of the employees. Mr. F. M. Tower, the chairman of the meeting, informed the audience that the manufactory in Glasgow was only an offshoot from the American one which has been in operation for many years. One of the which has been in operation for many years. One of the
chief motives of the Company in transferring a portion of chief motives of the Company in transferring a portion of their production to that country was the conviction that it
was needed. Within less than five years the Conspany's was needed. Within less than five years the Conspany
production had increased from 50 to 500 per day. After giv an great works at Bridgeport Connecticut, and at Peru, in one of the western States, Mr Tower mentioned that the demands now are for $50,000 \mathrm{ma}$ chines per annum, and that ground extending to 8,000 or 9,000 square yards has been secured in the east end of Glas gow, on which very extensive works are to be erected forth with. The Company sell their machines in England at half the price they charge for them here, and still make immense profits. In this country, under the cover of the Wilson and other patent monopelies, they are enabled to charge extor tionate rates. It is to be hoped that Congress will refuse to extend the Wilson patent.

In is found; is Canada, that 100 1ber of peat will last longe than hale a cotd of pood for locemotion fiteh,

## Erientifir Gmariam.

MUNN \& CO., Editors and Proprietors. published weekly at
mo. 37 Pari bow, (Pari building) hew york. $\begin{array}{ll}\text { o. d. mUNN. } & \text { A. r. beach. }\end{array}$
'The American News Co.," Agents, 121 Nassau street, NewYork. "The New York News Co.," 8 Spruce street, New York. tor A. Asher \& Co., 20 Unter den Linden, Berlin Prussia, are Agents

VOL. XXVI., No. 20. [New Series:] Twenty-seventh Year
NEW YORK, SATURDAY, MAY 11, 1872.


## Importance of Advertising.

The value of advertising is so wellu understood by old established busines
firms, that a hint to them is unnecessary; but to persons estahlishing a new firms, that a hint to them is unnecessary; but to persons establishing a new
business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the impor tance of advertisling. The next thing to be considered is the mediun through which to do it.
In this matter, discretion is to be used at first; but experience will soon
determine that papers or magazines having the largest circultion determine class of persons most likely to be interested in the article for sale, will be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the vendors of any new article in the mechanical
line, we believe there is no other source from which the advertiser can line, we believe there is no other source from which the advertiser can get as speedy re
American.

We do not make these suggestions merely to increase our advertising pat ronaze, but to direct persons how to increase their own business.
The SOIENTIFIC AMERIION has a circulation of more than 40,000 copies pe
week, which is probably greater than the combined circulation of all the week, which is probably greater than the combined circulation of all the other papers of its kind published in the world.

## OPENING THE PUBLIC LIBRARIES ON SUNDAY.

For some time there has been a growing popular opinion in favor of opening the public libraries on Sunday. It is a just inference that there were and are grounds on which to base argument in support of such a movement. As people have had their attention called to the subject, they see that, in stead of tending to greater violation of sabbatarian observance, the opening of the libraries will in all probability prevent many from spending the day in a manner injurious to themselves, and totally out of keeping with the character of the Sabbath. The public libraries are all of them free from any associations tending to vice or immorality. They are retired resting places, where silence, comfort, and order for clerks, mechanics, and othe than the cramped, ill ven for clerks, mechanics, and others,
No one, we suppose, will at the present day declare it No one, we suppose, will at the present day declare it a
violation of the Sabbath day to read good books, even of a violation of the Sabbath day to read good books, even of a
secular character. If this be admitted, it is clear that the secular character. If this be admitted, it is clear that the
provision of good books, and a comfortable place to read them in, cannot be objectionable in either a moral or relig ious point of view.
A primary effect would be that the cheap and often filthy trash, sold in such large quantities at the news stands, would be less sought after, and a general elevation of taste in read ing would commence. It needs no argument to show that this must exert a salutary influence on morals. Another
scarcely less desirable result would be the attraction of youth from evil associations, found in suburban places to which, by their unpleasant and unsocial surroundings, they are al most driven on the Sabbath.
It may be asked if the luxuriant seats, the excellent music, and the pulpit ability of the churches do not draw young men from such associations as are hurtful, how is it to be expected the opening of the libraries will accomplish
it? We reply, that neither libraries nor churches will attract it? We reply, that neither libraries nor churches will attract
all. The churches will attract some whom the libraries will not, and vice versa; but both together will do more towards purifying the morals of the community than either working separately.
The recent lecture of the Rev. Henry Ward Beecher, at the Cooper Institute, placed this pointin an admirable light, and We are glad to see that not only this prominent divine, but others scarcely less influential, axe strenuously advocating

It is announced that the Cooper Institute reading room and library will be opened on Sunday in the Fall. The Mercantile Library will undoubtedly soon follow, and this action will, for the most part, undoubtedly be imitated by the trustees of public libraries throughout the country. We can see no probability or possibility of evil effects resulting from this movement, while its advantages seem obvious.
present state of morals in this country demands that no means of improvement should be neglected.
In an educational point of view, the opening of the libra In an educational point of view, the opening of the libra or the acquisition of knowledge and for self discipline, now wholly denied to a large class of our city population. Me wholly denied to a large class of our city population. Me chanics, clerks, and others, confined at labor almost constant
ly during the week, will, it is believed, gladly avail them elves of the facilities thus offered, and the usefulness of the libraries will thus be largely extended.

## DRYING BY CHEMICAL ACTION.

Having already penned several articles upon various meth ods of drying substances, we propose to conclude with some remarks upon drying by chemical action. That wonderfu property, called by chemists affinity, which exists between different substances, exerts a force so much greater that any which is practicable to the resources of mechanics, that it may be made one of the most effective means known where by the desiccation of substances can be accomplished. Some times it may be employed singly. In other instances, it may be used in connection with heat or mechanical action, or all three may be used together. There are few substances tha have no affinity for water, but there are some which seiz upon it and hold it with such intense force as almost to defy separation. The strongest chemical reagents, such as sul phuric acid and the other strong acids, the alkaline bases, potassa, soda, lime, etc., owe much of their usefulness in the arts to their affinity for water. There are few substances that have so strong an attraction for water that some one o the alkaline bases will not seize upon it and hold the whol of it .
Of course, when water is an essential ingredient of a com pound, and not an extraneous substance, its removal effects decomposition ; and in all such cases, the use of chemicals fo rying, as it not only removes the superfluous water but in most important processes in which chemical drying is em. ployed, and one of the best illustrations of the principles ployed, and one of the best illustrations of the principles
upon which it is based, is that of separation, as it is called upon which it is based, is that of separation, as it is called
in the soap manufacture. The fats or oils used for soda soaps are first saponified by an excess of the solution of caus ic soda, technically called "ley." The soap thus formed contains glycerin, excess of water, and soda, which it is de sired to remove. Now, although the soap has a strong affin ity for water, it could be dried sufficiently by the slow and careful application of heat, but to do this would require long time, and, besides being very tedious, would be a very expensive process. Soda, or chloride of sodium (common salt), has a much stronger attraction for watcr than soap If either of these substances in strong solution should $\mathrm{b}_{\mathrm{e}}$ added to the soap in sufficient quantity, and heat be applied, the following actions are set up: The soap floats upon a rong solution, la soda or salt (sometimes both ar sed). The heat applied to the bottom of the kettle drive off a portion of the water in the solution, which is replaced
by water attracted to the salt or soda from the soap; this is in turn converted into steam by the heat, and so on, the soda or salt taking water constantly from the soap, which the hea expels until the soap has been sufficiently freed from water Meanwhile the soda ley has dissolved out all of the glycerin and the water in departing from the soap has carried with it he excess of alkali, adding it to the solution at the bottom the kettle, and so the purified soap floats in hard grains o umps upon the ley. The soap being then drained is ready or the subsequent operations, which fit it for sale and use. This is a fine example of chemical action combined with heat to eliminate water. Another illustration is the produc ion of absolute alcohol by distilling it in contact with inned in the latter seizing and holding all the water conaned in the alcohol, which then passes over and is con Chemits pas
Chences through quicklime, chloride of calc m, calcined potash, or soda, to rid them of watery vapor Polished metallic articles, liable to tarnish through the ac
tion of watery vapor, may be protected by placing them in a ase in which is also placed a little quicklime. Whenever th lime falls into fine powder, it is an indication that it has ab sorbed all the water it can hold, and that a new supply of quicklime is required.
Very rapid drying without heat can be accomplished by the use of quicklime and a fan blower, using the same air ove and over, first passing over or through the substance to be dried, and then over quicklime in lumps. The page from the lime to the substance to be dried (the heating greatly in creasing the absorbing power of the air) and keeping the ime cold by means of tubes through which cold water pass s. By regulating the heat properly, very delicate substances may be thoroughly desiccated without injury. The write as applied this process in certain operations with great suc
ass. Where an operation of this kind is conducted cess. Where an operation of this kind is conducted on a
large scale, the lime can be renewed over and over again by calcination, which drives off the moisture (and perhaps car bonic acid) it has absorbed.
The hints thus thrown out may serve as a guide to invent ors who are devising means for the desiccation of fruits, veg

Processes of this kind are being extended rapidly at the present time, and the preparation of articles of food, in a pal atable form and in a condition to keep a long time, is daily becoming of greater industrial and commercial importance.

## FIREPROOF BUILDING.---THE LESSON OF CHICAGO

A disaster is partially compensated for when from it is derived the knowledge necessary to avoid similar catas rophes. The lesson of the great Chicago conflagration was severe one, yet full of instruction which, we regret to say ppears not to be fully heeded in the haste to reconstruct that devastated city. In the first tide of excitement that sread over the country, as the news of the terrible confla ration was received, the press teemed with theories hastily devised to account for the magnitude of the fire and the rapidity with which it devoured the richest part of the Gar den City. Statements equally baseless, as subsequent devel opments have proved, were circulated far and wide about the influence, of the wood and tar pavements and the bituminous stone largely employed in some of the buildings, upon the spread of the flames. It was to be expected that many con licting accounts would be promulgated and much false heorizing be indulged in, and that some months would elapse before the opinions of calm and dispassionate observ rs would be listened to. It is the purpose of this article to ive in condensed form the opinions of such an observer, and to make such brief comments upon them as may sugges hemselves
The gentleman referred to is Mr. P. B. Wight, Secretary of the American Institute of Architects, whose remarks upon he subject of fireproof building in connection with the Chi cago fire constituted the most interesting and valuable par part of the "Proceedings" of the above named association at its fifth annual convention, a copy of which proceeding now lies before us.* The views of this able architect and engineer, and the facts stated at the convention will correct many erroneous impressions.
Red brick and Milwaukee buff brick are the kinds chiefl used in Chicago. The buff brick endured the trial much etter than the red, but both yielded in many instances un er the heat. Mr. Wight attributes the great destruction of brick buildings to the extreme thinness of their walls, and the use in them of soft brick fillers. This latter practice Mr. Wight says, is yet in some instances indulged in, not vitbstanding the evident inefficiency of such walls to with stand excessive heat as demonstrated by the fire. Thes valls were cracked and warped, in fact "all shattered to pieces" by the heat. The bricks were "all burned white ven the red ones." Some of the bricks were rent in pieces, thers were rounded off at the corners, and some softened instead of being vitrified.
The Illinois limestone was the worst to withstand the heat being in many instances entirely calcined. Some of the fronts of this material were burned off entirely, leaving on or two stories of brick backing standing after the fire. In ther instances, this stone was so rounded at the corners as o appear like "boulders." The Lockport limestone proved etter, but still was badly damaged. The two sandstone hich withstood the heat the best were the Cleveland ston nd the Lake Superior stone. Little granite was used in he burned district, but such of it as was exposed to th heat was cracked badly and rounded at the corners.
The Illinois stone exploded where the heat was very in tense. "It seemed," says Mr. Wight, " to calcine with grea rapidity, and I suppose the effect was very much like that seen in the manufacture of pop corn." No observations of marble were made. One building, in which a great deal of rtificial stone was used, stood the heat remarkably well Mr. Wight says: "I do not know whose patent stone it was, but it was used from the second story up to the top in pilas ters, cornices, and sills. In many places, this stone was scarcely injured at all." We deem this fact of importance as proof of the part which artificial stone is destined to fill in future building.
A correlative fact is that all kinds of mortar were less af ected by the heat than natural stone. This might be inferred from the statement relative to artificial stone, since nortar, strictly speaking, is an artificial stone. This point has much significance, showing that, when the real constitu ion of stone which will withstand destructive influences is horoughly comprehended, chemical science will be able to upply the requisite conditions for its artificial formation.
The petroleum stone, of which so much was said in th newspapers and which was charged with having greatly assisted the spread of the fire, is spoken of as follows:
"There was one church in Chicago built of what they cal prairie boulders, which ten years ago were supposed to con tain tar, but really contained petroleum. The amount of petroleum in the church was so great that the heat of the un would draw it out, soon after being set up in a wall, and t would run down in black streaks. The effect of the hea n the inside of the walls threw out upon the exterior al he oil it contained, which formed a thick hard coating bout a quarter of an inch in thickness; and though the in rior of the church was exposed to $\varrho$ reat heat, and every article of wood in it was burned up, so that there was no scrap left in it, the interior sides of its walls were not reatly injured. In some places the stone had flaked off and yet this stone stood the test better than any other natural stone used in the city."

[^0]He also says that the Nicholson pavement, contrary t many statements, stood the test remarkably well.
"In some places the upper part was charred off, especially where it was new ; but the curbstones were in some places actually destroyed, while the Nicholson pavement remained intact. I would suggest as to whether the presence of tar in the wood was not similar in its effects to the presence of the oil in the stone. We may possibly discover a valuabl property in tar or oil, from this experience."
Iron structures and parts of structures were badly injured, with the exception of corrugated iron floors supporting con crete arches of masonry, the iron being simply a basis for he masonry.
Vaults built in the tower form, from the cellar up, proved the most efficacious; heavy brick vaults built upon floors are severely deprecated.
The importance of fireproof shutters is earnestly dwelt upon. Mr. Wight says:
" No matter how they are made, so long as they are strong enough; make them double or treble or quadruple, with air spaces between, but by all means keep out the fire from neighboring buildings, even if you have nothing in your own house to burn. Every fireproof building should have fireproof shutters on every window, whether on the front or on the rear. It is the habit with us to put them on the rear and very often to leave them off the front. We say "Our building is fireproof; there is nothing in it to burn." But there is something in it to burn, and the very books, papers, furniture and carpets used have proved-as in some of these buildings in Chicago-sufficient to soften an iron beam, and destroy the best constructed floors.'
Great emphasis is also laid upon the proper construction of roofs. They should " be made the best part of the building." In a great fire fanned by a hurricane, the current of heated air comes directly down on the tops of the buildings, instead of the fire communicating from house to house. This fact is shown by numerous examples, adduced by the speak er, which we have not space to reproduce, having already exceeded our prescribed limits.
We have seldom read a more instructive discussion, and i Mr. Wight fulfils his intention of writing an elaborate paper upon the subject, he will confer a great benefit upon th public.

POWER PRODUCED BY STEAM, UNDER DIFFERENT temperatures and pressures.

At the present stage of our knowledge in regard to the conversion of heat into motion, the steam engine stands fore most as the least expensive and most convenient apparatu to accomplish this transformation. Being founded on the increase in volume of water, when changed by heat into steam, it is easy to calculate the amount of heat required to produce a given power, for the reasons that the amount of the increase in volume of water when becoming steam, and the amount of heat required to accomplish this, are both

## well known.

To simplify our calculation, let us suppose that we have a long vertical tube 6 inches in diameter, or of 27 square inches, or $\frac{1}{5}$ of a square foot, sectional area: The whole length we suppose to be 144 feet; then the whole contents of the tube would be $\frac{1}{5} \times 144$, or 27 cubic feet. Suppose now we bave, at the bottom of this tube, water one inch high ; then we shall have 27 cubic inches, or one pound of water Let us finally assume that we give this water heat enough to convert it all into steam. Then, as it expands 1,700 times, it will just fill the tube, which is 144 feet, or 1,728 inches long The heat required to change one pound of water into steam is 965 units, and the power produced we may easily estimate by considering that the steam will possess one atmosphere's pressure and be just able to remove the atmosphere from the tube, as this has a pressure of 15 pounds per square inch, o $15 \times 27=405 \mathrm{lb}$. for the whole sectional surface of the tube in which a piston might separate the steam from the air This piston will, by the expansion of the steam, be moved through a distance of 144 feet, and, being subject to the atmospheric pressure of 405 pounds, the force produced by the evaporation of one pound of water will be $144 \times 405=58,320$ foot pounds.
If this result is accomplished in one minute, we shall have one and two thirds horse power, as 33,000 foot pounds per minute has been adopted for the amount of one horse pown. We see, therefore, that the evapo hour gives u one and two thirds horse power, and this agrees tolerably well with experience, which has taught that the evaporation of one cubic foot-that is, 63 pounds of water per hour-is amply sufficient for one and a half horse power. As we have seen ( $p .184$ ) that one pound of coalisable to evaporate 13 lbs of water, the evaporation of $5 \times 13=65 \mathrm{lbs}$. water requires
5 lbs . of coal (producing one and two thirds horse power), or three pounds of coal per hour for one horse power. And this is indeed the ordinary estimate for economical engine with Cornish boilers; locomotives consume double that amount, and even more.
The question now arises: Is it not more economical to raise the temperature of the water higher than only $212^{\circ}$ which only obtains one atmosphere's pressure? Is it not more advantageous to work with a pressure of severa atmospheres?
The answer to these questions is affirmative; but it must be remembered that the rule, usually given, that water expands 1,700 times so that one cubic inch of water makes one cubic foot of steam, is only applicable to steam of $212^{\circ}$ at higher temperatures there is a lesser bulk of steam. At $250^{\circ}$ Fah. we have increased every inch of water only to 900
nches of steam and a pressure of 30 lb .; at $293^{\circ}$, the volum is 475 inches and the pressure, 60 lb . ; at $340^{\circ}$, the volume is In regard and the pressure, 120 lb .
In regard to the heat required: Steam of $212^{\circ}$ consumes 965 units of latent heat; steam of $250^{\circ}$, or $38^{\circ}$ more, doe not require 38 more units, but only 11 , as the specific heat of this denser steam is less. At $293^{\circ}$, or $43^{\circ}$ more heat than the latter and 4 atmospheres' pressure, we require only an addi
ion of $12 \frac{1}{3}$ units of heat; at $340^{\circ}$, or $47^{\circ}$ more heat and ion of $12 \frac{1}{2}$ units of heat; at $340^{\circ}$, or $47^{2}$ more heat and units of heat.
It is thus seen that every additional atmosphere's pressure equires the addition of a lesser amount of heat, while the apacity for heat or specific heat of the steam decreases by n increase of the heat and pressure. Therefore, the same ddition of heat has more effect, when applied after a hig mperature and pressure have already been obtained, tha given have been obtained, by Régnault, by the most careful given have been obt
methods of research.
If we apply the same reasoning as before to our tube, with team of $250^{\circ} \mathrm{Fah}$. and two atmospheres' pressure we find that the piston is lifted, by a force of $2 \times 27 \times 15$ lbs., or 810 lbs., through a space of 900 inches, or 75 feet, producing $810 \times 75$, or 46,170 foot pounds, for $965+38=1,003$ units of heat. When heating the water to $293^{\circ}$, we have 4 atmo pheres' pressure, and thus $4 \times 27 \times 15=1,620 \mathrm{lbs}$; and as th water expands only 475 times, it will raise the steam of this pressure to the hight of 475 inches, or nearly 40 feet, and will lift the $1,620 \mathrm{lb}$. that distance, which is equivalent to 64,800 foot pounds, for $965+81=1,046$ units of heat. Finally or $340^{\circ}$, the steam expands 250 times, fills the tube to the ight of 250 inches, or nearly 21 feet, at a pressure of 8 tmospheres, or $8 \times 15 \times 27=3,240$ lbs.; this, lifted 21 feet ives 68,040 foot pounds, for $965+128=1,093$ units of heat employed.
It is seen that there is an advantage gained, but it is not as great as supposed by many. The pressure of one atmo phere gives 58 foot pounds per unit of heat; 2 atmospheres 60 foot pounds; 4 atmospheres, 63.5 ; and a steam engine of 8 atmospheres, $65 \cdot 5$ foot pounds for every unit of heat con sumed. But if we take into consideration that, at high tem peratures, there is more loss of heat by waste of fuel, radia ion, etc., it is evident that the advantages gained may be overbalanced by disadvantages.
In practice, it is customary not to consider the first atmo sphere, or 15 lb . pressure, but to call steam of $250^{\circ} \mathrm{Fah}$. and wo atmospheres, or 30 lb . pressure, one atmosphere, considering only the 15 lb . above the ordinary atmospheric pressure; one atmosphere has, therefore, to be subtracted rom our theoretical figures, in order to make them agree with the customary terms used in practice.

## A LONG FELT WANT

There has been a long felt want for a transparent material, which could take the place of glass for many purposes, with out the fragility of the latter substance. The substanc which comes nearest to these requirements is mica, but in many respects this fails to meet the want. It would seem hat the present resources of chemistry might be adequate to urnish to the world such a material as we have named. So ar as we are aware, but little experiment has been made to ward the attainment of less brittleness in glass. The ancient process of annealing is still solely relied upon; with how much success, let the myriads of broken lamp chimneys globes and mirrors testify.
It would not be necessary, to render a non-brittle transpar ent and easily molded material valuable, that it should be in soluble in water, but it would be very desirable that it should withstand the effects of considerable heat. Gelatin, of which beautifully transparent plates can be made, is not only oluble but is decomposed by high temperatures. Are the wo properties of transparency and brittleness in solids in eparable? We have no general reason, except the fact that most tr
belief.

Chemistry may yet render glass as little liable to breakag as hard rubber. Could this be done without change in it ther characteristics, the utility of glass for general purposes would be increased a thousand fold. The man who can do his cheaply would supply a process of incalculable value.

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with Sinker Davis \& Co., of Indianapolis, Ind.
For 4 Jaw Independent Screw Chucks, address Fairman \& Co., Baltimore, Md.
The Patna Brand of Page's Patent Lacing is the best. Orassolutely the best protection against Fire-Babcock Extin guisher. F. W. Farwell, Seeretary, 407 Broadway, New Yorb.
For Steam Whistles, address Exeter Machine Works, 75 Congress street, Boston,
Firer Purposes,etc. 800 different style Pumps for Tanners, Paper Makers, Fire Purposes,etc. Send for Catalogue. Rumsey \& Co., Seneca Falls, N.Y.
ord's Patent Separator for Ores, or any dry material, buil to order. State rights for Sale. 232 Arch St., Philadelphia, Pa.
Important.-Scale in _Steam Boilers-We will Remove and prevent Scale in any Steam Bo
Arch Street, Philadelphia, Pa.
For Sale-Twenty and thirty horse power Portable Engine of superior quality. Poole \& Hunt, Baltimore.
Anti Lamina" will clean and keep clean Steam Boilers. No injury to iron. Five years' use. J. J. Allen, Philadelphia, Pa
Wanted-The best machine in the market for making Boiler Rivets. Address, giving full particulars, P. o. Box 169, Milton, Pa
Painters, attention-New Pat. Quick, Clean, Easy, and Cheap Way of Graining, first class Imitations of Oak, Walnut, Rosewood, etc.
Send Stamp for Circular. J. J. Callow, Cleveland, Ohio. Williamson's Road Steamer and Steam Plow, with Rubbe Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809
Kelley's Chemical Metallic Paints, $\$ 1, \$ 1 \cdot 50$, $\$ 2$ per gallon, mixed ready for use. Send for card or colors, \&c., 116 Main Tested Machinery Oils-Kelley's Patent Sperm Oil, $\$ 1$ gallon Engine Oil, 75 cts.; Filtered Rock Lub
tificates. 116 Maiden Lane, New York
Billiard Cushions-Manufacturers of Billiard Tables, use Murphy's Patent Cushions. The finest made. Send for sample set. Gutt For the best Recording Steam and Indicating Gauges, address The Recording Steam Gauge Co., 91 Liberty Street. New York.
n inducement.-Free Rent for three months to tenants with good business, in commodious factory just built for encouragement manufacturing. Very light rooms, with steam, gas, and water pipes,
power elevator, \&c. \&c. Manufacturers' Corporate Association, Westfield, Mass. Plans of Building, Room 22, Twenty One Park Row, N. Y
A sober, steady mechanic, who has a thorough practical Spoons, Forks, \&c., is open for an engagement as Nickel Melter right away.' Address William Crookes, 94 Elm St., New York City.
For Tri-nitroglycerin, insulated wire, exploders, with pam phlet, as used
Adams, Mass.
All kinds of Presses and Dies. Bliss \& Williams, successors to Mays \& Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue. For Steam Fire Engines, address R. J. Gould, Newark, N. J. Presses, Dies, and Tinners' Tools. Conor \& Mays, late Mays \& Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. ₹.
In the Wakefield Earth Closet are combined Health, Cleanli ness and Comfort. Send to 36 Dey St., New York,for descriptive pamphle
L. \& J. W. Feuchtwanger, 55 Cedar St., New York, Manufac turers of Silicates, Soda and Potash, Soluble Glass, Importers of Chem cals and Drugs for Manufacturers' use
Derricks built by R. H. Allen \& Co., New York and Brooklyn Boiler and Pipe Covering manufactured by the Chalmers Spence Non-Conductor Co. In use in the principal mills and factories. Claims-Economy, Safety, and Durability. Offces and Manufactories, foo E. 9th street, New York, and 1202 N. 2d street, St. Louis, Mo

Dickinson's Patent Shaped Diamond Carbon Points and Ad justable Holder for dressing emery wheels, grindstones, etc. See Scientifi American,
Vertical Engines-Simple, Durable, Compact. Excel in econ omy of fuel and repair. All sizes made by the Greenleaf Machine Work Indianapolis, Ind. Send for cuts and price list.
For 2 \& 4 Horse Engines, address Twiss Bros.,New Haven, Ct Peck's Patent Drop Press. Milo Peck \& Co., New Haven, Ct Kelley's Pat.Petroleum Linseed Oil. 50c.gal., 116 Maiden Lane Enameled and Tinned Hollow-Ware and job work of all Best and Cheapest-The Jones Scale Works,Binghamton N. Y Mining, Wrecking, Pumping, Drainage, or Irrigating Machin , Anent. inside page. For Solid Wrought-iron Beams, etc., see advertisement. Address Onion Iron Mills, Pittsburgh, Pa., for lithograph, etc. Belting as is Belting-Best Philadelphia Oak Tanned. C. W Arny, 301 and 303 Cherry Street, Philadelphia, Pa.
Boynton's Lightning Saws. The genuine $\$ 500$ challenge Will cut five times as fast as an ax. A 6 foot cross cut and buck
E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor. Over 1,000 Tanners, Paper-makers, Contractors, \&c., use th Pumps of Heald, Sisco \& Co. See advertisement
Brown's Coalyard Quarry \& Contractors' Apparstus for hoisting and conveping material byiron cable. W.D.Andrews \& Bro,414 Water st.,N.Y.
Hydraulic Jacks and Presses, New or Secend Hand, Bought and sold, send for circular to E. Lyon,470 Grand Street, New Yors.
For the best Galvanized Iron Cornice Machines in the United States, address Calvin Carr \& Co., Cleveland, Ohio.

Facts for the Ladies.-Dr. A. K. Gardner, of New York, says there
is not the slightest foundation for the vague and interested statements that is not the slightest foundation for the vague and interested statements that feminine health. We speak advisedly when we deny most positively that any form of disease is traceable to its proper use by any woman in health.
For twenty years we have carefully watched the progress of the Sewing Machine, visited the large factories where it is used by the hundred, quesMachine, visited the large factories where it is used by the hundred, ques-
tioned the makers, the foremen in the workshops, the girls daily working
them, and never yet have been able to trace a single disease as having originated from the use of this domestic implement. See the new Improvement and Woods' Lock-Stitch Ripper.

## Modar 8quarios.

1. Wepresent t ereveoth a series of inquiries embracing a variety or topics of qreater or less general interest. The questions are simp
prefer to elicit practical answeers from our readers.]
1.-Coating Cast Iron with Copper.-I wish to know of good process for coppering cast iron by dipping.-F. M.
2.-Signal Light.-What composition is used for the white (Bengal) Indian light?-H. M. L.
3.-Indian Ink Stains.-Will some reader inform me how entirely obliterate Indian ink marks from the skin?-H. W.B.
4.-Water Telfgraph.-How can I construct a water telegraph such as is used in most mo ue highly appreciated.-W. M. R.
will
5.-Painting Inside of Water Tank.-Please inform me what kind of paint $I$ should use for the inside of a wroug
tank? The water is to be used for domestic purposes.-P. R.
6.-Keeping Iron Continuously Melted.-Will some of your correspondents intorm me if there is any way of running a cupola
continuously, day and night, so that one or two tuns of iron could be drawn from it per hour, and if so, how? - B.
7.-Key Ways and Keys.-Will some of your many machinist readers please inform me the correct taper of keys, for connecting
rods for engines,also the average taper of key seats of pulleys, etc. ?-A. P. 8.-Lining Cast Iron Vessels.-I have a number of cast ron porcelain lined soda , exposing the iron. Is there any cement or other preparation, which off, exposing the iron. Is there any cement or other preparation, which
could apply, that would be durable and not color the soda water or make it taste?-C.
9.-Prbserving Telegraph Poles.-Will some of your readers inform me the best way to preserve butt ends of chestnut telegraph
poles, that they may be made to last as long as their tops? Will gas tar or charing the ends help to preserve them?-H. R. R
10.-Grove's Battery.-I am constructing a Grove's batery, and I understand that the amalgamated plate is a mixture of zinc and mercury. Am I right, and will some one give me the right proportions of
the two metals? What proportion should the surface of the amalgam have the two metals? What proportion should the surface of the amalgam have
to that of the platina? What should be the dimensions of the porous cup? My zinc cylinder is open at one end; it it a quarter of an inch thick, and eightincheshigh by fourinc
gam be prepared?-J. C. .

## 

## $\overline{\text { SPEC/AL NOTE.-This column is designed for the general interest and in- }}$

 PECIAL NOTL.-This column is designed Yor the general inter est and in.struction of our readers, not forgratuitous replies to questions or a pureiy
business or personal nature we will publish such inguiries howerer business or personal nature. We will publish such inquiries, however,
when paid for as advertisements at 1.00 a line, under the nead of "Bussness zohen paidfor
and Personal.
$\overline{\text { Paint for Iron.-In reply to enquiry No. 6, April } 27 \text { th, }}$ about paint for iron, etc., we have received letters from various makers,
stating that their article is tha stating that their article is the best, and asking us to publish an account
of their goods. We would suggest to these manufacturers that they insert short advertisements of their goods in the column of "Business and Personal," and in this way they will be able to place the merits of the $r$ articles before all our readers.
C. B., of N. C.-The specimen you send is pulverized quartz Leaky Boat.-A. B.. of Pa., should caulk his boat with Nest of Boilers.-T. E. W., of Md., is referred to pages Nest of Boilers.-T. E. W., of Md., is referred to pages
3568,394 of Vol. XXV. of the Soientific American for a full discus$356,388,394$ of Vol. XXV . of the
sion of the question he proposes.
B. F. B., of R. I.-An advertisemes $t$ in our "Business and B. C., of Ohio.-Artificial stone is either run into molds while in a fluid state, or is, while:plastic, pounded into the molds by an in strument similar to that used by iron molders.
J. S., of Col. Ter.-We shall be glad to hear from you as
A. H. A., of Mich.-Upon examination of the description and drawings sent, we do not find anything to account for the anomalous
working of the boilers described. An examination on the spot by an expert might perhaps lead to the discovery of the cause.
L. P. L.-We do not think you incur danger from the use of a galvanized iron chain in your pump.
J. W. G.-We do not know of a reliable meter for measuring the flow of steam through pipes. Measuring the water supplied to the boiler is a good way of determining the quantity of steam used in a
given time. Or you may condense the steam, and by ascertaining the weight of the condensed water, determine it in that way
F. J. L., of Ohio.-There is no solvent of scale in boilers that can be universally used with good results. We have published
much upon this subject; consult back numbers. Also see recent editorial for answers to queries about asbestos packing
G. A. B., of Ohio.-Glass could, we think, be easily molded J. R. W., of N. Y.-The salts used in England for street watering are the chlorides of calcium and sodium. Chloralum has also
been used, it is said, with good results. been used, it is said, with good results.
A. W. C., of Iowa.-The specimen of rock which you send is a limestone, with disseminated particles of iron pyrites or "fool's
gold."
A. V. P., of Mich.-The specimen you send appears to consist mainly of alumina and some alkali, either lime or potash. An analy-
sis will be needed to determine exactly, which will cost $\$ 10$. Cement for Rubber Boots.-P. H. W. can find the required
toan.

Deposit in Locomotive Cylinders.-The enclosed is sample of a substance which gets into some of the cylinders of locomo
tives. It accumulates so as to flll up the clearance space in a short time not form it, althou
your opinion of it your opinion of it, and what is the stuff composed of? When first take
yon out it is like soft pitch. Some of the engineers blame the stacks; these ar nearly all self cleaners. All the engines burn wood.-J. R. M. Answer: I
is the result of the distillation of some hydrocarbon, probably derived from the tallow. The engineer sh
soine cylinders and not ingo others.
Separation of Mercury in Thermometer Tube.-To F D. H., query 1, page 281.-Heating the thermometer bulb until the mer D. H., query 1, page 281.- Heating the will unite the separated parts of
cury fills the whole length of the tube the column. The separating of mercury in a barometer tube is cause
by air entering; it is rather diffcult to remedy. You had better take i
to to a ma.
Mercurial Column.-Query 11, page 217.-The chamber containing the mercury should be of sufficient size to hold more mercur than the column, so that water from the pump will not get into the lat-
ter. The pipe leading to the column should be let into the bottom of the chamber. The pipe from the pump should be let into the top of the same One atmosphere, or $14 \cdot 71$ pounds pressure per square inch, equals a column of mercury $29 \cdot 22$ inches in hight, nearly two inches mercury for
every pound pressure per square inch. This is near enough for all practievery pound pressure per square inch. This is near enough for all practi-
cal purposes; therefore a column, to indicate 60 pounds per cal purposes; therefore a column, to indicate 60 pounds per square inch
should be 120 inches in hight from the zero or starting point to the las mark. The columns in different cities ought to agree if they are spaced off with equal care, and the board upon which the spaces : re marked does not shrink or expand.-F. J., of N. J.
Tempering Springs.-Query 26, page 169.-Harden the spring in linseed oil, then heat it gradually over the fire until it becomes
hot enough to burn a small shaving, scraped off, on the sharp edges of the spring, from a piece of hickory wood. At first the shaving will lie on th spring a few moments before it will burn, but as the spring becomes hot-
ter, the shavings will burn as soon as they are scraped from the wood At a point betwen temper to different qualities of steel:-L. V. B., of N. C.
Tinning Cast Iron.-On page 212, current volume, Mr Charles Thompsongives a method to tin cast iron. It will not do at all
have tried the same thing before. If he ever had occasion to tin cas iron, he certainly could not have done it by the method he describes. use muriatic acid with zinc dissolved and diluted with water, and a smal
quantity ot sal ammoniac; but it is not what is wanted. There must be quantity of sal ammoniac; but it is not what is wa
some other preparation which is better.-W. S. M.
Timber for Water Pipes.-Query No. 8, page 249.Spring water can be conveyed in pipes, during one generation, made as
follows: Take "t tamrack," or, as it is called in Massachusetts, "hackmafollows: Take "tamrack," or, as it is called in Massachusetts, " hackma-
tack" logs, with the bark on or off, from six to eight inches diameter and ten feet long. Bore these, beginning at the small end with a gimlet
pointed pod bit. Get three quarter inch band iron, and make some hoops thus: Bend a piece to make a circle say of four inches diameter, then bend back each end making a semicircle or a little more; then, with a hammer, drive this into the end of the log around the hole edgewise
This will secure the log from splittipg when the thimble is driven in to his secure the log splittivg when the thimble is driven in to course, must be reamed to fit the slant of the thinables. -R. S. B., of
Mass $=$
Adhesion of Rubber Belts.-Query 2, page 233.-Use

Adhesion of Rubber Belts to Pulleys.-Query 2, Apri 6.-Linseed oil will prevent rubber belts from slipping, and will make
them last longer.-J. H. G., of Tenn. Fireproof Wood.-H. S., query 9, February 24, should immerse his wood in nitric acid. The s
the acid is incombustible.-G.H., of Mo.
Preserving Bird Skins.-To W. J. L., query 15, April 20. -The cheapest and most successful process is
parts of alum and arsenic.-H. W. U., of Wis.
Driving Elevator.-To C. W. W., query 9, page 333.You can drive your elevator from the lower pulley with fair success, yet
I wouldmuch prefer driving from the upper pulley. I am using one, ele. Twouldmuch prefer driving from the upper pulley. I am using one, ele
vating all kinds of grain and mill feed, driving from the bottom, with 13 inch belt, 12 inch buckets ( 12 inches apart), 75 feet high. The lower pulley is 2 feet and the upper 3 feetin diamet
the better it will work.-R. G. S., of Ill.
Finishing Furniture.-Query 6,";page 265.-The cheapest and quickest way to finish cheap furniture is, for black walnut color, to
use asphaltum varnish for a stain; when dry, rub smooth with curled use asphaltum varnish for a stain; when dry, rub smooth with curled
hair, then coat it with shellac and alcohol varnish; rub that with fine cane air, then coat it with shellac and alcohol varnish; rub that with fine cane
shavings, and lastly use furniture varnish. Other colors may be obtained by using a combination of cheap colors mixed with japan and spirits of turpentine.-A. B
Preserving Bird Skins.-Query 15, page 265.-I have used powdered white arsenic for four years with good success. It keeps out moth, and cures the skins perfectly. It is applied dry. I have also
used an arsenical soap for heavy skins and large birds. It is made of the following ingredients: Arsenious acid, 2 pounds; carbonate of potassa, 12 ounces; cam phor, 5 ounces; white soap, 2 pounds; powdered lime, 8
ounces; reduce each to powder and mix.-A., of N. Y.
Tempering Springs.-To W. R. H.-Tempering is only one, and that the last, condition essential to a good spring. The first is
good material, and this should be the best refined cast steel. The next is that the material must be carefully and properly worked into the proper shape and proportions throughout; lastly, heat the spring evenly to a
bright blood color, cool or chill it in melted lard or lard oil, free from salt, acids, or other chemicals (home made lard is the sure thing), hold it over the fire, blowing a little heat slowly and evenly, till the lard begins
to blaze; then hold it away from the fire till it is entirely blazed off, and lay it down to cool. If appearance is an object, now carefully polish you spring and it will improve in elasticity. A strict compliance with all the above conditions will make good springs for all purposes, for traps set ander water not excepted. A spring trap set under water is the greatest
test that I know of. Many good springs willstand severe frost that water test that I know of. Many good springs wi
will break in fifteen minutes.-S. P., of Mo.
Gate for Gang Saws.-Mr. J. V. Walter states, in his comments on E. F. J.'s communication about gang saws, etc., in your
issue of March 2d, "that a less number of pounds of cast iron makes a better and stiffer gate than wrought iron." We build wrought gates
very saws; and 750 pounds is plenty heavy enough for a gate to carry 40 saws. Now if Mr. Walter will inform us how to make a lighter gate of cast iron (or any other metal no more expensive) which will bear the strain and labor required of a gang, he will do not only us but the milling public a
great favor. I heartily concur with him in regard to the source of trougreat favor. I heartily concur with him in regard to the source of trou-
ble with E. F. J.'s gate. I think that 5,500 pounds is too heavy a load to bejerked about at the speed a gang snould run.-P. H. W.
Pin Points in Steel.-To H. M. H.-When the forging is done, heat the article to a dark blood color, just such as can be distinctly
seen in a dark place; then cool it in soft water. The exact degree of heat seen in a dark place; then cool it in soft water. The exact degree of heat
can be ascertained by experimenting; a little too hot or a little too cold can er ascertained by experimenting; a little too hot or a little too
will harden it. It must be heated evenly throughout. - S. P., of Mo.

To Color Castor Oil.-Take two ounces of annatto and formint and a
occasionally for a day or two, and filter. To one quart of castor oil, add
the above occasionaly for a day or two, and fiter. To one quart of castor oin, add
the above tincture until the desired color is obtained.-H. W. B., of N. J.

## Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:
Boiler Explosions.-B. C T.-J. B.
Cotton Wood Tree.-H. G. M.
Electrical Machine.-J. C. W
Rapid Transit for New York.-A. M. W
Steam Propulsion on Canals.-C. B.
Notes and Queries.-F. X. F.-W. C.-T. C.-H. W. B.J. L. R.-J. T. C.-N. F. O.

## cencut gmerian am fortigu eatents.

## nder thits heading we shall publish nent home ana foreagn vatents.

Hapness Saddle.-Samuel E. Tompkins, of Sing Sing, N. Y.-This in double harness, and which have heretofore been, for cheapness made wi a metal top plate and leather under pad, and finished on the end with a me al extension of the top plate instead of a leather pad, inclosing a metal stif ening plate, as in the better class. The invention consists of separate an attachable metal or leather extensions, either of which may be used at will
as preferred; and it also consists of a construction of the top plate by whic is adapted for said extensions, whereby greater beauty of design and fin is are combined with a form of top plate that can be cast cheaper, and that insures more perfect and nniform castings than can be had with the to ates as at present arranged. In the better class or harness the top plat is inclosed between the leather, and the bindings are formed on the cushion,
which is the most desirable way, except for the cost. The object of this in vention is to approximate the advantages of the method named and ye economize considerably in the cost. The top plate is made with ends in separate pieces, to be attached as heretofore described, so that either leather o metalends may be used, as desirable. Another advantage in the use of th attachable iron end is that the cushion part is fitted to the plate, and th
space between it and said plate for the side strap is preserved much easier than in the old way, in which it is necessary to insert leather pieces tempo rarily, over which the leather cushion is fitted, and then the pieces are with drawn and the side straps put in, Which requires experienced workmen; whereas in this case, the metal extension being put on, it
comes the form or part to which the cushion is fashioned.
Stand for Testing Fire Arms.-Julius Lehnert, of Louisville, Ky.-This invention provides convenient and reliable means for holding firearms,
such as rifies, pistols, etc., to be loaded and fired without danger ot dis placement, in order to ascertain the accuracy of the bore and adjust the sights. The invention consists in the use of a table, provided with a hinged
leat to which a clasp for holding the arm is applied. When the leaf is in
. ertical position it holds the arm convenient for loading, while when hor izontal the same is in a position for fring. The arm to be tested can be
conveniently loaded in thevertical position, and fired as otten as necessary in the horizontal position, and will, as long as the table is not shifted, re main in the position for fring, thus giving good opportunity for accurate tests. The leaf is locked in the ho
plied to or through its front part.
Metallic Telegraph Poles.-Francis Boyd, of Newburgh, n. Y.-This improvement in metallic telegraph poles consists in constructing such in the means of connecting it with the base piece, and in the arrangement of a lightning rod or conductor. The cast metal tube has a suitable step, with arms for bedding in the earth to support the pole. Braces extend from the
extremities of the arms to ears cast on the pole, the braces being fitted extremities of the arms to ears cast on the pole, the braces being fitted through them, with screen nutz above for straining them to adjust the
pole to a vertical position. A collar or ring is cast on the pole for holding pole to a vertical position. A collar or ring is cast on the pole for holding
the lowermost insulator arms; and shoulders for the other arms are formed by successive reductions of the size of the pole. The arms may be made of metalbars, with a large hole at the center to fit on the pole snugly above
the shoulders, each arm having its hole corresponding in size to that of the the shoulders, each arm having its hole corresponding in size to that of the pole above the particular shoulder whereon it is to rest, said arm either
being made in one piece and put on over the top of the pole, or it may be
dived The lightning rod The lightning rod passes down through an insulating tabe, and projects
above the top of the pole, being insulated by an india rubber cap fitted watertight on the top of the pole, the hole through which the rod passe being packed tightly to prevent the water leaking out. The insulated
arms have holesfor holding wood pins or india rubber insulators which arms have holesfor holding wood pins or india rubber insulators which
may screw into the arms or be attached in any other suitable manner. The arms are galvanized; the parts below ground are coated with coal tar. and th
lead.
Boot Strap Machines.-Aaron F. Stowe, of Worcester. Mass.-This in vention has for its object to furnish an improved machine for cutting the draw straps for boot legs, which shall be so constructed as to adjust itsel
to the varying thickness of the doubled leather, and which will feed the the varying thickness of the doubled leather, and which will feed the consists in a combination of a grooved or channeled feed roller, with circular knives, a knife roller, and top roller of the machine. If desired, part of
the knives may be placed at a distance apart different from the others, so the knives may be placed at a distance apart different from the others, so
that straps of different widths may be cut by the same machine and at the that straps of different widths may be cut by the same machine and at the
same time. This construction is particularly advantageous in shops where dif
and boys'
Wagon $^{\text {Wrengh. -Roland J. North, assignor to himself and B. B. North, }}$ of Cornwall, Conn. - This invention furnishes an improved wrench for removing the axle nuts of wagons and other vehicles, so constructed that,
when applied to the nut, the nut will be screwed from or upon the axle by when applied to the nut, the nut will be screwed from or upon the axle by
simply revolving the wheel. The body of the wrench is made with two simply revolving the wheel. The body of the wrench is made with two
arms which are curved, so that the body may enter the hub band and receive the nut. The arms are made of such a length that they may extend along the sides of the hub and pass between the spokes, so that the wheel,
when revolved, will carry the wrench with it, and thus screw the nut off $o$ on. according to the direction in which the wheel is revolved. The wrench has a square hole sufficiently large to receive any axle nut, which may be
made to fit smaller nuts by a bushing or block having a hole of the proper form and size to fit the desired nut. Coiled sprinos, the ends of which are attached to the outer parts of the arms, and the other ends of which have
hooks formed upon them to hook upon the spokes of the wheel, hold the hooks formed upon them to hook upon the spokes of the wheel, hold the
wrench securely in place while allowing the nut to move out or in as it is wrench securely in place while allowing the nut to move out or in as it is
screwed off or on the axle. If desired, the wrench may be secured in place screwed off or on the axle. If desired, the wrench may be sec
by screws, wedges, or other suitable and convenient devices.
Combined Propaller and Fire Extinguisher.-Allen Turner, of Bronwardend, buthaving apipe descending through which air passes into th cylinder and is forced out against the water to propel the boat. The reversing of the screw draws in water and forces it out of the pipe for the-ex-
ringuishing of a fire should it occur upon the vessel carrying the device. ringuishing of a fire should it occur upon the vessel carrying the
Two or three screws are employed, one on each side of the rudder.
Bridele. - Martin A. Penn, Sumter, s. C.--The invention consists in mak-
ingthe headstall of a bridle of metallic plates which can be made more inthe headstall of a bridle of metallic plates which can be made mor by means of a projecting and adjustable spring to which they are each at tached; in holding the side plates at any adjustment by means of a catch and sliding sleeve; and in attaching the headstall and reins to brt by hooks.
 Daved, of Phillipsport, , M. Y-M oblinvention consist in intonstracting the
main portion of the shoe with oblique tenons to fit into corresponding main portion of the shoe with oblique tenons to it itho correspondig
mortises in the under sideso of the runner. The main portion of the enoe
may be made in two or inore parts, connected by oblique $\mathbf{V}$ shaped joints, may be made in two or tiore parts, connected by oblique $V$ shaped joints,
and secured firmly in position by the front part of the shoe or banger, as it and secured firmly in position by the front part of the eshoo or banger, asi
is technically termed; or the main part of the shoe may be made in one is technically termed; or the main part of the shoe may be mad hene
piece. By this construction neitherthe shoe nor runner will be weakened
by boit holes. There will be no oolt heads to wear off, and the wearing burface of the shoe will be perfectly smooth. This construction strentht
suns
ens both the ehbe and runner, and enables the shoe to ee easily detached ens both the shoe and runner, and enables the shoe to be easily detached
when required. GLass GLobes or Reservorrs Por Lasps. - Adolph otto, of New
Branfels Texas.--The bject ot this invention is to prevent the breaking Brannfels, TTxas.-The object of this invention is to prevent the breaking
or glass globes used in kerosene lamps as reservoirs for the burning fluid of glass globest used in in erosene lamps as reservoirs for the burning fuid;
and the invention consists in the application around the reservoir of a rub-
 cossiode of glass and arranged to form part of a lamp in ordinary or suita, ble manner. The globe or reservoir is provided with a continuous grovv
around $i t$ at the point where, without such groove, the globe would hav around it, at the point where, without such groove, the globe woold have
the largest diameter. Into this groove is fitted a ring of india ruber,
 which projects beyy side of the lamp. Whenever the lamp is overthrown, the
cushon on
rubber ring will receive the concussion and prevent the breakage of the rubber ring will receive the concu
globe and consequent concussion.
Forming Screw Threans in The Nrocs of Bortues.-Goveneu
M. Keeffer. of East Birmingham, Pa.-This tool consists substantially of M. Keeffer. of East Birmingham, Pa.- This tool consists substantially of a
revolving plug having a screw thread cut upon it,provided with a notched revolving plug having a screet thread cut upon it,provided with a notched
circular flange, and pivoted to the for ward end ot a stationary roo, to adapt
cit it to be conveniently locked and released, also of a stationary plate, pro-
vided with a countersink and a sleeve to adapt it to receive the nanged base of the plug and the stationary rod to which it it a stached, also of
combication of a lever catch with the elastich hande, stataionary rod. plate combication of a
and pivoted flan
purpose intended.
Tool for removing the roller and replacing it upon the balanco SHAFT of WATchrs. -James Ingram, of Troy, N. Y.-To the upper end of
screw is attached $a$ handle. In the lower or forward end of the screw is screw is attached a hancie. .
formed a small hole, to recive the fine pivot of the staff. $A \cup$ shaped
and piece, having a screw hole formed in its middle part or bend, reecives the
screw. Upon the lower ends of the arms of the $U$ shaped piece is forme screw. Upon the lower ends of the arms of the U shaped piece is formed
a disk, havina a hole formed in one side and extending to the center or
por
 the roner may er rine
pivot or puting the balance out of shape. Another U shaped piece is de
. signed for replacing the roller upon the bal nce staff, and is constructed
the same as the frrst named U Shaped piece, except that, instead of a slotted $t$ disk, it has two in
their inner edges.
Animal Power.-James R. Deyo, of Sterling, Ill.-This is a new mode of combining means to form a small power, which may be operated by a do,
or other animal. A combination of an inclined tread wheel and shaft, friction wheel, crank shaft, and crank wheel, pitman, beam, and posts, ar ranged in a rrame, constitute the claim on which a patent has issued; the
principal novelty belng the means of adjusting the inclined shaft to any de principal novelty betng the means of adjusting the incilined ashad.
gree nf inclination, to adapt it to the amount of work required.
Folding TAble.-Jo eph Quevedo, of Brooklyn, N. Y.-This invention Fooding TABLE.-Jo eph Quevedo, of
is a dininio or other table oso constructed that the e legs. thereor may be
readily folded down onto the rails, and so that the table may be extended readiy folded and suitably supported in the midde. A novel arrangement of drops and recesses in combination with the top and leg frames and a a com.
bination of a cross piece hung at journals or pivots, a center leg, rod, and bination of a cross piece hung at journals or pivots, a center leg, rod, an
drops, with the folding table, having hinges, is employed and covered in th drops, with the rolang tal
claims by letters patent.
Apparatus for mixing Soap.-Horace N. Humiston, of Troy, N. Y.This invention has for its object to furnish an improved apparatuas for mix. corporated with the soap and distribute them thoroughly through all parts of the mass, and keep them from settling into the lower parts of the mas
before the mass has become sufflciently stifif to hold said materials.
Sprrroon Crask.-A Antonio Quirolo, of New York city. - This is an im.
provement in chairs, hy the connection with them of spittoons that can be swung out of the way under the sea ss, or made to project from the sides for swe. In also oonsists in hiningig the chair back and operating it with rod
usprings and catithes. T invalids and others a chair thus arranged will be
sel aprings convenience, as well as to those not requiring its comfort,
a rreat the spltitons whill be concealed the greater part of the time.
CTARerp for Sior Poverres.-Joseph T. Capewell, of Woodbury, Conn.
-This invention relates to a newarrangement of the inner cut-off of a lever shot charger attachment to a a a shat pouch or or belt; innd consisists of more lever shot charger attachment to a shot pouch or belt; and consists more
particulary in applying said inner cut-off to work within the enlarged
shank of the discharge tabe close to toin iner end of said tube, and in hinging it so that it may have a s sight play on on tis pivot. The object is it
prevent the inner cut-off rom crowding against the shot and preventing
 requiring the removal of the tube or the constant manipulation of the
ever. The invention is applica ble to all kinds of shot flasks, pouches or ever. The invention is applica ble to all kinds of shot flasks, pooches or
belts, of whatever construction, and is, in our opinion, a decided improve.
ment on the chargers hitherto used.

SAW MiLL.-John J. Reinhart and Wulliam Houghton, of Loogootee, Ind.
-The saw is rigidy attached to the crank pin by means of iron straps or otherwise. No pitman is employed, but the saw itself partakes of the character and receives the motion of a pitman. Adjustable muley boards
guide the saw. The frame work which supports the feed and gigging gearguide the saw. The frame work which supports the teed and gigging gear-
ing of the mill has an ad adsastable frame connected with t t by means of thich the upper end of the saw is supported and adjusted. A bar or arm, slotted at one end to reecive the saw, is attached to it by a pin. The other end of the
bar is hinged or pivoted, or so connected with the adjustable frame that bar is hinged or pivoted, or so connected with the adjustable frame that
it allows he eopposite end t to vibrate with the saw and deseribe the arc of a circle. As the log is fed up to the saw, the saw will make its cut as it de.
scends, and will be carried back in its kerf by the crank, thus preventing tiaesawdust or fibers ot wood from wedging or retarding the upward or
back movement of the saw. The points of the teeth of the saw are pref. erably of chisel form. The cut of the saw should be at tright angles with. the grain of the wood, so that the fibers or dust will be as sh rrt as passible.
The driving crank wheel is so constructed that the saw and the parts con.
 apparatus of peculiar construction also constitutes a feature of the invenappor.
tion.
Mtrring MaHirve.-Harry Malin, George W. Malin, and Albert D.
Malin of Pleasantville, Pa.-The invention relates to mitering machines Malin, of Pleasantville, Pa.- The invention relates to mitering machines
tor cutting picture frame and box joints, and consists in a combination of tor cutting pictureframe and box joints, and consists in a combination of
a table, plane, guide and plate arranged in a peculiar manner for the pura table, plane,
pose specifled.
Osclllating Engine.-John W. Van Sant, of Perth Amboy, N. J.-An adjustable sliding plate provided with slots and holes for the entering
steam, and holes for the exhaust steam, in combination with a stationary plate provided with holes for the passage of the steam, and with a pivoted or oscillating cylinder provided with holes for the same purpose, are
the features of this invention.
Clothes beater.-Alden Jameson, Boston, Mass.-This is a new implement for use in washing clothes and other articles with boiling hot suds, in common wash tubs, barrels, boxes, boilers, etc., and consists in the arrange-
ment of an inverted funnel on a tubular handle, and provided with radial and other beating edges at its large end. The instrument is, by hand or machinery, moved forcibly up and down, beating the clothes in its descent.
the air in the inverted fannel, and forces the hot suds and the air through the pores of the fabric in descending. When slightly lifted it creates a
momentary vacuum, somewhat lifting the clothes and keeping them light and prepared in the best manner for the next blow. It also keeps a fin lather on the suds, and thereby retains the esame in. best condition for the
process of washing. The implement is adapted to fine as well
cos corse fabrics.
Oranv.-George Woods, Cambridgenort, Mass.-This invention consists Irst, of a peculliar form of the case, which is very simply and economically Cormed of ti.e reed board for the bottom, with moldings for the sices, and
cover, the instrument not being inclosed below the reed board, the said moldings forming such inclines that a large reed board, and also a large sound board, with a small top surface, is secured, suitable for a card tabe
and the like, on which is arranged a chess board. The case is, by this con Struction, adapted for the arrangement of the stops in a a row along the fron of it under the esess. Alsoso the invention consists of an arrangement of the
blow pedals and their supports in connection with the stand or frame sup. blow pedals and their supports in connection with the stand or frame sup and to divide the labor between the two feet. The invention also consist or storing away chess men when not in use, and in a peculiar construction of the valves, claimed to improve their action.
Propruler Wherl for Fluid Mrtrrs.- William Van Anden, Pough-
veepsie N. Y .-This is a propeller wheel or fluid meters made from a plate seepsie. N. Y.-This is a propeller wheel for fluid meters made from a plate
fmetal of even thickness, and stamped up and pressed into shape by mean of dies. in the ordinary way of shaping metal, for the purpose of stretching he outer edge and giving ad Lional parts insures accuracy and uniformity, also a light and well balanced
wheel, the lack of which has been a great defect in the construction meters. The wheel varies 1 s speed according to the amount of water or did which passes through it; thus, when a large quantity passes through, he wheel moves slowly; and very sensitive to the slow movement of the water, a portion will pass through without its revolving. The utility of a meter depends on registering th smallest quantity of water that passes through it without the flow being
obstructed. By this method of stretching the metal, it it claimed, the most water surface and the greatest degree of pitch to the blades is secure which makes the wheel more accurate and more
low or quantity of water that passes through it.
PLUG For Leaky boiler Tvibs.-John M. Spiegle, Philadelphia, Pa.-
This invention consists of a long rod with a plug on one end small enough low of being pushed throunh the tube to the rear end ; and at the inner en said plug is a leather or other flexible disk, which follows the plug throug tube by the plug being pulled forwat, the plug and leather disk will sto the end of the tube tight, and the otheren end of the tube is paccered by a cap
forced against it by the nut and rod, which draws the packing of both eads gainst the tube; and another wood plag or a meal disk is apphied to Bear each end to ht singlu BaLNAG Corron, ETC.- -Benjamin W. Collier, Oxford, assignor to himsel n improvement in baling cetton, and other substances suitable to be put up in bales, simple, inexpensive, and secure, protecting the substance baled better, from thieves. fire, animals, etc., than when baled in the ordibales. It manner, ansists which shallibe equaily applicable to loose and compresse of wire valing cloth, and in the manner of trength to holit the cotton or other substance securely without ties. In the wire cloth, at suitable distances apart, are larger wires. The wire cloth may be secured upon the bale by locking the ends of the coarser wires into
ach other; but in the case of compressed bales this will not answer. is case, metallic hooks or buckles are used. which are secured to one en the c
Covar Mixvure.-Matthew Connell, Jersey City, N. J.-This remedy, for
coughs, colds, and kindrea diseases, consists in a combination of ingredie olidified as sugar candy, in the form of tablets, or in any other form conve ient for use., The compound consists of sugar, phosphate of soda, oil or
ieppermint, and water, combined, poured, in a semi-fluid state, atter the peppermint, and water, combined, poured, in a semi-fluid state, atter the
combination has been made, into molds, where it solidiese, thereby formin Cakes or tablets of
nch in thickness.
Grinding Machines.-William Battell and Milton E. Worrell, Quincy rrinding the revolving cutters of plows, and other revolving cutters, by which improved arrangement of adjusting devices the disk, which sustain the cutters, may be supported so as to present the cutters to be ground to
an edge, or thicker at the edge than at the center, or to the same thickness is may be required.
CLod Frxprer.-Rohert T. Gillespie. Millport, Ohio.-This invention co ists in a fender connected with a plow or cultivator for protecting growing
lants from clods of turf and from stones in the proces of working between the rows of plants, the construction and arrangement of parts constituting fender shoo and scraper combined together, which is broadly claimed he patent which has issued.
Reversible Axle Skeins.-Andrew F. Smith, Aiken, Texas.-This in vencon or iron, so that they can ene turned from time to time, as shey wear
waw, to remove the worn place from the wearing position and bring part ot worn thereto. The invention also consists in pinning, the skein to the
wxle, to relieve the linch pin or nut from the end thrusts of the skeins. The axie, to reileve hhe linch pin or nut from the end t thrusts of the skeins. The
axle skeen is polygonal in form and diagnonalys aperturea, so that the bearing surface
perimeter.
Clortres Drypr.-George W. Ainssorth, Waterbury, Vt. -This invention frnishes a simple and convenient clothes dryer, which may be compactly
olded, and securrely held when expanded to any desired extent in the construction and commination of standards, rounds, bars, and lock
nars, arranged together in a peculiar manner for the purpose set torth. Head block for Saw Mill.-Henry C. McEwen, Oakdal Station, Pa.-
The object of this invention is to facilitate the operation of setting logs to the swW in the process of sawing lumber, so that the thickness of the lumber
sawn may be determined with greater accuracy than it is by the usual operate the knee on a head blosk, whereby the sawyer can reach the setting apparatus from the side of the log, and can set the log with the greatest tre,
cision while standing erect. This invention is more especially designed for cision while standing erect. This invention is more especially designed for he circuins saw mill, but may be appied $t$ other kinds of saw mills.
Privunatic Sprivas.-Mathew F. Maury, of Richmond, Va.-Pneumatic
sprines have long been used in machinery, but the great obstacle to their general employment has been the inability to secure a packing suffliently thinks that he has accomplished this object in a perfect and economical manner as follows: He constructs the lower section with a central and up. of said section. He fill this channel with oil or other equivalent substance Whide into the upper part of the chamber, formed by the two sections, is per section rests quantity of air or other gas. The lower edge of the up. hermetically sealed, and with but a comparatively small quantity of oil.
Coxposirtow SToxe.-John W. Hopkins, of Fayetteville, N. C. C.-This inner. The elements of which this stone is composed are common sand and
 mixed, the rosin being, of course, in a melted state), and pressed and dried in the ordinary manner of manufacturing artificial stone, constitute a dur. able article of an agreeable dark brown color and very, cheap. The sand
torms the body of the artificial stone, the rosin serving to hold $t t$ tokether

Fexcr.- William Post Rollo, of Holland Patent, New York.- This inven
ion furnishes an improved farm fence, designed for line and other perma ent fences, claimed to be strong and durable, andat the same time neat
 one and a half $t$ t four feet square, as the frmness of the soil and the re quired hight of the post may require. The foundation is leveled up to the
bottom board or picket raill allowance being made for the settling of the post, and it is then banked up. The bottom board or rail is then arranged apon the foundation, and the upper part of the post is then built up to the picket rail being thus anchored in the center of the post. The top boards or upper picketr riils are placed end to end in grooves formed in the top of
the posts, to receive them, and are connected by ties wilh a grip. In the the posts, to receive them, and are connected by ties with a grip. In the
case of a board fence the top boards are covered and strengthened by a oard nailed to their top edges. The top and bottom boards are connected
ad strengthened between the posts by ties or cross bars one or Which, when the distance between the posts is long, may, extend to the
ground. The intermediate boards are attached to the ties. When a high ence is required the ties may be extended upward, and may have aldition al boards attached to them. When bar posts are required their upper ends
may be sustained in place by being attached to the top board or picket rail ay be sustained in place by being attached to the top board or picket rail.
When a picket fence or a close board fence is reauired, the pickets or boardd re attached to the bottom or top boards or rails, the ties serving as a part

Mrdical or Phospatred Candies.-Charles S. Allen, of New York city
 phorus with candies, sugars, and saccharine compounds in a solid forman for
medicininal purposes. One methoo of carrying out the invention is as fol mall lemon drops-use eighty minims of officinal dilute phosphoric aci evaporated to one sixteenth its bulk, in which acid dissolve double its
veight of best white sugar. Allow this phosphoric acid sirup to cool, the ir in the lemon drops so that they are evenly corered with the acid sirup ow roll the wet lemon drops in pul verized sugar and throw them on a sieve of these drops represent one dose of the offlicinal phoshoric acid dilute By varying the proportions of acid, any required number of lemon drops
may represent a dose. In order to make cordial drops contaning phos. horic acid, hollow confectionery drops are made in the usual manner, an he interior is filea with the above described sirip of phosphoric acid. I hitesugar are dissolved in as small a quantity of bolling water as posible wenty-six grains of phosphate of protoxide of iron are added, and mixed thoroughly. The heating is continued until a portion dropped in cold wa
her becomes hard, but not brittle. The candy is then poured into molds ter becomes hard, but not brittle. The candy is then poured into molds of
te usual form. The proportions of sugar and iron can be made to vary necessary. The above method can be adopted for any phosphate which is toned and the specific forms of phosphorus may be varied at the will of he manufacturer.
Top Prop For Carriagrs.-David M. Valentine, of New York city.-This a new detachablecarriage top prop, and has or its ofject, by being de-
achable, to permi the ready and neat application of the covering and void the cutting of too large or misplaced holes. The ordinary props now use have to be fastened in place before the cover can be stretched, and the prop and permit it to protrude. This necessitates be perforated to loration, which frequently turns out to be misplaced. From this cause unsightly holes often appear through carriage tops in the vicinity of the prop and often the holes do not insure a proper ftt. Another form of prop is tha
whose plate is fastened on the outside of the cover subsecuent to the latter, pplication, and which qreatly mars the appearance of the carriage. The astening plate of this improved top prop is, by screws or other means, se
cured to the supporting frame or seat. The prop is serewed into the plate arough the cover. The tion of the prop until after it has been properly stretched over the carriage
top. The prop is then applied, receiving afterward the thimble, the bows and the head nut. In order to prevent the prop from working loose by spontaneously unscrewing, it can be locked to the plate by a plin, key, or
othr means after having been put to its place, or else a prismatic flanged washer, having prongs that pierce the plate, may be placed upon the cove nd around the prop to receive a prismatic sleeve that slides on a portion of STEA
Stram Boiler Furyace Door Ways.- -Wiliam S. Wood, of Newtown
J. Y. - This N. Y.-This invention has special reference to the door ways of steam
boiler furnacess; and it consists of a hollow arch partially surrounding the doorway, which separates the doorway from the front "uptake" of the
boiler. The arch is divided oy one or more partition plates. Through a tube a current of water or air is forced into one of the compartments of the arch, and through another tube the water is conducted from the a arch. As steam bilers were ormery set, the end or the boiler was supported by
the front plate, or was fush therewith; and the uptake from the boiler fues
was made of sheet iron Was made of sheet iron, and attached to the outside of the front plate or end
of the boiler. The present mode of setting a steam boiler is to support it on stands, and drop it back from the arch plate, thus leaving the uptake inMe the front plate, thereby greatily improving the appearance of the whole
rrangement without contracting the smoke channels or interfering with the draft of the furnace. The fuel doorway must. of course, be separated from he uptake, and it has hitherto been arched with brick; but, as the heat from most constant repairs or renewals necessary, which it is claimed is obvited by the present method
Centre Bit.-William H. Richards, of Deerfield Corners, N. y.-This is tf for the sced cencer head bit, so constructed as to bore the hole and countersink many different sized screws. It consists in the combination of a counter-
sink lip or wing with the center bit. With this nit the hole is left, with shoulder above the conotersink. The hole thus formed allows the plug to rest upon the bottom or shoulder of the frrst or plug countersink, which nary bit.
Ventilator for Windows.-George W. Pell, of New York city.-This is an improvement in that class of ventilators which are adapted to be intro-
duced into a space under the lo werssash, which is raised upa a short distance for the purpose, and which takes the air in under the sash and discharges it apward in a direct course to the ceiling. It consists of a long tin or other
sheetmetal case constructed in two parts, telescoped together so as to be lengthened or shortened to adapt it to windows of any width sheres bottom and at the ends to fit the window sill and sides, and provided with a 1edgeo on the upper and outer side for the sash, and adapted to make a sym-
ledtrical apparatus extending across the whole breadth of the window, and affording all the capacity required withoun projecting into the room in such manner as to be objzctionable in appearance. The air passages, being ex and yet are quite narrow transversely, so as not to project into the room so lar as to be objectionable. The case being made of sheet metal or other
thin substance, there is $n$ material off set at the point where the two s sction meet, as in the case of the use of two thick bourds of wood. The air pass ages may be provided with tine wire gauze partitions to exclude insects and the like.
tion conges Wherl.-Charles W. Fillmore, of Marengo, Ill.-The inventhe huna and serving at intervels st oreinforce the sposeses, and admecesses of or orv
ing them home tightly and frmy. It consists, secondy, in the construc tion of the metallic band on each side of the spokes with a vertical flange Fire Kindier.-David W. Thompson, of St. Joseph, Mo.-This invention with brick dust or other porons absorbent of combustible liguids, the case being perforated so as to allow the liquid to pass in as it is isaborbec and pass out asit is burned, and the
cured therein in $\&$ novel manner

Hedae Trimmer.-.Toseph s. Crum, Scottville, Ill. - The invention con-
sists in a hedge trimmer so constructed as to allow the relation of the sists in a hedge trimmer so constructed as to allow the relation of th
several parts to be readily changed and the hedge to be thereby turned an formed into any preferred shape.
Petroleum Forge.-Herrman S. Saroni, of Cincinnati, Ohio.-The i:1 vention consists in impinging a constant flame from a gas burner agains non-combustible material, to form a forge fire, and in providing means, con nectad therewith, for generating the gas as it is wanted.
Rotary Pusp. - David L. Jones, of Nebraska City, Neb.-The invention
consists in forcing water upward through a tube by means of one cylinder having adiametrical slide valve rotating eccentrically within a second cylhaving adiametrical slide valve rotating eccentrically within a second cyl-
inder, each provided with apertures and combined with a discharge tube having a stationary valve. This forins a very cheap, simple, and effective water elevator.
Sash Lock and Stop.-Tohn E. Scott, Baltimore, Md.--The invention consists in forming a sash lock by means of a spring pressed rod, which can and also when closed.
and also when closed.
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5,819.-Cooking Range.-J. Beesley, Philadelphia, Pa
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$5,836 .-$ PLATE FOR Lock.-G. W. White, New
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$792 .-T w i n e s$, ETc.-Cable Flax Mills, Schaghticoke, N. Y

794.-Cattle Food.-G. Gordon, New York city, and Montreal, Canada.
795.- Pianos.-Ohio Valley Piano Company, Ripley, Ohio.
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21,029.-CLotHEs Wrinamr.-I. A. Sergeant. July 10, 1872.
21,603.-Tempering STEEL.-F. G. Gardiner. September 11, 1872
21,077.-Separating Wood Fiber.-A. S. Lyman. July 17, 1872.
$20,999 .-$ Stock for Holding Cutters.-I. Gibbs. July 10, 1872.
21,036.-Grain Separator.-B. T. Trimmer. July 10, 1872 .
EXTENSIONS GRANTED.
19,979.-SEwing Machine.-C. F. Bosworth.
19,984.-Cooling and Drying Meal.-J. Deuchfield.
EXTENSIONS REFUSED.
Lewis Miller.- Harvester.- Divisions No. $767,768,769$, and 770 of the reissue
dated July 19,1859, of origininal patent dated May 4,1858 . William H. Seymour and Henry Pease.-Harvester.-Dated May 25, 1858.

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