
a Weekly journal 0f practical information, art, SCIENCE, MECHANICS, CHEMISTRY, and MANUFACTURES.

## BORING MACHINE.

The invention herewith illustrated is adapted to the bor ing and turning of pulleys, gears, spiders, etc. A is the bed or frame, which is cast in a single piece, and arranged to fasten to a post, as at $B . \quad \mathrm{C}$ is the face plate which is cast with the hollow shaft, D. The latter fits in the boxes, E , and serves throughout its whole length as a bearing for the bar, $F$. The cone pulley receives motion from a suitable bar, be and transmits it to the belt, and transmits it to the gear wheels, $G$ and $H$. In the hub of the latter is a feathe which, acting on a slot in the
bar, F, communicates power to the latter.
The work to be bored is fast ened upon the chuck, I, as in an ordinary lathe. If the ex. terior of the object is to be turned, a set screw in the shaft, D, is screwed down upon the bar, F , and motion is thus im. parted to the shaft, $D$, face plate and chuck. The opera tion completed, the screw is loosened, the face plate set by loosened, the face plate set by
a dog or pawl, and the cutter a dog or pawl, and the cutter is adjusted in the hole, J , at the extremity of the bar, $F$, where it is held by the se screw shown. The shaft, D now remains motionless, but the cutter rotates with the bar, F. The feed gear is set in mo tion by a reversible lever at the end of the machine(not shown). K the feed screw is held in po sition by a slot planed along its entire length and a stationary feather or lug to keep it from turning.
It is claimed that this device occupies but little room and will do twice the work of
a lathe for the same purpose from ten inches upwards to any required size
Further information may be obtained of Messrs. T. R Bailey \& Vail, of Lockport, N. Y. This is the same firm re cently alluded to as manufacturers of the excellent form of key seat cutting machine, a short time since illustrated and described in our columns.

## PADDLE SHAFTS FOR PACIFIC MAIL STEAMERS

Our illustration conveys an excellent idea of the immens size of two paddle wheel shafts, probably the largest ever forged, recently made by Messrs. Lazell, Perkins \& Co., of Bridgewater, Mass., for the Pacific Mail Steamship Company. These are intended as spare shafts for the steamers Japan and China, to supply the deficiency in case of break down.
The one belonging to the Japan weighs $78,520 \mathrm{lbs}$, that of the China 68,400 lbs. They were transported from Bridgewater to San Francisco by rail, and reached the steamBridgewater to San Francisco by rail, and reached the steam-
er, in the latter port, which was to transport them to their


## IMPROVED BORING MACHINE

in the country. The time consumed in making and finish ing the shafts was about six months, 350,000 lbs. of iron and $900,000 \mathrm{lbs}$. of coal being employed in their manufac ture.
Experimental Researches on the Treatment of
By whatever means air is introduced into the lungs of an asphyxiated person, whether by pulmonary insufflation or artificial respiration, experience proves that its introduction is completely useless when the circulation is arrested. This happens in the case of a drowned person in some four or five minutes.
M. Le Bon, of Paris, further states that if the physiological causes be inquired into regarding the impossibility of restoring drowned animals to life after this short delay, it will be found that the heart always contains voluminous black clots of blood To renew the movement of the heart when it has ceased is not difficult, but to force out these enormous clots, which completely block the passages, is manifestly impossi-
destination, the depot at Yokohama, Japan, in twenty days from the time of leaving the forge.
These immense masses of iron are each $38 \frac{1}{2}$ inches in largest diameter by 39 feet 8 inches and 37 feet 3 inches (respectively) long, and are made of the best Swedish scrap iron, worked with charcoal and open forge fires. The hammer used in forging them is 11 tuns in weight and has a ten foot stroke It is believed to be the largest machine of its kind in use

In a lecture recently delivered in connection with the Liv erpool Literary and Philosophical Society, Professor Max Müller addressed himself to the phase of Mr. Darwin's theory, which deals with the possibility of the higher animals acqui ring the faculty of articulate speech
The lecturer gave various illustrations of the essential dif er in of emotions and the expres sion of ideas or abstract con eptions, and argued at length as to the impossibility of mere motional signs and sounds de veloping into articulate speech and he ridiculed the notion that the materials of language being given, all the rest was a mere question of time, a natu ral gradation from the neigh of the horse to the poetry of Goethe. Man and animals pos sess emotional language in common, because man is an animal; but animals do not possess rational language be possess rational language, be distinction between istinction between emotional rom ranguage, so fa rom being fanciful and art cial, is radical, as proved by various evidence, especially by the testimony of pathology in reference to certain brain diseases. Rational language is to be traced back to roots, and every root is the sign of a gen eral conception or abstract idea of which the animal mind is incapable. Mr. Darwin has said there are savage langua es which contain no abstrac erms; but the names for com mon objects, such as father, mother, brother etc are ab tract terms and unless Mr. Darwin is prepared to produce . Dr. Darwis is prepared to produce a language containing no such names, his statement, said the lecturer, falls to the ground as the misconception of the real nature of a general idea as distinguished from an emotion, This phase of the controversy lies within the Professor peculiar domain, and he was able to entertain his audience with technical illustrations that in ordinary hands must have proved tedious, but in the hands of the most accomplished inguist of the day proved a source of wonder and amuse ment to his hearers. He concluded as he had begun, by maintaining that language is the true barrier between man and beast.

The latest style in mourning is to have a black frame printed in the paper at the head of the obituary notice of your friend, in which a photo portrait of the deceased is pasted after the papers come from press. We have received a copy of the Marlboro' (Mass.) Journal containing such a a copy of the Marlboro (Mass.) Journal containing such a
photo obituary of an enterprising citizen of that place, and the general effect is quite pleasing


TRANSPORTING PADDIE SHAFTS FOR PACIFIC MAIL STEAMERS ACROSS THE CONTINENT.

# Srientifir cenmoricm. 

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## burning water as fuel.

It is astonishing how prevalent the potion is that water can be advantageously burned as fuel. All that can be said and written on the subject appears to have no effect, and easily deluded capitalists are always ready to invest in the newest contrivance that comes along for the above purpose. There has recently been a tedious suit in reference to the invention
of Moses Thompson for burning wet tan, during which a of Moses Thompson for burning wet tan, during which a
ponderous volume of testimony was taken and a tangle of scientific evidence elicited that might well stagger the judge on the bench and the practical tanner in his yard, provided any of them have that faith in a long life which must precede the perusal of such an amount of worthless matter. There is the usual array of high sounding names of witnesses who testify as experts, and he must be an exceedingly expert angler after truth who can make out what they are driving at. It is clear that Judge Blatchford did not allow himself to be deluded by these experts, for he knocks the whole crowd off their feet and fires a round shot through the enemy's camp by the following conclusive sentence: "It is apparent from the evidence that Thompson was the first to discover and put in practice the true method of economically burning wet fuels, and obtaining from them better results than from equal quantities of dry fuels," which goes to show that the Judge believed the following claim put fortì by Thompson: "The water in the fuel, in the presence of carbonaceous substances in the furnace, will be decomposed, giving its oxygen to the carbonaceous matter, dispensing with the draft and its cooling and wasteful influence, and rendering combustion so perfect that no smoke is visible." We hardly know whether the inventor proposes to shut the water and carbonaceous matter up in a strong box to "dispense with thedraft," and, by the decomposition of the water and the re-combustion of the hydrogen, create a perpetual motion for affording heat such as the world never before saw, or not. The science of the proposition is too deep for us, and we cannot blame the Judge for being captivated by it. People will always believe in the perpetual motion whether in mechanics or in combustion, and it is better to join them to their idols and leave them alone. As our readers, however,
do not belong to this class, it may be well to let in a little outside "draft" on the laws of combustion by way of ventilating the subject.
The heat required to elevate a given quantity of water one degree is employed as the unit of measurement. The results obtained are called heat units; and as experiments have been tried upon all combustibles and gases and the products have been tabulated, there is no difficulty in obtaining all the it is desig ed to burn water as fuel, it must not be forgotten that it is necessary to convert the water into vapor by the o.bsorption of heat, then to decompose it and burn the hydrogen at the expense of oxygen over again, thus reproducing vapor, which when it escapes, after having passed through all of these stages, must carry away heat as irrecoverable as
that blown off through the safety valve of a boiler. There is, therefore, no possible theoretical gain of heat in attemptis, therefore, no possible theoretical gain of heat in a
ing to pass water through these circuitous processes.
Air-dried wood contains at best a large quantity of the elements of water, and most people prefer to burn the dry article. If the advocates for consuming wet wood were honest in their belief, they ought to keep the wood pile in soak all the time to prevent the disadvantages likely to accrue from the loss of water. During the last fifty years, something like sixty patents have been taken out in the United list affords a curious collection of attempts to accomplish
impossible results, and it would be a real service to the country if they could be posted up as warnings to ambitious in ventors. Sometimes the hydrogen of the water was carburetted by being passed over tar or oil; that is the favorite method with this class of gas inventors. The water must first be converted into steam, then decomposed by the glowing coals, and the resulting hydrogen brought in contact with turpentine or other hydrocarbons, when it is carburetted
and ready to burn for both light and heat. Other inventors decompose the water by passing it through iron grates on which are placed the live coals; on closer examination it was discovered that they obtained their hydrogen at the expense of the iron of the grates, and this was pronounced to be decidedly too expensive for practical use. Another apparatus cidedy too expensive for practical use. Another apparatus
introduced steam through an iron tube; but finding the tube introduced steam through an iron tube; but finding the tube
disappear, they substituted a fire clay mouthpiece and were disappear, they substituted a fire clay mouthpiece and were
disgusted to find the operation no longer successful. As long as there was any red hot iron to decompose the water, they got enough hydrogen; but when that was removed, the decomposition ceased. In general, the sixty patents were founded upon the principle of burning up some valuable substance, includirg the furnaces themselves, in order to obtain an apparent gain. They robbed Peter to pay Paul, and had to pay the penalty for such unscientific conduct. In 1850, the world was astonished by the famous water gas patent of Paine, who converted water into hydrogen or oxy gen at will, without leaving a trace behind, and whose fame kas not yet died out in connection with more recent efforts in the same direction.
This whole business of burning water as fuel is an imposition, fostered by ignorance and encouraged by dishonesty; and it is high time that it should be suppressed.

## the metropolitan moseum of art.

The Metropolitan Museum of Art in this city has rented a large and splendid building on Fourteenth street, and will immediately proceed to prepare it for the reception and exhibition of the many rare objects now in possession of the society. The present lease is for eight years, the premises being only intended as a temporary place of deposit and exhioition. The large and splendid permanent Museum is to be erected in Central Park, and will be finished by the
time the present lease expires. This temporary opening of time the present lease expires. This temporary opening of
the Museum in the lower part of the city is an excellent idea, the Museum in the lower part of the city is an excellent idea,
as it will be conveniently accessible to all classes of our citias it will be conveniently accessible to all classes of our citiance. Among other curiosities that are to be soon placed on exhibition is the remarkable collection of Chaldean, Assyrian Phœnician and Grecian antiquities, more than ten thousand in number, recently discovered and exhumed in the island of Cyprus by the United States Consul, General Di Cesnola. This is one of the most valuable collections in the world, embracing ancient sculptures, vases, coins and orn

## are the planets inhabited

The Evening Mail contains, under the above head, an ar gument tending to an affirmative answer to this question; but it is founded more on poetical imagination than on sober truth. The writer says: "Reasoning from analogy, it is hardly possible that such magnificent worlds as are within telescopic insprection, far surpassing our own in magnitude and celestial beauty, are solitary globes, destitute of living forms organized for enjoying as much as we," etc., and he ends with the statement that the spectroscope has demonstrated that the composition of these worlds as to their metallic resources is essentially like that of the earth; and he asks, finally, "why not in all other respects?"
The answer to this question is that in allother respects the conditions required for organic life are exceedingly complex. One of them is a temperature between $32^{\circ}$ and $100^{\circ}$ Fah., and this condition prevails only on two of the planets, the Earth and Mars; all the others are too hot, and their moon are too cold; at least, it is probable that the moons of Jupi ter, Saturn, and Uranus are as thoroughly cooled off as our own moon, which is as totally unfit for the existence of or ganic life as the tops of our Himalayas. If the spectroscope had not demonstrated that the celestial bodies were com-
pounded of the same elements as our earth, we might perpounded of the same elements as our earth, we might per
haps argue that, for other elements unknown to us, another range of temperature might be required for organic life, bu the revelations which this admirable instrument has given exclude such a supposition; and as, in connection with the telescope and photometer, it has also taught us that a tem-
perature of $1000^{\circ}$ Fah. and upward prevails on all the plan ets except Mars, the idea that they are all inhabited at the same time, is fallacious
We say at the same time; the moon may have been inhabited millions of years ago, when the surface of the earth was as red hot as that of Jupiter is now; and when by further cooling during thousands of centuries our earth will have become desolate, it may be the turn for Jupiter and other plane
A German saying is: "God works slowly, because He is eternal." No doubt the universe was not created in a hurry planets have been revolving around central suns for millions of centuries, and according to unalterable laws have their periods of preparation, disturbance, evolution, organization, then their period of full organic development, and finally of decay; it is already, a priori, very unlikely that these differ ent periods of their history should exactly coincide, as the planets differ individually a nd are placed in different conditions; the larger ones must cool slower than the smaller, and those further from the sun faster than those nearer to that
orb. Each has its own individuality, its own history, and will go through the different periods of its destiny in its own time, a time so long that our longest historical period is comparatively a mere instant; while it sweeps in its course hrough spaces so large that all the empires of our earth are comparatively a mere handfull.

## THE NEW YORK STATE REWARD FOR IMPROVEMENTS IN CANAL NAVIGATION

Our readers will remember that in 1871 the Legislature of the State of New York passed a law offering a reward of one hundred thousand dollars to the introducer of a plan, for navigating the Erie canal in this State, which should prove on actual trial, to be better and inore economical than the existing method of towage by horses. The following were the chief requirements of the law :

A Board of Commissionerss were appointed, consisting of George B. McClellan, Horatio Seymour, Erastus S. Prosser, David Dows, George Geddes, Van R. Richmond, Willis S. Nelson, George W. Chapman, William W. Wright, and John D. Fay, whose duty it was to practically test and examine all inventions that might be submitted to them, by which steam, caloric, electricity, or any motor other than animal power could be practically and profitably applied to the propulsion of boats upon the canals. Such tests and examinations were to be confined to the seasons of canal navigation in the years 1871 and 1872, and the Commissioners were required to demand that the competing inventions should be tried practically upon the canals at the expense of should be tried practically upon the canals at the expense of
the applicants; that the boat should, in addition to its weight the applicants; that the boatshould, in addition to its weight of machinery and fuel, be able to transport at least tho
tuns of cargo, be able to run at a speed of not less than three miles per hour, be easily stopped and backed by its own machinery, which should be simple, economical, and dura ble, and readily adapted to the present canal boats. Lastly, the law requires before an award is made that "the Commissioners shall be fully satisfied that the invention or device will lessen the cost of canal transportation, and increase the apacity of the canal."
The limit of time for competition for the reward expired with the close of canal navigation last fall, and it may not be uninteresting to make a cursory review of the operations of the various competitors, give an outline of the construction of the boats, and see if we can determine who among them, f any one, is likely to carry off the hundred thousand dollar prize.
We do not intend to give the particular numerical order in which the boats were put upon the canals, but for conveni ence of reference will designate each exhibit at random. If from this list any exhibitors have been omitted, we shall be glad to be informed, so that correction may be made.
Exhibit 1. Steamer Dawson. Inventor, Thomas Main. This was a common canal boat altered for the purposes of the trial, which alteration consisted in making a concave recess in the bow of the boat, in which a common propelling screw was set. About 20 horses power were employed, 200 tuns of freight were carried, and a speed in excess of three miles an hour, on an average, was obtained, cxcept when de tained by lockage. The average running time through the canal was 2.02 miles per hour.
Exhibit 2. Steamer Baxter. An ordinary canal boat fitted with two stern propellers of the ordinary construction driven by one of WilliamBaxter's patent compound engines The only peculiarity claimed for this boat was that she was simple, and could be run on less coal than any other boat and such indeed proved to be the fact. She made two o three successful trips through the canal, and proved to be a useful and economical boat.
Exhibit 3. Steamer Montana. An ordinary canal boat fitted with a single 9 foot feathering wheel encased in a bor in her stern. A. H. Brown, inventor. Forty horse tubula boiler, 2 engines $9 \times 18$, direct action. Burns less than one un coal in 24 hours. Speed 31 miles an hour loaded, and $5 \frac{1}{2}$ miles light. Ran very well.
Exhibit 4. Steamer Hemje. Charles Hemje, inventor. This was a well modeled boat, provided with an ordinary tern screw propeller, and the chief peculiarity consisted of cylinder in which the screw was enclosed. This cylinder was movable and served as a rudder, and was used to steer the vessel. By turning the cylinder, the column of wate jected from it by the screw was deflected, which assisted steerage. This boat made good time, carried over 200 tuns of cargo, and worked extremely well.
Exhibit 5. Steamer Eureka. Hiram Niles, inventor This boat was propelled by means of two conical shaped screw propellers, arranged on the outside of the bow, upon the same angle as the bow. The points of the two screw converged, like the two lines of a triangle. This boat ran faster than any of the experimental vessels on the canal, and performed extremely well. But she proved rather heavy and, in order to carry 200 tuns of cargo, required 7 feet of wa er, which the ca
Exhibit 6. Steamer Port Byron. Inventor, F. M. Mahan Through the hull of this boat, from bow to stern, runs a runk or water way, and in the after part of the boat a com mon paddle wheel is set within a chamber, which forms part of the trunk. The motion of the wheel draws in wa terat the bow, and discharges it at the stern. This boa made súccessful trips, and operated very well.
Exhibit 7. Steamer Forest City. Built at Russel and Eads yard, Buffalo, An ordinary canal boat fitted with two vertical propellers, placed one on each side of the stern. These propellers are on Dr. Hunter's plan, the blades feath ering, and so made as to be feathered from the deck so as to act on the water at any desired angle. This facilitates
steering, as the propellers may be made to act sidewise, or
in line with the vessel's keel. This boat performed well, in line with the vessel's keel. This
made good time, and carried 200 tuns.
Exhibit 8. Steamer Excelsior. This boat, built of iron, was fitted with Mallory's patent propeller, which is constructed somewhat on the principle just described. By its use the vessel is steered as well as propelled. The blades of the propeller are made to feather from within the boat, and they act upon the water at any angle desired. Very good results were obtained, although we believe the owners did not compete incārrying cargo.
Exhibit 9 Steamer Geo. M. Pheter. This was an old canal boataltered for these experimental purposes. A little abaft the middle of the boat, an opening on each side is made and water ways or trunks inserted, which converge into one discharging trunk at the stern. In each trunk a $4 \frac{1}{2}$ feet screw is placed. Engine, 40 horse power. This boat made one trip and operated very well. Built by Russel \& Eads. Exhibit 10. Steam Pump boat. Propelled by a piston at
the stern, operating in a cylinder, the stern, operating in a cylinder, Results not satisfactory.
Exhibit 11. Steam Pole boat. Propelled by poles which were made to operate on the bottom of the canal and push the boat along. Results not satisfactory.
Exhibit 12. Steamer Vermont. Endless belt of paddles on each side of the vessel, passing over rollers at stem and stern of boat. Results not satisfactory
Exhibit 13. Stern wheel steamer. A recess in the stern in
which an ordinary paddle wheel was placed. which an ordinary paddle wheel was placed. Resembled the ordinary stern wheel steamers. Result not very satisfactory.
Exhibit 14. Tow path locomotive. This was a trial of Williamson's road steamer Enterprise, placed on the tow path of the canal. It was a twenty-four horse steam engine mounted on three wheels, with a hinged smoke stack. Four
boats, three loaded and one light, were attached by rope to boats, three loaded and one light, were attached by rope to
the steamer, which made four and a quarter miles per the steamer, which made four and a quarter miles per
hour with them, and ran from Albany to Port Schuyler. The experiment was considered to be a success, de monstrating that towage could be expeditiously and econom-
ically accontplished by this method. But it is alleged that ically acconıplished by this method. But it is alleged that
the tow path of the Erie canal is unsuited for road steamers in many parts, and would need, in order to permit their suc cessful use, an improvement and strengthening of the paih, involving great expense. This trial was not within the limits of the competition, which applied only to devices for propulsion not moving upon the bank.
Exhibit 15. Steam rope towage. This method consists in having a wire rope laid on the bottom of the canal along its whole length. A steam tow boat is employed, on which there are a series of gripping rollers; the rope is brought on dech and passed between the rollers, which are driven by steam and pull the boat along, with other boats in tow. This is known as the Belgian system, and works very well on the few miles for which it has been adopted on the Erie
canal. Full accounts have been heretofore given, in our paper, of its operation. This method was excluded from the present competition.
Exhibit 16. Steamer Success. Captain W. F. Goodwin, in ventor. The distinctive feature of this exhibit consisted in having a train of boats, specially made to join and work to gether. No other exhibit on the canal presented this feature. The propelling power was contained in the front boat the bow of which was provided with a hollow paddle wheel extending entirely across the bow, and well enclosed. The exterior of the wheel was provided with a band of cogged teeth, with which meshed the teeth of a driving pinion, and
miotion was thus communicated to the wheel. Twenty horse miotion was thus communicated to the wheel. Twenty horse
power engines. This exhibit brought through the canal power engines. This exhibit brought through the canal
and down to New York a cargo of 13,200 bushels of corn, or 400 tuns, in $10 \frac{1}{2}$ days running time. In respect to cheapness of running per tun of cargo carried, this exhibit of train boats was a decided success, and the inventor is confident that the principles of construction are in the main correct, and that, with such modifications as the experience gained on the canal has suggested, he will be able to solve the prob ner.
It may be said, in respect to nearly all of these exhibits, that they have demonstrated that canal boats may be successfully operated by steam power. But have any of them fully and satisfactorily fulfilled the intent and conditions of the law? We think not. Before any of the exhibitors can expect an award, the Commissioners "shall be fully satis
fied that the invention or device will lessen the cost fied that the invention or device will lessen the cost of canal transportation and increase the capacity of the canals." It is evident that none of the exhibitors are entitled to an award, for they have all come short of these requirements. The next inquiry is whether any of the exhibits are likely, on further trials and the addition of new improvements, to accomplish the design of the law? It seems to us that an affirmative answer may be conclusively deduced from the results of the experiments, and we will proceed briefly to point out the reasons.
It was demonstrated, by a majority of the boats tried, that they could steam through the canal, except for detentions, at about one third the cost of horse towage. But a single steamboat, if delayed, rapidly runs up expenses, as the cos of maintenance is almost the same, whether moving or
standing still. tanding still
It was further demonstrated that one steamer could carry nearly 200 tuns of cargo, and tow three additional boats car rying 240 tuns each, making in all 920 tuns of cargo, with but little additional expense over the cost of running a single steamer, and it became evident that the solution of the canal
problem depends upon the successful running of boats in problem depends upon the successful running of boats in
traias. But it was also demonstrated that in
defective condition of the canals, the crowd of horse boats, the rocks, wrecks, sedimentary deposits, shallow places and other obstructions, the towage of boats by lines in the ordi nary way was productive of great confusion and serious de-
lays. If the towing boat slacks in speed, the boats in tow lays. If the towing boat slacks in speed, the boats in tow
jam together; they collide with horse boats, and are in other jam together; they collide with horse
It is, then, to the introduction of better means of working and controlling boats in trains that we are to look, in order to lessen the cost of transportation or increase the capacity of our canals.
In respect to this matter, the suggestion which has been made, of placing side screws at the bows of the front boat so as to work the boat laterally when steerage way is lost, had to poling by hand, a slow and laborious operation. If some quick and ready method of applying steam power could be introduced as a substitute for poling, almost half the difficulty of canal navigation would be overcome.
Another appliance needed for train navigation is the placing of steam power in the rear boat. The principal towage power should be in the front boat; but there should be a re serve power at the stern, to assist in guiding the train and swaying the train promptly as circumstances require. Other minor improvements will suggest themselves to experi
mentors. But those -we have specially mentioned, it seem mentors. But those we have specially mentioned, it seem Another deduction, made evident from the results of these experiments, is that the limit of time fixed by the Legislature for the competition was altogether too short. The construc tion of experimentil machinery of any kind is always more adapt new, and alterations have to be frequently made to adapt new inventions to oractice. Many of the competitors
in the present case were compelled to go through the canal with defective machinery, for lack of time to change or strengthen it.

Then again, by some remarkable fatuity, the canal offi cials, when applied to by competitors for information as to the depth of the canal, invariably replied that it was 7 feet in mean depth; width at surface, 70 feet, bottom, 56 feet. Many of the competitors built their boats to run in this water, bu found, on entering the canal, that 6 feet of water was all they had to depend on, and this only in the center of the
canal, the sides shoaling very rapidry, whereby the boats were frequently grounded and greatly injured.
The exhibitors have joined in a memorial to the Legislature, asking for an extension of the time for trials and the appor tionment, for the purposes of new trials, of those parts of th canal that more nearly furnish the volumes and depths of
water that were originally and impliedly assured to them by water that were originally and impliedly assured to th
the law under which they engaged in the competition.
The subject is one of great importance to the State; and i the Legislature will now grant the petition of the memorial ists, and encourage their enterprising efforts, we have no doubt that, ere another two years have elapsed, valuable methods for practically reducing the cost of transportation
and increasing the capacity of the canals will have been produced.

## ARMY AND NAVY PATENTS.

The question has lately arisen whether officers in the army and navy are entitled to the same privileges, as relating to patent rights on military inventions, as are accorded to pri ate individuals, and whether the Governmentshould com pensate such inventors, by royalty or otherwise, for such use
as it may make of their devices. The subject is one which has long been agitated in both arms of the service, in which it is the generalopinion that the absorption, by the country,
of private privileges, whether patents or inventions or of private privileges, whether patents or inventions or besides tending to check a spirit of investigation and a desir to perfect crude ideas which might, if fostered, prove of material benefit to the nation. The provisions of the bill recently Admiral Dahlgren a suitable compensation for the use, in the navy, of her husband's patented guns and projectiles, bring the matter prominently before the public, and afford an opportunity for a decision which will furnish a precedent for he future.
To our mind, there is but one view to be taken of th subject. The officers of the army and navy enter the service at an extremely early age, and for the residue of their lives are the wards of the nation. Educated and supported at the expense of the people, their first duty is manifestly to their country. It is clearly a moral $\varepsilon n d$, by the implied contrac which they assume, a legal obligation upon them to devote their best efforts in return for the benefits they receive
Clearly, therefore, if they so employ the advantages freely fforded them in such a manner as to render the same pro ductive of valuable results, such fruit of their efforts belongs not to themselves but to the country which, for this very spe cific end, has intrusted to their keeping the knowiedge, of which their ideas are but the outgrowth
To descend from general principles to a definite case, i phe Government pays one of its servants to perform certain
work, if such services comprise the experimenting upon, work, if such services comprise the experimenting upon,
txamination and improvement of munitions of war, for ex emple, it is evident that, if no especial result be attained aroportionate to the value expended in conducting such investigations, the loss will fall, not upon the individual but
upon the nation. Why then, on the other hand, if he be successful in fulfilling the very labor which he is paid for performing, should the servant, who runs no risk, receive he extra compensation, while the Government, which incurs sum than if his toil had been fruitless?

We do not deny the right of a military employee to obtain patent on an original device, if such be his inclination. believe that the authority of the nation over matter which are clearly within the line of his duty, as is the case with the designing of improvements or inventions of a professional nature, is paramount; and, while the patent should hold good as against all the rest of the world, the Govern ment should be entitled to its free use and enjoyment.
In the special instance of the claim of Mrs. Dahlgren, we agree with Senator Morrill in his opinion that its grant wil establish a dangerous and impolitic precedent. As regards the intrinsic merits of the casc, however, we consider that it would be but a graceful and just recognition of the worth and appreciation of the services of an able, faithful, and brave officer if Congress would appropriate an adequate sum for the maintenance of his family; not in satisfaction of any claim, but as the free and unrestricted gift of the people in whose service his life was passed.

## THE EMPLOYMENT OF WOMEN.

The presence of Miss Emily Faithfull in this country at the present time has revived the discussion of the woman question, and been the occasion of public assemblages to con sider a report upon the best form in which to disseminate correct information and influence popular opinion on the sub ject. A meeting was held a few evenings since at Steinway Hall which must have given great encouragement to the ad ocates of the new movement. It was not one of the unfem nine exhibitions with which we are too familiar in New Tork, the tendency of which has been to repel delicate and ensitive women from taking any part, but it was a dignified efined assemblage of the very best representatives of the ex to be found in New York. The woman artist, the author the teacher, the artisan, the editor, and every trade into which woman has been able to find her way, were represented by thei chosen delegates. There was no loud talking, no expression of woman's rights, no complaints, no recrimination, but a straightforward presentation of facts and statistics that must have carried conviction to any but the most selfish and mer
nenary hearer. Mrs. Henry M. Field, formerly Director eenary hearer. Mrs. Henry M. Field, formerly Director of Miss Faithfull to the for Women, presided and intress wa reported in full in the morning papers and need not be repeated here, but the ideas suggested in it, and the remedies for the evils complained of which were there advocated, are deserving of careful study and consideration on the part of echanics, tradesmen, and thoughtful citizens everywhere f we study the progress of invention we shall find that, in many directions, some new contrivance has invaded the spec al avocations of women and taken from them the ability to arn a subsistence by work which at one time was their mo nopoly. Not many years ago the baking, brewing, spinning and weaving were conducted by women at home in the do mestic circle. It enabled the females to contribute to the support of the family, and oftentimes the sister sustained the brother at college without being compelled to leave the sacred precincts of the home circle. Some of the best men in our country owe their opportunities for education to the self-devotion of women at home. How does the case stand at the present time? The baking is conducted by men, even in small towns. Machinery for sifting, stirring, and knead in small towns. Machinery for sifting, stirring, and knead
ing the flour has been invented, which must be superintend ed by men, and it is only in limited circles that bread baking ed by men, and it is only in limited circles that bread baking can be conducted at home. It is true that men complain
that women know too little about baking, but that has noththat women know too little about baking, but that has noth-
ing to do with our argument, and we must let the women ing to do with our argument, and we must let the women
defend themselves from the aspersion. The fact is that defend themselves from the aspersion. The fact is that The same historical record must be made in reference to brewing. Home brewed ale was the favorite beverage in Old England and in New England, many years ago. The farmer's daughter could formerly contribute largely to the support of the family by her skill in compounding a domes tic brew. Perhaps they seasoned the beverage too well, for the taste for it increased more largely than the supply, and it soon became necessary to establish immense breweries, to be again supervised by men, and this part of woman's avoca tion was gone. So we could go on drawing illustration from the great mills for spinning and weaving, only that in hese latter mills women are perritted toe arn a support, and here has been some compensation to them for the wholesal heft of what was formerly the chief home avocation of ou grandmothers. Enough has been said to show the encroach ments upon woman's peculiar province by the invention of machinery and the introduction of modern improvements. These inventions and improvements have certainly tended to advance the prosperity of mankind, and it ought not to be made a reproach upon our civilization that they have been made at the expense of the women. It was claimed at the moeting that the se

## holesale robber

There are plenty of avocations which men have monopo ized which they ought to be willing to exchange for the stolen property they now hold in their hands. For example, there are 14,000 appointments under government, not inclu ding post offices, of which women get 600 ; there are 250,000 clerkships of all sorts, in shops, telegraph, insurance and other offices, for which women are peculiarly fitted, and yet they get no more than a beggarly 7,000 . Now would it be asking too much of some of the lubberly, hulking fellows, whose sinews and muscles are evidently intended for deeds of prowess and strength, to give up jumping counters, doing up parcels in red tape, directing wrappers, and keeping petty ccounts, and to turn their attention to some of the avoca can have full play? There are many employments to which
women are not physically adapted, such as hunting, trapping, mining, manning ships, running heavy machinery, farm labor, engineering, and the outdoor exposure of expressmen, conductors, hackmen, drivers, and a long list quite enough to afford men an opportunity to earn the lion's share of wages and keep matters generally under their control. The statistics of New England show that, while men have devised methods for adding to their wealth, the ability of women to earn a livelihood has diminished. In Massachusetts alone there are 50,000 more women than men. The men have rushed to large cities to look after clerkships or to do the counter jumping, while shipbuilding languishes and the famous New England sailors are fast becoming a myih. In the meantime the daughters of the land remain at home and, having been deprived of the industries alluded to above, as their numbers increase and the ways and means of earning a support decreases, it is natural that they should feel some anxiety for the future, and demand a larger share in the distribution of work. There are more than $2,000,000$ women in England who are compelled to support themselves, and with them the struggle is one of life or worse than death. Miss Faithfull established the Victoria Magazine in order to advocate the cause of women and give employment to her own sex in the composingroom. Her example has been followed in this country, and in many printing offices women ought to be followed by many others.
ought to be followed by many others.
It has been said that females are more conscientious and naturally honest than men. If that betrue, in times like the present, when charges of bribery, defalcation and dishonesty are freely made on all sides, it would be well worth the ex-
periment to see if the gentler sex are betterable to resist the periment to see if the gentler sex are better able to resist the
temptations that always surround positions of responsibility or trust.
One thing is very certain, the right of woman to her share of honest labor cannot be put down by ridicule or despotism. It must be met fairly and squarely, and now that it has been taken up by our most refined and gifted women, we trust that the question will be soon settled to the entire satisfac tion of all parties.

## ARSENIC COLORS.'

Since the publication of our article on arsenic pigments, we have received numerous letters enclosing specimens of calico, wall paper, etc., asking our opinion in reference to their poisonous character: We have had some of these examined by competent chemists, and in allinstances sufficient traces of arsenic have been found to prove the dangerous character of the articles presented. From Lee, Mass., we
have a sample of calico in which the green band is colored have a sample of calico in which the grit a goods. The misfortune is that even some of the aniline colors are so impregnated with arsenic that they are as dangerous as the older Scheele's green, of which we recently complained. Toy books with green covers are always to be suspected, and in fact the only absolutely safe thing to do is to avoid green colors altogether. The detection of arsenic is so simple that any one can perform the experiment in a few moments. We cut off a piece of suspected calico and immersed it in some strong ammonia, which we had poured into a tumbler; a blue color at once indicated the presence of copper. A drop of the blue liquid put upon a crystal of nitrate of silver turned immediately canary yellow, which reaction denoted arsenic. This is an experiment that anybody can try. To confirm our suspicions we poured some of the liquid into a Marsh apparatus, and easily obtained the well known deposit of metallic arsenic on glass or porcelain. With wall paper a neat and easy way is to put a drop of nitric acid on the green spot, then a drop of ammonia, when the color will turn blue, and on addition of a drop of nitrate of silver, if arsenic be present, a yellow stain will spread in a ring to the outer extremity.

## free mail privileges ended

Hitherto the right to frank letters of any size has been granted to the President, Ex-Presidents, the Vice President and former Vice Presidents, to members of Congress, the Secretary of the Senate and the Clerk of the House, the privilege extending to free letters not exceeding two ounces and public documents weighing not over three pounds. The governor of any State could forward official documents to the governors of other States. Cabinet officers, their assistants, commissioners and heads of bureaus, the general and adjutant general of the army, the superintendent of the coast survey and his assistant, and chief clerks of departments were allowed free transmission of official but not of private correspondence. Deputy postmasters could send free all documents relating to the business of their respective offices, and those whose compensation did not exceed $\$ 200$ per annum in 1846 were entitled to the privilege of forwarding and receiving free all communications not exceeding one half ounce in weight.
This is what is termed the "franking privilege." Devised at a time when the postage on letters varied from five to twenty-five cents, it was a necessary relief to the government officers, whose salaries would have been materially diminished had they been obliged to pay such high rates for their voluminous correspondence from their private incomes. Since the introduction of cheap postage, the privilege has degenerated to a superfluity and latterly to a positive abuse, and although repeated attempts have been made, in previous sessions of Congress, to pass an act forits abolition, the strong
opposition which the measure always encountered rendered opposition which the measure always encountered rendered such efforts fruitless. The evil has gone on increasing; hun-
dreds of tuns of letters and documents, together with bundles
of dirty clothing for the wash, boots and shoes and all kinds of stuff belonging to members of Congress and their friend have burdened the mails, being sent in evasion and often in defiance of the laws governing their transmission, and caus ing, according to the estimate of the Postmaster General, a loss to the country of over three million dollars a year. Even this large sum, at periods, has been greatly exceeded. It is stated that, for the presidential canvass of 1872, if all the ranked letters and campaign documents sent out from Washington and other points had paid the usual charges fully four million dollars would have been saved.

It is a matter of no small moment, therefore, to the nation that the act abolishing the franking privilege has at length passed both Houses of Congress and only awaits the Presient's signature to become a law. The bill reads as follows Be it enacted, etc., That the franking privilege be, and the same is hereby, abolished, from and after the 1st day of July, A. D. 1873, and that thenceforth all official correspondence of whatever nature, and other mailable matter sent from or addressed to any officer of the Government or person now authorized to frank such matter, shall be chargeable with ke matter sent by or addressed to other persons: Provided That no compensation or allowance shall now or hereafter be made to senators, or members and delegates of the House of Representatives on account of postage
The direct result of the abolition of the frank will be to increase the receipts of the Post Office Department, and thus to warrant the reduction of the rates of letter postage to two cents, a change which the people will everywhere welcome.

## THE BOSTON FIRE COMMISSIONERS' REPORT

The Commissioners appointed by the city authorities of Boston to make investigations into the cause, effects, etc., of the great fire have recently published quite a voluminou report. Seven hundred and seventy-six buildings, covering a space of sixty-five acres and assessed at the value o $\$ 13,500,000$, were destroyed, together with more than sixty millions of dollars worth of merchandise and other persona property. How the fire first broke out is not definitely property. How the fire first broke out is not definitely
stated, but its rapid spread in the building first consumed i stated, but its rapid spread in the building first consumed is
considered to be chiefly owing to the faulty construction of the elevator which,like most elevators in Boston, was sheathe with wood and destitute of self-closing hatchways. The committee state that, if the last mentioned appliances had been in the edifice, the flames would not have reached the roof before the engines a rived, and the calamity might have been averted.
There seems to have been considerable delay for want of horses and a lack of water. The fire, it is also stated, was greatly aggravated loy the escape of gas from the burning buildings, the water valves, which were believed to bo sufficiently powerful to cut off the supply, proving of little value. Sliding valves should always be so ar ranged that the risk arising from the impossibility of iso lating a burning district should never be incurred. The report strongly condemns the action of the authorities in allowing the use of gunpowder for blowing up build ings by citizens or others, not regular officials of the Fire Department. Recommendation is made that a system be arranged, for the future, for using a far more powerful and less dangerous explosive, and for training a number of men to use it skillfully. Dynamite is considered as the best material for the purpose, as its force is so directed as to bring the building down rather than scatter it in fragments. It may be dropped or jarred in any way without danger, and cartridges containing it may be safely cut or broken. A quantity of this substance should be kept conantly in proper places.
The Lowry hydrant is recommended for use throughout the city as giving a better distribution of water. Fire es capes should be attached to all warehouses, and every high building should have a permanent stand pipe of iron capable of having a hose attached to it. Finally, the general use of the most approved forms of fire extinguishers and hand pumps in every house is strongly urged. These would prevent many conflagrations from becoming serious,
and they would inspire confidence in cases of alarm of fire

## THE SYSTEM OF SNOW PROTECTION ON THE UNION PACIFIC RAILROAD

The Chicago Railooay Times gives a graphic pen sketch of he great obstacle presented by snow drifts to the passage of trains on the Pacific Railroad. During the great storm which occurred in the early part of last winter, it is said that drifts
thirty feet deep packed full the heaviest cuts as fast as the largest force that could work dug or plowed it out. The snow at other points covered the low bed for miles in a solid mass which had to be cut transversely with trenches, eight feet apart, so that the snow plows could remove it block by block. It packed with such density that locomotives left the rails and ran upon the bed covering the track. Fences, how ever high, were found of little protection, and cases are cited in which bushes beside the road intercepted the snow, causing it to pile into drifts often completely covering the cars side tracks.
From the experience gained during last winter, a new ystem was put in force during the present season which has thus far proved successful. Observations, along the extended portions on which the bed lay from a few inches to three feet above the natural surface, showed the latter hight to be the minimum requisite to give sufficient freedom and space for the wind to keep the bed clear of snow. The track was
therefore raised and the outs also widened at the bottom sufficiently to give freedom and space to the snow on either
hand. The sides were sloped 7 in 125, that being the slope which the drifts were noticed to assume naturally. For cut
of moderate depth, this plan has been found to answer with of moderate depth, this plan has been found to answer with
out the use of sheds; in the case of deep cuts, however, the widening and sloping of which would be very expensive, snow sheds have been retained or supplied.
In carrying out the plan the locomotive was utilized to draw both plows and scrapers. A massive beam extending across the bed from ditch to ditch was fitted with two heavy plows on each end; and this gang plow, attached to a loco motive, was drawn at a maximum rate of two miles pe hour; the locomotive scraper followed, excavating the fur rows thus made on both sides and throwing the dirt up against the bed. Each set of these equipments was equa to a force of 200 men ; and by this means an aggregate o bout 100 miles of the bed of the snow region across and eyond Laramie Plains was raised from three to seven feet Cuts were also widened-largely by the use of the stean shovel, operated by the locomotive-where their great depth did not preclude widening. To protect the deep cuts, wher fencing was deemed inadequate, miles of new and substan tial sheds have been built on a plan fully obviating the de ects of the old fences; and the latter have been thoroughly repaired, lengthened, or rebuilt of better material. On this work exclusively, a force of 300 men was employed during the entire season. At the shops of the road, the already arge equipment of snow plows has been increased and great y improved. Seventeen plows have been remodeled, an four mammoth ones constructed, weighing from 35 to 50 uns, and costing an average of $\$ 3,000$ each.

## Improvement in Spring Mattresses.

Among the recent patents is that of W. B. Judson, fo mprovements whereby the frames, slats, and straps, hereto ore required on beds of this description, are done away with and a light, elastic, durable and comfortable bed is pro duced, at a comparatively low cost. The inventor uses the ordinary standard upholstery steel springs, so well known in the trade. These are united by ingenious little couplings in such a manneras to produce a maximum of strength and elas ticity' with a minimum of weight. A double bed, 4 feet 6 inches by 6 feet in size, weighs only 25 lbs., although it con tains one hundred and ninety-two steel springs, Of cours the real value of such beds depends upon the quantity of prings that they contain, and in this respect the Champion Mattress is ahead, as the purchaser gets from two to six time oore springs for the same money than most other beds sup ply. This new bed is known as the Champion Spring Mat tress, and the advertisement of the manufacturers will b found on another page.

## Six Inches of Snow in London.

A fearful storm, accompanied by a heavy fall of snow, oc urred in England on the 1st inst. Much damage was done to the shipping on the coasts, while in the interior the road nd railways were extensively blocked up by snow drifts. In London six inches of snow fell, which was an astonishing thing for the cockneys to behold. An inch of snow is a much as they generally see there in a generation. The om nibuses, cabs, and street cars were all obliged to suspend travel, and the only available means of local communication was the Underground Railway, the cars whereof were of course densely crowded
Last year the London Underground Railways carried be ween fifty and sixty millions of passengers. It is to be hoped that the New York Legislature, now in session, will authorize the construction of a similar work in this city. It is urgently needed.

## Luther Tucke

Mr. Luther Tucker, the editor and proprietor of the Culti ator and Country Gentleman recently died in Albany, N. Y Mr. Tucker was born in 1802, and at an early age was ap prenticed to a printer, serving his time and learning that trade. In 1825 he embarked in the publishing business, and in the following year established the Rochester Daily $A d$ vertiser, the first daily newspaper everissued west of Albany Having a strong taste for agriculture, in 1831 he projected the Genesee Farmer, which was subsequently merged in the Albany Cultivator. At the time of his decease Mr. Tucke was treasurer of the New York State Agricultural Society He was an able and thorough writer, and an acknowledged authority on all matters pertaining to the farm.
Severe Cold at the West.-During a recent cold snap at Sparta, Wis., the mercurial thermometer became useles by freezing, while the spirit thermometer indicated $45^{\circ}$ below zero. Meicury freezes at $-39^{\circ}$, but alcohol has never been frozen. Thealcoholic thermometer is not, however, to be de pended upon for accuracy. In Minnesota, by a sudden change in the weather the thermometer rapidly fell below zero in the course of an afternoon, and a blinding snow storm came on. So sudden, so violent, and so cold was it, that many persons, having but short distances to travel in order to reach their homes, were frozen to death in making the at tempt.
Action of Gas in Rubber Tubing.-In determining the illuminating power of street gas, it should not be conducted through an india rubber tube, since this diminishes its illu minating power. A series of experiments, made by Zul kowsky, show that the weight of the tube increases. Thi phenomenon is probably due to the absorption of the heavy hydrocarbons by the tubing

The horse disease has reached Omaha, Nebraska.

THE CHEMICAL DISCOVERIES BY THE SPECTROSCOPE
Professor G. F. Barker, of Yale College, recently opened the fifth annual course of lectures before the American In stitute in this city, by an able discourse on the above interesting subject. He explained the spectroscope and its uses, iliustrating his remarks by pictures of the instrument thrown upon the screen, and described how different substances may be recognized by the autographs written in bands of color on the spectrum. Various experiments were performed show ing the spectra of different metals by the aid of the electric light, and a lucid description was given of the method by which new elements have been discovered. The more im portant portion of the lecture related to the application of the spectroscope to the determination of subjects of genera interest. After giving a brief explanation of the

## BESSEMER STEEL PROCESS,

the lecturer stated that a flame issues from the mouth of the converter which is exceedingly characteristic, and, by apply ing the spectroscope to which, we may learn something by which a method may be obtained to stop the decarbonizing blast of air at the proper instant. Dr. Roscoe appreciated this, and accordingly made investigations at the Bessemer steel works of Brown and Brothers at Sheffield. It was found that when the blow begins, the flame is scarcely lu minous, a mere glare of red, giving a very faint spectrum, if any. In about four minutes from the time the blast is let on, a flashing through the spectrum of the sodium line may be noticed. In about a minute and a half after this change we discover lithium and then potassium. As the process
continues, the flame becomes intensely luminous, owing to the silicon becoming incandescent. Then it gradually changes, and becomes slightly purplish, and, in a few seconds, passes to nearly the same color as at first. Th first spectrum is an exceedingly simple one, but the las is complex, containing as many as 33 lines. The lines disappear in the inverse order of their appearance, and when the last green band becomes invisible, the blast should be shut off and the metal cooled.

## absorption spectira

It is a singular fact that, if we take various colored sub stances, such as a set of dyestuffs, no two of them exert the same action upon light. The absorption spectrum is as dis tinct as the autograph of a metal. We may therefore distinguish one dyestuff from another, and thus we have an infallible means for the

DETECTION OF ADULTERATIONS.
Mr. Sorby got a coloring matter from grape juice, which he called "Vitis purple." If this be suitably treated with citric acid, we have a solution the color of which cannot be distinguished from that of fresh port. If more acid be added distinguished from that of fresh port. If more acid be added a further oxidation is noticeable, and then it resembles the
spectrum of port about ten years old. By adding more the spectrum of port about ten years old. By adding more the spectrum becomes like that of port which is still older, there being a certain coloring matter which changes in its charac ter by oxidation. In regard to adulteration of wines, Mr Sorby believes that, as a general rule, such is not the case with colored wines. The lecturer stated that, in his own in vestigations, he had clearly seen the spectrum of logwood in a sample of port, and that he considered the popular belief, as to the use of Brazil wood and the common Virginian poke, to be not without reason.
Mustard, it is found, is almost uniformly adulterated with turmeric. Inferior rhubarb is also caused to imitate superior qualities. There is a kind of cheese bought in the English markets which has a curious yellow color which has been proved to be due to annatto. Professor Barker added that he once tested a suspiciously yellow sample of butter and that the spectrum obtained was plainly that of carrots, but whether the coloring matter was introduced by the manu facturer or the cow, he was unable to determine

## COLORING MATTER OF HUMAN BLOOD.

Professor Stokes was the first to apply the spectroscope in the investigation of the spectrum of human blood. The various kinds of blood give different spectra; Fig. 1 is the

spectrum of arterial blood, Fig. 2, that of venous blood, and Fig. 3, of the dried coloring matter in blood. To show the utility of the spectroscope as a means of determining the presence of blood, Professor Barker mentioned the following instance
A case of suspected murder by means of some dull instrument was once given to Dr. Herapath to investigate. At some distance from the place where the crime was supposed to have been committed, a hatchet was found several weeks after, lying in the woods. It was stained with a drop of some dark substance. The Doctor, obtaining the implement, drove out the handle, and, slicing off a small portion of the stained wood and adding water to the shavings, obtained few drops of a brown dirty solution, which coagulated by heat He then cut off another very small portion of the wood
and obtained a single drop of dirty liquid, which he placed in a tube, and light through this, being examined with prism, gave the characteristic absorption spectrum of pema-
tine-the coloring matter of the blood. He estimated the tine-the coloring matter of the blood. He estimated the whole quantity of matter examined as weighing $1 \frac{1}{8}$ grains. Yet this was sufficient to enable him to detect the substanc and bring the guilt home to its perpetrator. Now blood va ries in character with the different gases which may have been added to it. This happens in many cases; for instance, when people are suffocated by going down into vats or wells. n these cases the blood contains a certain amount of car bonic acid. The spectrum given by blood in this state perfectly distinct from that given by blood in its normal con dition. In like manner, when blood is compounded with sulphuretted hydrogen, prussic acid or other foreign sub sulphuretted hydrogen, prussic acid or other foreign subKnowing these facts, the cause of death may be determine in many cases where it is impossible to detect it by any othe means
Blood corpuscles are so extremely small that 3,200 of hem only measure one inch, yet the presence of even a por tion of one may be tested by the spectroscope. Dr. Hera path says that it is perfectly easy to detect and ocularly ex amine the human blood in the stomach of a flea. We may ven dilute this blood with a teaspoonful of water without its losing its property, if the insect has been dining off a san vineous individual.
Professor Barker concluded with a review of the fiel passed over, and an eloquent tribute to Professor Tyndal for his efforts in behalf of original investigation.

## MIXING CYLINDER FOR CONCRETE

We are indebted to Mr. G. C. Reitheimer, the superin tendent of the Government submarine works at Hell Gate N. Y., for the accompanying excellent design, of his ow invention, for a concrete mixing cylinder. The apparatu

was used with every success, by Mr. Reitheimer, in the con truction of the great breakwater at Holyhead, England
The revolving cylinder, of boiler iron, is immovably attached The revolving cylinder, of boiler iron, is immovably attached,
as shown, to the axle which passes diagonally through it Also, firmly fastened to the axle, are a number of knives o cutting blades arranged in spiral form. Motion is communicated by means of the belt wheel on the right of the engra ving. The components of the concrete are introduced into the apparatus through the hinged manhole door. The ma chine is then set in motion, making some twenty-five revolu tions per minute, causing the material to fall alternately from end to end of the cylinder, meeting in its progress the harp edges of the knives. At the above speed, no effects of centrifugal force which would tend to keep the materia in a single position are encountered. After the concrete is horoughly incorporated, the cylinder is rotated so that th door is at the lowest point, when it is only necessary to open the manhole to allow the mixture to fall into a recep tacle placed underneath.

## Underground Telegraph Wires

A recent heavy rain followed by a severe frost in this cit played great havoc with the telegraph wires. The weight of ice was so great as to cause innumerable breaks, so that the elaborate fire alarm system became useless, and for a time it appeared as if communication with other cities was to be se riously interrupted. This has caused a re-agitation of th subject of underground wires, which, it is justly believed, would prove of great advantage as compared with thos now in use. Not only would the unsightly telegraph poles be removed from our streets, but such casualties as th bove, due to the weather, would be permanently averted. Professor Silliman, in a recent letter, points out some of the difficulties incident to the underground plan. He says hat gutta percha covering will not answer for insulation where it is exposed to the action of moist earth and vegeta ble processes. An element also, that is to be carefully considered in carrying out a general system for underground elegraphs in cities, is the facility that must be given for re laying in case of accident or of excavations in the streets fo constructive purposes. If, however, says the Professor, the wire is once properly laid underground in insulatory mate rial proof against natural agencies of destruction, the 'elec ical leakage" is very small, so much smaller than is poss le with wires in the air as to be a great saving to the tele graph company.

## THE PANTAGRAPH

The pantagraph is an instrument for copying drawings, producing the copy on an accurately enlarged or reduced cale. It is much used by engravers and designers, and, to some extent, by mechanical draftsmen. It was invented in 1803, by Christopher Scheiner,* a Jesuit, and has been im proved and modified by Professor Wallace, of Edinburgh who rechristened it "eidograph," and by M. Gavard and others. As now made, it is a very neat and quite useful instrument The principle involved is that of the proportional com pass, and, although, for nice work, it should be made of metal and with great accuracy, any good mechanic can con

struct it in hard wood, and with sufficient exactness fo ordinary purposes.
The four rulers, jointed together by pins at their in tersections, as shown in th figure, are supported on light, smoothly running cas ters, and carry a pen or pencil at A, and a tracer a B , or vice versá, and th point, C, is held fast to th paper by a weight on which it is pivoted, and around which the wholeinstrumen swings. A, B, and C all interchangeable. The arms are graduated to in dicate where the movabl points of junction, $D$ and E , must be arranged for any desired degree of reduction o nlargement of the scale. If the reduction is to be to one half its linear, or to one quarter its superficial dimensions, place the original drawing under the tracing point at $A$, the pencil at $B$, and let $C$ remain unmoved. The joints, $D$ and E , must each be made at the middle of the length of the long arms A F and C F, making the distances B B and B E equal to the half length of A F. The tracing point at A being now moved over the lines of the drawing, the pencil at nill describe precisely similar lines, and will make an will dine act copy, of hal size. For the system is a otion, times, in the rex a parallelogran whose sides are $B D$ extent the angles may be altered. Then, if the three point move in the direction of the line containing them all, $B$ will move but one half as far as $\mathbf{A}$; and, if the instrument swings about C, B will again move but one half as far as A; and any combination of the two movements, by which any other line may be described, will give B a motion having the same relation to that of A . The point, C , always remains at rest. By putting the pencil at $A$ and the tracing point at $B$, it is vident that the drawing will be copied on a double scala. Placing the rods so that their junctions, D and E, shall oc Pr at fourth the lengths of C F and A F from C and from F respectively, and constructing thus a new parallelogram, DBEF , the original drawing may be reduced or enlarged four times. And, generally, the two triangles C D B and BE A being similar in consequence of the parallelism of heir sides, the distance $\mathrm{BC}: \mathrm{BA}:: \mathrm{DC}: \mathrm{EA}$ and $\mathrm{CC}: \mathrm{CF}:$ EF: EA. So long as this proportionality is preserved, the instrument will be accurate, and the scales of the two draw ngs will be to each other as the distances of the pencil and of the tracing point, from the fulcrum or pivot of the pan tagraph.
In our sketch, we have represented the simplest form of this instrument, and such as will be found easy to make and et very convenient and useful. It can be purchased of the dealers in drawing instruments in a variety of improved orms and at correspondingly high prices. We have no doubt that many an apprentice, who reads our paper, wil find this little "bundle of sticks" a most useful addition to his collection of drawing instruments.

## Gas Burners.

In batswing burners it is found that, though the size of the flame diminishes with the amount of gas consumed, it is ot in equal ratio. The cost of a large flame for each candle ower per hour may be, for instance, 0.42 centimes, while with a small one, it will be 0.897 centimes. Or, again, th ight of a large flame may be equivalent to 15 candles, while that of two small ones together will be $7 \cdot 4$ candles. The cause of this is attributed to the complete combustion of the gas in the blue zone of the gas flame, which gives little or no light in either case, and has more favorable circumstance or its occurrence relatively to the size of the flame in the mall than in the large flame. Another more inexplicablo phenomenon is that with a flat flame the intensity of the light is the same, whether the edge or the flat of the flame is tested. This points to the absolute transparency of the fame. The use of cylindrical glass chimneys with round jets (argand, etc.) is concluded to be, on the whols, some what more economical than with flattened chimneys, after a series of experiments to settle this point.-M. Offret.

Manufacture of Chlorate of Potash.-To manufac ure chlorate of potash on a large scale, it has been recom mended by W. Hunt to adopt the following method: Milk f lime is made to trickle down over bricks placed in a towe here it comes in contact with a continuous current of chlorin as. Chlorate of lime is the chief product, and, by treating his with chloride of potassium, chlorate of potash is formed which can be purified by crystallization.

## Cortrypandemte.

## A Boller Biffeculty

## To the Editor of the Scientific American:

I am running a cotton seed oil mill with an 18x 30 engine, supplied by two boilers, with five 10 inch flues each. Said boilers are 52 inches diameter by 20 feet long, and are set up with the regular western steamboat casing of sheet iron lined with fire brick. They are connected on top with a 30 inch steam drum, 10 feet long, with 10 inch legs, set on the second sheet from front. The mud drum is on the second sheet from back end, and is 20 inches in diameter by 10 feet long, with 10 inch legs connecting both boilers, and is supplied with necessary pipes, checks, and mud valve. The boilers are made of Hilman Son \& Co.'s best Tennessee C. H. iron, $\frac{5}{16}$ thick, with $\frac{7}{8}$ heads. The trouble is that on increasing my machinery, I was forced to run up to 90 lbs. pressure, and as soon as I did so, the boilers began to leak on the first sheet over the fire. I had them caulked and re-riveted a dozen times, until the first and second sheets bagged on each side of the lap. The makers finally concluded to cut out one half of each sheet and patch across the lap. It looked like a good job when tested by hydrant pressure of 50 lbs. ; but on rais-
ing steam, both patches gave way in 19 hours. After taking ing steam, both patches gave way in 19 hours. After taking the advice of all our experts, they finally moved the steam drum back over the mud drum, put in an extra mud drum just back of the bridge wall, on third sheet, and put on new patches, but changed their laps so that they run with the boiler sheets. I have been running now two weeks and the boilers seem to hold tight and work well. They were also tested by the United States Inspector of this part at $160 \mathrm{lbs} .$, and stood the test. Now the question arises, was it necessary to go outside of established custom to move steam drum back, when my engine sets front, and to put in two mud drums under a 20 feet boiler? I am using a Stilwell \& Bierce
superheater, ind am well supplied with water. I clean out superheater, ind am well supplied with water. I clean out
once a week and show no scale or sediment. The boilers, once a week and show no scale or sediment. The boilers,
they admit, are perfectly clean, and the iron shows no signs of being burnt. The boiler sheets are $3 \frac{1}{2}$ feet wide, and the flue sheets 26 inches; this, some chaim, is unequal expansion and caused the buckle or bag, but my theory is that it is all in the furnace. I use no fuel but cotton seed hulls, which make a quick fierce flame. My grate bars are 22 inches from boilers, while the bridge wall or throat is only 5 inches from boilers; and from that, the bed drops back to 10 inches at back of boiler. Now I claim that in my fuel, which burns somewhat like anthracite, the back flame curls up from the shape of bridge wall; and the draft flame in front, which is very fierce, is checked or forced up hard against the first lap to get over the rolling flame from bridge wall, and that it does not extend to rear of boilers, and shows here through flues, thereby making very intense heat causing unequal expansion. The boilers are caulked only on outside; is this customary? Some experts claim unequal expansion from difference in sheets of boiler and flues, some from not being caulked inside; others that the sheets ought to be connected with cheeks, while others were in favor of the change that was made. My gage cocks show water level in both boilers and do not vary; but I have been stopped about two months in repairs of boilers, at a loss of about $\$ 15,000$ and a bill of repairs of $\$ 1,200$. If you will please give me your opinion of my difficulty, I will be under many obligations. Geo. W. Hatrield,
Superintendent of Dixie Oil Company.
Nashville, Tenn
Remarks by the Editor:-We should judge that the boilers were of good material, well put together, for only excellent iron and well riveted joints would be likely to exhibit the behavior described by our correspondent. It is not unusual to leave the interior of boilers uncaulked, although it is generally considered better practice to caulk inside and out. We do not think that the caulking can have had any important influence in the matter. Some engineers of large experience and admittedly good judgment believe that, under the action of a very heavy fire, with defective circula-
tion, the water may be driven off of the heating surface imtion, the water may be driven off of the heating surface immediately adjacent to such an extent that the metal may be
so highly heated as to yield under ordinary pressure, or even to become burnt. There is strong evidence that such cases have occurred, and it seems very probable that we find here described another example. We should have supposed the trouble to have been caused by sediment or scale over the fire, had we not been assured that none was found at the weekly cleaning. Wonderfully little incrustation over a heavy fire will make trouble. We should not suppose that the change of position of the steam drum could make any eshardly effect anything unless the trouble arose from incrustation. We presume that the new work prevents the recurrence of the bagging, simply by stiffening that part. It is evident that the boiler was strong enough to bear the presevident that the boiler was strong enough to bear the pres-
sure, simply. We should feel uneasy still, and should not sure, simply. We should feel uneasy stin, and should not
be surprised were further trouble to occur. In any event, we should first endeavor to diffuse the heat from the fire more generally over theheating surface, and, if unsuccessful in this, should put in more boiler and drive the fires less. We rarely meet with a case in which too much boiler power has been given. It might be found advisable to construct new furnaces, from which no radiant heat could reach the boiler.

## $\left.\begin{array}{c}\text { Steam Pressure in Bo } \\ \text { To the }\end{array}\right]$

If the true way to estimate the strain in a cylindrical steam boiler is to multiply the pressure by the radius, a boiler 100 inches in circumference, having within it a pressure of 100
pounds upon each square inch, will of course have a strain of 1,600 pounds upon every circle of the boiler one inch wide, will it not?
Has it not been proved by careful test that the breaking point of good boiler iron is about 13,000 pounds to each one quarter inch of sectional area? If this be so, the bursting pressure for a boiler 100 inches in circumference and on quarter inch thick is, of course, 13,000 pounds upon each circle of the boiler one inch wide. According to your method of estimating strain in boilers, 100 pounds to a square inch on the boiler just named is less than one eighth of its bursting strain. Will a boiler thirty-two inches diameter and one quarter inch thick sustain any such pressure as 800 pounds to a square inch?

By using half of the circumference instead of the radius for one of the factors, we obtain a little less than 300 pounds per square inch as the maximum pressure, which I hold agrees best with actual test and practice.
F. G. WOODWARD.

Remarks by the Editor.-A boiler of 32 inches diameter of quarter inch plate capable of resisting a tensile force of 50,000 pounds per square inch, would resist an internal pressnre of 781 pounds per square inch could it be made without seams. Experiment shows a single riveted boiler, however, to have but fifty-six one hundredths this strength at the seams. Such a boiler as is mentioned would therefore yield at about 437 pounds. - We regret that we are compelled to differ with 437 pounds. - We
our correspondent.

## Aero-Steam Engines.

To the Editor of the Scientific American:
In No. 1 of the present volume of the Scientific AmeriCAN, you advocate further experiments in aero-steam engineering. You probably remember obtaining a patent for me in 1866 on the aero-steam generator, with which Warsop afterward (1868) created quite a flurry in England. I have studied the subject for a number of years, and have arrived at the following conclusions:
First, that it is impossible to construct a successful air engine of any great power, for the following reasons: Air, like all gases, expands but one volume for each $493^{\circ}$ Fahr. of temperature through which it is raised; and it also becomes highly heated by compression; so that, if we force it into a heater under a pressure of seven atmospheres, the temper ature before compression being $60^{\circ}$, we will then have it at a temperature of $435^{\circ}$; then, in order to double its volume, we must raise it $493^{\circ}$ more, which will bring it to a temperature of $928^{\circ}$ which is entirely too high for practical purposes. And even if we could work it at this degree of heat, we would then be compelled to have a feed pump of half the capacity of the engine, which would be very cumbrous, to say nothing of the cost; and more, our engine would have to be twice the size of a steam engine of the same power. If we work the air at a less pressure, we may reduce the temperature, but we must increase the size of the engine to ob tain an equal power.
Second, that the only way in which we can obtain the advantages of air as a motor is to combine it with steam. In this way we can control the temperature of the air, as it is well known that the degree of heat of steam is regulated by the pressure. The air must take the same temperature as that of the steam with which it is mingled, consequently we can have no over heating of the air. But right here comes the difficulty in using air and steam together. As air becomes
heated to a high degree by compression, we cannot force it into a boiler under a pressure of seven atmospheres without its becoming heated to a much higher degree than the steam, the temperature of the air being $435^{\circ}$ while that of the steam is only $332^{\circ}$, a difference of $103^{\circ}$. The air, in taking the temperature of the steam, contracts; the steam at the same time expands. But the volume of contraction and expansion must be in proportion to the specific heat of air and steam. Air, having a specific heat of only one third that of steam, must contract three volumes, while the steam expands only one volume. The expansion of the air having been produced by mechanical energy applied to the pump, we have here a direct loss of power. This difficulty may be overcome; and in overcoming it, several advantages are gained. What is necessary is to prevent the air from becoming heated by compression. This, I believe, I can do with a pump of peculiar construction of my invention, and without the loss of power,
as the heat is extracted from the air as soon as it begins to as the heat is extracted from the air as soon as it begins to develop, consequently it will not expand until it reaches the boiler where it will take its heat from the steam, and we will have the former operation reversed, the air expanding three mes and the steam contracting one volume. This, in worked together successfully
D. B. Tanger.

Bellefontaine, 0

## Ignition of Wood by Steam Heat.

## the Editor of the Scientific American

On page 32 of the Scientific American of January 18, you make the following statement, editorially: "We maintain that any man of science who has studied the subject of steam, or any practical engineer of common sense, knows that all
that steam can do, even when superheated, is to make woodthat steam can do, even when superheated, is to make wood-
work hot and dry and to predispose it to catch fire. The spark must be supplied from another source; the steam tubes can never attain, outside the heating apparatus, the high temperature of $900^{\circ}$ or $1,000^{\circ}$ Fahr. required for the red tra, a no less respectable authority than the Journal of Commerce has asserted, within the week, that, when wood has been charred by steam pipes, "engineers say that the least draft between the pipe and the charred wood will then cause
the wood to form a coal, which will readily burst into flame." Turning to page 41 of Wyatt " On Spontaneous Combus tion," republished in this country and annotated by the edit or of the Insurance Monitor, the following statements will be found: "The Institute of Technology, in Boston, long ago decided upon the danger of steam pipes passing through and in contact with wood." And here is an instance which oc
curred in a Pittsburgh oil refinery. "Steam curred in a Pittsburgh oil refinery: "Steam was generated in an ordinary boiler and was conveyed therefrom in pipes which passed through a furnace and thence into retorts for the purpose of distilling petroleum. Here the pipes formed extensive coils and then passed out, terminating at a valve outside the building. To prevent the steam, when blown off, from disintegrating the mortar on an opposite wall, some boards were set up to receive the force of the discharge, and, as often as the superheated steam was blown against them, the boards were set on fire" And here is another case in point: "Steam was taken from an ordinary boiler through a pipe forty feet long. Ten feet from the farther end, a col a pipe forty feet long. Ten feet from the farther end, a col-
lar of wood was fitted closely to the pipe; ten feet nearer the lar of wood was fitted closely to the pipe; ten feet nearer the
boiler a lighted kerosene lamp was placed under the pipe. In ten minutes the wooden collar was on fire." When super heated steam was turned against a bale oi cotton, "the cot ton was in flames as quick as a flash." In the report of Mr. Braidwood to the Committee of the Fire Brigade of the city of London (I quote from a newspaper article, embodying the chief points), it is asserted that "Iron pipes, often heated up to $400^{\circ}$, are placed in close contact with floors and skirting boards, supported by slight diagonal props of wood, which a much lower heat will suffice to ignite." "Mr. Braidwood, in his evidence before a Committee of the House of Lords, in 1846, stated that it was his belief that by long exposure to heat not much exceeding that of boiling water, or $212^{\circ}$, timber is brought into a condition that it will fire without the application of a light."
I do not make these questions by way of attempting to controvert the extremely direct and flatfooted position which you have taken, but merely to show that there is another side to the question, be its merits what they may the ScIENTIFIC AMERICAN is a thoroughly practical paper which is read by practical men, and its opinions are doubtless in the vast majority of cases accepted without question. Hence what seems to me the danger which may arise from the positive tone of the article referred to. For the past few years, underwriters, basing their opinions upcn such statements as those to which I have asked your attention, have endeavored to impress upon the public that steam pipes in contact with woody fiber are eminently dangerous And the writer with fesses that in the prosecution of his business, he does not fesses that, in the prosecution of his business, he does not
care to ity as the Scientific American thrown in his teeth, unless ity as the Scientific american thrown in his teeth, unless
that dictum has been based upon facts as absolute as itself. that dictum has been based upon facts as absolute as itself.
If steam pipes are not dangerous, it is to the interest of all that the truth should be known. But if the question is still an open one, if a positive answer to the question is as yet impossible, should not so cautious an authority give us the benefit of the doubt, and stimulate discussion rather than check it by enunciating an opinion which nine out of ten of your readers will accept at once as ex cathedra and final
I am sure that the public would thank you greatly if you would give a thorough review of the pro and con of the matNew York city

W may be.
New York city
its Surface

## To the Editor of the Scientific American

It is generally conceded that our earth is still a liquid fire, surrounded by a crust caused by congelation, through the elements, in its revolutions through space. Let us examine what influence this liquid fire has on the earth in its different positions, and on its affinity with the rays of light from the posit
At the period when the rays from the sun begin to be oblique, the earth is turningin position to cause the liquid portion to settle, thereby losing its heating power on the surface and its affinity with the rays from the sun; this change continues to increase, bringing on the coldness of winter according to position in the change. Water freezes, and the frost enters the earth at times when it is comparatively warm; but as soon as the limit is reached and a turn is made in our sphere to ward a more congenial position, the atmosphere may still be cold, and the ice on our lakes and streams melt away gradu ally from the source of heat generated by the internal fires. This change continues to bring spring and summer, and more heat than man really enjoys.
I make these suggestions to draw forth further investigation, for man, from the days of Adam to the present, has attributed much to the Author of Light without considering his own footstool.

Egbud.
A Swindle upon Inventors,
We have frequently received letters from various parts of the country calling our attention to the swindling transacthe country calling our attention to individuals who represent themselves to be agents for the disposal of patent rights. These parties send neatly printed circulars through the mails to inventors,setting forth their advantages for effecting sales, etc, and requesting the forwarding to their address of models and a fee of five dol lars or thereabouts. The money is of course taken and the model usually left in the express office.
Our latest advices regarding these scamps state that they have operated in Albion, Mich., at which place they collected some two thousand models, and more recently they have taken up their quarters in Galesburg, Illinois. We would caution inventors generally against any dealing with firms or individuals regarding whose standing they have not full and satisfactory information.

## the lost arts.

Mr. Wendell Phillips, the distinguished orator, has delivered no more brilliant discourse than that of which the following is an abstract. The "Lost Arts" is a subject of surpassing interest, not only as treating of knowledge long
since dead to the world, but as affording evidence that many since dead to the world, but as affording evidence that many of our newest discoveries were known and practiced in ages of which history furnishes but meager record. Mr. Phillips began by stating that he had been charged with repeating useless fables with no foundation. Take the subject of

## glass.

This material, Pliny says, was discovered by accident; some sailors landing on the eastern coast of Spain took their cooking utensils and supported them on the sand by the stones that they found in the neighborhood; they kindled the fire, cooked their fish, finished the meal, and removed
the apparatus; and glass was found to have resulted from the apparatus; and glass was found to have resulted from
the niter and sea sand, vitrified by the heat. The story was the niter and sea sand, vitrified by the heat. The story was
rejected by scientific men as improbable, on the ground that no mere bundle of sticks could produce sufficient heat to cause vitrification. But Professor Shepherd, continued the lecturer, states that when he was in Mexico his party stopped on the road one day to cook some venison. They made their fire, on stones, of a wood resembling ebony. When the cooking apparatus was removed, there was pure silver got out of the embers from the intense heat of that almost iron wood, ${ }^{\text {a heat more than sufficient to vitrify the materials for glass. }}$ Why then, can it not be supposed that Pliny's sailors used some such wood? Itis stated that nothing has been observed in ancient times which could be called glass. In Pompeii, a in ancient times which couls be called glass. In Pompeii, a dozen Vesuvius 1,800 years ago, they broke into a room full of by Vesuvius 1,800 years ago, they broke into a room full of
glass; there was ground glass, window glass, cut glass and glass; there was ground glass, window glass, cut glass and
colored glass of every description, and the house was evicolored glass of every descript.
dently a glass maker's factory.
The chemistry of the most ancient period had reached a point which we have never even approached, and which we
in vain struggle to reach to-day. Indeed the whole managein vain struggle to reach to-day. Indeed the whole manage-
ment of the effect of light in glass is a profound study. The ment of the effect of light in glass is a profound study. The
Catholic priests, who penetrated into China two hundred years ago, say in their letters that they were shown a glass, transparent and colorless, which was filled with a liquor made by the Chinese, that was shown to the observers and appeared to be colorless like water. This liquor was poured into the glass, and then, looking through it, it seemed to be filled with fishes. They turned this out and repeated the experiment, and again it was filled with fish. The Chinese confessed that they did not make them; that they were the plunder of some foreign conquest. Another story relates to the age of Tiberius, the time of St. Paul, and tells of a Roman who had been banished and who returned to Rome, bringing a wonderful cup. This cup he dashed upon the marble pavement, and it was crushed, not broken, by the
fall. It was dented some, and with a hammer he easily brought it into shape again. It was brilliant, transparent, but not brittle. The possibility of glass being thus made is strenuously denied by learned and scientific men. The Romans got their chemistry from the Arabians; they brought it into Spain eight centuries ago, and in their books of that age they claim that they got from the Arabians malleable glass. There is a kind of glass spoken of there that, if sup. ported by one end, by its own weight in twenty hours would dwindle down to a fine line, and that you could curve around your wrist. Von Beust-the Chancellor of Austria-
has ordered secrecy in Hungary in regard to a recently dishas ordered secrecy in Hungary in regard to a recently dis-
covered process by which glass can be used exactly like wool, and manufactured into cloth. In Rome, there is exhibited a bit of transparent glass, which is lifted up to show that there is nothing concealed, but in the center of the glass is a drop of colored glass, perhaps as large as a pea, mottled like a duck, finely mottled with the shifting colored hues of the neck, and which even a miniature pencil could not do more perfectly. It is manifest that this drop of liquid glass must have been poured, because there is no joint. This must have been done by a greater heat than the annealing process, because that process shows breaks.

The ancient imitations of gems have deceived the most experienced connoisseurs. The celebrated base of the Geneva cathedral was considered a solid emerald, but when Napoleon, after taking it to France, presented it to the Institute, the scholars, though asserting it not to be a stone, were unable to tell of what material it was.

## ancient aids to vision.

Cicero said that he had seen the entire Iliad, which is a poem as large as the New Testament, written on skin so that it could be rolled up in the compass of a nut shell. Now, this is imperceptible to the ordinary eye. Very recently the whole contents of a London newspaper were photographed on a paper half as long as the hand. It was put under a dove's
wing and sent into Paris, where they enlarged it and read wing and sent into Paris, where they enlarged it and read
the news. This copy of the Iliad must have been made by the news. This copy of the Iliad must have been made by
some such process. Pliny says that Nero, the tyrant, had a ring with a gem in it which he looked through and watched the sword play of the gladiators, more clearly than with the Italian, stood on the promontory of his island and could sweep over the entire sea to the coast of Africa with his nausco pite, which is a word derived from two Greek words meaning to see a ship. Evidently Mauritius, who was a pirate, had a marine telescope. The signet of a ring in Dr. Abbot's museum, said to belong to Cheops, who lived five
hundred years before Christ, is about the size of a quarter of hundred years before Christ, is about the size of a quarter of
a dollar and the engraving is invisible without the aid of a dollar and the engraving is invisible without the aid of
glasses. In Parma is shown a gem once worn on the finger
of Michael Angelo, of which the engraving is two thousand years old, in which there are the figures of seven women. A glass is needed to distinguish the forms at all. Layard says he would be unable to read the engravings on Nineveh without strong spectacles, they are so extremely small. Rawlinson brought home a stone about twenty inches long and ten wide, containing an entire treatise on matbomatics. It would be perfectly illegible without glasses. Now, if we are unable to read it without the aid of glasses, you may suppose that the man who engraved it had pretty strong spectacles. So, the microscope, instead of dating from our time, finds its brothers in the Books of Mopes-and these are infant brothers.

## the old dyes.

For the Egyptians, color was a means of recording history. We find upon the stucco of their walls their kings holding court, their armies marching out, their craftsmen in the ship yard with the ships floating in the dock, and in fact we trace all their rites and customs painted in undying colors. The French, who went to Egypt with Napoleon, said that all
the colors were perfect except the greenish white, which is the colors were perfect except the greenish white, which is the hardest for us. They had no difficulty with the Tyrian
purple. The burned city of Pompeii was a city of stucco purple. The burned city of Pompeii was a city of stucco. Tyrian purple-the royal color of antiquity; and the flaming hues are as bright as if painted but yesterday. Come down from 'Titian, whose colors are wonderfully and perfectly fresh, to Sir Joshua Reynolds, and although his colors are frest, to a hunshua Reynolds, and although his colors are not yet a hundred years old, they are fading; the colors on
his lips are dying out, and the cheeks are losing their tints. He did not know how to mix well. The French have a theory that there is a certain delicate shade of blue that Europeans cannot see. Ruskin says that we cannot imitate in colors that would last for twenty years the magnificen scarlet in old illuminated missals, now five centuries old. The Frenchman says: "I am the best dyer in Europe; nobody can equal me, and nobody can surpass Lyons." Yet in Cashmere, where the girls make shawls worth thirty thousand dollars, they will show him three hundred distinct colors, which he not only cannot make, but cannot even distinguish.

## ancient master artisang.

Taking the metals, the Bible in its first chapters shows that man first conquered metals there in Asia, and on that spot to-day he can work more wonders with those metals than we can. One of the surprises, that the European artists received when the English plundered the summer palace of the King of China, was the curiously wrought metal vessels of every kind, far exceeding all the boasted skill of the workmen of
Europe. English surgeons going to India Europe. English surgeons going to India are advised to
have their instruments gilded because English steel cannot have their instruments gilded because English steel cannot
bear the atmosphere. Yet the Damascus blades of the Crusades were not gilded and they are as perfect as they were eight centuries ago. There was one at the London Exhibition, the point of which could be made to touch the hilt, and could be put into a scabbard like a corkscrew, and bent every way without breaking. If a London chronometer maker send to Sheffield, the to use in his chronometer, he does not the empire of the seven rivers, where there is no science at all. The first needle ever made in Europe was made in the time of Henry the VIIIth, and made by a negro; and when he died, the art died with him. Some of the first travelers in Africa stated that they found a tribe in the interior who gave them better razors than they had. Scott, in "Tales of the Crusaders," describes a meeting between Richard Cœur
de Lion and Saladin. Saladin asks Richard to show him the wonderful strength for which he is famous, and the Norman monarch responds by severing a bar of iron which lies on the floor of his tent. Saladin says, "I cannot do that," but he takes an eider down pillow from the sofa, and, drawing
his keen blade across it, it falls in two pieces. Richard says: "This is the black art; it is magic; it is the devil; you can not cut that which has no resistance;" and Saladin, to show him that such is not the case, takes from his shoulders a scarf which is so light that it almost floats in the air, and tossing it up, severs it before it can descend. George Thompson states that he saw a man in Calcutta throw a
handful of floss silk into the air, and a Hindoo sever it into pieces with his saber. We can produce nothing like this.

## egypts mechanical marvels.

Taking their employment of the mechanical forces and heir movement of large masses from the earth, we know that the Egyptians had the five, seven, or three mechanical powers, but we cannot account for the multiplication and
increase necessary to perform the wonders they accomplished. In Boston, lately, we have moved the Pelham Hotel, weighing fifty thousand tuns, fourteen feet, and are very
proud of it, and since then we have moved a whole block of proud of it, and since then we have moved a whole block of
houses twenty three feet, and I have no doubt we will write book about it; but there is a book telling how Domenico Fontana, of the sixteenth century, set up the Egyptian obelisk at Rome on end, in the Papacy of Sixtus V. Wonderful! Yet the Egyptians quarried that stone and carried it one undred and fifty miles, and the Romans brought it seven Mr. Batterson, of Hartford, walking widt a word about it tect of then, of Hartfora, walking with Brunel, the archi tect of the Thames tunnel, in Egypt, asked him what he
thought of the mechanical power of the Egyptians, and he thought of the mechanical power of the Egyptians, and he
said: There is Pompey's Pillar, it is one hundred feet high, and the capital weighs two thousand pounds. It is some thing of a feat to hang two thousand pounds at that hight in Egyptian mechanics.

## canals.

The Suez Canal absorbs half its receipts in cleaning out the sand which fills it annually, and it is not yet known whether it is a pecuniary success. The ancients built a canal at right angles to ours, because they knew it would not fill up if built in that direction, and they knew such a one as ours would. There were magnificent canals in the land of the Jews, with perfectly arranged gates and sluices. We have only just begun to understand ventilation properly for our houses; yet late experiments at the Pyramids in Egypt show that those Egyptian tombs were ventilated in the most perfect and scientific manner.
Again, cement is modern, for the ancients dressed and joined their stones so closely that, in buildings thousands of years old, the thin blade of a penknife cannot be forced between them. The railroad dates back to Egypt. Arago has claimed that they had a knowledge of steam. A paint ing has been discovered of a ship full of machinery, and a French engineer said that the arrangement of this machin ery could only be accounted for by supposing the motive power to have been steam. Bramah acknowledges that he took the idea of his celebrated lock from an ancient Egyptian pattern. De Tocqueville says there was no social question that was not discussed to rags in Egypt.

## old hints of new things.

Yearsbefore Franklin's invention of the lightning rod, and before muskets were thought of, the old soldiers on guard on the towers, if a spark passed between them and the spear head, ran and bore warning of the state and condition of affairs. Solomon's Temple, lofty and situated on an exposed part of a hill, was guarded by a system exactly like Franklin's. The Duchess of Burgundy took a necklace from the neck of a mummy and wore it to a ball given at the Tuiler ies, and everybody said they thought it was the newest thing there. A Hindoo princess came into court, and her father seeing her said: "Go home, you are not decently covered-go home;" and she said, "Father, I have seven suits on ;" but the suits were of muslin, so thin that the king could see through them. Four hundred and fifty years ago the spinning machine was first introduced into Europe. Yet we have evidence to show that it made its appearance two thousand years before.
We have not an astrology in the stars serving only the kings and priests; we have an astrology serving all those around us. We have not a chemistry hidden in underground cells, striving for wealth, striving to change everything into gold. No; we have a chemistry laboring with the farmer and digging gold out of the earth with the miner. Ah! this is the nineteenth century, and of the hundreds of things we know, I can show you ninety-nine of them which have been anticipated. It is the liberty of intellect and a diffusion of knowledge that has caused this anticipation.
ocean Weather Signals.
The suggestion is made that a vessel, connected by telegraph cable with the shore, be stationed three hundred miles out at sea off the port of New York, to warn approaching ships of storms on the coast. 'I his a pretty idea but not of much practical value. In fair weather no skipper would go out of his way to find the telegraph boat; and in a storm he ouldn't find her if he would.
Equally valueless is the proposition to have signal buoys nchored at intervals in the ocean between Europe and America, to indicate wind currents, latitude and longitude afford refuge to distressed mariners, etc., The majority of marine disasters occur directly upon the coasts. Few ves sels, comparatively, are lost in mid ocean. The rotary mo tion of storms is well understood by sea captains, who know how to steer in order to avoid the most violent ortions, while the barometer gives notice in advance of approaching storms and change of winds. The proposed signal buoys could add little or nothing to the safety of ships.

A Locomotive Explosion.
A few days ago locomotive, while standing at the head of a freight train at Lewisville, S. C., exploded with a deafenng detonation, pro
The scene around
Tithe the engine was appalling. Every portion of it except the tender was a complete wreck. One of the arge driving wheels on the right side was torn from the axle and buried deep in the embankment. One of the heavy driving shafts was hurled over the embankment of the cut and, in its career, struck the top of a telegraph pole,
which it snapped of like a stick of glass. The dome of the which it snapped of like a stick of glass. The dome of the
engine was thrown far above the cut and fell about three ngine was thrown far above the cut and fell about three
hundred yards distant. The bell crushed in the gable end f a negro preacher's house, about the same distance away, causing the sable clergyman to tremble with fright. The cause of the explosion is inexplicable; the engine was quite an old one. No person injured.

Quanties of Materials used by Photographers. Dr. Vogel says: From my own experience, I give the folowing rules: For every square foot of plate, about half an ounce of collodion is necessary; a square foot of plate will consume also very nearly half an ounce of bath solution; and. when we use a developer of a strength of five per cent, with wo and a half per cent glacial acetic acid, we will require, for every square foot of plate, nearly half an ounce of sulphate of iron and a quarter of an ounce of glacial acetic acid. Of varnish, about three quarters as much as of collodion is necessary. The consistence of the collodions and the varnishes differs, of course; but we can hardly go amiss if we provide ourselves with one and a half times to double the abovementioned quantities for each square foot of plate.

## STEAM FILTER AND CONDENSER

Our engraving represents an improved form of steam filter and condenser, adapted to the purification of water for boiler feeding or other purposes. Steam enters through the pipe, A, into the annular perforated chamber, B. There it escapes through the numerous small orifices and is met by a copious shower of water which, supplied by the pipe, C, from above, is spread out over and percolates through the perforated distributor, D. The steam is thereby nearly all condensed and falls to the conical diaphragm, E , the residue escaping through the ex haust, F, on the left of the engraving. The water now descends the vertical pipe, $G$, to the lower section of the apparatus. At the bottom of the pipe it encounters the cup, H , over the sides of which it flows into the mud well, where it deposits such foreign matter as it may hold in suspension, the accumulated sediment being afterwards drawn off through the valve, I. The water next rises through the filters, J J, to the upper chamber, K , whence it emerges in a clear and pure condition through the pipe pipe, L. At $M$ is shown the overflow pipe, at N the glass water gage, and at 0 the man holes.
It is hardly necessary to dwell upon the advantage of using the purest attainable fluid for the feeding of steam boilers, or the general benefits of filtering water that is in anywise turbid, previous to employing it for the ordinary purposes of life.

The apparatus above described seems, so far as its principle and construction are concerued, an efficient and useful device. The intentors state that careful analysis has proved that it removes from water over three quarters of the lime which forms boiler scale, and probably five sixths of the suspended impurities.

Patented through the Scientific American Patent Agency, February 27, 1872. Further information may be obtained by addressing Messrs. Kennedy, Berkshire \& Co., Muscatine, Iowa.

The Million Dollar Telescope "An Old Mechanic" writes to suggest the formation of a stock company, with shares of ten dollars each, to construct the proposed large telescope, and states that he,
for one, would gladly pay $\$ 25$ for a peep at for one, would gladly pay $\$ 25$ for a peep at Mars or the moon through such an instrument, and would go to any part of the United States for such a privilege. He points out that it is of no use to look to Government for such a telescope, as it has no money for such a purpose, although plenty is forthcoming for European shows and big guns; and he asserts that the money, according to his plan, would be easily obtained; and, if such a telescope were placed in Philadelphia in 1876, that it would pay the stockholders 200 per cent, besides benefitting science.

## LYNN'S ANTI-FREEZING RAILROAD TANK VALVE AND FEEDER

The invention herewith illustrated is an arrangement of the The invention herewith illustrated is an a
parts of a railroad tank whereby water may parts of a railroad tank whereby water may
be delivered to an engine without requir ing the latter to be located at any precise spot near the reservoir, and aiso an inge nious combination of devices which prevent the flow of the liquid being stopped by freezing.
The outer portion of the spout, Fig. 1, is connected to the part, A, attached to the tank by means of the horizontal hinge, a shown, which allows of its motion in a ver tical plane. This outer portion is in two parts, B and C, which are connected by the india rubber bellows, D. Within the flexi ble joint, and shown through its cut away portion, is a vertical hinge, $E$, which attache a double rod, represented in dotted lines in the spout, to the part, C. On this rod the outer section, B, of the spout moves, this motion being allowed by the inner extremity of the latter being attached to the rubber connection. A clearer idea of this arrangement may be obtained from the similarly lettered portions in the horizontal section, Fig. 2. By means of the two hinges and the bellows attachment, it will be seen that the spout may be placed at any angle to sui the location of the engine. The special ad vantage of the flexible connection and double interior rods is that the portion, B , of the spout may be slightly drawn out, sliding on the rods, in order to adapt it to whatever distance the locomotive may be from the tank.

aNTI-FREEZING RAILROAD TANK VALVE AND FEEDER.
but if a colorless product be required, it should be treated as recommended for the oil of sweet almonds.

## Recognition of Vegetable Fibers in Mixed Fabrics

Silk and wool are dissolved by boiling in a 10 per cent so
rution of caustic soda, while vegetable fibers remain unat acked. When wool is dissolved in caustic alkali, the solu tion blackens on adding sugar of lead, sul phide of lead being thrown down. The un dissolved vegetable fiber is bleached if isse with hydrochloric acid and a littlo if col ored, wath It the rine water. property of ammoniacal so lution of oxide of copper. If the fabric con tains a large quantity of dye stuff, it is better to put it into a mixture of 2 volumes strong sulphuric acid and 1 volume nitric acid, where by the wool, silk, and dye are all dissolved and the vegetable fiber converted into gun cotton, which after washing and drying is re cognized by its explosive character.
In testing white fabrics, a solution of fuch sin can be employed, which will dye the silk and wool but not the vegetable fiber. Before this test is used, the dressing must be re moved by boiling in a dilute solution of sal soda and soap. Enough caustic soda must be added to the boiling fuchsin solution to par tially destroy its color and leave it of a ligh rose red.
To detect wool in silk, a solution of oxide o lead in caustic soda is used, as this wil blacken the wool but not the silk. If, on the contrary, you wish to detect an admixture of silk in a woolen fabric, you employ a cold am moniacal solution of oxide of copper, which dissolves the silk but not the wool. Acid precipitate white flakes from this solution Wool is also soluble in this solvent when warm, hence the necessity of using the solution cold when separating wool and silk.
Concentrated acids can also be employed, hydrochloric being the best; for they too dis solve the silk while cold, but do not act per ceptibly on the wool. The vegetable fiber also remain undissolved. The insoluble fiber are bleached and tested as above given.

The Premature Decay of Timber.
Mr. Hector Orr, in a paper on the above opic, communicated to the Journal of the Franklin Institute, gives conclusions drawn from an examination of the timbers of the U. S. ship Chat tanooga. This vessel was built in Philadelphia, but never left the Delaware. Last winter she was injured by the ice and partially sunk off League Island. Her keel was laid less than eight years ago, but at the present day her timbers are so rotten that they fairly crumble under the touch Near the forward bends the timbers were doubled. The writer noted one or more instances in which a pine log and a oak $\log$ were thus coupled, and the decay had evidently begun at the inner surfaces, which were in direct contact with each other; but even where both logs were of the same wood, the same inward decay appeared. Whether in the un wood, the same inward decay appeared. Whether in the un disturbed mass or where pierced with iron or copper fasten
ings or even with the treenail, the fiber was completel broken up.

The fleet of Commodore Perry, which was built in haste from timber cut on the lake shore for service in the war of 1812 , suffered from early rot, so that the vessels were pro nounced unseaworthy soon after the peace of 815. In some vessels a strange tendency to decay has been noticed, indicating a sort of triennial crisis in their early life, which, if passed without injury to the wood, predicted some twenty-five years of wear. Marked instances have been observed in large pieces cl timber, such as pillars, girders, and even rafters, that were cased with light boards to improve the appearance of the room, the inner mass being found dangerously rotten. Another important fact is that in portions of the " lining" of vessels covered with zinc or tin, as in provision closets, etc., the decay followed exactly the surface covered by the metal, indicating the action of "dead" air in contrast with that of a free atmosphere on the surrounding parts which remain sound. The hygienic condition of a decaying structure is worthy of consideration. It has been determined that in all well ascertained centers of production and diffusion of yellow fever, three conditions were always present, namely, heat, moisture, and decayed wood. The langer in such a vesel as the Chattano bvious. As to moisture, her mere bilge ater would furnish this, her mere bige drippings from tanks and boilers; the heat is drippings from tanks and boilers; the heat is
insured by her furnaces, which a cruise in the
$F$ is the valve seat on the lower side of the inner end of $\mid$ ether, or of any of the essential oils not containing oxygen, the pipe, $A$, which extends into the tank; $G$ is the valve, the rod of which continues up through the tube, H , to the top of the reservoir where it is connected with the lever, as shown. By pushing the valve downwards the water passes with force nto the spout, and the latter, acting as a siphon, does not
such as bergamot, citron, copaiba, lavender, mace, mustard, osemary, turpentine, etc. Colza, rape, beechnut, linseed, and brown cod liver oils each dissolve one seventieth of one hundred and five. Cacao butter dissolves one per cent
ropics would aggravate, and the rotten wood, as was evi dent, existed at once in profusion and perfection.
G. W. T. of Mason City, Ill., writes that he obs rved large numbers of meteors on the evening of November 27 In 55 minutes, 251 were counted.

## The Kallistochroine

This is a new and ingenious form of chromatic top, to which the above name has been given, and is the invention of Mr. J. Beverley Fenby, of Birmingham, England, and although nominally a toy, it is worthy of notice on account of the brilliant chromatic effects it produces. The instrument consists of a well balanced top, which, when spun in the glass cup provided for the purpose, will run from six to eight minutes. On the top of this top can be dropped paper disks variously colored, these disks resembling those used with an ordinary chromatic top. Above the colored disk is placed what is termed a mask, this being a black disk having two triangular openings cut in it. The mask has an india rubber ringo its under side, which rests upon a collar on the pindle of the ton while the mask itself is spindle of the (op), while the mask itself is lghty bucklen, so that its surface is no fat. Wha the top relves, the mask the ried round also, but the resistance of the ai causes the mask to slip slightly on the collar it thus revolving at a less speed than the top. The effect of this is to produce automatic changes in color of the top as seen through the openings in the rapidly revolving mask. These changes of color are very beautiful, the ap pearance of the top with some of the disks re sembling a mass of brilliantly tinted vapor which wells up at the center, and gradually changes color as it passes outwards towards the edge of the disk. Other disks produce brilliant rings, ever changing in their tints, and altogether the instrument is one which serve to illustrate some exceedingly interesting optical effects.

## Butter Making.

It requires both attention and experience to produce butter in the shortest time. If the cream be too warm, it froths a great deal and a thin liquid appears in the vessel, especial ly at high temperatures; when the cream is too cold, it froths too, but appears thick, like freshly fallen snow. In the latter case, the cream ought to be warmed, and in the former,cooled. The appearance of the butter globules also serves to indicate whether the cream is too warm or too cool. In the former case, the globules are soft and melting, in the latter, hard in both cases a slower churning is advisable. Old cream pro duces butter soon than fresh. A temperature between $70^{\circ}$ duces $80^{\circ}$ iter in the croun and 8 is bee in che pensable.

Telegraphy in the United States.
An interesting report on the subject of telegraphing in the United States, and with special reference to the proposed Government telegraph system, has been lately made by the Hon. David A. Wells. According to the statistics given by him, there are at present $\$ 60,000,000$ invested in the busi ness, 80,000 miles of line, and 180 , 000 miles of wire. This valuable and increasing property it is now proposed to transfer to the Nation al Government.
The cost of the British lines was $\$ 40,000,000$, and to buy the lines in the United States, not less than $\$ 75,000,000$ would be needed. To meet this expense a new na tionalloan would have to be issued The charge for transmission of messages, which is fixed at twen ty-five cents for twenty words in the Washburn bill, and at one cent a word in the Hubbard pro position, would be entirely insuf ficient to meet expenses. More over, as the cheap telegraphing mustbe counterbalanced by an ad ditional tax upon the people, it is difficult to see where the advan age lies.

In Europe, the government sys tem has been unsuccessful. In 1870, North Germany, Bavaria Denmark, Spain, and Austria, al had deficits, while the expenses in Great Britain were about $\$ 3,000$, 000 in excess of the receipts.

With regard to government ef ficiency, Mr. Wells calls attention to the fact that the post office of the United States is very much inferior to those of foreign na tions. We have neither cheap postage nor a strictly her cheap vice, and it is not suppose ser vice, and it is not supposable that any change would be made in these respects when the posta department was charged with the care of the telegraph. In addi tion, he repeats the arguments which have been so often ad ranced to show that all steps of this kind are inconsistent with the theory of republican institu tions, because they tend toward imperialism.


PNEUMATIC GUN CARRIAGE AND ELEVATOR.-Fig. 1.-[Designed by Captain James B. Eads, St.Louis, Mo.]
er than is required to bring it back to the elevation from which it falls. A part of this force is, however, given off by the cylinder and piston in the form of heat, otherwise the gun would be thrown up with great force; part of the force is also converted into heat in compressing the air in the cylinder, and as this heat is quickly absorbed, the latter is incapable of expanding to its original volume when the gun is thrown up. Hence the latter part of the stroke of the piston is made against an external atmospheric pressure, and tends to bring the gun gradually to rest as it rises above the parapet. If the gun is not down long enough for this heat to be lost, it comes up with greater energy. To equalize any differences of air pressure and also to prevent counter recoil, which would ensue if elastic buffers were used, and thus probably cause the gun to fall after it came up and before firing, the friction plug, $P$, is secured to the rear of the carfiring, the friction plug,
riage, and enters a corriage, and enters a cor
responding socket in the responding socket in the
crosshead. This socke crosshead. This socket
is lined with wood, and is lined with wood, and
the plug can be adthe plug can be ad
vanced or withdrawn by the screw and wheel, $Q$ according to the amount of resistance found desirable to check the gun. When the plug enters the socket, the gun is se curely retained until it is loaded and ready to is loaded and ready to be raised. This insures the cylinder being filled with air, and prevents the possibility of a va-
cuum after the gun is cuum after the gun is
up. up. down, is held agains the reactive force of th air by a peculiarly ar ranged pawl and ratch et gear. The ratchet is fastened to the under side of the crosshead, with teeth inverted, and the pawli retained in its upward position by a spring.

## The Money Value of Intelligence

Every thoughtful man recognizes the money value of intelligence in a community. It is for this, in part, says the Country Gentleman, that the State builds school houses and furnishes free education to the masses. "Knowledge is power;" even the ignorant respect it, and pay it many an involuntary compliment. The power consists in the ability to better one's condition more rapidly; and in doing that-such are the relations of men to each other-they usually benefit all around them. The improvements on a piece of real estaic do not affect the owner alone, but indirectly extend to the neighborhood, and next find their way to the assessor's books and thus benefit the nation. It is like the ripple which a pebble starts when thrown into the water-it spreads wider and wider, and though after awhile the visible effect disappears, we know that it does affect the whole body, no matter how large. So when something is added to the world's wealth, it benefits the whole world, although we may not be able to trace its full effects.
When an enterprising man buys a run down, neglected farm, with ricketty and dilapidated buildings, and at once proceeds to improve it, clears up the unsightly fence corners, drains the wet land, pulls out stumps or rocks, moves the barn to the back of the house, and sets the new house a little distance back of the highway, lays out a lawn with pleasant walks and sliade trees and hedges; brings blooded stock with him, and causes his acres to produce three fold more than ever before, what man so stupid as not to recognize that that is a pecuniary gain to the neighborhood? No matter how selfish the owner may be at heart, if he makes his farm more valuable, he does the same, to some extent, to all around him. The neighbors like to see a handsome farm near them even if they never think of selling, and when they do try to sell, the prospective buyer will invariably have his attention called to the handsome property over the way, or which adjoins, or at least is not far off. Speculators holding unimproved land like nothing so well as to be able to say (because nothing is more potent) that it lies in the very best of neighborhoods, is surrounded by rich farms in the highest state of culture, in a delightful region of walks and drives; that the people are all intelligent, and their tastes refined; that schools and churches abouni; and that the value of the land has been proved by the extraordinary yield of crops on the adjacent farms. When these things can be said truthfully, sales are comparatively easy, and that at the highest prices.
${ }_{4}^{4}$ Does not every enterprising farmer see then-as well as those who are not farmers-that there is a money value in intelligence, and that the rapidity of its spread concerns them very closely? Improvements on one's own place are well, wise and admirable; but so are improvements around you There should be, thè, no neglect of the means. Every agency which will promote farm intelligence should be em ployed and kept up.

## Submarine Water Supplies,

Yonkers is an enterprising city just north of New York, on the Hudson river, and the municipal authorities have lately been exerciscd upon the question of a water supply Through Yonkers runs a small river called the Nepperhan,
which empties into the Hudson. Professor Newberry, of Columbia College, has been consulted in the matter, and in his report he gives the following interesting information: Before any plan is adopted for supplying the city of Yonkers with water, I would strongly recommend that a thorough exploration be made of the materials which occupy the bottom of the rocky valley of the Nepperhan, and underlie, perhaps very deeply, the present stream. It is probably know to you that most of the draining streams of all the region between the Mississippi and the Atlantic are now run ning far above their ancient beds. This fact was first re vealed to me by the borings made for oil in the valleys of the tributaries of the Ohio. All these streams were found to be flowing in valleys, once deeply excavated, but now par tially filled, and in some instances, almost obliterated. Fur ther investigation showed that the same was true of the

Meteorological Phenomena.
Father Sanna Solaro, in a communication to the French Academy of Sciences, takes an interesting and comprehen ive view of meteorological phenomena. He says that if w consider the sun as the principal source of terrestrial and atmospheric electricity, we can consistently explain the mos difficult phenomena of meteorology. The sun being th cause, we can account for the extreme violence of electrica phenomena in the tropics and especially at the time of the equinoxes. Hence the terrible cyclones, which mere differ ences of temperature cannot explain. The excess of elec tricity of those regions, striving to re-establish its equilibri um, causes the air to flow towards the temperatezones. The whole column of air over the tropical zone being mor powerfully electric than the balance of our atmosphere, it is but natural that the electricity in the higher and more rare fied regions should flow fied regions should flow
off towards the poles and manifest itself under a luminous form. Hence auroras are most frequent too at the time of the equinoxes.
When electricity is de veloped in an electrica machine, it accumulates in the prime conductor and pushes away the air from them in orde to escape. What then must be the effect of the immense oceans of elec ricity accumulated above our heamatated be that heads? It is for the we must look tric cause of barom will then understand why the barometer falls rapidly at the approach of the center of a cy clone, and why it some times rises suddenly af

## NEUMATIC GUN CARRIAGE AND ELEVATOR.-Fig. 3

the Atlantic slope. For example, the valley of the Mohawk, for a large part of its course, is filled with sand and gravel to the depth of over two hundred feet. In the Hudson the water surface stands old mouth of the Hudson and the channel which leads to it being distinctly traceable on the bottom nearly eighty miles south and east of New York. The excavation of these deep channels could only have been effected when the continent was much higher than now. Subsequently it was depressed so far that the ocean waters stood on the Atlantic coast from one hundred to five hundred feet higher than they now do. During this period of submergence the blue clays in the val ley of the Hudson-the Champlain clays-were deposited, and the valleys of all the streams were more or less filled. Following the general rule, the Nepperhan probably once discharged itself into the Hudson at least one hundred feet below its present level, and the old valley in which it flowed is perhaps filled to this depth for some distance above its mouth. It is also probable that a portion of the material occupying the bottom of the old valley will be found to consist of sand and gravel, saturated with water and traversed by drainage currents which are quite independent of the surface stream. In the boring made near the head of Nepperhan avenue, a thick bed of clay was found underlying the surface gravel. It is almost certain that beneath this clay are sand, gravel, or boulders, through which a flow of water passes on the bed rock toward the Hudson. Should this be found to be the case, it would be an easy matter to construct a subterranean dam between the rocky walls of the valley-which here approach very near to each other-stop this underground flow and pump it out for city use, either directly by the Holly process, or throw it into reservoirs to be distributed by gravity.
Color BLIndness.-An instrument has been invented in Germany for testing color blindness. It consists of a rotating apparatus, which moves a disk whose center is a circle, one half black and the other white; outside of this is a ring half red and half green, then another ring of violet and and red, then the outside ring of violet and green. When rapidly rotated, the center appears to be colored gray, then is black and white mixed. To a green blind person the middle line will appear gray, that being the result to him of a mixture of violet and red. The outer ring will appear gray to the red blind patient, and the inner, gray to the viole blind. By the use of this instrument, a large number of patients may be simultaneously examined for one or more kinds of color blindness.

A bILL is before Congress to permit scientific institutions to import alce hol, free of duty, for use in preserving specimens. Professor Agassiz appeared before the Congressional Committee to advocate the measure, and stated that, last Unive the institution with which he is connected, Harvar University, Cambridge, Mass., used five thousand dollars worth of alcohol, and he thought that about as much more
was annually used by other institutions.
Sir G. C. Cowell states that he witnessed the explosion of a fire ball, which seemed to be about twelve feet in diam eter, near the Great Western railway at Slough, England, on November 30, 1872 , at 2.30 P. M. The report made wa ing the ground, like a well timed shell.

郎 ap of thunder. The daily and the yearly variations of
 zero in winter at high latitudes.
It has winter at high latitudes.
It rises considrably, the thermometer falls a few days after On the supposition that the depression of the barometer is due to an accumulation of electricity, it will be easily under stood that the electricity, escaping by puffs, cools the air in
proportion to its own tension; the barometer will rise at proportion to its own tension; the barometer will rise at
once, while several days will be necessary to transmit the lower temperature to the thermometer.
Earthquakes are of two kinds; one of them originates in the interior of the earth, while the other, and by no mean the less violent, is produced upon the surface. The latte are the more numerous. They are frequently preceded by noises in the air resembling rumblings of thunder or the un loading of pebbles on a stony road; they are often accompanied by luminous phenomena, and, for the most part, noth ing can be heard below the surface of the earth. On on occasion, the shocks were not perceptible in the cellars and caves. Father Solaro states that frequent personal observa tions of these phenomena have forced upon him the conclu sion that they are of ten due to atmospheric waves caused by sudden disturbance of the electrical equilibrium between th earth and the atmosphere.

## Fires and their Causes.

In a recent report of the Boston Manufacturers' Mutual Insurance Company, a list of the fires by which that corpor ation suffered in 1872 is given, from which we take the fol lowing. It will be found interesting as showing the many causes which may produce fires, and shows the great care necessary in all manufacturing establishments to preven combustion.
1872.

 83,300.

 over two laps which were in contact with a steam pipe. There seems to be
no dout that we have here a clear case of ingiton of what is usually
clean cotton by the heat of ordiary steam pipes.



 March 11 .-Kearsarge Mills, Portsmouth, N. H. Fire in the pleker room
from foretgn matter In coton. No claim made.




February 15, i873.]
§rientific Ammicur.





























It will be observed that the pickers still keep up their reputation as the most frequent originators of fires, 18 out of putation as the most frequent originators of fires, 18 out of
35 having been in that department. There are also several cases of spontaneous combustion, and woolen manufacturers should be warned by the case at Stillwater. The attention of all is directed to the case of firing of cotton laps by steam pipes in the Utica mills, as one to which very many concerns are liable, from the practice of allowing combustible matters to remain in contact with steam pipes. The sprinklers alluded to consist of perforated pipes placed on the ceilings, through which water is sent in case of fire.

Facts for the Ladies.-Mrs. Rev. W. V. Milligan, Cambridge, Ohto, has aved with her Wheeler $\&$ wilson Lock-Stitch Machine hundreds of doljars In the last ten years without a cen
ments and Woods' Lock-Stitch Ripper.

## PATENT OFFICE DECISIONS.

Thacher, Acting Commission








##     

## DECISIONS OF THE COURTS.

United States Circuit Court--Southern District of

| Blatchford, Judge: <br> The patent to the plaintiff,granted March 19, 1861, is for an " Improvement <br> in Method of Preserving Fis The claim is for "preserving", fish or other articies in a close chamber by means of a freezing mixture, having no contact with the atmosphere of the means of a freezing mixture, having no contact with the atmosphere of the "preserving", chamber, substantially as set forth. the process prevlously used for preserving frozen ice cream. All that the patentee has done, according to his claim, is to take the frozen fce cream pate thee has done, according to his cla in, is ther article, frozen or unfrozen That is no patentable invention. If the process of preserving the frozen ice cream hatd not existed prev iously, the use of such process in the manner stated, would be within the cl aim or' the patent, and wuld be an Infringe ment of it. The prior use of such process must, the erefore, be an anticipa tion of the claim of the pat ent at least in a case like this tion of the claim of the pat ent at least in a case like this. The patentee may be the firsi person who has practic. introducing int o the market, at all seasons, salmon as fres as when fre caught, and may thus have supplied as great desideratum and have estab lished a business that is commerclally proftable. He may have invented something, in that connection, which is capable of being protected by a something, in that connection, which is capabie of beng protected by patent, and he may have described in this spectication, or shown in the model or drawings accompanying it something which may be claimed, and model or drawings accompanying it, something which may be claimed, and But the diffic ulty with the present claim is that it 18 too broad, and that 1 tially in the same manner set forth in the specification. For these reasons the bill must be dismissed with costs. M.B. Andrus and Browne \& Holmes, for complainant. |
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## farcent gurcrican and foreign satents.

Improved Vapor Stove for Heating Soldering Irons.
David Berkey, Huntington, Ind.-This invention has for its object to fur ish an improved vapor stove or fire pot for tinners' use for heating the soldering frons. The body of the stove is made of any sheet metal in th cal cover, terminating in a neck to recelve the smoke plpe. The reservot to contain the kerosene or other light hydrocarbon is supported by rods. From the reservoir a plpe leads downward, and is then curved to enter the
lower part of the stove. To the end of the plpe is attached a semicircular lower part of the stove. To the end of the pipe is attached a semicircular
piece of pipe. To the other end of the semicircular pipe is attached a short plece of plpe, which is bent into succ a shape that tts other end, to which
the burner is attached, may be directly beneath the center of the curve pipe so that the flame from the sald burner may strike the sald pipe an vaporize the liquid before it passes to the burner. The burner is made in the form of a short tube, and with a number of small holes in its close apper end. A disk fits into the stove and has a slot with flanged side edge
formed in it. It 18 so adjusted that the slot may be longitudinal with the formed in it. It 1s so adjusted that the slot may be longitudinal with the
semictrcular plpe, the flanges of said disk overlapping the sides of the said pipe so as to collect the heat from the burner and gulde it through the slot in the sald disk so that it may come into direct contact with the copper tubes placed above and upon the disk; and its open ends communicate
with holes in the side of the stove through which the irons are inserted with holes in
to be heated.

Improved Corn Husker.
John M. Carissle, Sumter, S. C. - This in vention has for its object to furnish an improved machnne for separating ears of corn from their husks, enabiling
the work to be done faster than it can be by hand, saving the hands of the operator from Injury, and leaving the husks in fne condition for belng fed to stock. In using the machnne the ear to be husked is lald upon the rest
with its stem forward, and is pushed forward till stopped by the stop claw. The spring lever holder is then lowered to hold the ear, and the sash 1s forced downward. By the downward movement of the sash the stop claw Is withdrawn, the knife cuts the ear from its stem, and the husks are slit
longitudnally, by the points as they are drawn back along the ear by the rearward movement of the head block, and drop from the ear, which ts then is then ratsed and the machine is ready for another ear.

Improved Spectacle Frame.
Jullus King, Warren, O.-A difflculty has heretofore been experienced in fining the bow to the bridge, or nose plece, tn manufacturing steel frame spectacles. By making the bridge of silver, gold or other non-oxidizing
metal, the soldering of such metal to the steel is done at much lower tem perature, and prevents burning, which renders ordinary steel frames very
brittle. By the use of a comblnation of metals, greater strength 1 obtaned arittle. By the use of a comblnation of metalis, greaterstrength is obtained, practical optictan, and author of a chart by the use of which persons are enabled to determine the focus of their sight, and thus be readily fitted with glasses of the number they require.

Improved Cartridge Loader.
Joel S. Warner, Ogdensburg, N. Y.-The object of this invention is to produce a portable device but little larger than the cartridge shell for plactng the wads thereln, and the invention consists in a tube counterbored to ft
over cartridge shell and provided with a spring plunger very effectively applied.

Improved Glove.
James F. Mason, Johnstown, N. Y.-This invention relates to that class of combintch are made partly of leather and partly of cloth, and known as herefrom.

Improved Steam Boiler.
Atwood Wigzell, Halifax, England.-This invention relates to the con struction and general arrangement or steam bollers, having particular refer-
ence to the class known as "sectional steam bollers," and consists in a series of contcal tubes attached to or forming a part of horizontal parallel tubes upon the sides of the boiler, the sald conical tubes being so arranged that the tubes of one part fit between the tubes of the other part, thus forming one or more horizontal thers of these conical tubes, two or more such t
being contained and operating in combination with a steam chamber.

Improved Adjustable Pipe Tongs.
ney, Belleville, . J. J. This invention relates
William Kearney, Belleville, N. J.-This invention relates to improvement a screw, but is more particularly a modification of a device described in the patent of H . N. Smade, dated August 29, 1871. The object of this invention is to provide an adjustable Jaw which shall be capable of adapting itself,
within moderate limits, to the object to be selzed or held, and of belng readily adjusted to various positions.

## Improved Awl.

Godfrey K. Mellor, Wer part of the ama ed. The grooves extend to the its sides which cut easily through the leather, and which, therefore, make it

Peter Peartree, Lansingburg ioved Slide Valve.
urnish an improved device er or has for its object to hall be so constructed as to enable the steam to be cut off at any desired which may also be regulated at will.

Improved Pruning Shears.
Oscar Chase, Rutland, Ohto. This invention has for its object to furnish inproved pruning shears, so constructed as to cut the bows with a circu the ordinary manner, and which may cutting bolts and other articles of iron or other metal; and it consists in the arm, and ston of the handles, one of which is provided with a hook, guide vided with a finger or cam.

Improved Boots and Shoes.
Robert Sommerville, Sandusky, O.-This invention consists in the use of Wire gauze cloth for the uppers of boots and shoes. The principal acvan.
tage of this shoe ts that it gives the foot free ventilation, and it is sufflectently

Joseph Willhite, Pllot Polnt, Texas. $\begin{aligned} & \text { Improved Phet Fence. }\end{aligned}$ arnish animproved picket fence whichis invention has for its object to stock, and it conseqn he easily repaired, and cannot be rubbed down by the parts of the fence, so that all may incline laterally, and the timber may ber madelight, and at the same time the fence will be strong and substantial With this construction, also, when any of the pickets rot off they may be riven down into the grow or rephaced with new plakets, without dis

## William P. Hammond, Napaved Ore'Try, Crusher.

att, same place.-This invention has for its object to device for operating the stamp of a stamp mill or ore crusher, enabing the tamp to be raised with a less expenditure of power than when the stamp tion with the stamp shaft, cam, and driving shaft. By suitable constructlo and arrangement of the tappet the friction will be lessened, the cam wil rotate the stamp more surely, and the power required to ralse the stam will be diminished, the point of contact being directly above the driving Apparatus for Filling, Polishing, and Varnishing Moldings. Max Hamburger, Isaac J. Slskind, and Achille Klein, New York ctty.-Thi French polithing, finishing, varnishing, and sand papering wood molding etc. In using the machine, the molding or other work to be operated upo is secured to the table, which table is then raised to bring the work agains the brushes or rubbers with the necessary pressure. A lever is then operated to bring a clutch in contact wha wheel hat will carry the brushes or rub bers in the proper direction. The motion of the brushes or rubbers may be
reversed at any time, and as often as desired, so that a short strip of molding or a part of a long strip may be operated upon, as required.
Improved Balanced Slide Valve.
Hubbard Hendrickson, Red Bank, N. J.-This invention relates to a new means of balanctng the slide valves of steam engines with such exactnes
and regularty that the motion of the valve will be made easy, tis wear pre vented, and friction avolded. The invention consists, first, in connecting pivoted yoke with the sllde valve, sald yoke having a vertical stem that swingsat its upper end on a horizontal plvot. This plvot :s supported in tube or cylinder, which is held balanced by the ateam, so that the actual
support is supplied to the valve by the steam, but indirectly under sadd cyl apport is suppnied to ther,

Improved Pole Clamp.
Henry Haering, New York same place.-Thls invention consists of a $U$-shaped yoke with bearings in the bars near the open ends, an eccentric clamp with a hand lever, and Jour
nals for working in the aforesald bearings, and a fastening chain or rope combined or arranged so that a couple of scaffold or other poles lappin each other may be embraced between the bottom of the yoke and the
eccentric clamp by placing the yoke around them and then putting the clamp in its bearings, and thus be bound together very frmily and in a sim ple manner. The clamp is designed for spicing scaffold, tent, and othe

Improved Plow.
Edwin Reese, Eutaw, Ala.- The Invention consists in a self sharpening
plow having the landside of such pecullar construction that the polnt and ge of share are allowed in a uniform and certain manner to wear upo worn out.

Improved Butt Hinge.
Isaac L. Thompson, Sardis, Ohio.-This invention relates to an improve ment in the class of butt hinges provided with supporting arms or straps and consists in constructing such arms or straps. With lugs for taking int the wood and relieving the screws from strain.

Improved Chair Seat and Back.
William T. Doremus, New York city.-This invention has for its object to urnish chairs, provided with elastic seats and backs, which shall be simp in construction, strong and durable, and at the same time conventent in aprnate rigld and elastic blocks, aving flexible

Improved Lubricator
John McLure Power, Port Dlscovery, Washington Territory.-The neck o the lubricator is screwed into the cylinder head. A plpe is connected with
the branch from the neck of the lubricator and with the condenser, through which steam is admitted from the cylinder. This plpe enters the condense and is closed at its end. It has a short vertical branch plpe screwed into it. A valve spindle ts attached near the bottom of the reservolr, ford rawing off the surplus water of condensation. A spindle valve is located in the cup or
recelver, by which the flow of oll is controlled, and the condentn recelver, by which the flow of oll ts controlled, and the condensing surface
increased or dimintshed. A solld plug. made of any non conducting mate rial, closes the top of the neck tube. Steam will passup through the branch and plpe from the cylinder into the condenser, which steam will be condensed in whole or in part, and the water of condensation will fall by it own gravity in to the reservoir. The water, belng of greater speciflc grav
ity than the ofl, will settle at the bottom of the reservolr cy than the onl, will settie at the bottom of the reservoir, and when it ac bricating oll flows over tht the pipe, and reaches the cylinder by. The lu its own gravity. The filow of steam upward, as well as of oll, may be shut of by means of the valve spindle.

$$
\begin{aligned}
& \text { Improved Tool Holder. } \\
& \text { gh, Easton, Pa.-This inven }
\end{aligned}
$$

James S. Ettenborough, Easton, Pa.-This invention consists of a relle bar or plate plvoted to the end of the shank by which the toolis attached to the reciprocating bar of the machine at right angles to the line of motion,
with a tool post similar to the tool post of a turning lathe, for holding the tool, the relief bar being arranged to swing and free the point of the too from the work when it moves back, to prevent it from rubbing on the wor and belng worn thereby or broken when escaping from the end of the work, the sald bar betng provided with a spring to throw it back into the to shift the tool sidewie beginning to cut, and the tool post being arranged
Improved Door Check.
George Rohrbaker, Penn Station, Pa.-The object of this invention is io provide means for holding swinglng doors in any desired position; and it
consists in one or more clrcular plates forming part of a frame attached to the casing and arranged concentric with the door hinges, and in an elastlo friction block connected whit the door and working in contact with said cir
Improved Farm Gate.
Cyrus E. Gllesple, Edwardville, Ill.-This invention relates to an im.
proved mechanism for operating gates on roadways at a distance therefrom so as to make it conventent for persons on horseback or in carriages to open such gates before reaching them, and to reclose them after they are passed, all without dismounting. The invention consists malnly in connecting the latch of the gate with a crank on a pinion that hangs on Its lower plvot, so
that as sald plvot Is moved to one side or the other, the pinton will be turned and the latch opened to permitt the opening of the gate.

Inventions Patented in England by Americans.
ntions Patented in England by America
[Compiled from the Commissioners of Patents' Journal.]
From January s to January 9, Car Spring.-P. G. Gardner, New York city. drying Prat, etc.-L. W. Boynton, N. Y. city, J. E. Holmes, London, Eng Eleotrio Stanal.-W. Robinson, Brooklyn, N. Y.
Extracting Nails.-G. J. Capewell, Cheehire. Coan
Hat.-R. Efckemeyer, Yonkers, N. I.
Hospital Bed.-I. Waller, Cleveland, O., H. Fowler, Detroit, Mich.
Printing Trlegraph.-G. L. Anders, E. b. Welch, Cambridge. Mass. Goodrlch, Trigg Furnace, Ky. Goodrich, Trigg Furnace, Ky.
Tor.-W.W. Roge, New York city.

## 

The Charge.for Insertion under this head ts $\mathbf{\$ 1}$ a Line,
$\underset{\text { Water }}{\text { Front, also Sorstores or Lots to Rent, }}$ Covering for Boilers and Pipes. The most
economical and durable article in use. Took frst prize economical and Intitute Frair. Van Tuyl Manufacturing
at Amertean
Company, 528 Water Street, New York. Indispensable to every Manufacturer and
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 Spur and Bevel Wheels and Spindles, of
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Carpenters-For Sale, a Sash Factory, run
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run of trade. For particulars, address P. O. Box No. 2 ,
Charlestown, Jefferson County west Charlcstown, Jefferson County, West Virg'ina.
Chucks--Fairman $\&$ Co., Baltimore,
Md. I have some capital and a practical know-
ledge of the manufucture of Tubs and Palls, and want to put them both to usc. Address H. J. Howe, Pltts-
purgh, Pa.
Mining, Wrecking, Pumping, Drainage, or
Irrigating Machinery, for sale or rent. See a d vertisement,
dit Andrew's Patent, inside page.
Need and clock gachinery of every de-
scription of the most Improved Styles. Hendey Bro's, Wanted - A lot of Second-hand Machinery
or a cotton Mill consisting of Looms, Spinning Frame,
 E. P. Peacock, Patent article., manufacturer
in 11.ght metal work of all kinds, 145 s s.clnton st,chleago. Wanted--A situation by a first class Ma.
chinist and Toom mazer. Best reference given. $A$ daress Send to H. Miorere, 41 Contre St., New York,
for Catalogue of "Broughtons" (the best) Lubricators,
 margin. Address J. H. Layman, 223 Baymiller Street
Cincinnati, Ohlo. Buy Gean's. Improved Automatic Dovetail-
ing Machine, Boston, Mass. Peck's Patcont Drop Press. For circilars,
address the sole manufacturers, Milo, Peck \& Co., New Haven. Conn.
A Superior Printing Telegraph Instrument
(the Selden Patent),for private agna short Inenes-awsided the First Premiun (esiliver Medal) at Chctinnatt Expo
Bition, 1872 , or " " Best
Telegraph Instrument for private
 truction Co., 50 Broad St., New York. P. O. Box 6865.
Diamonds and Carbon turned and shaped for Philosophical and Mechanical purposes, allo clala-
zier's Diamonds, manufactured and reset by $J$. DtckinPatent Gearing-Great Strength, Durable,
Noiseless, Cheap. $J$.Comly, 148 Ten Eyck St., WillamsSteam Boiler and Pipe Covering-Economy,
Safety, and Durability. Saves from ten to twenty per cent. Chalmers spence company, foot East tht St., New For Sale, Machhine Shopand Foundry. Ad-
dress, Wagorer \& Mathews, Westminster, Md. Sperm oil - No lubricator like it. See KelIron Roofing. Scott \& Co., Cincinnati, Ohio. Shafting and Pulleys a specialty. Small or-
ders filed on as good terms as large. D. Frisbie \& Coo, New Haven, Conn.
Wanted, a Machine to make a flat flour bar-
rel hoop out of black ash timber; also, any Machinery
that while that will decrease the cost of makling Flour, Frult, or
Lime Barrels; also, a Machnine to shave a flat hoop ready for the barrel. Address P. O. Box 2533, Buffalo, N. Y.
Hydraulic Presses and J Jocks, new and secFoot Lathe or $\$ \$ 2$. Goodnow \& Wightman,
Cornhll, Boston, Mass. Wanted, reliable and responsible parties to
Sell Enginese, Saw mills, and other maininery manutactured by the Mansteld Machline Works, Manstield, Ohio.
For the Best Circular Saw Mill and Steam
Engines, Statitionary and Portable, of all Sizes, Apply to Engines, Statlonary and Portable, of all Sizees, apply to For Wait's Improved Turbine Water Wheels,
kmproved Mulay, Gang, and Circular Saw Mills, Paper

Circular Saw Mills, with, Lane's Patent Sets;
more than 120 in operation. Send for descriptive pammore than 1200 in operation. Send for descriptive pam
phlet and price list. Lane, Pitkin \& Brock, Montpe Machnists-Price List of small Tools free
Gear Wheels tor Models, Price List tree ; chucks and Drills, Price List free. Goodnow \& Wightman, 23 Corn-
hill, Boston, Mass.
All Fruit-can Tools, Ferracute,Bridgeton,N.J. Nickel Salts and Ammonia, especially manV. Feuchtwanger, 55 Cedar Street, New Yori.

English Patent-The Proprietors of the

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peing published in the Boston Journal of Commerce send for Specimen Copy.
American Boiler Powder, for certainty, safe-
y, and cheapness, , The Standard anti-1-ncrustatat.". Am.


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Pumps. All klnds fine brass work done by The Recorrdlig Boynton's Lightning Saws. The genuine
q500 challenge. Will cut tive times as fast as an ax. A


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of the economy and asfety in working Steam Boilers. I. B. Davis \& Co.., Hartford, con.
Abolutely the best protection against Fire
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Con.,
Hart
Iora, Conn.
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What rubber Tries.Adress D. D. Willameon, 82 BroadWay, N. ..., or Box 1899.
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paratus for holisting and conveyling material by yron cable,
 Belting as is Belting-Best Philadelphia
ar Tanned. c. W. Aryy, 801 and 303 Cherry Street, Pnil.

For Solid Wrought-iron Beams, etc., see ad
vertisement. The Berryman Heater and Regulator for
Steam Bollers-No one using steam Bollers can afford to Always right side up-The Olmsted Oiler,
under Gatling guns, that fire 400 shots per minute,
with a range of over 1,000 yaxes, and whlch welgh only 25 pounds, are now being made at Coltis Armory, Hart ford, Conn.

## 

1.- A. F. P. asks: How can I tan a sheeps
ande with the wool on it, and then color it pink? 2-E. M. K. would like to have a recipe for
3.-J. T. would like to know what is the
easiest method to brighten cyllider heads, and other eastest methor to
smooth cast Iron?
4.-G. R. C. wants directions for making a spactoseoper for
5.-J. P. Wishes to know how to color
anned deer, sheep, and dog sking the different shades of brown, purple, orange, black, etc. He has six or eight
rundred to color.


7-A. B. asks if some one will explain the matiematical process of af acertaninng the distance be.
tween two chords of a circle, the area of circle and the area of that porti.
only belng given.
8.-S. T. W. asks: Will S. L.. D., who asked ransferring printsto glass than rem oving ther paper from
the back of the plcture, the back of the picture, state $h$
nish is used and how tits made?
9--E. M. H. asks: Will some one please in-
 I want to make a grease, or flish wheel. What trnd ot
eather shall $I$ use? What number of emery 18 best leather shall I use? What nu
set with, to fnish atter a 90 ?
10-P. P. F. asks: What is the best rule for
making comins ?
The one in use is not applicable to all
 will cause one's moustache to grow? If so, what are its
ngredients?
3 . How can I make halr oil that will cause ngreaients? 3. How can 1 make har on that win cause
the halr to curl, and not be ingurious to halr or scalp? Is there a dip for polished iron to keep 1 t from rust
g , and what is it that manufucturers of sewing $m \mathrm{ma}$ ang and what is it that manaquacturers of sewing ma
chnnes use on thelr polished steel and Iron to prevent
rust?

## 

M. McD. asks for ( 1 a a rule to find the diskep in a given pressure, when the size of vave, distance
from fulcrum to valve, and welght are known ; and also rule, when the diameter of a valve is given, to find the
rea. 2 . Which ts to be taken, the inside diameter of Valve seat, or the whole diameter of valve that rests on
the seat? Answer: 7 o find the total length of a a afety Yalve lever for a required maximum pressure: : Multiply center line of its stem to the pln on which the lever 1 hinged, and divide by the welght of the sugpended wetght.
2. Where the valve is well
ftted, the inner diamcter of is seat to be that whose diameteris the outsde diamete of the seat.
J. M. G. asks: How long should two boilers
42 inch sheil with 77 three tnch fues) be for an eugine



 nealing surface
in larger tubes.
 It 18 cladmed by some that this portable arrangement 11
cheaper than any other mode. Answer: By portable gas Sheaper than any other mode. Answer: By portablega,
we presume you mean the apparatus now so commonly used for Ilighting churches and $d$ wellings in the country. What considto of a device for drirling at throug ligh
ool oll and thence troug has pipes to the place of com
 just as oll carried up by a wrik burns. The air serves the place of the wick. If properly made and carefully used,
these portable gas machnnes are safe and afford a drrat rate light at a cheap cost. The oll used, termed here gas
olne, $1 \mathrm{is} \mathrm{very} \mathrm{explosive}$,and the utmost care should be taken to keep Are and lights far away from the machnie
A. B. says: The heating pipes of a green
nouse are common sewer tiles, composed of ume and gravel, hte e end of each jotht stipping into the next one.
Ifind the heat or cold expand ing the cement that I put them together with, conse quently permitting the smoke to escape and and conse the
greenhouse, to the no small detrimeut of the plants. How can I obviate this evil, and is there any kind of springy cement with which I could jotn them? 2. . What
is the force per square tinch of freezing water? s . The iews dealer charges me 8 cents for include postage; if not, what would the postage be? An swers: 1. As an expedient, we suggest that you cover
the jolnts with a band of thin slleeet tun, the endis of which you can lap and bend over with your fngers with sui
cilent tightness. 2. The expansive force of water frezing has been estImated at thirty thouand pounds
per square tnch. s . The postage on the Scrismiritc AMERper square tnch. 3. The postage on the Scirsmific Axpr.
CAN 1 is 5 cents a quarter or 20 cents a year, payable by
G. W. D. says: The water backs in th
G. W. D. Says: The water backs in the deposit of lime, the hot circulating plpes stopplng up
frat. I wish to know if, supposing I can get a prepara
 he plpes and back, it will cut the lime from the pipes or back and leave it in the form of sedment, so that it can
be washed out. Answer: Try chloride of bartum. It may do the worl th time. It 18 8 al ways more difficult to For such situations, water backs should be constructed with special provistion for cleaning out scale mechanic.
aily. There is a chance for some one in the trade to nake a usefull mprovement.
N. B. J. asks: 1. How can I find out the law I regard to Inspecting steam boilers, and who 1s the in
spector? I know of several ensines which have bee running for years, Which have never been inspected. 2.
Will you inform me how I can find the rule for setting an ccentric? 3. Can an engine be bullt with the cylinde moving on guldes in one direction, connected to a cran
while the piston moves in the other direction, thus util tining the power always exerted on the cylinder head, and
ziso answering the purpose of the valve? Answer: 1 ,
and
 Supervising Inspector J. S. Deveenny, Pittsburgh, Pa., of to Supervising Inspector General Nimmo, United States
Treasury Department, Washington, D. C.
2. Consult Treasury Department, Washington, D. C. . 2. Consult
back numbers of the Scrisntrici American, or purchase copy of Professor Mccords bor on valve gearng
which may be had of any New York bookseller. 3 . Itha been thought of before and has been tried, but withou sucess. You do not lose power in consequence of the
pressure of steam acting against the stationary cyllinder ead, any more than from the eng'ne itself pressing upon its stationary foundation. Motion 1s necessary to elther
the use or the loss of effective pressure developing
E. W., of R. I., asks: If I take an iron box contannng1 cubic foot of space, in111t with steam at 2122
ahr, ratse the temperature to 500 Fahr, what pressur Would an ordinary steam gage thdicate on this box? Fill the same box with ar at at the temperature of say 60.
Fahr, and ralise tals temperature likewise to 5000 Fahr.


D. F. W. writes for information as to re tralght split; $t 11$ is about 1,4001 bs. in welg ht, and 1 s abou
 ised forstoves and stove pipes), place it on a 2 shart an
an it at about 5,000 revolutions per minute, moving th
 it do it, and, if so, would more than one day be required
to do hec utting and atter the cuting was done, would
the bell be likely to have a good tone ? Answer: You the bell be likevy, to have a a oood tone? Answer: Yo
have proposed the only practical method of getting out
 prenensive that very thin rion might not work as well
miron of, say, No. 12 or No. 14 gage. " soft iron saw
 sound of a cracked bell Is due to the jarring gapannseaneach regular vibrations producing mustcal tones. Cut the
two sides clear of each other and the note will beagain steel saw could neit ther be found or made. Knowing nothngg of your facilites for dolng work, we cannot tell
J. F. . L asks: If a steam boiler of 1,711
cubic feet internal measurement have one cublc foot of
 cating 141 bs. presure, and if then the heat be ralised 20. rees above the billing point? Doos steam expand o contract by betng super heated? Whith hs the most dense,
steam or superheated steam? What 18 the actual cohesion of best cast tron heated to 750 Fahri, alaso of cast
cell, unwrought, in pounds, the materials belng one ich square, two or triee feet tong? What is the effecto
 contact with water, behaves prectisely like any other gas expanding zo of of its volume at $32^{\circ}$ Fahr. for each degree that
Its temperature rises, the pressure belng proportional to
 ressure will be $\left(232^{\circ}+461^{\circ}\right) \div\left(210^{\circ}+461^{\circ}\right) \times 14=144$ pounds per suare tnch. Steam, superheated, is Ave eighths as
ieavy as air. No rellable experiments have been made
nem
H. D. says: I have seen in the Scientific gas for illumination, and that the hydrogen gas was made very cheap. I would llike to know how it is made oses. Answer: There is no really cheap way of making ydrogen gas. One of the methods that went the round
of the fournals a few years since, is to heat damp coals
 g blcarbonate can be sold to advantage, and the alka Me earth can boo obtantine in quantity, it has been masin
tained by Mo Motay that he above method it the cheap. est yet proposed. The economy of the operation has
not been tairly tested.
A. W. D. asks: Will it be necessary for me provement to be patented? Answer, The model only
needs to be complete enough to illustrate the working of your improvement

A correspondent asks. How can the work
eecessary to overcome the riction of a body on roller be calculated? Take for example, a house welghng 100,the rollers running on on oak planks. There tis no lack of ata concerning sillding friction, and that of axles, bu of moving heavy boodies, as gung, by mounting them on cradles and placing the rollers under in succession. An swer: The earliest experiments on rolling friction were
made by Coulomb, and later experiments were made by Morin. The laws deduced are the following: 1. Rolling resistance isnearly proportional to the pressure. 2. Such
resistance is inversely proportional to the diameter resistance is inversely proportional to the diameter o
the rollers. Where the rollers are smooth and no crush og occurs, the rule for determining the resistance, wi ank rollers running on hard wood, as determined by
perimen ts on a small set of rollers, is: Multiply the pres ure or load, in pounds, by seven, and divide by 1000 times the radius of the rollers used in feet, or $\mathrm{R}=7 \mathrm{P}+$
1000 . Thus, for a load of 100,000 pounds and 20 rollers of 8 inches diameter, $R=(7 \times 5000) \div\left(1000 \times \frac{1}{3}\right)=105$ pound for each roller, or $105 \times 20=2100$ pounds total. Results wil vary greatly in different kinds
for different kinds of road bed.
J. R. asks: Will some one give me the solu
tion of the followingproblem? What are the contents on stick of timber, length 40 feet, diameter of larger end 24 wer. Answer: The mathematical formula is as follows. $\pi$ h
 radus, and h the length of cone. This formula hold P. S. says: In your book "For Inventors Jue. I have tried your recelpt and falled. I took su tanding some three weeks and there is no sign of it dissolving. Answer: Why do you try sulphuric ether? J. T. writes as follows : Bourne's " Hand
book of the Steam Engine" says that a cylinder 64 inche iameter and 8 feet stroke, working with 12 pounds pres .ol inches in diameter, and by cast tron crank shat e 17.59 inches. Byrne's "Calculator" gives the later
gure. Again, Bourne says 396 pounds acting ata foo radius will twist off a cast iron bar one inch in diameter is the ultimate strength of t , and that 3,981 , or one third of it, will work with safety, but he does not say at what radius. Who is right? Byrne also says if you multiply he force applied in pounds by the length of lever it ches, and divide the product by one third of the ult the quotient will be the diameter of the shaft in Incles herefore, according to this rale, we have : force acting lied by 48 inches, the length of crank or liver whit an 8 feet stroke, which equals 1852991.0784 , which, divided y one third of the ultmate strength of an fnch bar o . $981=405 \cdot 4887+$ of which thecuberootis 744 , the answer, 0 lameter, a blg difference between 17.59 and 7.74 . How the strength of shafts. I also notice in your last issue ower compound engine, which is not according to the Ho old theory of 4 square inches for every horse powe
Is mewhat variable. Some specimens twist offunder the action of far less force than do others. The most rella-
ble expertments thus far published are those of Major Wade of the United States Ordnance Corps. Using bars one inch in diameter and a leverage of one foot, he found some specimens that gave way with a force of
less than 600 pounds, while others bore nearly 900 . The verage was 733 , with American cast gun irons. Basing mine the least force, in pounds, which wreak a crank shaft of good cast Iron: Multiply 733 by the cube of diam crank in feet; ; that is, $P=733 \times \mathrm{d}^{3}+\mathrm{L}$. (1.) To determine the $f(\mathrm{PL} \div 733)=\frac{1}{2}$ the cublotof(PL) (2) raic expression of the following rule: Multiply the twisting orce, in pounds, by its leverage or the length of crank in feet and take one ninth the cube root of the product, for the lometer of a shaft which will just break under this tor ional strain. The principal cause of variation among
authorities treating on this subject is the fact that they use different factors of safety. One writer considers three suffciently high, while another is unwilling to subcct a shaft to a twisting force greater than one tenth o recommends a size which would be utterly condemned by another. The best authoritles, such as are accepted by our ortant parts be made strong enough to bear six times th whit is proposed to subject them. Introducin ractor of safety of six, we construct, for shafts of cas
ron, the following rules for safe working sizes: To de termine the proper working torsional stress on a given
shaft: Multiply 120 by the cube of the diameter, in Inchhaft: Multiply 120 by the cube of the dameter, in inch lgebraically, $\mathrm{P}=120 \times\left(\mathrm{d}^{3} \div \mathrm{L}\right)$. (3.) $\quad$ To determine the dameter required to be safe for a given working torsion al stress: Multiply the twisting force, in pound, by
the length of crank, in feet, divide by 120 , and the cube oot of the product will be the diameter in inches, that is $=$ the cube rootof (PL -120 ). (4.) Using rule (1) we find th reaking strength of a shaft 17$)^{2}$ inches dameter, with
crank 4 feet long, to be $\left.733 \times(17)^{3}\right)^{3} \div 4=982,037$ pounds. sing rule (2) to determine the size of shaft just capable $=\frac{1}{8}$ thecube root of $(38600 \times 4)=6$ inches. 0,770 igures by rules ( 8 ) and ( 4 ), we get $P=120\left(17 \frac{1}{2}\right)^{3}+4=$ aches. The rules given in Bourne are frequently very defect ve. Professor J. D. Van Buren's work on "Strength of ceam Machinery" is the most conclse and accurate ye For more general purposes we use,often,the work of Proessor D. V. Wood on "Resistance of Materials" and, for More obstruce investigation,consult Rankine, Mosely and al reader, bowever. Barlow on "Strength of Timber," n Wrought Iron and Steel" and J. B. Francis on "Cas Fon Pillars" are valuable authorities for spectal cases.
For ordinary every day use, we find the Pocket Books of Taswell, Trautwine, Molesworth and Nystrom extreme ly conventent, and always keep them by us. Question
relating to size of steam ports is answered in a reply ready given to an earlier applicant.
*Investigations of Formulas, etc. J. D. Van Buren
New York, 1869 .
J. A. S. finds the alum and sulphur method
of preserving eggs to be a fallure, and enquires for some ther means of keeping eggs fresh in hot weather. An wer: The theory of egg preservation is that the closin equent destruction of their contents, and so various substances for coating them have been recommended Drying varnishes have been used, and collodion has been
recommended; but the expense of these rreans would ustify an experiment with the Chinese method, w
o coat the eggs with wet clay, and let it dry on.
B. asks how the number of yards of carpet room, $14 \times 15$ feet, contains 210 square feet, or $231 / 8$ squar yards. Your carpet being 27 inches wide, you will need
116 yards of it to make a square yard, or 31 yards 4 inches 11/2 yar.
in all.
W.
W. N. asks for a recipe for pasting paper
o tron, so that tit will not be affected by oil or water Answer: Paint the iron first with oil paint and let it dry, Glue or paste will then adhere to the iron, but the pape
Ill not be oll or water proof. Try a quick drying va alsh.
R. D. S. wants elaborate details for making are very good dimensions) of very thin sound pln round hole in the center of the lid, and stretch by screw several strings of fine catgut, lengthwise over the hole, strained over two bridges. Tune all the strings to th
same note, and stand your box upright in the wind. same note, and stand your box upright
violin strings will do for the purpose.
G. F., of Mo: When there are two assign
Ments of record covering the same interest, the offce J. D. M., of Texas: Your remarks censuring
the acts of the Patent Oflte are not well founded, , though your sentiments accord with those of many others
who have obtained patents which they could not suswho have obtained patents which they could not sus
tain. If you will consider for a moment, you will see determine matters of infringement: It is for the Cour nly to adjudicate in such cases. The Patent Offlce exam Ine your claims, and, if your invention possesses nov
elty, it ts bound to give you a patent ; should it go fur her and dectde as to its confilcting with. previous pa ents, it would exceed ete jurisdiction.
N. B. H. Writes: I would say to your en
quirer H. C. ., who asked for a rule for laying off wood n axles, that the old rule, one third off front, two third ehind, one third off bottom and two thirds off top
the axle is not a bad one, but the only scientific way making a wooden axle is to set the bottom of wheels 4
feet 10 inches apart from inside to inside. Set the tops 4 eet 11 inches, the front one inch nearer together than the back. Then take a straight edge and run throug that much off the axle at that point. Try the straigh ge bottom and front, and work the back and top off t it; and no matter what the shape of the wheel may be the wheels will track and run precisely right. From shoulder to shoulder, bet ween the hubs of course, is the
D. M. S. asks: How can I plate, with silve ments, for instance? How is the metal applied, an What is the best preparation to remove the coating o
varnish on the articles to be plated, if it is necessary $t$ emove it before plaling or washng? Answer: Before plating with metal, it is necessary to remove all pain ichromate of potash made actd by a little sulphur cid. The surfaces of the metal must be thoroughly leaned. To plate with nickel, use the double sulphat a bar of nickel.
W. C. W. s. sys: I was running a saw mill struck a veln that rose to the top of the hole at onc y bolier was very badiy scaled; but since using this closed is a sample; please tell me what is in the water,
and if it wlll injure my boller. Answer: The water has een examined by an expert chemist. It contains con siderable chlorine and organic matter, not much magne
sla, but too much lime for good drinking water. It would be better to blow off the boller more frequently whe

## sing such water

E. P. W. says: In a recent number of the vanadium, in which you speak of a Mr. Apjohn, who ha tiving me the address of this gentleman? Is the article in your paper a synopsis of a fuller article in some othe and if so, what? Answer: The artcle on vanadium wa repared expressly for this journal from the literatur and was not the synopsis of a longer article from anoth rjournal. The latest information on the subject, aceessible to American readers, is contained in the Suppl
$\underset{\text { avenoticed the circles of smoke, frequently caused by }}{\text { E. H. R Says }}$ the puffing of a locomotive. A few weeks since I noFhich some uncommonly fine circles of the kind, one of tes, and unt1l it had floated out of sight. If it is a cen in its orbit, where is the centripetal force that held this ircle of smoke from dissolution during the time refer ed to, or in fact for any appreciable time? Do not such phenomena indicate that there is a force inherent in pay be denominated circular force ora natural tendenc to revolve in circles? Answer: Any force acting sudden ly upon the air from a center, imparts to it a rotary mo-
tion. Smoke and steam render the motion visible. The
 colsin a state of rapid e arrows in the figure The rapid rotation, in short, confnes the
smoke within the nar smoke within the nat
row limits of a circl and causes the rings to
be well deflined. Professor Tyndall, in one of his experiments, made wav
motions visible by blowing tobacco smoke into the ap motions
C. F. asks which would make the best table r 6 thin white wood boards, glued together diagonally and veneered with black walnut. Which would be th crews the best? Answer: We should prefer the black walnut made of thin boards, glued together diagonally as you propose. The white wood $m$
describe would make a good table.
O. N. McK. asks (1) who it was who observed
he lifting of the lid of a tea kettle by steam, and fast
 drst appled steam as a motor? Answers: 1. A some
Hat similarstory 1 told of James Watt, the lege stating that his attention was irst called to the power
of steam by the lifting of the lid of a
settle. 2. Heron, of steam by the lifting of the lid of a ketle. 2. Heron

in his work on pneumatics (230 B. C.), mentions three | $\begin{array}{l}\text { simple contrivances for using steam as a a motor; this the } \\ \text { we believe, the oldest record on the subject, but the }\end{array}$ |
| :--- | ower of steam was

D. J.T. says: Please let me know the effect
of mixing creosote and nitro-glycerin. Answer: we
A. L. asks what will destroy or neutralize he narcotic effect of tobacco while beng smoked in
ipe. Answer: Fill your ppipe about one third full of pine
 hem, changte the wood two or three times throug
S. H. wants to know if a coil of pipe in his
stchen range will not be a good water back or heater res, it will be, none better. Thave used It for years ystove, and never ay other. A. Aru had an iron ${ }^{3}$ brass pipe put in, and the action 1s perfect. There
ought not to be any steam generated, and will not be, if he circulation is good. An tnech pppe is better than any
and maller size. One end, projecting from the stove, shoul ex Inch higher than the other, more would be bette
o estabalish the circulation. My pipe comes in at the back of the stove, passei around the fre box, on the fire rick (touching tit) and passes out agalin the two leg
eing parallel. Two or three inches outside the stove ding parallel. Two or three inches outside the stove lof the brasse pipe, roese elbows are used. the pipe bella
screwed in, Hike conmon gas plpe. My copper tank is in he bath rom and water closet, in second story directly
ver the kitchen, keeplng to warm in winter- N . D.
E. E. S. says that J. C. J. J., who enquired how
prepare canyas for painting on, will find little econo my In preparing his own can vas. He can make a very
heap substitute for canvas by mountling a sheet of well cheap substlute for canvas by mounting g aheet of well
lampened drawing paper on a pane of glass; ; when par tampened drawn paste over it four or five thicknesses of thit
tall musiln, each plece beling allowed to dry thoroughly be nd rubbed smooth. Cover it with paint, spreading 1 vith a knife, and using a ilittle as possible ; when dry pit ts better to use sisinglass than nlour paste, as it doe
doe
not or lavi motstre as boon as the thater; and ond mus. n, it it saturated with drylng oil and allowed to dry
 olio. Some panterss make canvas by tackIng cloth on
stretcher, sponging it with a strong solution of glue astetcher, sponging it with a atrong solution of glue
nd spreading white lead on with a knife, but it lacks at roughness which is technically called "the tooth, nd it is hable to crack if too much glue has been used. material to a professional picture dealer, he will be in cllined to think that it is the canvas,
it, which the Shylock wishes to buy.
In answer to C. D., who asked for a mode earlarticles are made from the shells of the pearl oyster known as mother of pearl. They are found round the
slands of Manilla and Ceylon, In the East Indies. The slands of Manilla and Ceylon, in the East Indies. The
hells are cut with saws and ground to the various shapes on grindstones running in water,
and carved into various patterns.
A. G. C., who asked how to temper taps,
should draw the temper in hot sand; he will then have otrouble tin getting an even temper and will. not b
J. H. W. says, in answer to C. R. M., who ollers : I have used the following for over 25 years with uccess: : dissolve common glue in good cider vinegar dd to 1 quart glue heat untilit is all dissolved; It the unces Vente turpentine or white pine pitch direct fro the tree.

## COMMUNICATIONS RECEIVED.

The Editor of the Scientific American acknowledges, with much pleasure, the re eipt of original papers and contributions pon the following subjects
On a Method of Utilizing the Waste Hea f Street Gas Lamps. By R. B. M
On the Proper Ventilation of Apartments By. M.
On Steam Boiler Pressure. By C. P. E. On Marine Camels for the Bar of the Miss issippi. By W. K.
On Steam and Air Engines. By E. L. B. On a Telescope to cost One Million Dollars L. L.

On Forests and Drought. By C. G. F. On Design Patents. By W. E. S
On the Delineation of the Mechanical Move ents. By J. HI.
On Protection from the Spread of Fires By B. G
On Polar Mutations. By J. E. H
On the State Reward for Improvements in Canal Navigation. By R. L.
On the Austrian Show. By J. M. B
On the Influence of the Earth's Central Fire n its Surface. By E. B.
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APPLICATIONS FOR EXTENSIONS Applications have becnduly fled, and are now pending
for the extension of the following Letters Patent. Hear gs upon the respective applications are appointed fo ter mentioned
3,665.-Cooking Range.-B. W. Dunklee. Aprila.

 23,792.-GAS PIPR CUTTER.-J. E. Stanwood. April 9.
24,009-TIRE UPSET.-C. L. Crowell, R. Smith. April 30 EXTENSIONS GRANTED

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## VALUE OP PATEMTS

 And How to Obtain Them.Practical Hints to Inventors.

HeROBABLY no investment of a small sum money brilugs a greater return than the
xpense incurred in obtanining a patent even when the invention is buta amall one. Large well. The names of Blanchard, Morse, Bigeand others, who have amassed immense forAnd there are thousands of others who reallzed large sums from thetr patents. More than Fifty Thousand inventors have availed TWENTY-SIX years they have acted as solicitors and Publishers of the SCIENTIFIC AMRRICAN. They stand at the head in this class of business; and their large corps Patent Office: men capable of rendering the best service
to the inventor, from the experience practically obtalned while examiners in the Patent Office: enables MUNN IOWapre than any other rellabe ager.
HOW TO
ry letter, describing some invention which comes to this
office. A positive answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Pettion, Oath, and full Specification. Various
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