

## a WEEKLY JOURNAL 0F PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

## MODERN BRITISH LOCOMOTIVES.

Although railwar gages are no wider than they were, and consequently the space at the disposal of locomotive builders is limited, there is a continual progress being made in the efficiency of the locomotive engine. The machine itself is so complicated that the proper proportions of many of its parts are still matters of experiment; and many engines have been built especially to attain a maximum result, only to reveal on trial that the weight is improperly distributed on the wheels, or that the springs are ineffective on heavy grades or around sharp curves.
In England,the prograss of locomotive building is noticeable on several grounds. The Great Western Railway, Brunel's master piece, with its 7 foot gage, for many years has possessed engines which no narrow ( 4 feet $8 \frac{1}{2}$ inches) gage railway could hope to rival. In their boilers, nearly 2,000 . square feet of heating surface gave a tremendous steam-making capacity; and the admirable proportions of the whole engine, and the concentration of the heavier parts around and above the center of gravity, made them remarkable for steadiness, even at a speed of 60 miles an hour, the usual rate of travel on Great Western express trains, and their economy in fuel and repairs has yet to be surpassed But the numerous connections with narrow gage lines have at last made the broad gage a serious disadvantage to this line; and its conversion into one of the ordinary dimensions will before long be completed.
In the meantime, the narrow gage engine is being improved till it seems fairly in the way to become as big and as powerful as the width of the track will let it. The London and Brighton Railway, a line with a very heavy passenger traffic, has made much advance in this direction, under the guidance of Mr. W. Stroudley, the company's locomotive engineer, and we give herewith an engraving, showing in section his latest work; it is an engine named the Grosvenor, which possesses many points of interest, and which has already performed some notable feats.

The first thing in the representation of this engine that strikes the critical observer is the large heating surface. The firebox is of unusual dimensions, the outside shell being $72 \frac{1}{4}$ inches by 46 , and the inside 66 by $40 \frac{7}{8}$ by 71 . The diameter of the boileris 53 inches, and the tubes are 206 in number, and of $1 \frac{8}{4}$ inches outside diameter. The tubes are distributed nearly all over the cross section of the boiler, giving a high water level ; and dryness of steam is insured by use of a steam dome. The cylinders are inside, giving the engine
the additional steadiness imparted by concentrating the weight; their dimensions are 17 by 24 inches, and they are supplied by ample steam pipes, 3 inches in diameter. The slide valves travel 4 inches,and give $\frac{1}{8}$ inch lead with a maximum travel, the outside lap under the same circumstances being $\frac{7}{8}$ inch. The driving wheels are 6 feet 9 inches in diameter, and the leading and trailing wheels, 4 feet 6 inches. The two latter pairs of wheels have leaf springs, 3 feet 6 nches by 5 inches wide; while the driving wheels have volute springs,as shown, which are, perhaps, tiee one ieature in the design which is open to criticism. The weight on hese springs is no less than 14 tuns, and this pressure must tell on the springs, rendering them very liable to set under so heavy a lead; and the excellent devices for tightening them up can only defer the time when they will go to the scrap heap. The total weight of the engine is 33 tuns. The tender is of unusual dimensions, to allow of long runs without stopping for water; it will hold 2,520 gallons, and has a warming apparatus of 153 square feet of heating sur face, so that cold water need never be pumped into the boiler. The tender runs on 3 pairs of wheels, and weighs 15 tuns The te
6 cwt
It will

It will be predicted that this engine has a great power of making steam, and of keeping up the supply; and this surmise has been verified by feats actually performed. The Grosvenor recently took a special train from Portsmouth to London, 87 miles, in 1 hour 50 minutes, the average speed being 48 miles an hour. But a still greater proof of the staying power -to borrow a term from the race course-of the engine was run from London to Brighton, $50 \frac{1}{2}$ miles, in 1 hour $10 \mathrm{~min}-$ utes, with 22 railway carriages in the train. This last will be regarded as an extraordinary speed with such a load, especially when it is remembered that the railway is troubled with many long and heavy grades.
An invention of Mr. Stroudley's calls for special mention. It is a speed indicator,consisting of a fan with straight arms revolving in a brass casing and sending water up a copper pipe which terminates in a glass gage tube. The hignt at which the water stands shows the speed at which the en gine is traveling. It certainly is a convenient appliance, and is said to be exceedingly accurate.

The National Tube Works Company has just been award d a gold medal by the Mechanics' Institute Fair, San Fran isco, Cal., for the merits of their patent enamel water pipe Their address can be found in our advertising columns.

A Skillfully Executed Job.
A new and interesting experiment in house-moving was performed in this city, not long ago, at No. 116 West Twenty ourth street, in the presence of a number of prominen builders and inspectors. About a month ago the Society St Crescent de Paul determined to build on the vacant lots in rear of their Twenty-third street building. A survey of the and being made, it was discovered that the wall of the five tory brick livery stable adjoining occupied by S. C Mott, ncroached eighteen inches on their property. The owner was notified to remove the wall to the eastward, and Week and Brothers, builders, were authorized to tear it down and rebuild. Mr. Weeks did not like to pull down the wall, and hit upon a plan for moving it bodily.
Ten yellow pine timbers, 12 by 12 inches, planed on the upper surface, were let in horizontally under the wall, a equal distance, just above the foundation, and at right angles to its face. "Needles," builders call them. The upper sur face of each needle was profusely greased, and a smaller nee de, planed surface down, inserted along each larger one Spur braces fixed at the foot in these upper timbers held the wall plumb. The jack screws, working horizontally, wer set at the ends, on one side of the ten upper needles. This being done, an eighteen inch slit was taken off vertically from the stable building just inside the wall. At 7 o'clock in the morning, says the New York World, a man at each ack screw began to work it, and the wall moved an inch safely. "Go on!" said the boss, with some little excitement, nd this time one of the ten men did not work his rack as much as the rest. The overseers were a little nervous a his, but the wall carried the lazy needle along with the rest By 10 o'clock the 4,900 square feet of wall were pushed up tight against the open side of the stable, and the whole was perfectly plumb and unshaken. The men in the stable pursued heir usual avocations during this performance, which at racted a crowd of interested spectators.

According to Dr. Schuller of London, the bad effects of chloroform on the pia mater are neutralized by nitrate of a myl. This substance, it is stated, even in cases of complete anæsthesia, arrests suffocation, reëstablishes normal respira tion, and allows the pulse to regain its vigor. This, if de monstrated beyond doubt by further necessary investigations will be an important discovery, since it tends to neutralize the serious danger which now in many instances attends the use of chloroform.


# Erientific gmmerian. 

MUNN \& CO., Editors and Proprietore publibied weeili at<br>HO. BY PARK ROW. NEW YORK.

$\xlongequal[\text { o. D. MUNN. }]{\substack{\text { TERMS. } \\ \text { TE. BEACH. }}}$

## TERMS

One copy, one year, postage Included..
O ie copy, six months, postage included.
Clubrates.
Ten copies, one year, each \&2 70 , postage included.
Over ten copies, same rate each, postage inciuded. 16 By copies, same rate each, postage inciuded. the subseriber then receives the paper free of charge.
Norre.-Persons subscribng will please to give their full names, and Pos Office and Staten address, plainly written. and also state at which time they
wish their subscriptions to commence, otherwise the paper will be sent from Wish their subscriptions to commence, otherwise thie paper will be sent fron
the receipt of the order. When requested, the numbers can be supplie the receipt or the order. When requestea, the In cose of changing resi from January 1 st, when the eolume eommenced. In case or changsing res.
dence, state former adduress, as well as give the new one. No changes ca dence, state former adress. as well as give
be made uuless the former address is given
volume xxxili, No. 18. [New Series. 1 Thirtietl Year
NEW YORK, SATURDAY, OCTOBER 30, 1875


IS OUR TORPEDO SYSTEM USELESS
An editorial has recently appeared in the New York Sun, advocating the abolition of the engineer corps of the arm on the ground that that arm of the service is no longer use ful. Referring more particularly to the Government torpe do station at Willett's Point, on the Narrows of Long Island Sound, where a school of instruction in the manufacture and use of torpedoes for the army engineers has been for some time past established, the Sun considers that the same is of no vaiue to the country, mainly on account of the defects known to exist in fixed submarine torpedoes, which class of weapon the Sun seems to believe is the only one made the object of military study. Our contemporary fortifies its ar guments, which are directed against the entire torpedo sys em, by extracts from a report of Admiral Porter, in which that officer suggests several points in which he deems th ubmarine mine to be deficient.
It is well known, to all who have watched the remarkable progress which, during the last few years, has been made in orpedo science, that of all types the planted torpedo is probably the weakest. Unless a vessel comes within a destructive range, which experiment has proved to be quite contracted, no injury would result; and there are besides the other dis advantages of the concussion of one submarine mine blowing up the others, and of possible deterioration of the explosive material through long immersion. These facts are set forth by Admiral Porter, and are true enough; but on ther hand it should be remembered that in the colvese the exist now is the strongest possible reason why the engineers should continue the experiments already begun with that should continue the experiments already begun with that
object. Again, the Sun and the Admiral place much stress object. Again, the Sun and the Admiral place much stress
on tee failure of submarine torpedoes during the war. It on the failure of submarine torpedoes during the war. It
should be remembered, however, that such torpedoes (with should be remembered, however, that such torpedoes (with
the exception of a few attempts made by the Russians dur ing the Crimean war) were the first ever employed, and were of the crudest imaginable construction. Nitro-glyceri never entered into their composition, and seldom gun cotton and very frequently they were merely tin cans or kegs of powder rigged with a percussion fuse to blow up on impact with the vessel, or some equally imperfect arrangement, to
be fired by a friction tube attached to a cord from the land and which, if left under water for months, might easily be come harmless. They are certainly not to be compared for an instant with such submarine torpedoes as were used in the recent Oberon experiments in England, to explode which electrically worked devices were employed, which not only enabled the operator to blow up the sunken mine, but also exactly indicated when a vessel had arrived within the de structive area of the torpedo.
We think, therefore, that, even if the engineers devoted themselves to nothing but submarine mines, which is not the case, the continued existence of the corps would be an advan tage to the country. The fact is, however, that the engineers study not only the system of fixed but that of movable tor ve branch the Sun fails to consider To every one invento who is giving his attention to the fixed torpedo. a dozen ar devoting their energies to the movable types, and the movable torpedoes are those which will play the prominent part in future conflicts. We have already noted the remarkable success which has attended the experiments upon the Lay and Ericsson boats, which can be directed into the midst of an enemy's fleet when the latter is miles away from shore, and be made to blow up the strongest ressels without those on board having the slightest indication of their presence There are the spar torpedo launches, now built in England of steel, and capable of steaming at the rate of 18 knots per hour. Half a dozen of these swift craft, each provided with a heavy torpedo, could on a foggy night run in among a fleet of vessels, and each sink or shatter its victim before the be of little use against rapidly moving objects which could noiselessly steam inside of point blank range before fairly discovered by the lookouts.
Our readers are sufficiently posted in the progress made in torpedo science not to require any review of what has been accomplished at Newport, the work at which station is well supplemented by that at Willett's Point. Both schools have acquired a high reputation abroad, and the abolition of eithe would be, we think, a loss which the country can ill afford to incur.

## the colleges and the hard times

No one will deny that money is "tight" at the presen time. Nine men out of every ten we meet exclaim: " Oh I can't get any money." At this time it would be well to re
member the principle embraced in the famous reply of that member the principle embraced in the famous reply of that
sturdy old New Englander, who said that, among the rocks sturdy old New Englander, who said that, among the rock
where they could raise nothing else, they built schoolhouses to raise men. When you cannot find work for the hands set your brains at work. If you cannot labor, study. It the counting houses, the woolen mills, the machine shops, even the railways, will not open their doors to your sons, there are plenty of educational mills where they will be thrice welcome. Every trade seems overstocked with men just now; but he who lays a sound foundation at any techni cal or ssientific school during his enforced vacation will be the better prepared to profit by the revival of trade and manufacture when it does come, as come it must and will in due time. The machinist who has mastered the higher mathematics, or acquired skill and facility in the use of his pencil, is prepared to take a high rank as inventor, superin tendent, or proprietor, when time and practice shall have rendered him equally skillful in the use of tools and the working of metals.
We met a gentleman recently who had taken up the study of a foreign tongue in order the better to study his profes sion. To-day, he tells us, the knowledge of that language taken up only as a means, has become a source of profit a most equal to that which had been his main object of study Many are the cases we have met where some subject, pur ued at odd times as recreation, has become a source of honor, if not of glory. Dr. Priestly, the discoverer of oxygen gas, was a theologian, and chemistry was his pastime; bu hemists honor his memory and celebrate his achievements, while his name has long since passed from the notice of the heologians, or is mentioned only with disrespect nnd dis gust.
It is a gratifying fact to notice that the attendance at al our principal institutions of learning is larger this year than ever before; new colleges are being opened, old ones ar
 bright and encouraging

## the locomotive semi-centennial.

On the 27th of September, 1825, the first railroad for con veying passengers was opened in England between the town of Darlington and Stockton. The occasion brought togethe a throng of witnesses, some doubtful, more scornful, and all perhaps better prepared to scoff at the failure, which it was confidently predicted awaited the bold inventor in his darin attempt to make vehicles travel at the unprecedented rate o fifteen miles an hour, than to congratulate him upon the tri unph which upset their theories and left them questionin he reliability of their senses. It is suggestive to contras his unbelieving assemblage with the gigantic gathering which has enthusiastically celebrated the day which marks the lapse of the half century since that victory over preju dice and ignorance was gained. Sooty Darlington, oppor tunely washed by recent heavy rains, donned her gayest garb. Flags and banners flaunted from every building, tri umphal arches spanned the streets, processions paraded, the railway magnates and notabilities congregated at a great banquet: and a peer of the realm unveiled a statue of Josep

Pease, the philanthropist and capitalist, in whose open purse George Stephenson found the staunch material support which enabled him to prosecute his labors to their successful end. On the following day, the festivities were continued in djacent towns, and so, for forty-eight hours, the jubilee ex isted.
In Darlington, the locomotive which drew the first pas enger train was exhibited actually at work. It was propped up so as to be just clear of the rails; and being held in a stationary position, its wheels revolved at their utmost speed which would have carried the engine along at its old maxi mum rate of eight miles per hour. The weight of the ma chine is but six tuns, twenty-five tuns less than that of the magnificent engines which English workshops now produce he contrast between the two tof which next week, when we publish the engravings of both, our readers will have an opportunity to judge) is as proportionately great as that beween the knot of unbelievers of 1825 and the cheering rowds of the recent festival
Stephenson, it may be remembered, was born at Wylam on-Tyne, and it was there in 1813 that a locomotive called the "Puffing Billy" was built, under William Headley's pat ent, for Christopher Blackett, Esq., the then proprietor of the collieries. The mackine was used to drag coal long beore Stephenson constructed his railway engines. Probably was from this crude old apparatus (which, after working at Wylam continuously from the year above mentioned up to 1862, was removed to its present resting place in the Patent Office Museum in London) that Stephenson gained some of the ideas which he subsequently developed. Puffing Billy has, however, another and greater claim upon popular notice, one especially interesting in these later days, when railroad litigation has become so vast and extended that a new code of lawshas sprung up for itsgovernment, and that is that it was the subject of the first legal controversy engendered by the railway. The question of nuisance, on which the difficulty was based, became after wards the ground for many of the most absurd objections to Stephenson's pro osed use of the locomotive for passenger transportation. The smoke and dirt will annoy everybody on the line," "the noise of the machine will scare cows so badly that their lacteal functions will be arrested," "if cows get on the track, how will the engine get out of the way?" are specimens of this cavilling, familiar to every one who has perused Ste henson's eventful biography. The smoke nuisance seems to be the trouble in this earliest dispute, and the opinion of he counsel learned in the law, who was appealed to in the matter, we give below. It is a curious contribution to the history of the railroad, and we are indebted for it to a London correspondent, who copied it from the original manu script now hanging framed beside the old engine.

9th July, 1814.
ase respecting the use of a steam engine for conveying coal
fee for mr. williamson's opinion, 1 guinea.
Bainbridge
Mr. Blackett is Proprietor of a coal mine at Wylam in Northumerland and for the purpose of sending his coal to Lemingtoa he ook Wayleaves on various Estates between there and Wylam, es pecially over the estates of $A$, for a term of years not yet expired nd Passage to and for Mr . Blate and convenient Wayleavie sitrartor and assigns and his and their Agents Servants and Workmen from time to time and $\mathrm{a}^{4}$ all times during the continuance of said demise to take leave and carry away with horses carts waggons or an ther carriages whatever all and every or any of the coals to b won, wrought and gotten forth and out of the said colliery and
coal mines in through over and along the lands and closes of A according to the line of way therein described under the yearly certain and contingent rents therein mentioned.
When the Wayleave was granted Mr. Blackett led his coal by the ordinary coal waggons drawn by horses; but his agent has recently discovered an Invention to them by a Steam Engine instead of orses and for that purpose he obtanaed his Majesty's Letters Pa tually at work. In the operation a little nuise and Smoke is ac ainly made, which A. considers a nuisance and has requested 4 . Blackett to suspend the use of it. Mr. Blackett is extremely an ous of being on good terms with his Landlord and is inclined to yield to his wishes so far he consistently can, but in the first place
he isdesirous of having the Question of right and wrong established he is desirous
The Patent in
hing the Patentestion is granted for the express purpose of ena ine instead of Horses, and it is rather improbable that Govern ment would License a thing the use whereof could be deemed a nuisance; and in a Mining Country like this Every Encouragemen hould be given to the Ingenuity of Mankind in all things that tend o decrease the Expence of Labor.
In consequence of the Waggon way being made, the county roa ron way and it is alleged that the Steam and Smoke will frighte the Horses passing and repassing and render traveling unsafe. However in many places the road has been removed to the Waggo way, and not the Waggon way to the road
You will be so good as peruse the case and give your opinion on Whether under all
Whether under all the cireumstances stated in the case Mr. Black coal Waggon by means of a Steam Engine which is placed upon Frame resembling that of a Coal Waggon over the lands of $A$ Whether the use and exercise of the Steam Engine upon Waggon way and for the purpose above suggested can under al It does not ances of the case be deemed a nuisance.
It does not appear to me that there is any objection arising from means of this Steam Engine. But I think that coal waggons by Engine may be deemed a nuisance to A. if the smoke and noise oc casioned thereby render his habitation unhealthy or uncomfortable But this must entirely depend upon the quantity of smoke and noise so occasioned, and the distance of the house of A. from the Waggon Way Rt. Hopper Williamson. If the noise of the engine disturbs the cattle grazing on the land ajacent to the Waggon Way so as to injure them with regard to
their feeding, I think it may be considered a nuisance. RT. H. W.

## PROGRESS OF AMERICAN TELEGRAPHY.

According to the recent annual report of the Western Union Telegraph Company, this great corporation has now in operation 72,883 miles of telegraph line, 179,294 miles of operating lines, and 6,565 offices. Its receipts for the past year were nine and a half millions of dollars, expenses six ond a half millions, nearly-net profits over three millions Over seventeen millions of messages were transmitted, the cost of which to the company was 37 cents per message. This is rather cold comfort for new companies that would like to compete with the Western Union by a reduction of
the rates. Rather dismal, also, for the advocates of government telegraphy, who propose a uniform charge of 25 cents for each message, being the rate now in vogue in England, where the telegraphs are worked by the government at a great annual loss.

Our British cousins are a little apt to think that what they don't know about telegraphy isn't worth knowing. But the truth is they have not as yet learned the A B C of rapidity in the business. In this respect the American telegraph engineers are in advance of other nations; nor in this very surprising, since both the teiegraph works and telegraph experiences of individual nations are diminutive when compared with those of the United States. For example, the length of all the telegraph lines in the United Kingdom
is only 23,878 miles, while, as shown above, a single comis only 23,878 miles, while, as shown above, a single com-
pany in this country is now working more than three times pany in this

Another reason for the advanced situation of telegraphy in this country is the fact that there are thousands of tele graph operators and electricians here who, under the stimulus of our patent system, are constantly studying how they may improve instruments or make discoveries by which the operation of the line and adjuncts can be improved, quickened, or made more economical. Their success is as tonishing, and in one branch is illustrated by the report of the Western Union Company, which shows that, by the employment of the new duplex and quadruplex instruments, they have greatly reduced the expense of transmission, besides increasing the capacity of the lines..
If our telegraphs were in the hands of government officials there would be less striving or competition for excellence, and little encouragement, we fear, would be offered for the discovery of new improvements.
The recent invention of Elisha Gray, heretofore described by us, by which sixteen or more messages may be transmitted each way, at one time, over one wire, promises wonderful re sults in the future. It indicates that thetime is coming when household and private telegraphic lines will become as common as the existing method. It is one of the peculiarities of Mr. Gray's remarkable method that, while sixteen differen persons may use the wire, none of their messages need interfere with or become known to any of the other users, save th sender and his designated correspondent.
A new organization entitled the National Telegraph Company, with a capital of $\$ 25,000,000$, has been organized in California, and it is to be hoped that it will meet with success. But this it can only hope to achieve by improving the existing service. If it can send messages as promptly, at no greater prime cost than that now paid by the present companies, it may secure a share of the business. But this wil be up-hill work in the face of the admirable management of companies like the Western Union, which are constantly striving to improve every branch of their service, and quick to adopt every practical improvement that inventors pre sent.

## FOREIGN PATENTS-REDUCTION OF COSTS.

We would direct special attention to the announcement published in another column by Messrs. Munn \& Co., of an important reduction in the costs of foreign patents.
Throughout all Europe there is a large and increasing demand for American inventions, and those of our ingenious countrymen who neglect to secure foreign patents, if their improvements are good, simply throw away golden oppor tunities.
Many millions of dollars are already invested in Europe in the manufacture of American inventions, introduced there by enterprising adventurers, who are always on the alert to pick up and patent abroad, for their own benefit, all new American devices of any account, the foreign patents for which have been neglected by the original authors in this country.
American patentees have it entirely within their power to put a stop to this species of piracy. They can always, if they desire, file in their applications for foreign patents in advance of others, because the invention remains unknown abroad until the patent issues here.
Indeed, one of the provisions of the American law is intended for the special convenience of our inventors in securing their foreign patents. After the official examinations have been made here and the patent allowed, the inventor then possesses good prima facie evidence that his improvement is equally good and patentable in all other countries; and after such allowance, the patent need not be issued under six months, if the patentee so elects, or for sueh less period as he wishes, thus giving him abundant time to take as many patents in foreign countries as he desires.
Our patentees are not sufficiently alive to the importance and value of this excellent provision of law. It should be their aim, in all cases where the invention is of probable value, to secure European patents promp
Where the original author is unable to
Wher the
Where the original author is unable to meet the necessary expenses, he can generally, by a little perseverance, find
partners to assist him: one of whom. for example, would pay
for the English patent, and share in its proceeds; another for the French patent, and so on
The facilities of business, steam, postal, and telegraphic connections between this country and Europe are now so great that patents may be taken and handled in the chief European States with almost as much ease and promptitude as in this country; and, we repeat, it is a folly for our pat entees to overlook the matter.

## THE KEELY MOTOR DECEPTION.

By a special invitation of the managers of the Keely motor Vice Admiral Wellesley, of the great ironclad Bellerophon, and a party of his associate officers and friends, were lately admitted to a private exhibition of this rara avis. The ad miral was attended by several of the original promoters of the scheme, among whom, according to the Philadelphia Times, were Professor B. Howard Rand-who, it will be re membered, certified in effect that, while he did not know ac tually anything about the wonderful gas, he did know that its nature and generation were totally unknown to Scienceby W. H. Rutherford, Chief Engineer U. S. Navy, by the earned counsel of the company, who so adroitly managed o get a hundred thousand dollars in cash out of the New York capitalists, by Keely himself, and several of his best elpers.
Keely went through the juggle in the usual manner. The boiler was suspended by chains from a beam overhead, to satisfy the visitors that there was " no humbug." Water was then run through the boiler, which visitors were alowed smell and taste, indicating no chemicals present. Keely hen blew his breath into her as usual, turned the cocks, and ! the gage indicated 1,750 lbs. pressure per square inch This was allowed to escape for half an hour, more or less, through a pipe having the bore of about the size of a horse hair, during which time the gage went down to 500 lbs . One of the British officers suggested that this didn't look like a constant force, or capability of doing actual work. To which Keely made the old reply, originally given three years ago and repeated at every performance, to the effect that the new machine was not quite done, would be ready in abou gained by the British officers, if we may judge from thei reported expressions made after the exhibition, was that they saw the gage go up; but how it was done they were not hown, nor was anything of a practically useful nature de veloped in their presence

## THE FAIR OF THE AMERICAN INSTITUTE.

That telegraph wires in cities will eventually have to be aid underground is a fact which is beginning to force itself pon the popular mind. It is only necessary to recall the wholesale destruction of the aerial wires by the accumulated ce during last winter, and the danger in which the city was placed for the time owing to the consequent rupture of th re alarm system, to perceive the importance of the change, without considering other reasons which militate in its favor.
Inventors consequently are turning their attention to the deInventors consequently are turning their attention to the de-
vising of means for enclosing the subterranean lines, and vising of means for enclosing the subterranean lines, and
ne new mode of so doing we find among the exhibits at th fair. Copper wires are drawn through glass tubes of a some what larger diameter. These tubes are in turn enclosed in ron pipe and held firmly therein by paraffin, whichis poured in in a melted state. For lateral connections, as well as for convenience in laying, traps are used, into which the pipe is screwed, the wires passing over non-conducting bridges, so that any wire may be taken out and replaced without in erfering with the working of the others. The pipes ar made in suitable lengths and are connected by couplings, the
joints being faced with paraffin. The inventor states that he device has been tested over considerable distances wit success.

## THE AQUOMETER

is a new steam pump now in operation in the machinery de partment. It bears a strong resemblance both in shape and n construction to the similar apparatus known as the pulso interposed pressure chambing chambers combin chan the other according to the position of a steam valve, and presses upon the surface of water in the chamber, forcing the same out. As soon as the live steam reaches the dis charge port, its free escape produces a reduction of pressur in the working chamber. The discharge valve then closes he steam valve cuts off further entrance of steam, and the body of water in the central pressure chamber opens the suc tion valve and causes an instantaneous condensation of the entire volume of steam within the working chamber, so as o produce a vacuum therein, which causes said chamber to fill with water. The suction valve then ceases, and the momentum acquired by the water flowing up the suction pipe perates to fill the pressure chamber. As the one chamber is thus filling, the steam current operates to force the water out of the opposite chamber, so that a constant flow is produced in the discharge pipe. The steam valve is balanced in its chest, and means are provided to prevent injury by he entrance of grit or dirt
Any farmer who possesses a manure heap, according to he inventor of
a new incubator
on exhibition, is provided with the essential means of artificially hatching chickens. The idea is to utilize the natural heat of the manure, to produce and maintain the requisite which is quite simple, consists of a casks. The apparatus, which is quite simple, consists of a cask or cylinder of wood near the bottom of which is a door for convenient access to
the interior. On the bottom is placed a sieve for the recep-
tion of the eggs. In the head is made a kind of chimney covered with an adjustable sliding piece. A bed of horse manure about a foot thick is prepared, and on this the cask is stood. Then manure is heaped about the sides of the lat ter, flush with the top. A thermometer is placed upon the sieve; and when this shows the interior heat to have reached $104^{\circ}$, the eggs are inserted. Nothing further remains to be done, but to watch the thermometer during the usual hatch ing period. If the heat exceeds $104^{\circ}$, some of the manure is removed and a portion of the circumference of the cask left exposed; if the mercury falls below the above point, manure fresh from the stable is substituted for the older ma terial. When the chickens appear, the interior of the cask is cleaned, and an artificial mother, composed of a disk cov ered on its under side with buffalo hair, is inserted and ad justed to a proper hight from the bottom, by means of a threaded rod passing through a nut in the cover of the cask The manure is still left around the latter, the heat being ne essary for the young chickens until they have grown suffi ciently to warrant their removal. The chimney on top serves for ventilating purposes. The inventor says that any num ber of eggs that can be conveniently disposed on two sieves if need be, can be thus hatched.
The manufacture of
american cordials
is interesting as the starting pointing of a possible new in ustry. The visitor will find in a small room adjacent to the main hall a large variety of these liqueurs, and will also have an opportunity of witnessing the preliminary operation of their distillation. It is proposed, of course, to compete with the maraschinos, chartreuses, and other cordials of for eign make ; and to this end the manufacturers confine them selves, as far as possible, to herbs and other ingredients of American production. The distilling apparatus now in ope ration is worked by steam. The ingredients, moistened, are placed in a vessel which is contained in a larger receptacle placed in a vessel which is contained in a larger receptacle,
into which the steam enters. The effect of the heat of the into which the steam enters. The effect of the heat of the
latter is to vaporize the materials, the vapor first passing to latter is to vaporize the materials, the vapor first passing to
a drum above and thence through a high arched pipe to cooler, which is simply a receptacle enclosed in a cold wate bath. The high pipe prevents the passing over of the heavy oils, so that only the fine aromatic essence is condensed, and afterward, in liquid form, drawn off from the cooler. Sub sequent distillation is carried on with California brandy or native wine, which supplies the spirituous principle; and he result is a cordial of fine tlavor, in many respects equa to that of foreign production.

Mr. L. W. Pond.
The death of Mr. L. W. Pond, the well known machine ool manufacturer of Worcester, Mass., recently occurred in a very sad and unlooked-for manner. He took passage in the night steamer Providence from this city for Boston. The weather was quite stormy, and the vessel had considerabl motion, owing to the rough sea. When last seen Mr. Pond had quitted his state room, partially undressed, and probably was suffering from the effects of the rolling of the boat His apartment in the morning was found empty with the exception of a few articles of clothing, and no traces of its occupant could elsewhere be discovered. From the fact of Mr. Pond being known to have a considerable sum of money bout him, together with the circumstance of his having oc cupied a state room in a very quiet and retired portion of the vessel, a suspicion of foul play was engendered; but this has since given way to the more probable assumption that the unfortunate gentleman, while near the side of the boat, lost is balance, and was thrown over the rail by a heavy lurch The terrible death which he thus met, while it will awaken deep feeling of sympathy among all, cannot add to the sor row with which those who knew Mr. Pond will regard his loss. He was one of those persevering, enterprising men such as are naturally fitted to be leaders in great industries, and such as the country can least afford to part with, an in ventor and a patentee of celebrity and of marked genius and ability, and beyond all he possessed a personal character untinged, through a busy life, with the faintest shadow of reproach.

## Rise and Progress of Trademarks

Examples of the practice of using marks to show the workmanship of various manufactures have been discovered at Herculaneum, such signs having been in vogue among bakers and others. In modern times similar tokens have been adopted in textile and various other fabrics, though the earliest estant are those of paper. After the invention of paper (15th century) from pulp of linen rags, water marks were introduced into the fabric, doubtless to show the manufactory from which the paper was issued. The process has since become general, and the trademark a recognized part of the system of commerce, by which a guarantee is given to me purchaser and a legitimate protection afforded to the
manufacturer. The legislation of 1862 is a step in the right manufacturer. The legislation of 1862 is a step in the right
direction, and has already done service to trade and morality. It is upon the uniform good quality of manufactured commodities that any foreign trade depends for its continuance, and the obligation of the legislature to secure the purchasing public from fraud, whether the purchaser be a home or foreign consumer, is more and more stringent when the goodness or badness of the object cannot be readily detected by ocular inspection. It is in such cases that the use of trademarks is most useful."
The above, from so good authority as the London Station$e r$, applies with equal force to our manufacturers. There are some things in which the slow Britishers excel the more rapid Yankee. In the matter of securing trademark protection on their products, and the extent of advertising their goods, they are far ahead of our people.-Eds.

## IMPROVED TEA KETTLE

This is an age of utilizations. It is a province of invention to prevent waste-to economize everywhere-facts well exemplified in the device illustrated herewith, the object of which is to usefully employ the steam which issues from the tea kettle, and thus to enhance the value of that indispensable vessel. Incidentally the invention serves to prevent water boiling over upon the stove, and also offers a conven ient funnel for filling the kettle.
About the main portion of the kettle and about the handle there is nothing peculiar, save that the latter is provided

with a metal guard, A, to protect the hand from the steam. The opening of the vessel, however, has a funnel-shaped rim, B, the space inside which may be utilized for steaming, cooking, or warming various articles placed therein, and en closed by the cover, C. The top aperture of the kettle is closed by an interior perforated cover, which has a centrally applied slide piece, D, and button, so that the opening for the escape of the steam into the upper chamber can be increased or diminished at will.
creased or diminished at will. February 16, 1875. For further information, address the inventor, Mrs. Harriet Gray, lock drawer 5, Marquette, Mich.

## COMBINED SCISSORS AND RIPPING KNIFE.

Combination implements are coming more and more into use. Every day brings us new forms of instruments, more or less complicated, designed to reduce the number of tools which an ope rative must have at hand by placing several tools in one handle. Many of these devices show considerable invention, and save expense in first cost, as well as time and trouble in manipulation.
Mr. C. M. Johnson, of New York city, is the inventor of an ingenious arrangement of a knife blade with a pair of scissors, the object of the knife being to cut or rip seams or perform other operations incidental to the seamstress' labor. One blade of the scissors is made a little thicker than usual and a longitudinal slot is cut in it, in which the square part of the knife is received. The latter can be pushed out or in, as desired, and is secured in any position by an ordinary clamp screw.
The annexed engraving shows the device very clearly.

## RECENT HOSPITAL CONSTRUCTION

There has recently been erected in London a hospital for There has recently been erected in London a hospital for
children, in the construction of which there are many novel children, in the construction of which there are many novel
and important features. The building is from a design by Mr. Edward M. Barry, R. A., and it consists of a center block and lateral wings, the former containing the hall, main staircase, chapel, operating theater, and administrative offices, the wings containing the wards, which run longitudi nally, being lighted on boih sides. The hospital isintended to accommodate 200 in patients, and a dispensary, for the relief of out patients, is located in the basement. The chapel is small, being about 26 feet square; but the Building Neros states that so unique and costly a gem of art, for its size, has seldom been seen. It is the gift of an anonymous donor, and no expense has been spared on its decoration. The richest and no expense has been spared on its decoration. The richest marbles and alabaster are used in its walls, and the pave-
ment is mosaic.
The wards are about 80 feet long by 23 feet wide, and 13 feet high, and each contains 18 beds; thus each patient has feet high, and each contains 18 beds; thus each patient has
about 1,200 cubic feet space. Five such wards are provided,
besides separate apartments for infectious and surgical cases At the end of each ward are bath rooms and closets, each bath being provided with flexible tubes for filling portable baths for the small children; and each closet is flushed every time a child pushes the door. Slate and glass are used for utensils and for shelving, for cleanliness' sake, and the walls are made double to secure warmth and dryness, the inner surface being of glazed brick, which is easily washed, and is so completely non-absorbent that it gives no foothold for the spread of infection. The floors are of teak, so perfectly laid that they are waterproof ; and they are polished so that imply sweeping them insures cleanliness.
The exterior of the building, as shown in our engraving, is of the modern classic order. The ornamental piers, which are striking ornaments, contain the smoke and air flues, while the shafts for admitting the pure air and extracting the foul are in the pyramidal roofs of the end towers. Colored brick and tile are freely used in the work, and serve to show how highly ornamental a structure can be, by the hands of a real artist, constructed of brick.

IMPROVED FRICTION CLUTCH PULLEY.
This engraving represents Bean's patent friction clutch pulley applied to a countershaft, such as is used over engine lathes and other machinery requiring quick and positive change of motion. This countershaft has innumerable

advantages. It runs without noise, and it is strong and du rable. It is not complicated in its construction, and is consequently always in working order, the few wearing surfaces being so arranged that they can be very easily and quickly adjusted.
For use on heavy machinery where it is necessary to start and stop gradually, to prevent strain or breakage, and upon line shafting where it is desirable to stop a part or the whole without slackening the speed of the engine, the application of this friction clutch pulley is guaranteed by the manufacturer to give full satisfaction.
One of these countershafts can be seen in operation at the Fair of the American Institute. For circulars and particu lars apply to D. Frisbie \& Co., New Haven, Conn.


## THE NEW GIFFARD RAILWAY CARRIAGES

 blocks may be placed on it when it is in position in the mold. chanical skill: "Of course I suppose him to have odd pieces We recently gave an engraving of the new railway car- These slide down the beveled faces of the post, into the of sheet brass of different thicknesses, brass tubing, screws, riage, constructed after the designs of M. H. Giffard, a French corners of the mold, and close up the spaces through which wood, etc., as, if he has to resort to the shop for everything engineer, and so built to be free from the oscillating or similar motions common to railway vehicles. While this device excellently answered the objects of its inventor in the respect mentioned, the systems of springs adopted added ver: materially to the weight of the carriage, thus increasing the labor and expense involved in its traction. To meet this difficulty M. Giffard has devised a new vehicle, which is represented in the annexed illustration, extracted from La Nature. The body is entirely separate from the trunk. The springs are of the ordinary leaf pattern. The novel feature consists in the la por ture consists in the of is dusp from the springs, which is done lower ends of the curved iron rods, four of which are fastened on each side of the vehicle, by means of universal joints, to the lower extremities of arms suspended from the ends of the springs. The weight of the carriage is reduced to about one tenth in excess of that of the ordinary car, while all the advantages of immobility and easy riding, described fully in our previous ariicle, are retained.

## GIFFARD'S RAILWAY CARRIAGE.

loam might squeeze down. The only openings still left are those at $a, a, a, a$, Fig. 7, between the blocks; and in arranging the molds for casting ingots, such as those for tires, in which a perfectly smooth top is required, these are closed by laying over them small loose pieces of sheet iron, before dropping the stopper in. Tire ingots may be cast either in the form of solid cheeses, the more usual plan, or with a core, in order to save punching. Stoppers for both these plans of casting are shown in Figs. 2, 3.
The molds when arranged on the base plate are filled through a central runner, with a branch leading into each mold. The central runner is made in two parts, bolted together, or clamped, as shown in the illustration, by rings driven over them ; or by rings put on loosely, and tightened up by wedges, in the same way in which the halves of ordin-

## NEW METHOD OF CASTING STEEL INGOTS

The advantages of casting steel ingots in groups, from below, that is, filling a number of molds at the same time, from one runner, are soobviousand so great that many plans for casting in this way have been brought forward from time to time. The chief practical difficulty in casting in groups has been to find some entirely satisfactory mode of stoppering the ingots, when the molds have been filled to the required hight.
Durfee patented, some years ago, making molds for groupcasting closed at the top, with the exception of a small vent hole: a plan that gives a very sound, clean ingot, but necessitates a different mold for each different weight to be cast, and renders it difficult to get out an ingot that may stick in the mold. Ireland uses a plain heavy casting stopper, dropped on the metal after the mold is filled, such as is used in casting ingots of tool steel from crucibles; a stopper of this kind, however, can only be used in parallel molds, made in two parts, bolted or cottered together; and in these parallel molds, even when planed all over, inside and at the joint, the ingots are apt to stick, and the molds, after having been in use for a short time, open at the joints, causing fins on the ingots. Mr. A. L. Holley has patented several modes of stoppering molds, to be filled also from below, but they have not come into general use.
In the plan of stoppering herewith illustrated, the stopper used is a cast iron block, about 2 inches thick, grooved round the edge, as shown in the accompanying sections, and of such a size as just to drop freely into the top of the mold. A small vent hole, about $\frac{3}{16}$ inches in diameter, is drilled through it, and is slightly conical, that the metal may not stick in it. The stopper is fixed in the mold by two cast iron wedges, as shown more clearly in the enlarged plan and section, Figs. 10, 11. To set the stopper in the mold, the latter is dropped over a post of such a hight that, when the stopper is placed in the mold, and on the top of the post, it is exactly at the hight required. A small shovelful of loam, uch as is used in lining steel ladles, is then thrown in and rammed into the joints by a rammer 2 inches or 3 inches broad, and about inch thick; the wedges are driven in, to broad, and about $\frac{1}{2}$ inch thick; the wedges are driven in, to
fix the stopper in its place, and the mold is then ready for fix the stopper in its place, and the mold is then ready for casting. The loam or mixed clay and sand used should be only slightly damped, so that it will just cohere when pressed
together in the hand. The post is adjusted to the required together in the hand. The post
hight by putting packing blocks or rings at its foot, to raise the mold, or by packing under its head, which for that purpose may be made loose and fixed by a set screw in the side. In order to prevent the squeezing down of a fin of loam between the post and the inside of the mold, if the loam is rammed in too hard, or if the rammer is thin the head of the post should be a pretty close fit in the mold at the hight at which the stopper is fixed. For this purpose, several he ds this purpose, several he ds
should be provided, to fit different molds, or different hights in the same tapered mold; or the top of the post may be made beveled, as shown, Fig. 6 , and four small adjustable

ry molds for casting steel tool ingots are put together. 'Jhe funnel-shaped top of the runner is in a separate piece, put
in after the lining is completer. The runners are dried by in after the lining is completer. The runners are dried by by a fire, or by a gas flame; and in order that the lining may dry readily, they should be perforated all over with $\frac{1}{2}$ inch holes, placed pretty closely together. Where there is plenty of crane power, to handle the runners, they are most conveniently made of cast iron, but where they have to be carried by hand, they may be of light wrought iron. Both these forms of runners are shown in Figs. 1 and 2.

A HOME-MADE COMPOUND MICROSCOPE.
A correspondent of the English Mechanic sends the following description of a microscope stand, which may be manu-
factured at a trifling expense by any one having a little meimes a steel pinion can be had with axle already fixed (baving formed in this shape a portion of a clock), when none of this work is of course required. Now comes the most difficult part of the job, to file teeth in the rack to fit the pinion, which must be done very exactly, or it had better be left undone and a sliding adjustment used. My rod was of lead, in which the teeth are more easily cut, and although it has been in constant use for two years it is still in good working order; but of course brass is preferable and would repay the extra trouble. In the larger piece of wood, at a distance of $3 \frac{1}{2}$ or 4 inches from the end toward the stage, the groove must be deepened for a short distance to allow room for the pinion, and in the best position, to be ascertained by careful pinion, and in the best position, to be ascertained by careful
measurement, a round hole ${ }^{\text {( }}$ (he size of pinion, on the measurement, a round hole (the size of pinion, on the
opposite side, and concentric with the other hole) the size of opposite side, and concentric with the other hole) the size of
the axle; or it may be made larger, and a metal bearing put larger, and a metal bearing put
in on both sides instead of one. in on both sides instead of one.
You will now have your pinion in the center of the groove, and an inch of axle projecting on either side, on which to fix the knobs or milled heads with which to turn it; but before putting these on, two pieces of brass (Fig. 2) must be cut out, and about $\frac{1}{16}$ of an inch of the upper edge turned at right an gles, and a slit made in the slid ing top in which this will work, for which purpose the bent edge should be about $\frac{1}{16}$ of an inch above the upper face of the board on which it is fixed, and care must be taken that it is perfectly parallel. The engraving will show the method of fix ing. Now put on a pair of milled heads,or any knobs which
will enable the pinion to be worked evenly, slide the top in its position, and if everything has been done correctly you will have a rack adjustment which will work as truly as in many of the cheap brass microscopes, in fact better than some. Be careful, in screwing on the brass plates, that the screws do not project into and spoil the groove. The best plan for getting the sliding piece to work smoothly on the other is to work them backwards and forwards on each other, and on no account must the faces in contact be either stained or polished, except naturally, although the exposed portions will be much improved in appearance if stained and polished. As regards wood, any that will not split easily and will take a good smooth surface will do. Now fasten the piece of wood with the pinion on the opposite side to the groove, to the flat face of the curved piece of wood (Fig. 1, A), leaving one inch projecting toward the stage (which is to be fixed at $B$ ), and the end to which the pinion is nearest is to be placed uppermost. The tube, which may be of brass, zinc, or even brown paper, according to what is most convenient or procurable, is the next thing to be made, and it should be rather greater in diameter than the amplifying lens if the eyepiece is not constructed, and, if so, of a size that the eyepiece can slide closely into. It may be fastened to the sliding piece
by means of strips of brass going round it and screwed into middle of the sliding piece (in the groove), one side of the middle of the sliding piece (in the groove), one side of the
tube, and fastening into two small bits of wood inside; or tube, and fastening into two small bits of wood inside; or the heads may be inside the tube, and small nuts used to tighten it. The tube, which should be 8 or 10 inches in
length, should reach, when the two sliding pieces coincide, length, should reach, when the two sliding pieces coincide,
to within $\frac{1}{2}$ inch of the opposite side of the curved piece of to within $\frac{1}{2}$ inch of the opposite side of the curved piece of
wood. The stage, which should be a piece of wood $2 \frac{1}{2} \times 3 \frac{1}{2}$ wood. The stage, which should be a piece of wood $2 \frac{1}{2} \times 3 \frac{1}{2}$
$x \frac{1}{4}$ of an inch thick, should be let in by one of the shortest sides into the slit, C (Fig. 1), and screwed firmly in that position. Exactly opposite the center of the tube make a dot; and with this as a canter and a $1 \frac{1}{4}$ inch center bit, cut a hole, into which fit a brass tube 1 inch in length, to fit the apparatus into. Two springs of sheet brass, cupped so as to allow a slide to be slipped in and pressed just sufficiently to hold it in any position, should be fixed at the sides of the stage; or a sliding ledge, on which the slide may rest, may be used instead. Under the stage, in the position indicated in Fig. 3, which represents the completed instrument, a strip of wood, $\frac{1}{3}$ of an inch square and of such a length that when the microscope is placed upright it may touch the base, must be mortised in, on which to fix the mirror, the manner of doing which is shown in Fig. 3, the crank and U-shaped piece being strips of brass screwed so as to be capable of being turned in any direction. The mirror may be either a plain one with two pivots, or, what is better, one of the sixpenny reading glasses, which should be unscrewed out of its handle, the slit soldered to act as one pivot and a piece of wire soldered on the opposite side for the other. Now get two pieces of thin looking glass, and get a glazier to cut them to fit the brass rim of the lens, cement them back to back, and fix them in the rim of the lens, when you wil have one side plain and the other equivalent to a concave
mirror. You have now only to construct your eyepiece and mirror. You have now only to construct your eyepiece and
objective to have the microscope complete. For the eyepiece, procure a plano-convex lens 2 inches focal distance, and an other 1 inch; fix them in a brass tube $1 \frac{1}{2}$ inches apart-con vex sides of both toward objective-and in the focus of the eye lens fix a diaphragm, with a circular aperture about $\frac{8}{8}$ of an inch in diameter; and a brass plate with a small hole should be placed between the eye and the eye lens (Fig. 4). The objective, which may consist of a double or plano-conve lens, should have an aperture of about $\frac{1}{8}$ of an inch for a inch power, and smaller for higher powers; it must then be fixed at the other end of the tube, and be sure that it is ex actly centered, and its axis coincident with that of the tube If you have carefully followed these directions you will hav
a really useful microscope, which will afford you hours of instruction and enjoyment.'

## Lowe's New Process for Gas

Mr. G. L. Dwight, of Mont Clair, N. J., sends the follow ing description of th se in Utica, N. Y.
In general terms, the product is the result of a decompo sition, by heat, of water and crude petroleum, but it is as different, in its character and quality, as the method by which it is produced differs from all others
The system of retorts or equivalent vessels, heated exter nally, has been in all other methods in some degree adhered to. In this, however, it has been entirely abandoned, and the materials for decomposition are introduced directly into the fire itself, by which means there is secured the greatest possible economy of heat; while certain constituents, ordinarily wasted, are utilized as fuel, some being burned, which in other processes are carried forward with no advantage to the product. However trivial this difference of principle may appear, it is proven to be radical by the accomplishment of important differences in result. No other residuum than pure ashes is drawn from the generator. This generator is substantially a small cupola furnace of about $3 \frac{1}{2}$ feet inter nal diameter, built of firebrick, with air space between
double walls, which is charged with anthracite to a depth of double walls, which is charged with anthracite to a depth of $3 \frac{1}{2}$ feet and driven to the proper heat by a blower. The draft is carried into the base of, and upwards through, a sec ond cylindrical chamber, much like the first, but higher and filled with firebrick laid up with interstices, through which the gases of combustion are carried and ignited, evolving a high temperature. When suitable heat is attained (a dul cherry red in the generator, and a white in the superheater as the second chamber is termed) the base is closed agains
atmospheric air, the valve passage to smoke stack shut, and dry steam is admitted directly into the incandescent coal, little above the grate bars, while crude petroleum is droppe from above upon the same. The gases therefore are gener ated in the same vessel at the same moment, and pass to gether into the secondary chamber
It will be remarked that the mass of coal is gradually being cooled by the passage through it of the steam; but as the gases escape from the furnace very hot, they do not greatly diminish the heat of the second chamber, which, by its uniformity and hight of temperature, equalizes and thor oughly fixes the product. Thence it passes, through the washing and condensing apparatus, onward through the lime boxes to the holder.
In practice at Utica, which is the largest place yet lighted by this system, two generators are employed (though four were set up), being used alternately. No. 1 is heated while No. 2 is making gas, and so on, so that continuity of pro duction is ensured. One generator is used for 30 minutes, and then another, this length of time being, on the whole, the most economical, as the fire is not, during that period, so far checked as to involve delay in re-firing. The mass is then stirred slightly with an iron rod, a small quantity of coal added, and the blast re-applied. Each run gives an average of 3,000 cubic feet. The management of the appa ratus is stated to be exceedirgly simple, requiring no skilled labor beyond a little experience in judging of heat and in the gaging of the oil flow. In the Utica works, two men by day and night, at laborers' wages, make all the gas required by that city, the coal system having been for some months entirely superseded. Continuous daily operation there has clearly demonstrated that 60 lbs. anthracite, costing $\$ 6$ per tun, and 3 gallons petroleum costing 6 cents per gallon, yield 1,000 cubic feet of gas, which,with the labor and time added, makes a cost, in the holder, not exceeding 50 cents per 1,000 cubic feet, for gas of a quality not less than 20 candles. No difficulty is found in maintaining a uniform standard, and noindication of stratification or of deposition in the pipes is met with. The flame is remarkably white and intense and its combustion perfect. Extreme experimental tests, or (better still) the practical experience of the past winter, a Phonixville, Pa., where the thermometer sank to $17^{\circ}$ below zero, have shown conclusively that this product is less sensi ive than coal gas. Mr. Dwight considers himself justified, by the facts, in claiming for the Lowe process the following vantes over all others

1. Great simplicity of apparatus, and consequent low first .
Solidity of mechanical construction, whereby the mini um of wear and tear is secured.
2. Ease of management, which largely reduces the labor 4. The comparative cheapness of materials employed, and heir thorough utilization.
3. The high quality of the product, and, for the above stated reasons, its very low cost.

## Vertical Motion of Vessels

Mr. Thorneycroft, the well known builder of fast steam aunches, proves that at high rates of speed the body of a ves sel actually rises above its ordinary load water line, and, a the speed increases, continues to rise still higher. The experi nents from which these results were deduced were conduct ed with the steel torpedo launch lately built for the Austrian government, with which a speed of $19 \cdot 4$ knots was attained The differences of level were ds,termined by means of three ront bobs hanging from a bowsprit at various distances in water surface was measured, and some exceedingly instruc tive diagrams made therefrom. From these it appeared that up to a speed of about twelve knots, the vessel sank mor deeply in the water; but on being driven to a higher speed he seemed to make an almost sudden leap up, and continu gradually to rise above the normal water line as the speed ncreased.

## A Buried Forest

A man living in Essex county, Virginia, in digging a well recently, at a depth of about thirty feet came upon the trunks of large trees several feet in diameter, which were ound upon examination to be cypress. Fearing the wate ould be injured by the wood, he determined to abando his well, and dug another some distance off. When he had eached about the same depth he again encountered the trees nd a third attempt, at a still greater distance from the firs well, again brought him in contact with this subterranea forest, the trees of which are of great size and well pre served.
There are portions of land in New Jersey, near the coast has been done in unearthing them.

## Cable Telegraphing.

The ocean telegraph operator taps the key as in a lan elegraph, only it is a double key. $I$ ' has two levers an nobs instead of one. The alphabet used is substantially the same as the Morse alphabet-that is, the different letters ar epresented by a combination of dashes and dots. For intance, suppose you want to write the word " boy." It would read like this
$B$ is on dash and three dots; 0 , three dashes; and Y , one dash, on dot, and three dashes. Now, in the land telegraph, the ther end of the line, which is unwound from a cylinder, and perforated by a pin at the end of the bar or armature If the operator could read by sound, we would dispense with
the strip of paper, and read the message by the click of the armature as it is pulled down and let go by the electric magnet.
The cable operator, however, has neither of these advan tages. There is no paper to perforate, no click of the arma ture, and no armature to click. The message is read by means of a moving flash of light upon a polished scale pro duced by the deflection of a very small mirror, which is placed within a mirror galvanometer, which is a smal brass cylinder two or three inches in diameter, shaped like a spool or bobbin, composed of several hundred turns of small wire, wound with silk to keep the metal from coming in contact. It is wound or coiled exactly like a bundle of new rope, a small hole being left in the middle about the s'ze of a common wooden pencil. In the center of this is suspended a very thin, delicate mirror about as large as a suspended a very thin, dericate mirror of corn, with a correspondingly small magnet rigidly kernel of corn, with a correspondingly small magnet rigidly
attacked to the back of it. The whole weighs but a little attacked to the back of it. The whole weighs but a little
more than a grain, and is suspended by a single fiber of silk, more than a grain, and is suspended by a single fiber of silk,
much smaller than a human hair, and almost invisible. A narrow horizontal scale is placed within a darken box two or three feet in front of the mirror, a narrow slit being cu in the center of the scale to allow a ray of light to shine upo the mirror from a lamp placed behind said scale, the little mirror in turn reflecting the light back upon the scale. This spot of light upon the scale is the index by which all mes sages are read. The angle through which the ray moves is double that traversed by the mirror itself; and it is, there fore, really equivalent to an index four or six feet in length without weight
To the casual observer there is nothing but a thin ray of light, darting to the right and left with irregular rapidity but to the trained eye of the operator every flash is replet but to the trained eye of the operator every flash is replete
with intelligence. Thus the word boy, already alluded to with intelligence. Thus the word boy, already alluded to,
would be read in this way: One flash to the right and three would be read in this way: One flash to the right and three
to the left is B. Three to the right is $O$. One to the right, one to the left, and two more to the right is Y , and so on Long and constant practice makes the operators wonderfully expert in their profession, and enables them to read from the mirror as readily and as accurately as from a newspaper. Boston Herald.

## Suicidal Epidemic.

A recent number of Chambers' Journal gives an entertain g article on suicides, from which we copy :
ays the writer, "a person determined to destroy himself will wait months and years for an opportunity of executing the deed in the particular manner he has marked out for himself, and the very inclination to suicide may be re moved by withdrawing the particular objects that would awaken the idea. Thus a man who has tried to drown him self will be under no temptation to cuthis throat. Example it is well known. is a powerful cause of excitement to th suicidal act. We were once told by a physician that a hypochondriacal patient used to visit him invariably the day af ter reading the report of a suicide in the daily papers, poss essed by a morbid fear of imitating the act of which he read Sir Charles Bell, surjeon of Middlesex Hospital, was on day describing, to a barber who was shaving him, a patient' nsuccessful attempt to cut his own throat, and, on the bar bar's request, pointed out the anatomy of the neck, showing how easily the act might be accomplished. Before shavin perations were completed, the barber had left the shop and ut his own throat according to Sir Charles Bell's exact in tructions. Sometimes there is an epidemic of suicides, a at Versailles, in 1793, when out of a small population 1,300 persons destroyed themselves in one year; or as in the Hote des Invalides in Paris, when six of the inmates hanged them selves on a certain crossbar within a month. Very often the disease is hereditary, and at a certain age the members of on family will all in turn evince the suicidal tendency, while ven children of very tender years have been known to end their short lives by their own act, from force of example Curious, too, are the methods of self-destruction, but they are too painful to bear description. A Frenchman once at tempted to ring his own death knell, by tying himself to the clapper of the church bell, which thereupon began to swing nd alarmed the villagers by its unwonted tones. All case f determined suicides are characteristic of confirmed insani y; whereas, in a case of impulsive insanity, the perpetrato will often regret the act before it is completed and endeavo to save his life, as did Sir Samuel Romilly, thus demonstrat ing that the very attempt may effect the cure of the disordere brain. The months of March, June, and July are the favorites with men, September, November, and January for women in which they voluntarily end their lives. In youth men hang themselves, in the prime of life use firearms, and when old, revert to hanging. Women usually prefer Ophe ia's ' muddy death.' Poisoning is a method adopted by the very young of both sexes. We have the consoling reflection that, prevalent as brain disorder is in our country, at least eighty per cent of cases of insanity are curable if treated at an early stage; while it is to be noted that it is not pleasura le, productive brain work that does the mischief, but rath he mental strain which results from the high pressure of ou artificial life.'

## Centennial Notes

The Centennial Board of Finance have secured more than orty-six acres of fine level grain land at Schenck Station, on the Philadelphia and Trenton Railroad, three miles this side of Bristol, for the purpose of making it an international trial ground for reaping machines, steam plows, harrows, rollers, etc., at the Centennial Exposition. The necessary plowing has already been done under the superintendence of the Centennial Bureau of Agriculture.

## PRACTICAL MECHANISM. by Joshua rosm. number XXXIV.

CONE Plate for boring in the lathe.
For chucking shafts and other similar work in the lathe to bore holes in the ends of the shafts, etc.), the cone plate shown in Fig. 150 is the best appliance known to ma-

chinists. A is a standard, fitting in the shears of the lathe, at $E$, and holding the circular plate, $C$, by means of the bolt, B , which should be made to just clamp the plate, C, tightly when the nut is screwed tight. The plate contains a series of conical holes, $1,2,3$, etc. (shown in section at D). The object of coning the pin, B , where it carries the plate, C , is that the latter shall be made to a good working fit and have no play. The operation is to place the shaft in the lathe, one end being provided with a driver, dog, or carrier, and placed on the running or line center of the lathe; and the placed ond to be operated upon, being placed in such one of ather end, to be operated upon, being pa suitable size, the the conical holes of the plate, C , as is of suitable size, the distance of the standard, A, from the lathe center is to be
adjusted so that the work will revolve in the coned hole adjusted so that the work will revolve in the coned hole
with about as much friction as it would have were it placed with about as much friction as it would have were it placed
between both the lathe centers. Thus the conical hole will take the place of the dead center of the lathe, leaving the end of the shaft free to be operated on. F F are holes to bolt the standard, A, to the lathe shears or bed; and $G G$, etc., are taper holes to receive the pin, $G$, shown in the sectional view. The object of these holes and pin is to adjust the conical holes so that they will stand dead true with the lathe centers; for if they stood otherwise, the holes would not be bored straight in the work. In Fig. 155, hole No. 7 is shown in position to operate, the pin, $G$, locking the plate, is shown in position. In setting the work, the nut on the pin, C , in that position. In setting the work, the nut on the pin, B, should be eased back just sufficiently to allow the plate, C, to revolve by hand; the work should then be put into po sition, and the pin, G, putinto place; the standard, A, should then be adjusted to its distance from the live lathe center, and bolted to the lathe bed; and finally, the nut on the pin. B, should be screwed up tight, when the work will be held true, and the cone plate prevented from springing. Care must be taken to supply the conicalholes, in which the work revolves, with a liberal quantity of oil, otherwise they will be apt to abrade.
slotting machine tools.
Tools for use in slotting machines are divided into two classes, those used by themselves, for holes in which there is not sufficient room to admit a tool post or bar; and short tools, held in a tool post on the bar, and fastened by a set screw or screws thereon provided.
Referring to the first class, which should never be em. ployed if it can be avoided, Fig. 151 is a tool for cutting out a key seat. The edge, $A$, is the cuiting part, the thickness at $G$ being reduced to make it clear the sides of the key seat. The face, $B$, sary to bend the shaving, which, acting at a right angle to that face, tends (as will be observed) to force the tool deeper into the cut, at the angle shown by the dotted line and arrow, E. Now sup pose $B$ to be ground to the angle shown by the dotted line, C ; the di rection of the force re quired to bend the sha ving would be in the direction of the dotted line and arrow, D; and a com parison of $D$ and $F$ shows that an equal degree of sping wouldhave more effect in deepening the cut of the too in the case of D than in that of E ; and it is this considera tion which determines the proper angle of the face, $B$. It being obvious that the more angle it has, the keener the cut ting edge of the tool will be, and the greater the liability to force into the cut; and since the deeper the cut, the greater is the force required to bend the shavings, the tool continues to spring, digging into the work and either bending or breaking itself, or stopping the machine. Hence the face, B, should be made for slight tools, or for tools held far out from the tool post, at about the angle shown above.
The face, H, should, in all cases, be made as shown above and not hollowed at all in the direction shown by the dotted
line, F , which would not only weaken the tool, but would cause the cutting edge to be badly supported by the metal behind it, and hence to break; and these considerations, as to the shape and angle of the faces, B and H, apply to all descriptions of slotting machine cutting tools, and are of more importance in the class of tools above shown than in tools used in any other kind of machine, because of the great distance they have, at times, to stand out from the holding screws or clamps.
A roughing out tool, held in the tool post without the aid of a bar, should be made as shown in Fig. 151 a, concernng which nothing need be said save that it should be hardened right out, if the cutting edge stands close to the holding screws or clamps of the tool post, and tempered to a light straw, if held far out from the same, which will, in the latter case, prevent it from breaking in consequence of any deepening of the cut from the tool springing.
For cutting out a halfround groove, the tool shown in Fig. 152 should be employed. The outline, A is made as denoted by the dot ted line, B, in cases where rom the narrowness where, from the narrowness of the tool, it is very liable to spring from the pressure of the cut, as, say, when the thickness at $C$ is less than three eighths inch, in which case the cutting edge should be lowered to a
straw color; whereas, if thicker, the edge may be hardened right out. It is well here to note that it is advantageous that the tool should have a barely perceptibleamount of spring, in the direction of D in Fig 151, be cause otherwise the because of the edge of the tool will rub against the work during the back stroke, and thus become rapidly dulled.
Whenever the nature of the work to be done will admit, a holding bar and short tool, such as shown in Fig. 153,
 should be employed. A represents the bar, which is fastened in the tool post, $B$ the tool, and C a set screw to hold the tool, which set screw may be placed in the end, D, of the bar. By using such a bar, short tools, such as have been already described for use in the lathe or planer, may be em-

ployed, their shortness rendering their grinding and forging much easier of accomplishment. Many of these holding bars have small pivoted boxes, similar to that shown in Fig, 154 , provided to receive the tool. A is a sectional view of

he bar, B is the bos, pivoted at C, D is the tool, and E ihe set screw for holding the same. It will be observed that the set screw, E, screws into the pivoted box, and not into the end of the bar, and that the hole, provided in the end of the bar to admit the set screw, is large enough to permit the set screw to have plenty of play or movement. The object of this and similarly designed devices is to allow the tool to move, in the direction of $D$, off the pivot, $C$, and thus to pre vent the tool edge from rubbing against the sides of its cut
during the up stroke of the bar, the spiral spring shown being made sufficiently strong to support the box, $B$, in the position shown, but not sufficiently strong to resist much force exerted upon the tool and in the direction of D. For small or even medium sized work, these devices are very efficient; but for large, heavy, outside work, the bars themselves are too slight, and it is usual to employ a similar device (on a large scale) provided in the tool end of the slide itself. Under these conditions, the slotting machine will perform as heavy duty as either the lathe or planing machine. The writer has in his possession a cutting taken off the outside of a crank at the Morgan Iron Works, which cutting measures $2^{5}$ nches and is a full $\frac{1}{8}$ of an inch in thickness, the tool employed being a knife tool, ground as shown in Fig. 155. B

represents the tool end of the slide of the slotting machine, A the knife tool, $C$ the work, and from $D$ to $E$ the depth of the cut.
The face of the tool is ground off at an angle, in the direc tion of I, so that the point of the tool shall not break off when it strikes the work, and so that the strain upon the tool and working parts of the machine shall not come upon them too suddenly, and cause them to break, as would be the case were the cutting edge of the tool to strike the cut along its whole length simultaneously. As shown in the engraving, the tool would strike the work at $F$ on the edge only, which would for an instant of time exert only enough resistance to bring all the working parts of the machiue to a bearing; and as the tool descended, the strain would gradubearing; and as the tool descended, the strain would gradu-
ally increase until the point of the tool reached the work. ally increase until the point of the tool reached the work.
When the tool is near the end of the stroke, and therefore When the tool is near the end of the stroke, and therefore leaves the cut, it will do so at $F$ first, thus leaving the cut gradually, and greatly modifying the jump due to the recoil of the working parts of the machine when relieved of the heavy strain necessary to drive such a deep and thick cut. The enormous strain placed upon the tool would inevitably break it were it left very hard; it is therefore tempered to a purple.
No other tool can well be used for taking such heavy cuts because grinding off the face, F , of any other tool would not leave the tool edge sufficiently keen to sever the metal with out an excessive amount of driving power, and further because the breadth of the face, $F$, which sustains the force necessary to bend the cutting, is narrower in the knife tool than in any other, and therefore bends the cutting less, ex periencing a corresponding decrease of strain. Cuts of such great depth and thickness cannot be well taken in slotting machines whose slides are operated by a connecting rod or link, because the excessive strain would be apt to force the connecting rod along the slot provided to alter the stroke of the machine; the sliding head is therefore provided with a strong rack on each side, operated by pinions, with suitable reversing gearing attached for varying the stroke.
When operating the feed of a slotting machine by hand, the work should be fed to the cut while the tool is reversing its motion at the top of the stroke, and not while the tool is cutting or at the bottom of the stroke, because, in either of the latter cases, the tool edge would grind against the sides of the cut during the up stroke, which would soon impair the cutting qualifications of the tool.
Tool-holding bars of sizes below about $1 \frac{1}{2}$ inches in thickness should be made of steel so as to be strong enough to resist the tendency to spring. For sizes above that, they may be made of wrought iron.

## Buffalolibones.

It is stated that many of the settlers in Kansas, in the val ley of the Arkansas, have done a profitable business by gathering up buffalo bones. The prairies for forty miles each way from the railroad have been gleaned over till not a relic of the chase can be found. Heads and ribs are worth $\$ 5$ a tun; these are shipped to Philadelphia and ground up into fertilizers. Shins and shoulder blades are worth $\$ 10$ a tun; these go to the sugar refineries. The horns are worth $\$ 30$; the tips are sawn off here and sent to the factories of umbrel las, fans, pipes, etc.; the remainder is used by the chemists. Bits of hide found hanging to the heads are taken off and sent to the glue factories. Every fragment of these animals is made to serve a purpose.

## Electrical Exhibition in Paris.

In the Champs Elysées, in July, 1876, will be held an exhibition of the applications of electricity to industrial and do mestic purposes. Information will be given on application at the offices of the exhibition, 86 rue de la Victoire, Paris. A special exhibition of the improvements in railway appli ances has been proposed to be opened in Paris next year.

## A Snake within a Snake.

While some workmen were laboring in a meadow near Saugus, Mass., recently, they discovered a black snake about five feet long. A closer examination revealed the fact that the tail of another snake was protruding from its mouth, and his was found to be a water adder, which measured nearly four feet.

## IMPROVED GRINDING MILLS

Geared mills with vertical spindles, says the inventor of the improved mills illustrated in the annexed engravings, are going out of use.. Their toothed wheels or cogged gears are too rough in running and too expensive, while spindles in a vertical position do not run well, because they cannot be kept thoroughly oiled, and do not lie steadily against their bearings. Almost all the shafting used for driving machinery is now horizontal, with vertical pulleys, and therefore the driving pulleys of grinding mills should obviously also be

The engravings show three different types of mill, the principal points of difference being the construction and mode of adjusting the spring bearings by means of which the pressure of the stones is automatically controlled. The mills are adapted to all varieties of grinding and for every substance, whether wet or dry, hard or tough, heavy or light, brittle, or fibrous.
The strength and durability, necessary to enable these mills to be run safely at a very high velocity, is secured by the employment of the best materials, metal and stone only

From the annexed engraving it will be seen that the ice eceptacle, A, is arranged in one end of the space within the counter, from the main portion of which it is separated by an open work partition which admits of the free circulation of air therefrom around the cooling vessels, B. These are supported by top flanges on side strips, so that there is an open space at their sides and beneath them, for the circulation above noted. The coolers are constructed of any suitable material, and in form suitable to the milk or solid articles which they are to contain. They may be used for milk ${ }^{\text {c }}$


HARRISON'S GRINDING MILLS.
vertical, in order to be as convenient as possible to set up and put in operation.
In constructing the mills represented, the horizontal shaft was the inventor's main object; but subsequent experiment showed him other and superior advantages attaching to the form. The machines became more quiet and light run ning, but ground more rapidly, while their simplicity evi ning, but ground more rapidly, while their simplicity evi-
denced that the extensive repairs required in the use of denced that the extensive repairs required in the use of
gearing would be avoided. As now made, the mills are gearing would be avoided. As now made, the mills are
compact and convenient to be driven from portable steam engines or horizontal shafting. The boxes for supporting the spindles are four times longer than are usually made, extending almost through the entire mill; and they carry the runner, which is solidly attached to the spindle, in a true plane with the face of the bedstone.
Millstones and the framework on which they are usually mounted are liable to be broken by hard substances passing ihrough the mills, which in many cases have proved destruc tive to life and limb. To avod such accident, the inventor con structs his mills so that they may be readily adjusted to any desired strain; and should nails, slugs, or bolts go through the stones, the latter immediately return to their places with such accuracy that no stoppage of the machine is required, buch accuracy the working position is kept, and all delay avoided.
It is claimed that anything, however hard or ungrindable which will pass through the eye of the stone will pass out without injury to the stones or mill. In order to accommo date different articles, which require more or less strain in grinding, and each needs a pressure peculiar to itself, the mills are provided with safety springs, which can be readily adjusted or changed to suit. These are also applicable to change of pressure, needed according to the quantity to be ground, as of quantity to be ground, as of course it takes more working pressure to grind 50 bushels than 10 bushels of meal per hour. A common working speed for the 20 inch mill is 1,400 turns per minute, and 1,000 turns for the 30 inch mill. The small portable burrstone mills grind 50 bushels of good meal per hour, as regular work, from day to day, and have averaged as high as 80 bushels. This, the inventor claims, is due to the peculiar mode of mounting and dress od the stones, their facility githe stones, their acity or recelving grain at the eye, and the ease with which the meal passes out of the new discharge spouts. It is due also to the vertical position of the stones, the extraordinary velocity at which they run, and to such an adaptation of speed to grinding surface that, when the meal is once properly ground, it is thrown out and does not clog the fur rows and consume the driving power.
The inventor has submitted to us written certificates as to the above mentioned capabilities of his mill. He further states that over 9,000 machines were sold up to the beginning of the present year


BARNES' REFRIGERATOR AND COUNTER.
beneath the same, into a refrigerator. In winter, when ice is not required as a preservative, the refrigerator lids are
closed, and a slab of marble or wood placed above. By this closed, and a slab of marble or wood placed above. By this
arrangement not only does the seller have his refrigerator arrangement not only does the seller have his refrigerator the storing of the same when its use is not required. Furthermore he is provided with an ice box of superior con struction, which, by ar economical employment of ice, re frigerates a large quantity of goods.
lard, butter, poultry, etc., or for either kind of produce alone. The lids of the coolers are hinged together in pairs, and are movable, so that they can be cleansed conveniently. The lid of the ice box is hinged to the center. The cold air from the ice receptacle keeps the coolers at a uniformly low temperature, as no air is admitted to the inside of the refrigerator by the opening of the lids of the vessels. This refrigerator by the opening of the lids of the vessels. This
separate access to each cooler thus necessarily tends to eco nomize the consumption of ice. The cooling effect of the latter is further increased by the passage of the cold drip latter is further increased by the passage of the cold drip
water over the inclined bottom of the refrigerator to a dewater over the inclined bottom of the refrigerator to a de-
pressed box in the furtherextremity of the same, where the water accumulates until it escapes from an adjustable faucet, shown at C.
The slab used to cover the box in winter is represented at D. When the refrigerator is in use, the lid of the ice receptacle, which need be opened for replenishing the contents but once daily, serves as a counter, and a hinged leaf, E, upheld by a brace, augments the space, and answers as a support for the scales.
The present arrangement, among the dealers in Washington and other large markets in New York city, is to pack their goods directly upon the ice when the refrigerator is used as a counter. As this is detrimental to the quality of meats and cannot be beneficial to butter in firkins, especialmeats and cannot be beneficial to butter in firkins, especial-
ly as that material is so easily affected by impure surroundly as that material is so easily affected by impure surround-
ings, the improved counter and refrigerator above described will doubtless be found an advantageous substitute.

Patented through the Sci entific American Patent Agency, by Mr. H. H. Barnes, Sep tember 7, 1875. For further information relative to sale of rights and of patent, address the patentee, 1,004 Pacific street, Brooklya, N. Y.

A Microscopical Soiree. A Microscopical Soiree. soirée of the British Associa soiree of the British Association, 10 microscopes were ar ranged in classified divisions devoted to crustacea, arach nidans, insects, marine and fresh water fauna, ciliary action, vertebrate circulation fertilization of flowers, cry $p^{-}$ togamia, microspectr sscopes etc. The idea of practically il lastrating Sir John Lubbock's " Fertilization of Flowers by Insects" was novel, and so far carried out as to give a vivid idea of the processes to those who were previously unfamiliar with them. Th unfamiliar with them. Th geological division included an exhibition of the peren nial eozoon Canadense, which mu st be exhibited again and again to live down the hostility to its animal nature.

The Cincinnati Exposition closed on October 9. In spite of the prevailing business depression, the fair was in every way successful, having been visited by over 350,000 people. There will be no exhibition next year. It is intended to de vote $\$ 400,000$ to the construction of a magnificent brick building, in which will be held the Exposition of 1877.

## ORIENTAL HORTICULTURE

Our illustration introduces to us a curious phase of East Indian garden scenery. In the foreground is a noble talipot palm (corypha umbraculifera), the leaves of which are used by the Buddhist monks, prepared in small narrow strips, as books in which to record their sacred writings. The leaves of this palm are used also as umbrellas and sunshades, and every where the custom is universal to use them for covering huts and making temporary tents. It is one of the noblest of the palm family, growing to the hight of one hundred feet frequently. It only flowers once, and then dies.
A correspondent of the London Gardener, in writing of it, says: " I saw a noble grove about three years ago all flowering at one time; they had a truly grand appearance, and would produce some thousands of seeds."
At the left hand, is the sacred bo tree (ficus religiosa). Every temple has one of these in its vicinity, usually a cutting from the ancient tree at Andro Japoora, which was originally planted there by Buddha and his followers, and is said to be one of the o.dest trees in the world. The temples are also al ways located near abundant water, and the vege tation is rich beyond description. With regard to the inter est of the Buddhist religion in horticulture, Tennant's " History of Ceylon" says :
"One peculiarity in the Buddhist ceremonial served at all times to give a singular impulse to the progress of horticulture. Flowersand garlands are introduced in its religious rites to the utmost excess. The atmosphere of the wehara and temple is rendered oppressive with the porfume of champac and jessamine; and the shrine of the deity, the pedestals of his image, and the steps leading to the temple a ere strewn thickly with blossoms of the najaha and the lotus. At an earlier period the profusion in which these beautiful emblems were employed in sacred decoration appears almost incredible; the Mohawason relates that the ruanwelli dagoba, which was two hundred and seventy feet in hight, was on one occasion festooned with garlands from pedestal o pinaacle, till it resembled one uniform bouquet, and at another time, it and the lofty dagoba at Mehintala were
buried under heaps of jessamine, from the ground to the buried u
" The various kings in succession formed innumerable gardens for the floral requirements of the temple. The capital was surrounded on all sides by flower gardens, and these were multiplied so extensively that, according to the rajaratnacari, one was to be found within a distance of four leagues in any part of Ceylon. Among the regulations of the temple built at Dambenia, in the thirteenth century, was: "Ever day an offering of 100,000 flowers, and each day a different flower.'
Another advantage conferred by Buddhism on the country was the planting of fruit trees and esculent vegetables, for the gratuitous use of travelers in all the frequented parts of the island.
On the rocks and monuments of India are edicts from the
kings to their successors to continue the good work. One of their edicts, by the king of Magadha in the third century, B. C., commanded that "everywhere, wholesome vegetable roots and fruit trees shall be cultivated. and that on the road wells shall be dug and trees planted for the enjoyment of men and animals."

## On the Action of Bromide of Camphor and Borate

 silicate, and Arseniate of sodium Upon the Germination of Seeds.M. E. Heckel says: "M. Vogel recently called the attention of physiologists to the curious results of the experiments undertaken in 1798 by Benjamin Smith and Barton, concerning the singular and unexplained property which cam phor exercises upon vegetables, and he confirmed those results in their entirety. This observer, in treating the seeds of lepidium sativum, of raphanous sativus major, of pisum sativum, and of some other plants, placed between two sheets of blotting paper moistened with a solution of camphor, noiced that these seeds germinated long before those which had been maintained in ordinary conditions. Filled with these new ideas, and resting upon the fact, well known since the labors of Göppert, of the action of bromine, as an agent capable of hastening the germination of seeds, I asked myself, in the course of some researches touching the action of certain chemical compounds upon the germinative faculty, if the bromide of camphor, which is sometimes considered as definite combination of bromine and camphor (the bromin replacing one equivalent of hydrogen in the camphor) and sometimes as a simple association of the same components would present, from the biological point of view which oc cupied me, the sum of the properties with which the bodies composing it were gifted, or if the new chemical entit would manifest a proper attitude, decided enough to permi of a differentiation, either by the intensity or by the modal ty of the action, between the body and its components simply associated. With that end in view, I instituted the fol lowing experiments at the beginning of April, which have been carried on until now, with the seeds of raphanus ativus alone, but which I propose to extend to other seeds. Between several layers of double wadading wetted with wa ter, I enclosed for each experiment twenty radish seeds, and I had care to have all the substances act upon the seeds un der like conditions of heat and humidity.
In the first double of wadding I placed 7.7 grains of finel pulverized ordinary camphor; in the second, 7.7 grains o bromide of camphor equally reduced to powder; in the thir one, sprinkled with bromine water, $7 \cdot 7$ grains of camphor in the fourth one, the seeds were sprinkled with bromin water only; in the fifth one, the seeds were surrounded with 7 grains of crushed bromide of potassium; in the sixt nd in the seventh ones, the seeds were sprinkled with解 experience of Göppert in regard to the activating action of
chlorine, of bromine, and of iodine. These three bodies in contestably hasten germination, and with an intensity de creasing from chlorine to iodine. Thus, iodine water pro duced germination in five days on an average, bromine water in three days, and chlorine water in two days, and under normal conditions it required at least seven or eight days to obtain the same results. The action of bromide of camphor was still more rapid; in thirty-six hours the rootlets were striking.
In the double of wadding containing camphor alone, the phenomenon required between four and five days. In the third package (containing camphor and bromine water) the seeds germinated the first time thirty hours later than in the case of bromide of camphor, the second time twenty-six hours later, the third time thirty-six hours later. As for the bromide of potassium, it remained without effect, though dissolved in water; the germination was produced in the issol the the ame length of time as witt ordinary water These experiments, several times repeated, having always yielded identical results, I concluded that the bromide of camphor enjoyed a more considerable action than the sum of the two bodies of which it was composed, taken separately or acting in consort. I should add that the bromide of camphor acts without being dissolved. M. Vogel employed camphor in solution; the same solvent might have been employed to dissolve the bromide of camphor, which is insoluble in water, but without utility, since I obtained the two bodies simply pulverized. It must be admitted that they act by vapor ization. I extended my researches to the boron and silicon serits; I found the alkaline borates and silicates, employed in small quantities ( 3.9 grains for 309 grains of water),retarded germination from one to three days, and that with larger quantities ( $9 \cdot 02$ grains ior 309 grains of water) the phenomenon was suspended entirely.
Arsenious acid and the soluble arseniates arrest germina tion and destroy the embryo, when relatively small quanti ties are employed ( 39 grains for 1,380 grains of water.")Comptes Rendus de l'Academie des Sciences, 1875.

## An Electrical Fish Bait.

In the Paris International Maritime Exhibition there is a small objest deserving of notice. It is a platinum wire placed in a bottle and ignited by electricity from a bichromate battery. It is intended to be immersed in the sea, and the light emanating from it is said to attract an immense number of fishes. Experiments have been tried lately on the coast of the Côtes du Nord department with a fishing boat, and have proved very satisfactory, on a bank of sardines. The glass must be green or black, otherwise the fish are frightened by the glare and do not follow the submarine light

To tin small castings, clean and boil them with scraps of block tin in a solution of cream of tartar.


## USEFUL AND CURIOUS INVENTIONS．

Below we give engravings of a number of ingenious in vent：ons，extracted from the pages of Knight＇s＂New Me chanical Dictionary．＂＊These devices，as will be seen，re－ late to various subjects，the selection being governed eith－ er by their novelty or their peculiar adaptation to the va－ rious purposes for which they are designed．
kNAPSACKS．
Of these，in Figs． 1 and 2，we give two ingenious exam－ Fig． 1.

ples．Weber＇s invention，Fig．1，has a frame which myy be changed into a couch，the cover forming a shelter．The

Fig． 2.


Frotsham cund Levelt＇s Innapsack． central section has jointed and folding sides．Frodsham and
Levett＇s knapsack， Fig．2，consists of an india rubber casing， made watertight and containing a bag of finely cut cork，so as to convert it into a life preserver．A pocket is made in the rubber casing to contain articles of clothing，thus forming a knapsack，which，when unrolled，becomes a bed，the com－ bined articles serving as a pillow． accumulator．
This is an apparatus used in working hydraulic cranes and other machines where a steady and powerful pressure of water is required．As shown in Fig．3，it consists of a large cast iron cylinder，$a$ ，fitted with a watertight plunger $b$ ，to which is attached a loaded weight case，$d$ ．Thus a

pressure is obtained upon the water in the cylinder，equal to a column of water 1,500 feet high，or 660 lbs．to the square inch．As the water is pumped into the cylinder by the en－ gines through the pipe，$h$ ，the piston with the weighted case rises，being guided by the strong wooden frame－ work，$g$ ，and is made to regulate the amount of water pumped in，by actuating a throttle valve in the steam pipe of the pumping engine，which it closes after having reached a certain hight． When the cranes，etc．，are in operation，the wa－ ter passes from this cylinder through the pipe， $i$ ，to those actuating the motion of the cranes， and the weighted plunger naturally descends，al－ ways keeping up a constant pressure upon the water．In descending，the same causes the throt－ tle valve to open again，and the water is again pumped in．

AN ANCHOR TRIPPER
of ingenious construction is represented in Fig 4．The anchor hangs from a clutch ring on the catblock，which is suspended below the cathead． When the fall is cast loose，the block descends ＊Published in numbers by J．B．Ford \＆Co．，New Yort
and the clutch is opened by the chains，which are attached to the cathead and to the projecting levers or prongs on the respective halves of the clutch．A single motion，the slack－

## Fig． 4.

 ening of the fall，operates the tripper；the clutch is opened when the chains are made taut， by the descent of the block． the arcograph．
Fig． 5 is an instrument for describing arcs of circles with out the use of centers．A thin pliable strip of metal has it which may be sprung into the required bhape and the required shape and fast ened by set screws．This de vice is susceptible of many va－
riations，and is useful as a tem－ plate or marker for different purposes．

## ANGLE JOINTS

 differ according to the material， thickness，purpose，and expo sure．In Fig． 6 we give repre sentations of several forms．$a b$ are joints which are en tirely dependent upon solder；such are used with tin ware and sheet lead．$c$ is a miter joint．It is used for thicker metals with hard solders．$d$ is a butt joint，otherwise simi－ lar to $c$ ．$e$ is a lap joint；the metal is creased over the hatch． et stake or by the spinning tool．It requires solder．In the
joint shown at $f$ ，one plate is bent rectangularly，and the other is doubly bent，so as to recurve back on itself，lapping around the edge of the other．It needs solder to keep it from slipping apart．$g$ has a fold to each plate；these lock upon each other and require no solder to perfect their hold， although it may be added to make the joint airtight and watertight where the closure is not absolutely perfect．$h$ is a riveted joint，one plate being bent to lap upon the other． This joint is called the folded angle，and is common to all kinds of work．In $i$ the edge of one plate is formed into tenons which enter mortises in the other，and are there ri－ veted．$j$ resembles $i$ ，except that the tenons are prolonged so as to be retained in the mortises by cotters．In $k$ one plate makes a butt joint with the other，and is attached by L－formed rivets or screw bolts，the heads of which are ri－ veted to one plate，while their screw stems pass through the other plate，and are fastened by nuts．At $l$ two plates are shown，secured by being bolted or riveted to an angle iron， which is straight or bent into sweeps according to the shape of the object
In Fig． 7 is represented a mode of
angular gearing．
The wheels are quadrilateral，and the speed of the driven wheel is variable．The driving wheel，rotating at regular speed，will impart a quicker rate to the other wheel when the angle of the formeris in contact with the flat side of the

Fig． 8.

latter，and conversely．This device has been used in print ng presses．

This invention，represented in Fig．8，affords a means of training guns to a given angle with the axis of the vessel or on an object，while the gunner remains beneath the deck There is attached beneath the deck，to the pintle of the pivo ted gun，a graduated index plate by which its horizontal bearing may be read．A telescopic tube，with two rectangu ar bends and with reflecting mirrors at the angles，is so laced as to be used from beneath the deck；two of these may be so situated as to form a base of sufficient length to btain，by simultaneous observation，the distance by trian ulation．Two screw propellers，working in contrary direc ions，rotate the vessel so as to bring the guns to bear on the required point．The upper and lower limbs of the telesco pic tube are parallel；the one above the deck is presented toward the object，the other to the eye．The image of the object，after being twice reflected，reaches the eye of the observer，whose body is not exposed．This device entered into other ingenious appliances connected with the Stevens battery．
A large amount of ingenuity and inventive skill has been directed toward the replacing，by mechanical devices，of members of the body lost through accident or disease．In Fig． 9 we give an
artificial arm
and hand，in which there are arrangements for moving the fingers and thumb．The shoulder cap is the basis for the various movements．The strap，C，is hinged to the cap，A and connected by a rod to the ring，L．The straps，DE of the upper arm，are also hinged to the cap and the lower part of the upper arm ；from the ends of the straps，D E，proceed the slotted bars， N ，to whose lower end the forearm is pivot ed．The three straps mentioned are the means of suspen－ sion of the arm，forearm，and hand，and the stump of the natural arm within this outer skeleton is the means of im parting motion to the forearm，wrist，and fingers．The ring， L ，is connected to the strap， C ，and hinged to the forearm Fig． 9.

behind the elbow joint；it is guided in its motions by the slotted bars， H N ，sliding down the said slots as the stump is moved forward，and thereby thrusting upon the point of the elbow and flexing the forearm．Pivoted to the bars， H $\mathbf{N}$ ，near the elbow axis，are the bifurcated ends of the wire， Y ，which actuates the fingers and thumb，flexing them as the arm bends by means of tension on the tendons，which pass through the metacarpus and then diverge to follow the pha－ langes．By means of the lever， K ，the spring slide， 5 ，and the notched slot，the thumb and fingers can be connected to or disconnected from the arm and forearm，so as to receive motion therefrom，or otherwise，as may be desired．In the rotary movement of the stump，the upper end of the strap runs on a rod attached to the shield，A，under the axilla．

Effects of Stress upon the Magnetism of Soft Iron． In the physical laboratory at Glasgow University，Sir William Thomson stretched steel and soft iron wire，about twenty feet long，from the roof．An electro－magnetic helix was placed round a few nches of the wire，so that the latter could be magnetized when an electric current was passed through the former，the induced current thus produced in a second helix outside the first be－ ing indicated by a reflecting galvanomoter． When steed wire was used，the magnetism di－ minished when weights were attached to the wire，and increased when they were taken off but when special soft iron wire（wire almost as soft as $⺊$ nad）was used，the magnetism was in－ creasea when weights were put on，and dimil ished when they were taken off．Afterwards he discarded the electrical apparatus ；ard ty
 suspending pion a of a grain in weight，with a reflecting mirror
attached, the wire was magnetized inductively simply by the magnetism of the earth, and changes in its magnetism were made by applying weights and strains, the changes being then indicated by the magnetometer.

## SCIENTIFIC AND PRACTICAL INFORMATION

discovery of $a$ new element
At a recent session of the French Academy of Sciences, M Wurtz presented a communication from M. Lecoq, announcing the discovery of a new simple body, a metal analogous and allied to zinc and cadmium, and found in blende or sulphide of zinc in Spain. The existence of the substance was re vealed by spectral analysis, two lines appearing which sould not be traced to any other other element. The lines are situated in the violet, the region in which the brightest zinc lines are found; one is very brilliant and takes, in the table of wave lengths, the 417th place; the other and weaker one has its wave length represented by 405 . The new metal has not been reduced from its combinations, so that its physical characteristics remain undetermined. It has been obtained, however, in the state of hydrochlorate and sulphate, and its distinctive features have been so clearly re cognized, showing its marked difference from either zinc or cadmium, that there is considered to be no reasonable doubt as to its existence. The discoverer patriotically names the new metal gallium in honor of France.
testing potabie water for animal matter.
Most of our readers are already aware of the danger arising from the use of water which contains animal excreta, or other animal matter in a state of putrefactive decay. Although no certain rest has yet been found for these matters, it is not difficult to detect the decomposition products which always accompany them, and when the latter are absent we may safely conclude that the former cannot be present. This indirect analysis involves testing for carbonate of ammonia, nitrous and nitric acids, phosphoric acid, chlorine, and sulphuric acid.
The test for carbonate of ammonia is best made with a few drops of corrosive sublimate solution, or a little of the Ness ler test. Nitrites are detected by slightly acidifying the wa ter and adding a starch solution which contains iodide of cadmium. To test for nitrates, acidify with a few drops of dilute sulphuric acid, immersing in it for a minute a rod o zinc or cadmium, and then adding the starch and iodide of cadmium. Phosphates are detected with most certainty by few drops of a concentrated solution of acetate of uranium

## Japanese bronzes.

M. E. J. Maumené writes as follows: We recently re ceived bronzes from Japan, the composition of which pre sents great interest. Their origin has been well and precisely established; they come from public monuments and from temples of habitation where great luxury reigned, which is attested by the dimension of most of the pieces imported, and which were destroyed during the great religious and political struggle which ended a few years ago.
We had occasion to analyze these bronzes, and here are the most striking results

| No.1. | No.2. | No. 3. | No.4. |
| :---: | :---: | :---: | :---: |
| Copper.......... 86.38 | $80 \cdot 91$ | 88.70 | 92.07 |
| Tin............. 1.94 | $7 \cdot 55$ | $2 \cdot 58$ | $1 \cdot 04$ |
| Antimony....... 1.61 | $0 \cdot 44$ | $0 \cdot 10$ | " |
| Lead............ 5.68 | $5 \cdot 33$ | $3 \cdot 54$ | " |
| Zinc............. $3 \cdot 36$ | $3 \cdot 08$ | $3 \cdot 71$ | $2 \cdot 65$ |
| Iron . . . . . . . . . . . $0 \cdot 66^{7}$ | $1 \cdot 43$ | $1 \cdot 07$ | $3 \cdot 64$ |
| Manganese...... " | trace | " |  |
| Silicic acid...... 0.10 | $0 \cdot 16$ | $0 \cdot 09$ | $0 \cdot 04$ |
| Sulphur......... " | $0 \cdot 31$ | " |  |
| Waste........... $0 \cdot 26$ | $0 \cdot 79$ | $0 \cdot 21$ | $0 \cdot 56$ |
| $100 \cdot 00$ | $100 \cdot 00$ | $100 \cdot 00$ | 100.0 |

The complex alloys thus formed are all of a granulat ed texture, blistered on the interior surface, full on the exterior surface (which can be readily polished with a file), showing a varied shade, which is sensibly violet when antimony is abun dant, red when iron is present, etc.; all the specimens were cast in slight thicknesses, from $0 \cdot 195$ to 0.468 inch, and the molding was well filled. It appears from analysis that these alloys were not made with pure metals, but with entire minerals. We should, says the author, consider these bronzes as resulting from direct employment of copper pyrites and antimonial galena mixed with blende; and the calcination was not always complete, as the presence of sulphur in specimen No. 2 proves.
Antique alloys, Greek, Roman, old French, etc., present indications of the same nature: but we have never observed so great a complication and such clear proofs of the simplicity of metallurgic work.-Comptes Rendus de l'Academie de Sciences, 1875.
new african explorations.
Mr. H. M. Stanley, the reliever of Dr. Livingstone, is now chief of an African exploring expedition fitted out by the New York Herald and the London Daily Telegraph. Letters recently received from him have appeared in those journals, from which the first tidings of his labors may be gleaned. Starting from Zanzibar on the coast, he began a journey of 720 miles to the great Victoria Nyanza lake. His progress was impeded by hostile savages, by the unknown nature of the country, and by the fearful mortality among his followers, 126 out of the 300 men which composed the expedition falling in battle or succumbing to disease; despite these obstacles, however, the march was accomplished in 103 days, an incredibly brief period when it is considered that by the natives the distance is counted as a nine months' journey.
Launching his sectional steamer on the lake, Mr. Stanley
began his explorations; and of those u
May, the results are now reaching us.
ay, the results are now reaching us. The most important discovery thus far made is the verification of Speke's description of Victoria Nyanza as one great
inland sea. This is contrary to the later decisions of many inland sea. This is contrary to the later decisions of many eminent geographers, who believe the lake to consist of a
number of small bodies of water united by streams or tracts of frequently overflowed marshy country: a new view upheld by Speke's comrade the explorer Burton, and even by Dr. Livingstone himself. Stanley now, bowever, demonstrates Speke's account to be strictly accurate, and thus secures to that explorer the fame of being the first discoverer of the ue source of the Nile.
preservation of meat by compressed air
We recently described a discovery of M. Bert, relative to preservation of meat through keeping the same in a hermetically sealed compartment under a pressure of several atmospheres. M. Reynoso proceeds a step beyond M. Bert, and announces that, if the meat be removed from the compressed gas after remaining therein for several weeks, it may be exposed to the ordinary atmosphere indefinitely without decom. position. This was accidentally discovered through a frag ment of flesh from the compression apparatus being left unnoticed in the laboratory. M. Reynoso finds that the meat dries slowly, keeping its color, odor, and consequently its leshy taste.

The Relation of Patents to the Various Industries. At a recent meeting of the New York Society of Practical Engineers, President James A. Whitney delivered an address "The Relation of the Patent Laws to American Agriculture, Arts, and Industries." Passing over those portions of this address which present, in a concise and forcible manner the several arguments and authorities in favor of these laws, we would direct especial attention to the following interesting historical and statistical information regarding several important American inventions. "Beginning with the printting press, we learn that the one used by Franklin over one hundred years ago gave but one hundred and thirty impres sions an hour; as the result of successive patented improve ments, this capacity was so advanced that in the year 1847 a machine had been perfected-the Napier double cylinder press-by which from twenty-five hundred to five thousand impressions an hour could be made-the former of large, the latter of small, newspaper size. It was then believed that
with this machine the limit of speed had been reached, and with this machine the limit of speed had been reached, and yet the public demand for more newspapers and periodicals was advancing rapidly. It was at this juncture that the American inventor Richard M. Hoe brought forward his im proved printing machinery, and, as the result of his genius and mechanical skill, it was soon brought to so great perfection that, in the year 1861, one of the New York papers printed a daily edition varying from one hundred and fifteen to one hundred and thirty thousand copies, all printed in four hours and a half. Though it is not claimed that this was the work of a single press, yet to have accomplished the same work on Napier presses would have required five additiona forms of type, each at the cost of one thousand dollars a week, or two hundred and sixty thousand dollars a year Another kindred invention, and one effecting even a greate relative improvement, was the Chambers folding machine. This was the invention of Cyrus Chambers, to whom the first
patent was issued about the year 1859. In the year 1874 , seventy-two of these patent news folders, for folding newspa pers alone, were in use. Regarding the work accomplished by these machines in the several departments of paper, magazine, and book making, we read: "The cost of running these machines was $\$ 2$ a day each, and each accosis $\$ 8.75$ per day, being a saving of $\$ 6.75$ a day for each machine, and these newspaper folders alone, during the original term of the patent, effected an economy of labor amounting to up ward of $\$ 1,165,000$. During the same period the paper fold ers for duodecimo publications saved in labor more than $\$ 353,000$; for octavos, more than $\$ 139,000$ : for quartos, more than $\$ 64,000$; and for 32 mos , more than $\$ 522,000-$
making from this one patent alone, in less than fourteen years, a saving of human toil and exertion amounting to more than $\$ 2,243,000$. Thomas Silverthonn, the poor me chanic who invented the copper-toed shoe, little knew the significance and value of this simple idea. Through its adoption, it is estimated that from $\$ 6,000,000$ to $\$ 12,000,000$ are annually saved to the country, and yet the humble inventor had to wait for his good fortune until his patent was ex tended, when it was bought by a company for $\$ 67,000$ Henry Burden, the inventor of the first successful machine for the manufacture of horseshoes, was able to sell a finished shoe, including the iron, for four and one half cents, where as to make the same by hand would have cost sixteen cents, not including the iron. While the absolute benefit to the public by this invention cannot be calculated, it is known that the gain to the government alone during the late war
amounted to $\$ 4,000,000$. Under the head of "Profits of Pa tentees compared with Profits of the Public," the following interesting facts are presented: There is now in common use a little staple for fastening the rods to the slats of Venetian blinds. It has corrugated shanks to hold in the wood with out clinching, and for this reason requires so much less iron in its manufacture that in five years' trade, in this country alone, it is estimated that five thousand tuns of wire hav been saved. Seventy-fivetuns of these little staples are used in the United States every year, at a yearly saving to the ublic of $\$ 100,000$, while $\$ 20,000$ was all that the inventor Byron Boardman, received as his share. We are forced t pass over without mention many equally interesting an
significant facts, of all of which Mr. Whitney makes use in
comfirming his views regarding the value of patents in fostering industry by rewarding the inventor, showing at the same time that the gain to the latter is by no means exces sive compared with the saving to the public. A closing illus tration enforcing this claim, and one which will be readily recognized by the housekeeper, may here be cited: Formal ly, when a tin can was soldered up, it was difficult matter to open it, but in 1859 John W. Masury hit upon the idea of making a portion of the cover of very thin metal, which could be easily cut through with a knife. Ten millions of these cans are made yearly. The Borden Condensed Milk Company use ten thousand each and every working day in the year. The invention is largely used in the paint trade, as it enables paint to be put up in liquid form, ready for use therefore saving the painter's time and trouble in mixing paint. The United States Circuit Court decided the value of this improvement to be not less than three cents for each pound can; but the inventor granted licenses under the pat nt for a royalty of one quarter of a cent per pound can, tha to say, for every twelve cents the public gained from th invention, the inventor was content to gain one cent.
The above (from Appleton's Journal) contains only a smal ortion of Mr. Whitney's address, which abounds in inter esting statistics, exhibiting on the part of the author a re markable degree of research. We shall take occasion to make further extracts in a future issue.-Eds.]

## Subterranean Festivities.

We acknowlege the receipt, too late, however, to enable us to get there, of a ticket to a grand "Basket Picnic and ubterranean Ball," given October 13, 1875, in the bowel Leavenworth Mountain, within Marshall Tunnel, vicinity Georgetown, Colorado. Our invitation says:-
For the information of visitors it may be stated that the elevation of the Tunnel is 9,500 feet above the level of the sea, and the dance hall is 810 feet in from the mouth of th unnel, and is 500 feet below the surface. From the mine cut by this tunnel millions of dollars have been taken-

## And belo wthis argentiferous flo

The exercises will be opened by a brief address from Com odore Stephen Decatur.
Guests are privileged to ride on the palatial rock sars from outh of tunnel to hal
The festivities will be prolonged until ten boxes of wax candles are consumed.'
Effects of Heat on Steel Wires and Rods. Professor W. F.Barrett has found that, if steel of any thick ness be heated by any means, at a certain temperature the wire ceases to expand, although the heat be continually poured in. During this period also the wire does not increase in temperature. The length of the time during which this ab normal condition lasts varies with the thickness of the wir and the rapidity with which it can be heated through. It ceases to expand, and no further change takes place till the heat is cut off. When this is done, the wire begins to coo down regularly till it has reached the critical point at which the change took place on heating. Here a second and reverse change occurs. At the moment that the expansion occurs an actual increase in temperature takes place, sufficiently large to cause the wire to glow again with a red-hot heat. It is curious that this after-glow had not been noticed long ago or it is a very conspicuous object in steel wires that have been raised to a white heat and allowed to cool.

The Electric Light as a Military Signal.
The roof of the Siemens-Halske factory at Berlin, was re ently the scene of a series of experiments with the electri ight, which filled all the streets in the vicinity with rowd staring with astonishment at a supposed wonderfu atural phenomenon, up in the clouds. The apparatus, which gave a light so powerful that ordinary writing could be read by its illumination at a mile distance, was arranged with an nclosed mirror, so that the rays were projected against the louds, which served as a screen. In front of the mirror the signals were made, and these were repeated, of course on a gigantic scale, in the clouds. The light is to be adopted to the German army for night signaling.

## The Force of Expansion

The boiler stack ( 60 feet in hight) of the Ohio Iron Company of Zanesville, recently fell with a sudden and heavy crash killing one of the furnace men instantly. The boiler had jus been heated up, after having been cold, when the stack gav way. It appears that the gas flame had destroyed the inside ining of the stack, and had partly destroyed some of the brick and weakened the brickwork, so that, when the tack became suddenly heated again, the expansion resulted in the demolition of the whole structure

New Oil Car.
A. P. O'Dell, of Oil City,Pa., is the author of a new oil tank ar, which, if it fulfils the expectations of the inventor whe put to a practical test, will greatly lessen the cost of trans porting oil to the seaboard. The tank is swung underneat platform, which can be used as an ordinary gondola ca for carrying freight on the return trip. At present the tank cars have to be returned empty, which is a dead loss in freight.

To render glass impervious to the direct rays of the sun but not so opaque as to exclude light, powder some fluorspa nd mix it with sulphuric acid, and rub the mixture on the lass with a piece of lead. Then heat the glass on som tove or other arrangement by which the fumes can pass up the chimney; and when cool, wash the plate with a dilut solution of potash, and rinse in water

## Important to Inventoris and Patentees <br> REDUCTION IN THE COST OF FOREIGN PATENTS.

Messrs. Munn \& Co. take pleasure in announcing that they have effected arrangements by which the cost of Pa tents, in all Foreign Countries, for American Inventions is Greatly Reduced, and they are now ready to receive applications for such patents at the annexed rates, which include both Government and Agency fees for all ordinary cases. Some applications may require a number of drawings and a specification of unusual length, for which an additional charge will be made. But the annexed very low prices will be adhered to, except in special cases, when the invento will be notified of any additional cost before any expense is incurred.

## CANADA.

The expense of applying for a Canadian Patent is reduced $\$ 50$, currency.
A Canadian Patent is granted for 15 years, divided, if the applicant desires, into three terms of five years each. The expense of applying for the 5 year patent is $\$ 50$. Model and drawings required as in this country. American inven. tions already patented here can be patented in Canada if the application is filed within the one year from the date of the American patent. Caveats can be filed in Canada. Expenses, $\$ 25$ in full. Send for pamphlet giving all particulars.

## ENGLAND.

The expense of applying for an English Patent, which overs England, Scotland, Wales, Ireland, and the Channel Islands, is $\$ 75$, 'currency, payable in advance, and an additional fee of $\$ 175$, payable within $3 \frac{1}{2}$ months, to complete the patent. Certain government taxes are required after 3 years. Patents granted to the first person who files in the complete specification and pays the fees, whether he is the original inventor or merely the introducer. For full particulars, send for pamphlet.

## FRANCE.

The expense of applying for a French Patent is reduced to $\$ 1 \mathrm{CO}$, currency, payable $\$ 75$ on making the application, and $\$ 25$ on arrival of the Patent. A small annual tax is re. quired after the first year. For amount of this tax and particulars about working the patent, see pamphlet. Sent free BELGIUM.
The cost of a Belgian Patent, and the conditions, are substantially the same as in France. For full particulars send for pamphlet.

GERMANY AND AUSTRIA.
The expense of applying for Patentsin Germany and Austria is $\$ 100$ each, payable in advance. Send for pamphlet giving details.
Munn \& Co. obtain patents also in Norway, Sweden, Russia, Spain, Portugal, Italy. all the British Australian Colonies, including Victoria, New South Wales, Tasmania, Queensland, New Zealand, and British India, on the most favorable terms, and at reduced rates from former charges.

## GENERAL REMARKS.

No models required in any of the Foreign Countries exeept Canada; and sometimes in Prussia, the officials re quire a model when in doubt about the novelty of the invention, but it is seldom that one is demanded, and never till the application is secure.
All persons who desire to take out Foreign Patents are requested to communicate with the undersigned. They msy depend thattheir cases will secure prompt and careful attention. We have had an experience of nearly Thirty years in the business of soliciting American and Foreign Patents; and as is well known, a very large proportion of all patents obtained by American citizens, both in this country and in foreign lands, are solicited through the Scientific American Pa tent Agency.
To secure a foreign patent, all that is necessary is to write to the undersigued, transmitting the fees and a copy of specifications and drawings. We can theu at once proceed. The personal presence of the applicant is not necessary.
A pamphlet, giving full detailed information regarding each country, sent free. Address, MUNN \& CO.,

Office of the Scientific American, New York.

## Gecent Ankrican and fortgin eatents.

## John B. Hall, St. Paul, Minn.-This invention relates to boots or

 wrappers for horses' feet, to aid in the cure of diseased feet, an consists in a boot or wrapper applied to the foot, havingthereto a spring plate to press against sponge on the frog.

Improved Wrench.
Richard J. Welles, St. Joseph, Mo.-The handle is threaded and Richard J. Welles, St. Joseph, Mo.-The handle is threaded and
movable on a screw shank so as to form an adjustable jam nut to the revolving nut, through which the sliding jaw is moved. Improved Corset.
Daniel H. Horne, New York city.-This corset has bosom-supporting cups of suitable wire gauze, which are connected by sockets with the stays. As the air pass.
the corsets are cool and healthy.

## Improved Wagon Spring. Lucien B. Devendorf, Utica, N. Y.-This

 as to prevent the box from tipping when getting into and the wagon, and which may also serve as a reach in skeleton toward the middle, and bent inward so that their middle parts cros each otber.Improved Magazine Fire Arm.
Emil A. F. Toepperwein, Boerne, Tex.-This improved repeating fire arm is contrived with a sliding breech block, which is drawn back by a crank on the right hand side of the gun, connected with a pair of toggie levers, pivoted, respectively, to the breech closer and
the breech frames. There is a cartridge lifter below the biock, the breech frames. There is a cartridge lifter below the biock,
which is thrown up to present the cartridge to the barrel by an which is thrown up to present the cartridge to the barrel by an
arm of the block just before it comes to rest in the backward movement. The shell is partly expelled by stops, against which the lower edge strikes at about the same time, and the new cartridge finishes the work, and it is held in position by a spring, when the lifter drops back, till the breech block pushes it in the barrel. The cartridges are put into the magazine through the opening made by sliding the breech block back, the block being moved not quit

Improved Tripod for Rock Drills.
Joseph C. Githens, New York city.-This is a tripod and clamp for
holding the shield, in which the steam cylinder of a holding the shield, in which the steam cylinder of a steam rock
drill moves up and down. It is so constructed as to hold the cylinder securely while the drill is being used, and to enable the drill to be adjusted to work at any desired level and at any desired angle.

Improved Escapement for watches.
Edouard Bourquin, La Heutte, Switzerland.-This invention is an serve the purpose of the two commonly used, and so arranged that it works with less friction, and is more cettain in its action.. There are two rows of reversely inclined teeth on the side of the scape-
wheel, in combination of a single pallet in the lever. The teeth are wheel, in combination of a single pallet in the lever. The teeth are the impulse by their incines.

## Improved Plane Guide.

Walter S. Shipe, Minerva, O.-This invention improves the plane guide for which a patent has been granted to the same inventor under date of January 6,1874 , so that it will work more steadily and accurately, and be readily set to any desired angle. The invention consists, mainly, of a recessed handle extension of the yoke part in connection with a slotted arc piece of the guide strip-connecting plate, the arc piece being pivoted to the yoke and set by a clamp
screw thereto. A wire key with bent end is inserted into a hole of the guide strip for being readily available for turning the clamping ew nuts.

Improvedd Crozing and Leveling Tool.
Samuel S. Steel, of Martin, and George W. Reel, of Woodville Ohio.-The stock of the leveler or plane, which is made of segmental form, has a projection on its inner or concave edge, to which
the crozing tool is attached by means of studs. The crozing plate the crozing tool is attached by means of studs. The crozing plate
has a projection to which the crozing cutter is attached. In using the tool, the thumb is placed on a piece, and spring pins are pressed
through the stock, so that their ends bear upon the inner surface of through the stock, so that their ends bear upon the inner surface of
the stave ends, and thereby prevent the crozing bit from cutting while the barrel is being leveled.
Improved Machine for Bending Wire Frames of
Charles de Quillfeldt, New York city.-This invention relates to a stoppers, being mainly designed to manufacture the wire lever frame and yoke of the bottle stopper, for which a patent has been granted to the same inventor under date of January 5, 1875. The invention consists of different mechanisms, to which the wire blanks
are fed for being bent in consecutive order into the required shape, are fed for being bent in consecutive order into the required shape,
one wire lever frame or yoke being turned out at each revolution of the driving shaft.

Improved Combination Lock.
Alfred E. Peters, Moncton, Canada.-This invention consists of a by spring bars depressed by a pin inserted through perforations o the face plate. The springs are engaged by a sliding and toothed spring bar that releases the preceding spring, and secures thereby the return of the spring-acted roller,except when the correct combination is set in regular succession, which prevents the return of e roller and allows the throwing of the bolt

## Improved Colliery Plant.

Rufus A. Wilder, Cressona, Pa.-The coal is dumped into the chutes above the platform. When it is covered with dirt from the mines it is washed, by means of the attached hose, with water under
pressure. The fine parts unfit for use, as well as the water. run off pressure. The fine parts unfit tor use, as well as the water. run off
below the platform. In this state, the men employed on the platform to assort the coal can easily distinguish the pure from the impure, and cast the latter upon the conveyer, to the rear of the platform, which carries it to the dirt wagons or elevators for that purpose, while the former is separated, if desired, and the lump and such sizes as it is not desired to break are thrown upon the side conveyer, which takes it directly to the loading chutes, while the rest
is thrown upon the conveyers in front of the platform and moved th thrown upon the conveyers in front of the platform and moved
to the breakers. Over the breaker is a slotted pipe, which throws a thin stream of water into the breaker, to lay the dust produced by breaking the coal. As the coal falls from the breaker upon the next conveyer, which delivers it to the elevator, it is struck by a
forcible stream of water, steam, or compressed air from the pipe forcible stream of water, steam, or compressed air from the pipe
under the breaker, to assist in spreading the coal over the surfaee nder the breaker, to assist in spreading the coal over the surfaee the conveyer, and partially separate it from the slate. Along rities. At the end of the conveyer there is a thin opening under a separating plate, to take out small, thin pieces of slate not observed by the pickers, while the revolving rakes assist in moving the coal over this plate to the buckets of the elevator, which take the coal to
the head of the chutes. A movable conveyer at the head of the the head of the chutes. A movable conveyer at the head of the
elevator is used to convey and separate the coal, as conveyed from the main chutes to any number of platforms placed parallel to the

## Improved Journal Box.

John Schellkopf, Tidioute, Pa.-The object of this invention is to arovide a simple form of adjustable journal box; and it consists in bination with holders upon each side, one of which is provided with a socket or depression which receives and supports one of the pivots of the journal box, and the other of which holders is provided with an elongated depression or mortise, which receives the other pivot of the journal box; by means of which construction the said jouralso an adjustment at right angles thereto, equal to the length of also an adju
the mortise.
Combined wheat Drill, Corn Planter, and Roller. Samuel Brown, Lebanon, Mo.-The invention relates chiefly to which the revolving roller hasits bearings, and providing the roller with cams which operate the seed slides through the medium of
levers pivoted to the hinged frame.

## Improved Heel for Boots and Shoes.

Robert Vint, Brooklyn, N. Y.-The outer surface of a casing tapering toward the lower edge to form a rim that guides a coni cally tapering heel plate of rubber that is attached to cushioning band springs securely attached to the casing. A recess in the stiffening plate may also be used to secure the skates. The heel plat fits exactly into the tapering casing, and has shoulders which serve to form contact with the interior of the casing and give a perfectly level position to the heel plate when depressed by the foot. Th the heel plate is pressed up far eaough to be within the extromit of the heel casing the rim of the same is brought into use, and thereby the wearing out of the heel plate retarded.
Improved Cultivator.

Martin McNitt, Mound Station, Ill.-This invention is an improve ment in the class of cultivators whose teeth are attached to pivoted
bars, whereby their pitch may be adjusted at will. The improvement relates to the arrangement of the pivoted handles of the im plement to act as pawls in conjunction with the ratchet bars, by Improved Cartridere Case for Blasting.

Improved Cartridge Case for Blasting
Paul A. Oliver, Wilkesbarre, Pa.-The invention consists of a
cartridge shell provided with one or more tubular sections that telescope therein, for adjustment to the requisite length.

## Improved Mining Machine.

J. J. Weirrel, Allegheay Township, Pa.-The invention relates to means whereby a coal drill may be conveniently adjusted and operated in the mine, and consists in novel combinations by which a person can drill more closely to, and more nearly with the wall
the mine, thus leaving nothing to be trimmed with the pick. Improved Baling Press.
Christopher C. Campbell, East Chatham, N. Y.-This invention relates to certain improvements in perpetual baling presses, or presse in which the plater and follower are successively interchangeable, and the operations of pressing and tying are both conducted at the
same time, the compressed bale being held in position for being tied, while the box is being filled and the succeeding bale pressed. t consists in the peculiarconstruction and arrangement of the stop devices for holding and retaining the follower in the rear of the bale, which has been forced into the slotted portion of the box ready for tying,
for a new bale.

Improved Centrifugal water wheel.
J. H. Meacham, Petersburg, Va.-The invention relates to tur of wheels adapted to be run by the vertical or centrifugal action grooves running from apex to periphery of base.

## Improved Hat-Brushing Machine.

Simon P. Siver and George H. Swords, Fishkill Landing, N. Y.This consists of a conical hat-carrying roller and a conical revolving brush, arranged side by side to brush the hat between them, and
contrived so that the brush can be swung away from the roller and back again readily, to facilitate the adjusting of the hat body.

Improved Balance Valve.
John F. Allen, New York city, assignor to George T. Hope, Bay
Ridge, N Y, and Charles T. Porter, New York city Ridge, N. Y., and Charles T. Porter, New York city.-This valve is balanced so that it can be adjusted to any pressure at any time
without opening the steam chest. It will lift when a locomotive without opening the steam chest. It will lift when a locomotive
engine is running after the steam has been shut off, and prevent the piston from pumping air into the boiler by allowing the arr to escape from the front to the rear of the piston under the valve. It also acts as a relief valve to the engine in case the cylinder is filled with water.
Automatic Bale-Rolling Attachment for Com-
Henry Riesel, Galveston, Tex.-This device is designed especially for attachment to the press known as Iyler's cotton compress, but is applicable to other presses, for rolling the bale, when compressed
and bound, from the press to the floor. It consists in a bar provided with two or more forwardly projecting prongs upon its upper end, the spring latch, and the inclined bar, in combination with the follower and the base of the press. When the follower is down in the position to receive the bale, the prongs of the bar rest in the groove of the said follower, and the bale, when placed upon the follower, ests upon them. After the follower has been raised, the bale compressed, and its bands secured, it is again lowered. As the follower
descends, the lower end of the bar strikes against the latch, which stops the said bar, and causes the prongs of said bar to rise against the rear part of the lower side of the bale, and roll or tumble it of he follower. As the follower continues to descend, an inclined ba trikes the latch and pushes it back from ber eath the bar, allowing he said bar to drop into place, and the machine is ready to receive nother bale.

Improved Sinker for Fishing Lines.
Edward Pitcher, Brooklyn, N. Y.-This sinker is cast with looped body of the ine
arern.

## Improved Farm Fence

Joseph E. Winters, Fincastle, Ohio.-This invention consists of osts which are set by feet, legs, or spikes, on a rock or block, an
onnected by slats in zigzag or worm shape, for supporting a light traight paling running intermediately between the posts place in the front and rear of the same.
lmproved Roller Bearing for Speeders, etc. Samuel Dyer, Natick, R. I.-A bearing plate and a screw are used attach and support the bearing, the said plate and the bearing being screwed on to a lug under a cup. The removable bearing
plate is introduced, so that when worn, it can be easily and cheaply late is intr

Improved Clip for Fellies and Tires.
Robert Ray, Carrollton, Miss.-This invention consists of a meta ip to wrap around the joints of the relin a wheel for splicin hold the tire on the felly without bolts or screws.

Improved Heater.
Miffin W. Baily, Pottstown, Pa., assignor to himself and R. J Mifflin w. Baily, Place.-A valve in the hot air passage is so balBaldwin, of same place.-A valve in the hot air passage is so bal-
anced that when the registers in the room to be heated are closed, and but littleair is passing up through the opening from the furnace on which the valve is seated, the valve will fall and close the
register and open an air inlet above the fire, thus checking the register and open an air inlet above the fire, thus checking the
same; but when more air passes by the increased draft caused by same; but when more air passes by the increased draft caused by
more open registers, the increased pressure on the valve will lift it aore open registers, the increased pressure on the valve will lift it
and close a damper, and open an air inlet to increase the fire accordingly, thus automatically regulating the fire by the hot air delivered into the rooms.

Improved Machine for Cutting Roll Paper. Louis P. Cohen and Ignatz Frank, New York city, N. Y.-This the roll papers, for telegraph rolls and other purposes; and it con sists mainly of movable roll-clamping standards provided with one or more revolving ring-shaped heads carrying the cutting knive
that are fed forward simultaneously by suitable mechanisms.

## susintss and zersouni

 The Charve for Ineertion under this head is \$1 1 Line. Dry steam dries green lumber in 2 days, and is thenily Cheap House Furnace. $H$ G. Bulkley Clevelana,, . Hoadley Portable Engines. R. R. H. Allen \& Co
New York, Sole Hotchkiss Airs Spring Forge Hammer, vest in the
market. Prices low. D. Fribbe \& Co , New Eaven. Ct. Wanted-The best Machine for pointicg Horse
Shoe Nails. William Morehouse, Buffalo, N. Y. Perfection of Hay Rakes, Fricion Self-Dump,
without Ratchets, Gears or Springs. Half interest in ithout Ratchets, Gears or springs. Half interest
U. S. Patent for Sale. C. La Dow. Ballston, N. Y. Saw Teeth Indicator-Showing improved form
for fling teeth on Saws for use in different kinds of The Newspaper A gency of Messrs Geo. r. Row
ell © Co., New York, is becoming quite celertate over the whole Union, extending their business facilities to
every part of the country, and doing their business in prompt. efficicent, and d asisfacaory manner with theire
tens of thousands of customers. Those who have adverising business with th
Lesilie (Mich.) Herald
Lit
Wanted-Proposals for diminishing cost of run-
ning two pairs of 20x48 Woodruft High Pressure En-gines-one pair running at 60, the other at 65
60 lbs. steam. Address Box 3329 , New Tork
For reduced prices of Surface Planers and Mitre
Dovetailer's Machines, send to A. Davis, Lowell, Mass. "Pantect," or Universal Worker-Best combina-
ion of Lathe, Drill, Circular, and Scroll Saw. E. 0 . Good Manufacturing Sites and opportunities at
Bridgeport, Conn. Address John F . Noble. For Sale or Trade, Cheap-A half interest in a
Machine and Repair Shop. J. A. Campbell, Farming-
 The best Varnishes used in this country are those
made by Hyatt $\&$ Co., New York. They are better, cheaper, and more satisfatcorory than any of the Imported var-
nishes and are everywhere demonstrating their superiornishes, and are everywhere de
ity. Send for their circular.
For Sale-Milling Machine and 3,000 Cold Blake's Belt Studs are the best fastening for
Leather or Rubber Belts. Greene, Tweed \& Co.,18 Park Seale in Boilers Removed-No pay till the work
is done. send for pamphlet. Geo. w. Lord, Phila., Pa. Suction \& Blast Fans, Wood-working Machinery,
D. J. Lattimore 3ist \& Chestnut st., Phila., Pa. To Manufacturers-Purt Lubricating Oil, Sample
Package ( 24 gals.), 87 . Send to Geo. Allen, Franklin.Pa. Educational Lantern Slides-Send for Catalogue
o Prof., W.A.Anthony, Cornell University, Ithaca, N.Y. Hotchkiss $\&$ Ball, Meriden, Conn., Foundrymen
and workers of sheet metal. Fine Gray Iron Castings to order. Job work solicited.
To Purchasers of Engines, Boilers, and Machin-
ery-Special and important information may be obtained, and special inducements will be offered, by addressing Told $\&$ Rafferty. Machine Com
No. 10 Barclay St., New York.
For Sale, cheap-One 60 H.P. Boiler, 40 Engines Steam and Water Gauge and Gauge Cocks Com-
bined, requirng only two holes in the boilier, used by all boiler makerswho have seen it, $\% 1 \mathrm{l}$. Hillard \& Holland, Amateurs and Artizans, see advertisement, page
221. Fleetvood Scrol Saw,Trump Bro's, Manufacturers, wilmington, De
Electric Burglar Alarms and Private House An-
nunclators; Cail, Servants' $\otimes$ Stable Bells; Cheap Teleg.
 Hand Fire Engines, Lift and Force Pumps for fire
and all other purposes.
Address Rumsey $\&$ Co., seneca
 Price only $\$ 3.50$ - The Tom Thumb Electric Tel-

 operation by any lad. Includes battery, key, and wires.
Neatly packed and sent to oll parts of the world on re-
 ree. Goodnow \& Wightman, 23 Cornhill, Boston,M Mass.
Peck's Patent Drop Press. Still the best in use
Address millo eeck, New Haven, Conn. For Solid Emery Whels and Machinery, send
the Union Stone Co., Boston, Mass., for circular. All Fruit-can Tools,Ferracute W'ks, Bridgeton,N.J. Hydraulic Presses and Jacks, new and second
hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, , 770 Grana street, New York.
Temples and Oilcans. Draper, Hopedale, Mass. Spinning Rings of a Superior Quality-Whitins-
ville spinning Ring Co., Whitinsville, Mass. For best Presses., , ines, and Fruit Can Tools, Bliss
W Williams, cor. of Plymuth and Jay, Brooklyn, N. Y. For Solid Wrought-iron Beams, etc., see adver-
fisement.
Address Union Iron Mills, $\underset{\substack{\text { Cor intino. Aaph, \&c. } \\ \text { Diamond Tools- }}}{ }$ Steam Pumps 1 to 8. Injectors. Steam Traps
and Damper Regulators on trial. Send for Circular. A. and Damper Regulators on trial. Send for
G. Brooks, 222 vine street, Philadelphia, Pren
Magic Lanterns and Stereopticons of all sizes and
prices.
views ilustratin every subject for Parror
Amsement and Amusement and Public Exhbibitions. Pays well on smal
Investments. 72 Page Catalogue free. McAllister, 41 Eassuu St., New York.
 For Sale- Large lot seocnd hand Machinists'
Tools, cheap. Send for list. I. H. Shearman. 45 Cortandt street, New York.
The "
The "Scientific American" Office, New York, is
fitted with the Miniature:Electric Telegraph. By touch Ithe
Intrele buttons on the dessks of the emanagers, siongal
are sent to persons in the various departments of the

 For best. Bolt Cutter, at greatly reduced P
address H. B. Brown © Co.,
New Haven Conn.

The Baxter Engine-A 48 Page Pamphlet, con
aining detall drawings of all parts and full particulars now ready, and will be
8 Park Place, New York.
Brass Gear Wheols, for Models, \&CO, on hand and
made to order, by D. Gibert \& Son, 212 Chester St Phi nade to order, by D. Filibert \& Son, 212 chester st., Phil
delphia, Pa. (List free.) Light manufacturing soilcted
"Lehigh"-For informationabout Emery Wheel American Metaline Co., 61 Warren St., N.Y. City Genuine Concord Axles-Brown,Fisherville,N.H.
 For 13, 15, 18 and 18 inch Swing Engine Lathe
address star Tool Co.. Providence. R. I.

## \% Wilesx Mineries

A. P. can cement leather to wood by usin marking ink on p. 129, vol. 28.-G. W. H. will find a good recipe for mucilage on p. 251, vol. 33.-H.
D. P. will find directions for gilding moldings on p. 347, vol.31.-G. H. R. will find a recipe for ha wash on pp. 267,363, vol. 31.-A. W. P. will tind -W. B. and D. A. R. will find directions for pro portioning cone pulleys on p. 100, vol. 25.-N. H.H will find a recipe for filling for millstones on $p$,
251, vol.31. G . W. will find directions for remov ing peach stains from linen on p. 283, vol. 31.-C. A. B. will find directions for gold and silver plating on p. 405, vol. 32.-J. B. can caseharden his plow 33.-F. D. T. will find explanations of the egg hatching process in the Science Record for 1874. W. R. B. will find directions for grınding a para-
bolic mirror on p. 276, vol. 30 . Silvering glass is bolic mirror on p. 276, vol. 30. Silvering glass is
described on p. 234, vol. 30.-W. B. T. will find dir ections for preserving cloth goods from mildew on 75, vol. 32. Dyeing feathers on p. 299, vol. 31.-W F. R. will find directions for mounting chromos, etc., on p. 91, vol. 32. Cleaning gilt frames is de-
scribed on p. 27, vol. 31.-W. R. H. will find directions for making fruit jellies on p. 281, vol. 26.-J. fur on p. 388, vol. 29.-C. M. W. should read the fur on p. 388, vol. 29.-C. M. W. should read the
SCIENTIFIC AMERICAN, and he will not then waste his time on the perpetual motion nonsense.-H. B. B. will find a description of the hydraulic ram en p. 269, vol. 31, and one of the construction of
windmills on p. 241, vol. $32 .-$ C. S. will find a formuwindmills on p. 241, vol. 3\%.-C. S. will find a formu-
la for the dimensions of a fly wheel on p. 288, vol. dropped 138,250 , vol. 31.-C. H. S. can color paraffin wit any aniline dye. - H. Y. will find that the proportions of a fly wheel are given on p. 288, vol. 28.
The temperature of compressed air is discussed on The temperature of compressed air is discussed on
p. 123, vol. 33 . - H. B. can galvanize iron by the process given on p. 347, vol. 31-A. Y. S. can wate proof canvas by the process described on p. 347
vol. 31.-E. H. P. is informed that the maximum pressure of steam depends on the maximum tem-
perature. See p. 81, vol. 29.-G.F. G. will find a description of the carving pantagraph on p. 95, vol 33.-C. W. M. will find directions for making plas-
ter of Paris on p. 399, vol. 29.-C. T. S. can clean rust off an engine by the method described on $p$.
267, vol. 33.-J. L. B. should not run the risk of spoiling her hair by usng nostrums, which are always deleterious. -A. A. D. can make battery car
bons by the process described on p. 35 , vol. 33 bons by the process described on p. 35, vol. 33.-
W. R. should apply to Seth Green, Esq., Rochester N. Y., for the best method of stocking a strea with trout-E. H. will finda description of lap and ead on p. 101, vol. 32. Crucibles are described on
309, vol. 31.-J. F. W. will find a recipe for axle rease on p. 90, vol. 31.
(1) J. A. M. asks: How can I clean stone are jars that have had muriatic tin crystals in The tin may be removed by muriatic acid.
(2) J. M. H. says: The phenomena referred to on p. 193, vol. 33, can be easily and satisfactorily explained by supposing that the boiler in the
first case was quite hot and not of very large size first case was quite hot and not of very large size,
but of thick iron; and the water being introduced but of thick iron; and the water being introduced
-not very rapidly-the small quantity became -not very rapidly-the small quantity became
heated intensely, producing the 190 lbs . pressure indicated. In the other case, it is probable that the boiler was not so much heated as supposed, or
the boiler iron not so heavy, or both, or the water may have been introduced much faster than in the first instance. If the boiler was not very hot and
the water was introduced quite rapidy, it would have had precisely the effect stated. The first wa-
ter introduced would be converted instantly into steam, which was suddenly condensed by the rapid cooling of the boiler and its contents by the working of the pump. These are the several conditions which, I think, would, separately or together, have produced the results stated. A. Our correspondent is entitled to especial commendation for the clear and satisfactory explanation here given. matters of theory to a great extent, but J. M. H.'s iews are very reasonable.
(3) J. P. M. says: Having had a conversatates Navy, late chief engineer of the United should never be used in the cylinder of any engine, only a little pure beeswax on the piston rods. If you are sure that the tallow is pure, you may we think it is preferable to use good oil.
(4) A. B. C. asks: There are two boilers in Rensselaer county, N. Y., which are running with-
out safety valves or steam gages. Is there any law to prevent this? They are old boilers, but
have recently been repaired. A. We do not think
there is any law, and we can scarcely believe that
any one would be foolhardy enough to carry muc pressure under such circumstances. We wish you would send us further particulars. If the owne of the boilers is running them in entire ignorance and carelessness of the pressure, you will be doing ion. We may add that, in the absence of a special reventive law, the owner of these boilers can be rosecuted on the complaint of any one who thinks that he is conducting his business in a man
(5) J. A. D. asks : How can I polish wrought ron? A. Warm your goods till they are unbearable to the hand; then rub with new clean white
wax. Heat the goods again so that the wax ma oak in them; then rub them over with a piece of serge.
(6) G. R. asks: Is there a practical way of etermining when an engine is precisely on th center, independent of the guides? A. Strike on
he end of the crank a circle of the same size a he end of the crank a circle of the same size as
he crank pin; then (for a horizontal engine) place he crank pin as near the center as the eye will direct, then place a straight edge with one end resting on the crank pin and the other even with the orresponding diameter of the circle. Upon the till the level stands true. If, however, the crank der is not set quite level first place the spirit livel on the piston rod, note how the bubble stands,and then move the crank pin till the bubble of the spirit level, applied as directed, stands as upon the
(7) F. H. D. asks: 1. Is there any differ ence in the tractile power of a locomotivedriv Wheel when the crade goes over or under the axie
in ascending a grade? A.No. 2. Is the leverage on the axle the only leverage there is in ascending
(8) C. A. a $-k s$ : Why does a ball, fired rom a barrel 6 inches long, fail to go straight t its mark at 10 yards distance? A. The barrel i
too short to throw a ball with any degree of accuracy to the distance you mention. The resistance of the air
deviation
(9) J. W. K. says: I have been told that ome planters in Louisiana employ electricity in the process of purifying cane juice. The juice it A. We have never heard of such use of electricity nd do not think the statement can be correct. (10) C. S. R. asks: 1. How can I put a
oint of metal or iron on a worn-out metal plow point, in a common smith's fire? A. The remain of the old steel or the plow will show the shape of the weld. Use shear or cast steel, using borax as a welding compound; be careful not to overheat
the steel. 2. How can I temper cold chisels, and drills for drilling iron and other metals, and stone? A. You will find directions for tempering drills and cold chisels for metal, etc., in "Practical Mechanism," No. 4, p. 21, vol. 31. To temper cold chisels for stone, heat the chisel in a charcoa
(11) E. A. K. asks: What can be added to tempering solution that will give the steel bright silver color without impairing the te
ing qualities of the solution? A. Nothing.
(12) F. B. M. asks: How can I test gold with acid, and whatkind of acid is used for that purpose? A. The touchstone used for this pur-,
pose is a piece of black basalt, or even black slate, over which the gold to be tested is drawn so as to leave a streak of the fine particles upon the surface. This streak, of course, remains untouched
when moistened with nitric acid; but if a streak when moistened with nitric acid; but if a streak of any base alloy (of copper and zinc, for exam-
ple), made to imitate gold, be made upon the touchstone, the nitric acid will immediately dissolve it. The acid employed in this test is gener
ally mixed with a minute proportion of muriatic acid (98 parts by weight of nitric acid, of specific gravity $1 \cdot 34,3$ parts hydrochloric acid of specific gravity $1 \cdot 173$, and 25 parts water. The streak isnot apparently affected by the acid if the gold is no below 18 carats fine; by making several streaks in face upon the touchstone, any error arising from the thin external coating of fine gold may be avoided; a feather or glass rod serves for moistening the streaks with the acid. In order to determine by the touchstone the proportion of gold
which is present in the alloy, the streak is compared with that made by a series of touch needles, composed of alloys containing gradually diminishing quantities of gold. In experienced hands the error of not more than one part in a hundred.
(13) G. B. asks: 1. Will a copper ball,made side a steam boiler with the steam at any desired pressure? A. Yes. 2. Will the heat of the steam injure a brass or steel spring? A. Yes. The in-
jury to a well made spring will be very slight, (1)
(14) B. T. P. asks: Please give me directions for tinning wrought iron wire. A.Clean the wire, cover it with a s.
and dip into melted tin.
I wish to send some dead birds 1,500 miles. How can I prepare them so as to prevent decomposi-
tion? A. It will be best to pack them in ice and or tan bark.
(15) N. A. W. asks: What are hyperbolic logarithms? A. The hyperbolic lugarithm of a number is the power to which in is necessary
raise the quantity 2.7182818 , in order to produc the given number.
(16) J. J. M. says: A Hunter's screw has a ever 51 feet long. The distance between the
threads of larger screw is 1 inch, and between
hose of the smaller, 3 inch. How much weigh an a man whose power is represented by 175 lbs. ion, the relatio of the fore the ion, the relation of the force to the weight in ween the distances passed over by each in the same time.
(17) J. A. McC. asks : Is there any kind of teel that may properly be called a natural pro the sense in which that term is ordinarily em ployed. There is no native steel.
(18) F. B. asks: Upon a railroad car in rapid notion, I let fall a ball striking the floor. A frien ays that the ball will strike at precisely the sam say the projective force given to me and the bal by the engine ceases to act upon the ball after it eaves my hands until it strikes the fioor, hence
he floor is a curved line A. Your idea is correet, he floor is a curved line. A. Your idea is correct,
but the time of descent is so slight that the curve is practically a straight line.
(19) J. B. F. says: I have a pair of cylin wits 169 tubes of half inch internal diameter ; out ide shell is 18 inches in diameter by 28 inches high. want to run a boat 30 feet long by $5 \frac{1}{2}$ feet beam. What will be the size of a propeller suitable fo his engine and boat, pressure of steam being 15 mete A. Use a prope meter and of 3 to $3 \%$ feet pitch. 2. What spee
ould be obtained with the above? rom 6 to 7 miles an hour.
(20) C. J. A. says: 1. I have a muzzle-loàa ag rife that carries a $1 /$ oz. round ball, and a 1 oz
onical ball; and with the same elevation of sight same kind of patch, same charge of powder, and sighted at same object, it will throw the conical ball nearly twice as far as the round one. Why is
this? A. The conical ball, on account of its shape ncounters less resistance from the air than the other. 2. In shooting over water for a thousand han it more, does it cause the ball to rall mor
(21) W. H. L. asks: What is the most simpe way to make a battery for plating? A. See
(22) J. T. H. asks: Who is Darwin, and what is his doctrine? A. He is an English naturaist, and his theory is that all animal forms have theory of evolution.
A friend says that if a thimbleful of gunpowder be confined in a solid block of steel of 4 feet cube not. Which is right? A. You are. Suppose $I$ have two tubes with 4 inches of wate in one and 10 inches in the other, and $I$ put 1 inch
of water more into each tube, will this last ine of water more into each tube, will this last inch
create any more pressure at the bottom of one be than theother, the tubes being the A. Yes, as we understand your question.

Will a 3 horse enyine do the same amount of ing an effective horse power can do more wor han an ordinary horse in a given time.
(23) F. O. says: The floor of my verandah is made of tongued and grooved boards, and paintover. The boards have shrunk, and water leat
hrough in rainy weather. I have filled the space etween the boards with putty, but would it no be best to cover the whole floor with canvas or
duck, tacked on and covered with paint? ack, tacked on and covered with paint? A. Try manufacturers of heavy iron skylights.
(24) J. C. asks: What is the proper way of bove ground tapering from 5x5 inches to $5 \times 3$ inches. A. It depends upon what kind of picket fence you wish to build. If the rails are to be sunk into the sides of the posts, in the usual way, and the pickets extend above the top of the posts, set the latterso that they will appear of unifor rom the front or back; set the front side of the post perpendicular, and let the incline be entirely on the back.
(25) W. A. asks: Has anything been in vering anything at the bottom of deep water . Marine telescopes for this purpose have long been in
lamps.
(26) N. K. B. asks : Can you give a formula for fluding the area of an inscribed regular polygon, when the perimeter of polygon and area of
circumscribed circle are known? Can you give circumscribed circle are known? Can you give
formulas for finding the number of its sides? Are the data sufficient when only one polygon will answer the conditions? A. We do not think that dimight be made by the aid of properly constructed tables.
(27) A. B. S. asks: 1. Where was the first
railroad built in the United States? raiload built in the United States? A. From Milton to Quincy, Mass., in 1826.2 Where was
the first in the South?
A. The Baltimore and hio railroad was commenced in 1828, and 15
(28) A. L. M. asks: What is meant by the number of inches of water used in driving a tur-
bine wheel? A. It refers to the size of the aperbine wheel? A. It refers to
ture, as generally employed.
In a recent issue you say one requisite for an ar tesian well is that it should be surrounded by mountains or high land. If so, how does it work
in a level desert? A. The high land in such a case is at a great distance.
Can you explain how logarithms are calculated ? A. You will find the formula, in as simple terms as
it can well be expressed, on p . 283, vol. 32. The whole subject is well treated in Law's "Logarithms," Weale's series.

Would hickory sawdust do to make paper pulp
of？ facturer
How is the angle for bevel gearing found？ have a plan for finding it which，if not identica
with yours，I will communicate．A．We should be glad to see your method．It is quite a simple problem．
（29）C．B．B．asks：What method is used to teel watch chains putish usually observed on steel watch chains，buttons，etc．？A．Use first
emery（on belts），then crocus，and lastly rouge or polishing powder．
（30）M．says：I want a 50 horse power boiler， but can get from none of the makers satisfactory nformation as to what constitutes a horse power hakers of tubular boilers of their boilers by the they allow to a proportionate amount of grate surface，and they range all the way from 10 to $221 /$ square feet．We are thus led to infer that a horse power is merely a nominal thing．But there must e something definite that constitutes in all cases horse power in a boiler．The makers of some lbs．water into good dry steam per hour constitute horse power，therefore the evaporation of 1,500 lbs．of water per hour will give me a 50 horse power
boiler．This seems like something tangible，but t correct？Must a boiler evaporate that amoun per hour in order to fill the requirements，and should a boiler that falls short of doing this be
rated less？A．There is no standard for the horse power of a boiler．The proper way to rate the ca pacity of the boiler is by the number of lbs of saturated steam that it will furnish in a given time， as，for instance，an hour．
（31）J．W．F．asks：Please give me direc－ ions for crystalizing pears，cherries，etc．，to pro carefully，and then dry，dip in thin gum arabic，and sprinkle with finely granulated sugar．
（32）J．N．P．says：＂The Catechism of the Locomotive＂gives the following rule for calcula－ used expansively in the cylinder ：Divide the ength of the piston＇s stroke in inches by the num ber of inches at which steam is cat off；；the quo－ logarithm of the ratio of expansion add 1 to it，an divide the sum by the ratio of expansion，and multiply the quotient by the mean absolute steam pressure in the cylinder during its admission．The result will be the mean absolute pressure during he stroke．＂Why do I have to add 1 to the loga－ rithm？A．It is the result of a mathematical in ou will find explained in works which treat of the theory of the steam engine．2．How do I find the hyperbolic logarithm of a number？A．To find the hyperbolic logarithm of a number，multipl he common logarithm by $2 \cdot 302585$ ．
（33）G．B．asks：What can I use to form a hard transparent varnish for paper，that will stand
handling and cleaning with water？A．We think handling and cleaning with water？A．We think
that good dammar gum in turpentine will give sat－ that good damma
（34）F．C．asks：I．How can I construct and use the simplest battery that can be made for old and sinc in a par of water ；place a piece of shee copper，to which a wire is soldered，at the bottom of the jar，and suspend a piece of zinc at the top． Connect the zinc with the object to be plated．The wire from the copper，which should pass through glass tube in the jar，is then connected to the other electrode in the plating solution．A few tery after it is set up，and more added from time to time，but care mast be taken that the blue line dues not quite reach the zinc．From one to thre cells will be required．2．Would an unglazed
flower pot do for a diaphragm？A．It is probably flower pot do for
baked too hard．
（35）E．G．F．says：A friend asserts that locomotive will pull more than it will push．I contend that its power is equa
Which is right？A．You are．
（36）A．S．G．asks：1．What is the chemical eaction in the Grenet battery The fluid is su phuric acia，water，and potassa bichromate．No upper part of cell．
$\left.\begin{array}{ll}\mathrm{K}_{2} \mathrm{Cr}_{2} \mathrm{O}_{7}+4 \mathrm{H}_{2} \mathrm{SO}_{4}=2 \mathrm{KCr}_{2} \mathrm{SO}_{4}+4 \mathrm{H}_{2} \mathrm{O}+3 \mathrm{O} \\ 3 \mathrm{Zn}+3 \mathrm{H}_{2} \mathrm{SO}_{4} & =3 \mathrm{ZnSO}_{4}+ \\ 3 \mathrm{H}_{2}\end{array}\right\} \stackrel{\circ}{4}$
．In using a small induction coil I find that，on bringing my finger near one pole of outer coil，
sparks pass，seemingly from the finger to the coil． I can feel nothing from the other pole unless the circuit is made through me．Changing the direc tion of primary current seems to make no differ－ is indifferent．How is this？A．Appearances seem to indicate that one end of the coil is not proper－ ly insulated from the base．3．What is the object
of the pole changer on induction coil？A．Conve aience in reversing the direction of the current which is often desirable in experimenting with Geissler
（37）S．H．L．asks：Is there any process by which ivory，exposed to the atmosphere，may be
made to retain its original whiteness？A．Coverit with some transparent protecting varnish
（38）P．K．W．asks：1．If a filter be built of brick in a cistern closed at the top，and covered
with water，will not pumping out of the filter draw more water ints the filter？A friend claims the pumping does not help to draw the water in the filter，that it only runs in of its own accord． A．Your friend is right．2．I claim that air can be forced in the filter until it will exceed the press－ ure of the water outside the filter，and keep the
water out．Is this so？A．Unless the top of water out．Is this so？A．Unless the top of
the cistern be airtight，you cannot force air into
the filter to a greater pressure than that of the at
mosphere without；and if it is airtight，and the pring is near the bottom of the filter，the wate will still enter the filter as high as the top of th spring，or until it traps it．If the spring is in the the air，and fill the filter，no matter what is th ressure．
（39）J．S．S．asks：How much power is r meal per hour？A．From 4 to 5 horse．It would be more economical，however，to use a smalle mill for this limited amount of work．
（40）C．B．B．says：I have a toy steam en sine，and the engine，which screws on to the boiler is rusted in so that I cannot unscrewit．How ca gas flame．
（41）W
（41）W．W．says：I read，on p．187，vol． 33 your State，forbidding the sale of goods manufac tured under your patent without a seller＇s license may be enforced，＂etc．As letters patent under the law of Congress are to grant unto the patentee， his heirs or assigns，for the term of 17 years，the ex clusive right to make，use，and vend his invention thereof，will not State legislation，which impose conditions and burdens on the rights thusguaran eed，in effect abrogate a law of the general gov ernment？A．Any Statelaw which imposes spe cial taxes upon patented goods，or aims to inter fere with the free exercise of a patentee＇s priv leges in the sale，manufacture，or use of his pat cided by the United States Courts．On the othe and it has also been held that States have a right oimpose equal taxes for the support of theirlocal governments：have a right，for example，to tax heir own citizens and all other persons who vend oods within the State．All venders are treated used from such taxation．
（42）E．M．R．recently asked：＂Why does essors charged with the answering of this query ave the following reply：＂We were under the impression that wetting a rope exposed to
strain caused it to stretch．＂The absurdity of strain caused it to stretch．＂The absurdity of correspondents．Everybody knows that the wet ing of a rope exposed to strain or when not ex－ isdoubtless due to capillary attraction，by which he water is drawn in between the fibers with such force as to push them apart，thus causing a ongitudinal contraction of the rope．The energy of the contractile force developed by wetting trained ropes is often usefully applied，and there have been many remarkable examples．C．L．T motive got off the track；it required lateral move ment of two inches for replacement．No appli－ ances were at hand except a large dry rope．This was attached to the locomotive and to the trunk of a neighboring tree，then strained as tightly as pos－ sible．All hands were set to work to wet the rope，which quickly began to contract，and soon ays：In the army a man is always supposed to be eft in charge of a certain number of tents，to oosen the stay ropes in case of rain；and I recol ect，upon one occasion when this precaution was eglected，a heavy rain coming on，all the posts to which these guys were attached were drawn ou the tents were soon flying before the wind．B．says All housekeepers have an experimental knowl edge of the contractile power of wetted clothe ines in drawing the rope posts out of perpendi－ （43）
（43）L．K．L．says，in reply to a query as to The Daniel Drew，the Mary Powell，and the Chauncey Vibbard，Hudson river steamers，are he three fastest steamboats in the world，remark informed that the Daniel Drew has made 25 miles per hour．The Mary Powell has beaten this，hav－ ing made 27 miles an hour．But best of all，and has run from West Point to Newburgh， 10 miles in $01 / 2$ minutes，or at the rate of a littleless than miles an hour．

## COMMUNICATIONS RECEIVED．

The Editor of the Scientific American a nowledges，with much pleasure，the receipt of ing subjects：
On the Coast of Texas．By F．W．B．
On Steam Boiler Phenomenon．By W．B．，and On Gravity on the Earth and the Moon．By F．C Also inquiries and answers from the following： J．С．－R．К．T．－J．C．－J．S．－J．B．H．－E．в．－C．

## HINTS TO CORRESPONDENTS．

 Correspondents whose inquiries fail to appea may conclude that，for good reasons，the Edito declines them．The address of the writer should always be given．Enquiries relating to patents，or to the patenta bility of inventions，assignments，etc．，will not b publy are given，are such questions，when initial as it would fill half of our paper to print them all， but we generally take pleasure in answering briefl by mail，if the writer＇s address is given． Hundreds of inquiries analogous to the following re sent：＂Who sells aneroid barometers？Whose is the best steam pressuregage？Who makes tele－ compasses advertise in the ScIENTIFIC A of ships All such personal inquiriesare printed，as will b
observed．in the column of＂Business and Per
sonal，＂which is specially set apart for that pur pose，subject to the charge mentioned at the hea of that column．Almost any desired inform．
can in this way be expeditiously obtained．

## 「OFFICIAL．］

INDEX OF INVENTIONS Letsers Fatent of the United States wer Granted in the week ending September 28， 1875.
AND RACH BEARINE THAT DATE

## ddressing machine，A．Bak

Ash pan，J．M．McHelm．
A wning，A．Inghels．．．．．
Bed bottom，spring，oothoud
Bed，sofa，J．B．Harlo
Bee hive，D．Latchaw
Ree hive，J．P．Peele
Bee hive，D．Latchaw
Beer and ale，making，$J$.
Bell punch，H．E．Towl
Bnder，temporary，
Blind，inside, J．Bryan．
oinler feeder，
Boiler feeder，V．D．An
Boiler－covering composition，
Boot and shoe heel protector
Boot jack，M．A．Richardson，
Boot shank spring，T．C．Wat
Boot shank spring，T．C．W
Boring machine，D．Minich
Bottles，etc．，molding．J．N．Fort．
Bridges，cover for chord of，M．Lassig
Bridle winker strap，Easton \＆Scott
Bridle winker strap，Easton \＆Sco
Brush handle，paint，G．W．Scher
Brush，water，H．T．
Buckle，w．C．Downs
Burner，lamp，G．
Bustle，R．Biering
Button holes，forming，J．Kenny
Calculating machine，E．D．Barbour
Cane and umbrella，Harris \＆Kindermann

## Car coupling，C．Maus

ar coupling，L．Sible
Car，sleeping，C．E．Lucas
Car starter，T．Murgatroy
Carpet lining，C．Amazeen．．．
Chairs spring rocking，s．Fallon．
himneys，ventilator for，P．Miha
hopping block for meat cutters，H．P．Rankin．
Churn，F．H．Bopgs
igar．Wilcox \＆Carr．．．．．．．．．．．．．．．
Cigar boxes，lock for，H．siberman
Cigar mold，F．C．Miller（r）
Clothes dryer．Osborne \＆Hay．
Clothes pounder，S．M．Allen
Cothes pounder，S．M．Allen．
Coffee mill，R．L．Webb．
Coffin，F．S．Haden
Compound，anti－incrustating， H ．Burges
Cooler，milk，L．C．Palmer
Corton cleaner，A．C．Pe
Crade．J．B．Nelbach
Cream of tartar，purifying，A．Reisert
Cultivator，J．A．Thompson．．．．．．．．．．．．．
cultivator and harrow，I．P．Pickerin
Disinfecting composition，etc．，C．H．Bo
Door check，E．S．Grauel
Dredging apparatus，W．H．Newton．．
Eaves trough，，re A．Codding．．．．．．

## ngine governor，marine，J．Everding

Engine，portable，J．Ulir．．
Engine，rotary，Reily \＆ W
Engine，rotary，J．C．Titus．
Engines，valve for pumping，w．H．Harriso
Equalizer，draft，E．Graham．．．．．．．．．．
Excavation brace，Dunn \＆Silliman
Explosive，cap protector，F．A．Canfield
Faucet，beer．A．L．Bobet．
Fauceets，attaching，J．S．Mor
Fence post，Latcher \＆Smith
Fire plug signal，G．H．Doughert
Furnace，N ，plastic，F．Walto
Furnace，smoke burning，S．A．Ford（
Furnace heat regulator，A．H．Tingeley
Gare apparatus，A．Miller
Gas apparatus，P．W．Mackenz
Gas apparatus，C．F．Schussle
Gas apparatus，C．F．Schussler．．．．．．．．．．．．．．．
Gas，etc．，generating carbonic acid，H．Voigt
Gasworks，tar gate，J．M．Slaney．．．．．．．．．．．．．．
Generator，sectional steam，Walker \＆Pratt．
Grain dryer，A．Nash．
Gun lock，J．O．Scott
Harrow，J．C．Williams．．．．．．．．
Harvester，R．H．McCormick．
Hat bodies，stretching，J．G．
Hat－pouncing roll，J．Nutt．
Heater，lunch，M．Bradley．．
Heater，lunch，M，Bradley．
Heater，school room，J．M．
Heater，school room，J．M．Reddy．．．．．．．．．．．．．．．．．．．．．
Heddle frames，securing bars，L．J．Knowles．
Hoeing machine，H．N．Prout
Hoisting apparatus，W．Turner．
Horses jumping，etc．．preventing，．．．．．．．．．．．．．．．．
Horseshoe blanks，roning，W．D．Young．．．．
Horseshoe nail machine，D．J．\＆S．Farme
Hose，vulcanizing，J．B．Forsyth
．．．168，087， 16
Husking pin，G．Armstrong．
ndicator，water， F ．w．wand
nk，carmine printing，C．J．and C．Briedbach
Iron，manufacture of，A．C．Lewis．．．．
ack．ratchet carriage，C．P．Willis

## Knife polisher，A．M．DeHart．．．

## Knitting machine，D．Bickford Lader，firemen＇s，M．Cronin

Ladder，firemen＇s，M．Cronin ．．
Leather，beating，J．H．Hussey．
Leg，artificial，Collins \＆McCalla
Leg，artificial，Collins \＆McCalla．．
Lever power，portable，W．F．Hale
Link，studded，C．A．Chamberlin．．
Lock，combination， Lock，combination，C．D．Judd．．．．．
Lock for cigar boxes，H．silberman
Locomotive spark arrester $W$ ． Locomotive spark arrester，w．G．Van Buskirk
 Mast hoops to sails，attaching，c．s．
 Oiler，for crank wrists，C．Kurth．
oleaginous seeds，treating，A．．．
Ore stamp，Ferguson \＆Jones．．．． Ore stamp，Ferguson \＆Jones．．．．．
Organ bellows，operating，G．Beac packing for steam tubes，W．A．Lighthall（rarbe Pan，baking，L．A．Fristoe．． Pasteboard，manufacture of，
Piano stool，E．I．Seavey．．．．
Picture hanger，C．M．Smith Pictures for transferring，oil，
Pillow，G．T．Barker．．．．．．．．．．．
Pills，manufacture of J．Dunto
Pipe tongs，A．McDonald．．．．．． Pipe tongs，G．Selden．．．．．．．
Pipe，hanger．gas，G．w．Bl Pipes，machine for punching，o．B．Olinsted
Piston rod stuffing box，J．M．Searle．．．．．．．．
Pitman connection，S．B．Howard．．．．．．．．．． Planter，seed，A．M．Kanouse．．．．．．．．．．．．．．．．
Plastering，corner bead for，G．P．Atherton．．
Plastic compound F F．B．Duffey ．．． Plastic compound，F．B．Duffey
Plow，W．H．Daniels．．．．．．．．．．．．．
Plow reversible，M．R．Hubbell．
 risons，construction of，Cook and Heath
Pump，A．N．Parkhurst（r）．．．．．．．．．．．．． Pumps，air valve for，Smith and Co
Purifier，middlings，A．F．Ordway．．
 Range，cooking，T．Groom．．．． Roofing compound，J．A．Craig．．．．．．．．
Rubber from waste，M．W．Beylikgy． Running gear，G．Burge．．．．
Saddle tree，H．Cruikshank． Sadde tree，H．Cruikshank．．．．．
Safe door，Walton and Hemler．
Saw frame，buck，P．B．Towle Saw gumming machine，etc．，H．A．Kimball． Sawing machine，F．M．Carnahan．．．．．．．．．
Screw thread die，Beddow and Jackson． Screwing machine caster．B．P．Pratt．
Sewing machine rufter，W．H．Convers． Shaft tug，A．F．Morse Shearing yards，truss for ．Jordan ，I．Ha hn．．． Shoe dressing．etc．，Brown and Whiteside Sign，D．D．Young，
Sleigh，R．B．Parks Soap，bleaching，P．Burns
Soda fountain，F．T．Paine Soda water，draft tube for，，C．C．Wh
Spark arrester．w．Halsted．．．．．．．．．．．
Spark arrester，w．G．Van Buskirk． spark arrester，w．G．Van Buskirk．．．．．
Speaking tube，Campbell and Creighto Spike and nail extractor，J．Passeno．．．．
taves，machine for jointing，B，Barker Stilt，F．Beaumont，Jr．．
Stove，W．Burrows（r）．

```
Stove, cooking, G. Comstoc
```

Street seeeping machines, J. Edison (r).........658,
Table, advertising. J. M. Plessner ... ... ......
Table, extention, Hantsche and
Table, folding, H. Bald win.......
Table, folding, H. Baldwin....
Table, kitchen, J. C. Ricketts
Tag fastener, T. P. Marston.......... .............
Telegraph automatic, T. A. Edison...........
Teeegraph keys, L. S. Crandall .. .... .. 168,143,

Thill coupling, w. Katon..
Thill coupling, B. C. Watter.
Thrashing machine teeth, J. W. Water
Toy building block, G. H. Chinnock.....
Track lifter, G. W. Hunter
Trap and bend. Adee
Truss, L. T. Lubin
Truss, L. T. Lubin...
runnel, o. B. Dowd....
Valve gear, H. J. Benrens.
Valve gear, H. J. Benre
Valve grinder,. P. Law
Vehicle axle, E. Ball...
Vehicle axle, E. Ball...
Vehicle hub, E. Ball...
Vehicle spring, w. Beers...
Vehicle spring. R. Walker
ehicle spring. R.
Vehicle wheel, E. Ball......
Vehicle wheel tire. E. Ball
Vehicle wheel tire.E. Ball..........
Ventilator for chimneys, P. Mihan
Wagon ison (r)
Wagon, ree, C. R. B. Wroth
Wash board, E. S. Heath
Wash board, E. S. Heath........
Washer and separator, gold, B. T
Washing machine, D. B. Pond.......................
Water, aerated sea, J. Matthews..............
Water trap, W. A. Butler (r).............6.664,
Water wheel, R. Wilson....................
Water wheel, R. Wilson..................................
Weft stop mechanism, T. Isherwood.........
W.
Wefl stop mechanism, T. Isherwood...
Well boring machine, R. H. Metzker...
Well boring machine, R.
Whiffletree, P. McGlew.
Windlass and capstan, D. N. B. Cottin, Jr............. 168,1189
Windmill, Stephens and Shay..................... 168,29
Windmill, Stephens and Shay....................... 168,29
Wrench bar heads, forging, o. c. Burdict........ 168,13
DESIGNS PATENTED
3,663.-Glassware.-J. C. Gill, Pittsburgh, Pa.
B,664-Chidd's Carriage.-L. B. Harrington, Jr,
ton, Mass.
B.665.-HANDLEs.-C. F. Haviland, Paris. France
8,665.-HANDLES.-C. F. Haviland, Paris. France.
8,666.-BortLEs.-G. C. Ovens, Red Bank, N. J.
B, 667 , 8,668 .-FANS.-C. Rowland, New York city
8.669.-SIGN.-F. McLewee, New York city.
8,670,
8,671 -
8,667, 8,671 .- Portiles.- W. R. Wanner, Fhiladelphia,
$8,672$. INKSTAND BASE.-B. Brower, New York jity.

## sChedule of patent fees.

 On each Trade mark.On filing each appication for a Patent (17 years). $\theta$ 解ssuing eacn or.ginal Patent. On appeal to Ex miners-In-Chief.....
On appeal to Commissioner of Patent on application for Retssue.
On an application for Design ( $3 \times$ y years) On application for Design (7 years).

## CANADIAN PATENTS.

List of Patents Granted in Canade, September 28 to October 2, 1875 ,216.-R. H. St. John, Springfield, O., U. S. Sewing
machine. Sept. 28, 1875 .
5,217.-J. S. Bogle, Springfield, o., U. S. Seeding ma chine. Sept. 28,1875.
,218.-H. Courteille, New York city, U. S. Manufac ture of blasting powder. Sept. 28, 1875.
$5,219 .-$ H. S. Wolf, South Bend, Ind., U. S. Cleansing gas retorts. Oct. 2, 1875.
$\qquad$ ,221-G. S. Thompson, Port Hope, Ont. Threshing
machine. Oct. 2, 1855 .
222.-J. Nickerson, Simcoe, Ont. Machine for keenin 5,223.-H. A. Howe, Detroit, Mich., U. S. Harvester ,224, 5,225.-R. L. Downton et al., St. Louis, Mo., U.S.
Middlings purifiers. Oct. 2, 1875. ,226.-C. B. Clark, Buffalo, N. Y.
and mop holder. Oct. 2, 1875 .
chine for rolling crimping tack s, etc. Oct, U. S. Ma-,228.-R. D. Chatterton, Cobourg, Ont. Railway ca ,229.-H. M. Macdonald, Lowell, Mass., U. S. Skirt protector. Oct. 2, 1875 . $5,231 .-$ W. H. Reed, Chicago, ill., U. S. Gas carbureter. 5,233.-I. C. Mayo, Gloucester, Mass., U. S. Culinary
boiler. Oct. 2, 8875 . ,231.-D. Maxwell, Paris, Ont. Straw cutter. Oct. 2 1875.
S.235.-C. B. Cla
Oct. 2, 1875. ,236.-B. W. Whurman. Gordonsville, Va., U. S. Stump ,237.-C. C. Holman, Hamilton City, Ont. Box. ,238-G. W. Copeland, Malden, Mass., U. S. Boot
and shoes. Oct. 2, 1875. ,239.-R. C. G wathmey, Louisville, Ky.,
for holding objects, etc. Oct. 2, 1875 . 5,240.-F. Erdmanski, St. Louis, Mo.
Oct. 2,1875 .

## satuertisentents.

| Back Page . - . - . - 81.00 a linc. <br> Ingide Page - . . - - 95 cents a line. |  |
| :---: | :---: |
| Enoravings may head advertisements at the same ra e per line, by measurement, as the letter press. Adver-tisements must be received at publication office as early as Friday mornins to appear in next issue. |  |
| mportant New Book <br> FOR |  |
| Mechanics, Engineers, |  |
| The Coach Maker's Illustrated Hand Book. con- <br>  |  |
| Gasitters' and Plumbers' Companion-A Clear and Comprehensive Treatise bearing on all the Impor-tant Points of the Business, wi th Valuable Recerpts. etc. By Jos. D. Galloway, Gas Engineer. 12 mo. |  |
| Water Works for the Supply of Cities and Towns. By Samuel Hughes. 12mo............. ............82.00 |  |
| Gas Works, and the Practice of Manufacturing and Distributing Coal Gas. By S. Hughes. 12mo..81.7 |  |
| Hydraulic Tables, Co-Efficients and Formulæ for Finding the Discharge of Water from Orifices, Notches.Weirs, Pi pes and Rivers. |  |
| The Commercial Hand Book of Chemical Analysis. <br>  |  |
| Treatise on Coal and Coal Mining. By w. W. |  |
| Hints to Yourg Architects. By Wightwick. Edit- <br>  Having removed to our new premises, |  |
| No. 810 Walnut Street, <br>  |  |
|  |  |
| Practical and Scientific Books, <br> IN ALL DEPARTMENTS. |  |
| Books imported to order from Europe. <br> Our new and enlarged CATALOGUE OF PRACTICAL any one who will furnish his address. |  |
| Thz A Select List of Books on Metals. Metallurgy, <br>  a choie coliection of rractical, scientinic and Books, with prices, sent free upon application. |  |
| henry carey baird \& Co., INDUSTRIAL PUBLISHERS, BOOKSELLERSAND IMPORTERS, 810 WALNUT STREET, Philadelphia. |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

PATENT SELF-COILING, REVOLVING STEEL SHUTTERS


$\$ 5$ to $\$ 20 \begin{aligned} & \text { per day at home. Samples worth } \$ 1 \\ & \text { free. Stinson \& Co. Portland, Maine }\end{aligned}$
 $\overline{\mathrm{C}}$ Scroil Chucks. Sent for new in ices of Wrought Iron TO ELECTRO-PLATERS, JEWELERS, BATTERIES, CHEMICALS, AND MATERIALS, in Silver Plating. THOMAS HALL, Manufacturing Elec-
Crician 19 Bromfiel MA Street, Boston, Mass. Illustrated
Catalogue sent free.

NIAGARASTEAM ${ }^{\text {The }}$ SMP





## PORTABLE STADLEYGINE.



 Foot Lathes.
W. The New
Elements of Hand-Railing.








BENTEL, MAREEDANT \& CO HAMILTOND OFIO.

GFO. W. READ \& CO. AND VENEER-CUTTING MLLL,

Hard-Wood Lumber AND CHICE FIGURED VENERES: Variety: The Loweest ricees:

## For Inventors Ind DiA RUBBER





simple send for


 S SEAM ROAD RoLLER-Improved design


 A SUPERTNTENDENT WANTED








Call at Fair American Institute and See NEWN DASWING PRESS \& OTHER TOOLS.

## Shaping Machines

 also, automatic cowown feced, and Wood filight Machine Cit

$\mathbf{W}^{\mathrm{ITHERERF}, \mathrm{R} \text { GGG \& RICHARASON, Man- }}$


 C friperme mustrated catalogue


 5000 AGENTS WANTED-TO Sell the Oriental








 The PORTER-ALLEN ENGTNE.



HAIR-FELT----HAIR-FELT. BOILERS \& PIPES.

$\mathrm{B}^{\text {Onseres patent steam trap stands su- }}$
 IMPROVED MACHINERY for STAVE


 IRON \& WOOD WORKING MACHINERY OF EVERY DESCRIPTION Cold Rolled Shafting.
 GEORGE PLACE


PATENT SCROLL SAWS


EAGLE FOOT LATHES,


Planing \& Matching,

 OTIS, BROS. \&
AY. NEW YORK.


Model Engines.
Coms



[^0]Advertisemturs
 Engravings may head advertisements at the same rate
perline, by measurement, as the letter press
Adperline, by measurement, as the letter press Ad-
vertisements must be received at publication office as early as Friday morning to appear in next issue.


HARDW ARE SPECIALTIES
 Q

 Corrugated Iron
 Todd \& Rafferty Machine Co.




PATENT
Planing and Matching


## Mill FurnishingWorks

 THE

## CHRISTIAN <br> UNION.

REV. HENRY WARD BEECHER. Editor.

## Ellinwood's authorized verb tim reports each wee Mr. Beecher's Sermons in Plymouth Church.

All his literary productions, including the characteristic
"STAR PAPERs,"" will be given. Serial Stories by
Rev. Edward Everett Hale, D.D.,
hon. Albion W. Tourgee, Jude of the Superior Court of , North Caro-
lina, (Author of " Toinette, , $\& C$ ).
Mrs. Harriet Beecher Stowe,
A Comprehensive Family Religious Newspaper Terms $\$ 320$ per year, postage prepaid.

New and Unusual Terms to Agents.
Cash Commissions and Competitive Premium \$2,000 Given Away
Send for particulars. HENRY M. CLEVELAND, Publisher. horatio c. KING, Ass't Publisher.
 Water Wheels.









THE BASTET MAGIETIC ENCHINE  simple, Dupable, and Fronomical. SEND FOR CIRCULAR.
( State Agents wanted.
607 Broadwav, N. Y.


BmeryWheels (TAN(TTE) EmeryGindars







MARTFORD

## STEAM BOILER

 Inspection \& Insurano COMPANY

## PORTLAND CEMENT



The Standard-Best Stock-Finest Finish

 Niagara SteamPump Works CHARLES B. HARDICK, 23 Adamsstreot
BROOKIVN, Our Boiler and Pipe Covering Save 25 PER CENT. in FUEL.
ASBESTOS FELTING COMPANY,


REYNOLDS \& CO.,



## Excelsior Do Your Own Printing


 Tin
Steel Tube Cleaner.


COVERING
SWirt air spaceiniphovement.


8,000 in Use! Blake's STEAM PUMPS



Pyrometers,



DITCHING and EXCAVATION

 THE BEST INJECTOR For Locomotive and stationary B. Trows more and hoter water with heses steam thope





## Portland Cemert


I MPORTANT FOR ALL CORP ORATIONS AND




$\mathrm{R}^{\text {IIGHARDSON, MRRAM } \& \text { CO. }}$



DAMPRR
RGUSATOT



W. Cen CuYCKINCK,

Railway, Machinists' and Engineers' Supplies,

## 


SHINGhinery of timpo



THE UNION IRON MILLS, Pittsburgh, Pa.-




TRON PIANERS.



The fact that this shafting has 75 per cent greater
strenght a finer finish, and is ruper to gage, than any



John Cooper Engine M'fg Co.



THMASS FLUID TANNATE OF SODA-


## WHIPPLE'S

Patent Door Knob.



Man \& Co's Patent Ofices.
Established 1846,
The Oldest Agency for Soliciting Parents in the United States.
TWENT P-EIGHT YEARS EXPERIENCA.
MORE PATENTS have been seoured through his agency, at home and abroad, than through any other in They employ as their assistants a corps of the most axerienced men as examiners, specification writers, and rartomen that can be found, many of who
SIXTY THOUSAND inventors have availed emselves of Munn \& Co.'s services in examining their inMUN
MEN \& CO., in connection with the publication of the SoIEnTific Amerions, continue to examine inventions
onfer with inventors, prepare drawings, specifications, and ssignments,sttend tw flling applications in the Patent Office paying the government fees, and watch each case step by
step while pending before the examiner. This is done through their branch office,corner Fand 7th Streets, Washngton. They also prepare and flle caveats, procure design patents, trademarks, and retssues, attend to rejected cases (prepared by the inventor or other attorneys), procure copyrights, attend to interferences give written opinions on matters of infringement, furnish copies of patents in fact nend to every branch of patent bung both in this and n Soreign countries.
Parmants obtained in Canada, Engliand, France, Belgitum Folonies, and all other countries where patents aro ranted.

Copies of Patents.
Persons desiring any patent issued from 1836 to Novem ber 26 , 1867, can be supplied with official copies at a rea-
sonable cost, the price depending upon the extent of drawsonable cost, the price depending
ngs and length of specifications.
Any patent issued since November 27,1867 , at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office $\$ 1$. A copy of the claims of any patent issued since 1836 will When er for $\$ 1$.
When ordering copies, please to remit for the same as doove, and state name of patentee, title of invion, and date of patent.
A special notioe is made in the Boirnitifo Anerrions of all inventions patented through this Ageney, with the
asme and residence of the patentee. Patents are often sold, in part or whole, to persons attracted to the invention by such notice.
A pamphlet of 110 pages, contalning the laws and fall dt-
rections for obtaining United Stas pertaining exolusiving United Sta Stes patents, also a circular pertaining exolusively to Foreign Patents, stating co MUNN \& CO
Pablishers SCIENTIFIC AMERIGA
3y Park Row, N. Y.
Bansog Orfic

## 

SCIENTIFIC AMERICAN, THE MOST POPOLAR SCIENTIFIC PAPEB II THE WORLD. THIRTIETH YEAR.
VOLUME XXXIII.-NEW SERIES The publishers of the SCIENTIFIC AMERICAN beg to announce that on the third day of July
1875, a new volume commenced. It will continue to be the aim of the publishers to render the contents of the new volume more attractive and useful than any of its predecessors.

To the Mechanuc and Manufacturer. No person engaged in any of the mechanical purambrican. Every number contains from six to ten engravings of new machines and inventions which cannot be found in any other publication. The SCIENTIFIC AMERICAN is devoted to the Manufactures, Inventions, Agriculture, Commerce and the industrial pursuits generally; and it is valuable and instructive not only in the Workshop and Manufactory, but also in the Household, the Liorary, and the Reading Room.
One copy, one year (postage included)
One copy, one year (postage included)....... $\$ 3.20$ $\begin{array}{ll}\text { One copy, six months (postage included).... } & 1.60 \\ \text { One copy, three months (postageincluded).. } & 1.00\end{array}$ One copy of Scientiflc American for one year, and one copy of engraving, "Men of Progress"..... ...................... 10.00 year, and one copy of "Science Record"
for 1875............................... $\quad 5.20$
Remit by postal order, draft, or express.
Remit by postal order, draft, or express.
Address all letters and make all Post Offce or-
MUNNI \& CO.




[^0]:    MAGNETS-Permanent Steel Mapnets
    

