a Weekly journal 0f practical information, art, science, mechanics, Chemistry, and manufactures.


## IMPROVED ROTARY PRESSURE BLOWER.

We pres blower. The machine produces a forced blast in such a mare
 worthy of careful consideration. Of these perhaps the first struction of the machine, nice workmanship is of course re- throughout and nonrequirement of internal lubrication, is to attract attention are fewness of parts and the strong con- quired in order to bring adjacent parts just as near to each excellently adapted. Other utilizations, notably in foundestruction of the entire mechanism. Another point of impor- other as not to touch, and yet to avoid leakage as much as ries, will readily suggest themselves. tance is comparative freedom from friction, there being no possible. The slight unavoidable leakage, it is believed, is The inventor, Mr. John G. Baker, of Philadelphia, Pa.,


## BAKER'S ROTARY PRESSURE BLOWER

portions in actual contact, although in certain localities very close working is necessary. The machine is well adapted for mine use, since it is not liable to injury either by dust or weather; it runs continuously without stopping to be oiled or needing any careful attention.
Whe large illustration affords an exterior view, and Fig. 2 gives a sectional representation of the interior. The external case is made of light boileriron, forned up very truly and inserted into the heads of the machine, said heads being of cast iron, firmly secured to a bedplate of similar material. They are also bolted together longitudinally by outside iron rods. Within the chest, and concentric therewith, is a cylin der, A (a single iron casting), which is provided with two vanes, $B$ and $C$. The shaft of the cylinder, $A$, is rotated by the driving pulley shown outside. The air enters at $D$, from underneath, and is forced by the vanes out through the outlet, $E$, in the direction of the arrows. In order to prevent any direct communication between inlet and outlet, two slotted cylinders, $F$ and $G$, are arranged on separate shafts, the latter actuated by gearing on the main shatt (partially conlatter actuated by gearing on the main shait (partially con-
cealed by the figure on the extreme right of the large engraving) so that said cylinders revolve twice as fast as the central drum. As the cylinder, A, therefore turns in the direction of the arrow, Fig. 2, the vane, B, is almost in contact with the upper part of the casing, and is compressing the air before it, driving the blast out of the pipe, $E$. This com pressed air is prevented from returning to the inlet by the cylinder, $F$, which above is close against the cylinder, $A$, and below meets the abutments formed on the bottom. The vane, C , at the same time has entered the slot of cylinder, G. A moment's consideration, supposing the auxiliary cylinders to revolve in the direction of the arrows drawn within them, will show that, whatever the position of the vanes may be, one or the other or both of these cylinders will pre-
much more than compensated for by the freedom of the moving parts from frictional contact with each other and with the chest.

The speed of this blower, to produce a steady current,

Fiq. 2


need not exceed 100 revolutions per minute, and it is stated that a large machine runs with the same amount of power as a small one, when each is delivering the same number of | as a small one, when each is delivering the same number of | being mor |
| :--- | :--- | :--- |
| cubic feet per minute. For exhausting air or gases, as in | the mud. | trolled. merely.

sends us a very excellent report, made upon the machine by a committee of judges at the recent Franklin Institute Fair, in which the results of elaborate comparative tests are given, showing the blower to be of a superior degree of efficiency. Patented December 9, 1873. For further particulars address the manufacturers, Messrs. T. Wilbraham \& Brothers, 2,316 Frankford avenue, Philadelphia, Pa.

## Nitroglycerin as a Motor.

M. Champion, a French chemist, states that the heat de veloped by a given quantity of nitroglycerin when exploded is capable of exerting, when converted into motion, a maximum energy fully five times that produced by the explosion of the same amount of gunpowder, and three thousand times more than that caused through the combus ion of an equal quantity of coal. A single quart of nitroglycerin, it is asserted, has the potential energy of 5,500 horse power, working during 10 hours. It remains to invent a machine in which the gigantic force can be harnessed and con.

## A Novel Eusiness.

A correspondent writes to know if it will be possible for him to secure by letters patent the exclusive right of selling pocket-knife blades, without handles. He thinks the idea original with himself, and, like Colonel Sellers, has reasons to believe " there's millions init." Our correspondent's idea is certainly novel, but unfortunately the Patent Office laws contain no provision for the patenting of a new business

We areall living too fast. The man who is always in a hurry generally has his own work to do over again, besides

## Srientific Immerican.

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## THE SOVEREIGNS OF INDUSTRY

During these times of financial depression, when the great industries of the country are languishing and labor is everywhere out of employment, diminished incomes are the rule, and economy the virtue most in demand. To those whose incomes are still liberal, though never so much less than heretofore, the problem of adapting expenditures to receipts is comparatively simple. They have merely to cut off a few luxuries more or less, to pinch their pride a triffe, it may be, but with no risk of trenching on the actual necessaries of life, either for themselves or their families.
For the great mass of working men, however-men whose wages never greatly surpassed the cost of living-the problem is not so simple. To strike off luxuries would help but little, not many luxuries falling to their share even in the best of times. To lessen the amount of their purchases means to eat poorer food, or less of it, wear cheaper clothing and live in poorer houses; in short, to submit to evils, not to practise economy.
The usual door of escape from the ills of poverty, hard work and more of it, is closed by the general stagnation of industry. Men are fortunate if they get any work, at reduced prices at that. How then can they manage to live? There is but one way, and that is by increasing somehow the purchasing power of money, so that the little they now have may go as far as the larger sums they have been used to: a hopeless undertaking, it might seem, for men without capital and with no influance in financial circles: but so it did not seem to the working men of New England, spurred on by that most efficient sharpener of the wits, necessity. The problem was to make two dollars buy as much as three, prices remaining the same. A glance at the conditions of trade will sutfice to make plain the efficiency of the means adopted. During the flush times, before the collapse of 1873 , money was plentiful, business brisk, and profits large. Consequently the race of middle men multiplied enormously Between the miller and the mechanic, the price of a barrel of
flour increased fifty per cent or more by passing through half flour increased fifty per cent or more by passing through half
a dozen hands, each charging roundly for the nominal and, for the most part, uncalled-for service rendered. In like manner, the cost of nearly every other article of food or
clothing was similarly advanced. With high wages and plenty of work, the consumer was able to pay the extra charges: but when the easy times were past, his lessened wages left small margin for the support of go-betweens. The machinery of trade had become so cumbrous and costly that it was a burden rather than a convenience. Its excrescences had to be cut away; and this the working men of the East
have set out to do, holding it suicidal as well as foolish to have set out to do, holding it suicidal as well as foolish to pay half a dozen large profits on each article they buy, wheo
they can be served as well for a single small advance on
prime cost. For example: A hundred laborers want each a barrel of froar. By going to the retail grocer they can get
such an article as they desire at the rate of ten or twelve dolsuch an article as they desire at the rate of ten or twelve dol-
lars a barrel. On the other hand, by clubbing their funds and buying a car load at the mill, the same grades of Hour can be got for seven or eight dollars a barrel, transportation and delivery included. So likewise with nearly every other standard article; by jumping the needless middlemen and buying for cash at first hand, the purchasing power of wages may be immensely augmented, without doing injustice to any one.
It is but a short and natural step from temporary combinations for mutual benefit to permanent organization. This step has been taken; and under the somewhat grandiloquent title of "Sovereigns of Industry," the new organization is drawing together the working men of the Eastern States with
a rapidity rivaling the development of the Grange throughout the West.
Thus far the Sovereigns have stuck to their original idea of mutual helpfulness in supplying the necessaries of life to the members of their several councils. It is to be hoped that they will continue to do so, avoiding strenuously the political follies of the ©rangers. It would be a pity if the power which the order is capable of wielding for the economical advancement of the great army of manual and mechanical workers of the country should not be developed to the uttermost, as it can be only by the most stringent repression of demagogues and party schemers.
Various plans of operation are adopted by different councils, according to the number of members, their place of residence, and the local advantages for buying. The chief object being to make the most of the money they have to spend, with the least inconvenience or risk, it is a common practice to avail themselves of the machinery of trade already established in their neighborhood, taking care, however, to pay no exorbitant profits. An arrangement is made with one or more dealers in each department to throw the trade of the council into their hands in consideration of a special discount on regular retail prices, a concession which the favored dealers can well afford to make in return for an assured cash custom, without the cost of advertising or other outlays for attracting customers. Every three months the council receives the bids of dealers desiring its trade, and elects those which offer the greatest inducements, all things considered Tickets of membership are then issued, the exhibition of which entitles the bearer to the stipulated discount on all goods purchased during the ensuing quarter. In all cases the council takes pains to secure trade circulars and lists of wholesale prices current, from which to estimate the justness of the charges of their local dealers. If the members can do better by ordering their supplies from the producer or the wholesale dealer, the local dealers lose their trade altogether.
In many cases large dealers undertake to fill the orders of councils at a slight advance on wholesale rates, delivering to the appointed purchasing agents the articles in separate parcels as required by the members, thus enabling the mechanics of the most out of the way village to command as favorable terms as the market will afford. Where the purchases are considerable and tolerably regular, it has been found a very satisfactory way to hire a cheap store room, and appoin one of the members storekeeper for the council, to distribute the purchases as called for, on certain evenings of the week. At the regular monthly meetings, the members elect the amounts of the several articles required, which are purchased in bulk, and of course on more favorable terms than in separate parcels. By this plan, most of the advantages of co-ope rative stores are secured, with none of the risks.
In several States, it has been found advantageous (experimentally, at least) to mass the trade of the order, or a great portion of it, by appointing a general purchasing agent, through whom the supplies for the councils are ordered, the superior advantages of such a buyer more than offsetting the cost of the increased machinery.
An idea of the rapid spread of the organization may be gained by the rate at which the order has grown in Connecticut. The first council, with seven members, was organized February 26, 1874. In May a State council met, with a membership of twelve hundred. By August, this number was more than doubled; and at the meeting of December 8, orty-seven councils, with a membership of over five thousand, were represented. To-day, there are probably near ten thousand of the more thrifty mechanics and laborers of the small State of Connecticut thus banded together for mutual benefit in trade. Thus far, the estimated saving to each member is thirty per cent of his purchases through the agency of the order--certainly an amount worth considering. Such a sensible and practical "strike" for increase of wages is something new in the annals of industry.
Besides the State councils, a national council has been or ganized. It will hold its session for 1875, probably before this reaches the eye of the reader. For what practical purposes the session will be held does not clearly appear to out-
siders. We can only hope that it will take no action to com. plicate the objects of the order, or to divert its work from its original purpose. National councils are apt to be over ambitious, and the temptation to use a popular organization for political purposes is hard to be resisted: if indulged in, ruin is inevitable.

## A BOX TRICX TO BEAT HARTZ.'

According to travelers' stories-the best of all evidence, as everybody knows-there used to be in India a school of vagabonds who got their living by dying. For a very modest
sum they would emulate the frogs which are periodically sum they would emulate the frogs which are periodically
discovered alive in solid rock-or in tree trunks, overlaid by
innumerable rings of annual growth-and retire for a specified period from the cares of this life. They professed to have such control over their vital processes as to be able to die at will, and would allow themselves to be sealed up in coffins or tied up in blankets, and buried underground for a week or a month, or more.
A very circumstantial account of such an operation was given by Sir Claude Wade. When he was at the court of Runjeet Singh, in 1837, a fakir was thus buried for six weeks, a company of soldiers guarding the place of his in terment to prevent untimely resurrection. At the end of the six weeks the seals were found intact; and on removing the lid of the box which served as a coffin, the white linen bag in which the fakir had been placed was found to be mildewed. When the bag was opened, the temporarily dead man's arms and legs were found to be shriveled and stiff and his head reclined, corpse-like, on his shoulder. To al appearance he was as dead as an Egyptian mummy, no pul sation or other evidence of life being discoverable. He was then turned over ta the manipulations of his servant, who made warm applications of various kinds, whereupon the arms and legs gradually returned to their normal state. He then removed the wax and cotton with which the fakir's nostrils and ears had been closed, and after half an hour the devotee was able to speak. All of which Sir Claude vouches for as an eye witness, with an air of truthfulness rivaling that of About's clever story of the man with the broken

This art of dying at will and coming to life again appears not to be monopolized by the Hindoos. At least one English man in modern times, if human testimony is worth anything has attained it. His name was Townsend, Colonel Townsend of the British army in India. This man could gointo a death-like trance at will, so skillfully counterfeiting real death that the most critical observers were deceived. On one occasion the experiment was made in the presence of Dr Cheyne, who reports upon the case, Dr. Baynard and a Mr. Skrine. All three felt his pulse: it was distinct, though small and thready: and his heart had its usual beating He then composed himself on his back and lay motionless for some time. Gradually all signs of life disappeared, till there was no pulse, no beating of the heart, and a mirror held before his mouth gave no indication of breath.
The witnesses discussed this strange appearance for a long time, finally concluding that he had carried the experiment too far and was really dead. As they were about to leave him, a slight motion of his body was observed, and a beating of the heart. In a little while he began to breathe, and gradually life was fully restored.
This account has been accepted as trustworthy and credi ble by high medical authorities, and so likewise have those given of the fakirs who carried the experiment a degree fur ther than Colonel Townsend, and submitted themselves to actual burial.
It is a pity the art has not been more widely cultivated; it would afford such a convenient refuge for geniuses born ahead of their time. On finding their generation too stupid to appreciate their grand discoveries and projects, they could retire for a season until in the regular course of events th masses should overtake them. Then instead of writing book and depositing it, sealed, in a public library, to b opened in the year 1975, or such a matter, they could them selves be so deposited, duly labeled and preserved, till their time should come. We could name a good many whose ac quaintances would gladly provide fireproof quarters for them and their projects for a century or two. The only fear that the fakirs had of protracted burial was that in the meantime their servants might die and there be left no one to resurrect them. In cases such as we have imagined, there would be no risk of this sort to deter the devotee, the community at large assnming the responsibility

## TEsTING THE CORRECTNESS OF FIGURES BY WEIGHT.

We publish in another column a communication from ou well known correspondent Dr. P. H. Vander Weyde, in which he suggests a rather novel and effectual method of testing the correctness of all calculations such as those pertaining to the squaring of the circle, and the contents of cironlar or other forms. His method is based on the practice,adopted sometime ago, of measuring the area of land by weight, in which the figure of the land is drawn to a scale on paper and the figure cut out of the sheet. The figure of a square acre is also drawn to the same scale and cut from the paper sheet. The two are now weighed separately. The weight of the paper figure of the land, divided by the weight of the paper figure of the square acre, indicates with accuracy the number of acres contained in the land
Applying this method to the squaring of the circle, $\mathrm{D}_{\mathrm{r}}$ Vander Weyde weighed the circle of paper and the proper squares, with the results given in his letter. It will be
seen that the calculations of some of our prominent circle squarers, when thus weighed in the balance, are found wanting.

## PI-RYI.

Among the ways that are dark and tricks that are queer for which the "heathen chinee" is peculiar, one of the cleverest bears the name p'i ryi. It fairly rivals the jugglery of our highly enlightened writing mediums, and is employed for the same useful purpose. When the pig-tailed earnest enquirer realizes the truth which the Widow Bedott versifies:

> "Poor short-sighted critters, we
> Kant calculate what's gong to be
> And, like enough, never'll take place:"
he consults an oracle, much as pig-headed enquirers do with
us. The oracle does not put a slate under a table to be written on; he writes on the top of a table, previously dusted with sand or four. The pen-that is to say the brush, for no other sort of pen or pencil is used in writing Chinese-is suspended by a string from the rim of an inverted wicker rice basket, which is balanced on the fingers of two persons sitting on opposite sides of the table. After the proper period of quiet waiting, the pen begins to move, writing out the answer to any question which may be put.
On one occasion, the Chinese teacher of the Rev. R. H. Cobbold, who is responsible for the story, consulted an oracle of this sort to discover certain names that were want ing to fill up an ancestral register. On being asked for particular name, the oracle wrote: " Inquire of another branch of the family." It was done, and the "spirit" at once wrote down the name. The story reminds one of a great deal tha passes for evidence outside of China, there being no proo that the names furnished by the "spirit" were correct. It is not surprising that the investigations made by the reverend gentleman were unable to discover the cheat.
Writing of p'i-kyi, in his chapters on China and the Chinese, the Rev. A. E. Moule says: "So great is the mystery, or, if you please, so clever is the trick, that some of the oldest and most wide-awake of the missionaries have leen quite unable to explain it a way, even when performed under their own eyes and on their own study tables." The chief difficulty seems to be the apparent impossibility of directing by muscular effort the formation of intricate Chinese characters by means of a pen suspended by a string

## LOSB of a Large new fork mail.

On the 7th of January the express train that left Washing. ton for New York at 9.30 P. M., in consequence of a misplaced switch, went into collision with a freight train standing on a side track. One man was killed, and another badly injured. The coal oil in the lamps of the postal car was scattered and instantly burst into flames, soon destroying the mails and the contents of the adjoining express car. The mails lost were large, comprising upwards of one hundred thousand letters from the South, bound for New York and other places. The usual daily correspondence of the Scientific American office was consumed, and a large number of our correspond ents will consequently fail to receive their expected replies. We hope they will promptly repeat their enquiries.

## improvelgent in canal hatigation.

It will be remembered that some three years ago the State of New York offered a reward of one hundred thousand dollars for the invention of improved methods of navigating the Erie canal ( 400 miles in length), whereby merchandize could le transported with greater economy than by the present system of horse towage. A variety of experimental boats were made, all or nearly all propelled by steam. The ultimate result vas that none of the competitors succeeded in
csomplying with the peculiar conditions of the law, and they complying with the peculiar conditions of the law, and they were finally modified, and under the modification an award
was last year paid to the owner of the Baxter boat and to one other competitor. So ended the State reward project. But other competitor. So ended the State reward project. But
there is still a strong demand for improvement, and the subthere is still a strong demand for improvement, and
ject is well worthy the attentiou of ingenious minds.

General Thayer, Canal Auditor of this State, takes up the subject in his recent report, and gives expression to the following eminently practical views:
" The Baxter Steam Canal Boat Company has been organized, and during the past season has constructed and oper-
ated seven boats, which, according to reports furnished this department, have proved successful, both in regard to increased speed and greater economy, as compared with boats moved by animal power. This company is really the first organized to employ steam as a motive power on a scale likely to prove a financial success. There can be no doubt that an organization with a sufficient number of steamers to ensure daily departures, and with convenient wharfage facilities at New York, will command business at remunerative rates. Such an enterprise can secure a large and profitable tratfic in both directions on the line of the Erie canal, which of late years has been almost entirely abandoned to the railroad.

## a plan for towage wanted.

One great need, however, has not yet beenaccomplished, that is, some plan for steam towage or propulsion adapted to the large number of boats now employed, five thousand to six thousand, and moved by animal power.

Although I do not disapprove of the liberal bounty which the legislature granted to the Baxter boat, still, without intending in the least degree to disparage the merits of that boat, I am inclined to believe that, if the same liberal reward had been open to wider competition, we might possibly have secured a better result. When the law required that the motor should be adapted to the form of boat then in use, that restriction virtually prevented practical mechanical en gineers from engaging in the contest. They knew that, as Mr. Baxter fully realized, a boat to be propelled by its own machinery must be of a different form and model from those that were simply towed, and hence were un willing to assume the risk of being recognized by the commission or rewarded by the State when not adhering to the requirements of the law. Had the time for competition been extended, the me
chanical genius of the country would have been enlisted; a chanical genius of the country would have been enlisted; a
greater number of plans would have been submitted, and might not the practical results have been more favorable?

## success of cable towage

- The New York Steam Cable Towing Company was organ ized for the purpose of introducing upon our canals the
cable system of towing. That company, during the season
of 1872 , laid a single cable between Buffalo and Lockport,
and, with two steamers especially constructed for the purpose, has beun operating the system, experinentally, during the past two seasons. It is claimed by the projecters of the enterprise that, during their experimental operations, 1,400 tuns of freight, with boats containing it, have been hauled n one train by a single cable steamer, against the strong cur rent between 'Tonawanda and Buffalo, at the rate of three miles per hour, at as low a cost for steam power as any known steam canal boat carrying two hundred tuns, that is to say, doing seven times the work at the same cost for
The steam. The cable system ought not to he considered an ex canals and rivers for several years, and found to be the cheapestadaptation of steam for towing purposes yet de vised. There is uo reasion why it should not be equally successful on our own canals, and certainly no more pro itable ficld for the operation of the system can be found.


## further improvements demanded.

Before dismissing the subject, I caunot refrain from re minding the legislature that the State has made but one earnest effort to introduce steam on our canals. That effort hould be continued, and not relaxed until success is assured. With steam successfully established on our canals, we shall command, without fear of diversion, our full share of west ern trade. The Lyons lock will be finished before the opening of navigation the coming spring. The completion of that structure will give us double locks the entire length of problem of the Cheap and rapid transportation is the grea consumer alike. Railroads reaching from nearly all the prin cipal cities upon the Atlantic coast to the great grain markets cipal cities upon the Athantic coast o the great grain markets
of the West are striving for supremacy in the carrying trade, and it is quite probable that active competition will have the effect to reduce rates, for a time at least, to a point below actual cost. But with our great lakes, on which a single vessel of modern build will carry one hundred thousand bushels of grain (equal to 300 car loads) from Chicago or Milwaukee to Buffalo, and with the Erie canal in good order, seven feet of water and double locks, together with steamboats and steam towage on the canal and river, through from Buffalo to New York, alongside of ship in five to six days, we can suc cessfully compete with all the railroads in the country, even at the present rates of toll."

## amalanim fillings for the teeth.

We are indebted to Dr. J. W. Clowes for a copy of his very excellent essay on the above subject, as read before the Odontological Society of this city. Dr. (lowes has rendered a good service to the dental profession by his long-continued, sturdy support and practice of tin amalgam fill ings. He has in times past been ridiculed for this by members of his own profession; but at last it begins to be per eived that, instead of ridicule, he was entitled to honor.
The use of tin amalgams as a filling for the teeth was begun many years ago, but the practice never became general among dentists. This was due to early prejudices against the material, engendered by lack of knowledge and skill in its use. Its employment is, however, being now judiciously evived.
The experience of some of our best dentists, throughout period of thirty years, has conclusively shown that tin amal gam, properly prepared and applied, is a reliable preserva tive; while owing to the plastic nature of the amalgam, it may be inserted within sensitive or delicate teeth without pain to the patient, and under circumstances when the use of gold would be inadmissible. This amalgam when first applied is quite soft, and a gentle pressure therefore causes it to fill every interstice of the tooth with certainty. After a few hours' time the amalgam becomes permanently solid. ('omplaint has been made that the tin amalgam fillings turn black and cause the teeth to decay. But this is not the case to any greater extent than when gold is used. Some of the worst looking and most badly decayed teeth we ever
saw have been those filled with gold by a poor operator. saw have been those filled with gold by a poor operator.
The truth is that, if the dentist is an unskilled man, or if you neglect to keep your teeth scrupulously clean, they will decay and discolor, no matter what fillings are used. When the decayed cavity in a tooth is properly excavated and filled with amalgam, it will preserve the tonth with certainty; while in general, it lookx better in the mouth than gold. Dentists skilled in the use of the amalgam, and patients carrying this filling, will testify to the correctuess of this statement.
Next to the breathing of pure air, exercise, and the use of suitable food, nothing more contributes to the preservation
of health than the possession of good teeth. All the arts used for their preservation are therefore of the highest imporfor th
tance.
It sh
It should never be forgotten that the teeth will not ordinarily decay, either originally or after being properly filled, unless food or other foreign substances are allowed to remain between them long enough to acidify or decay, and thus act injuriously on the dental enamel. The importance of keeping the teeth clean, by brushing, by drawing silk threads beween, by frequent rinsing, and other simple agencies, may thus be understood.

## Captain E. B. Wara

We note with regret the death of Captain Eben B. Ward, a well known citizen of Detroit, whose name for many years past has been closely identified with the remarkable growth was born in Canada, in 1811, and at the early age of 12 years was rendered dependent upon his own exertions for sup.
port. Entering upon the duties of rabin boy on a lake schooner, he speedily rose to command the largest vessels, and ultimately became himself an owner of a great number. During late years Mr. Ward gradually withdrew from shipping interests, and devoted his talents and capital to the establishment of iron manufactures in his section of the ountry. He founded the Eureka Iron Works of Detroit the North Chicago rolling mill, and the rolling mill at Mil waukee. He also made large in vestments in the Lake Su perior iron mines and erected furnaces in the vicinity. He was for many years President of the American Iron and Stee Association, and, in this as well as in other prominent posi tions, labored to push forward the important industrial en terprises which he had initiated. Pecuniarily his ventures were highly successful, and he leaves an estate estima ted at several million dollars. Mr. Ward's death was very sudden owing to an apoplectic stroke, and occurred on the morning of January 2.

## scientific and practical merozmation.

## a novel bingle rail railway.

The Turkish government has recently commenced the con struction of a railway, termed the Steam Caravan, between Alexandretta and Aleppo, Syria, a distance of 94.2 miles. A single rail is employed, following the conformation of the and, but raised on a wall 28 inches high and 17.5 inches broad. The vehicles are mounted and straddle, so to speak, both rail and wall. The locomotives are provided below with horizontal, leather-covered wheels, which rest against the sides of the masonry and serve as brakes, and the last vehi cle of each train has similar arrangements. Each side of each carriage contains two persons, and the complete train is cal culated to accommodate ninety-sis.
a new way of preserving eggs.
It is stated by the Revue Industrielle that the best metlood of preserving eggs is to soak them for half an hour in solu ble glass of a thick, pasty consistency. The material forms a chemical compound with the carbonate of lime of which the shell is composed, which renders the latter impermeable to air. After immersion, the eggs should lee carefully dried and kept in oats or on perforated trays in a dry locality

## ocarlatina an epidemic

The views of Dr. Alfred Carpenter, published some three years since in the Lancet, upon the subject of scarlet fever, ascribing to that disease an epidemic character, are strongly endorsed in a recent issue of the Medical and surgical Reporter. The editor maintains that not only is the disease infectious in the full sense of the term, but also that the malignity of the infection is something frightful. Articles of clothing worn by patients retain a dangerous character for over a year, as do walls, furniture, and in fact everything that has been in the vicinity of the disease and in its spread. The secretions of the body, epiderrinc scales, and excreta arr active carriers of the pestilence.
Thorough ventilation and disinfection are the best means or destroying the poison. Clothing, bedding, etc., should be submitted to a dry heat of $220^{\circ}$ Fah. for several hours, and then soaked in a mixture of 1 pound hyposulphite of soda, 2 ounces sulphuric acid, and 8 gallons of water. Rooms should be purified by burning sulphur, and the patient thor oughly cleansed before having intercourse with other people.

## vente as a luminous ring.

Professor C. 8. Lyman published in the American Journal eight years ago a brief notice of some observations made on Venus when near her inferior conjunction in 1866. The planet was then (for the first time, so far as appears) seen as a very delicate luminous ring.
No opportunity has since occurred of repeating these obser vations until the day of the recent transit. On Tuesday, December 8, Venus was again in close proximity to the sun, and the author had the satisfaction of watching the delicate, sil very ring enclosing her disk, even when the planet was only the sun's semi-diameter from his limb. This was at 4 P . m or less than five hours before the beginning of the transit The ring was brightest on the side toward the sun-the cres cent proper. On the opposite side the thread of light was duller and of a slightly yellowish tinge. On the northern limb of the planet, some $60^{\circ}$ or $80^{\circ}$ from the point opposite the sun, the ring for a small space was fainter, and apparent ly narrower, than elsewhere. A similar appearance, but more marked, was observed on the same limb, in 1866.
These observations were made with a five foot Clark telescope of $4 \frac{8}{8}$ inches aperture, by so placing the instrument as to have the sun cut off by a distant building while the planet was still visible., The ring was distinctly seen when the aperture was reduced to $1 \frac{1}{d}$ inches. The 9 inch equatorial could not be used, as there were no means of excluding the direct sunlight.
On the 10th the crescent, extending to more than three fourths of a circle, was seen with beautiful distinctness in the equatorial; and on this and two subsequent days, measurements were taken with the filar micrometer for the purpose
of deternining the extent of the cusps, and consequently the horizontal refraction of theatmosphere of the planet, on the assumption that the extension of the crescent and formation of the ring are due to this refraction.
$V_{\text {arnish }}$ for White Woods. -Dissolve three pounds of bleached shellac in one gallon of spirit of wine; strain, and add one and one half more gallons of spirit. If the shellac is pure and white, this will make a beautifully clear covering for white wooden articles.
Cocoa nut husk is better than cotton waste and turpentine for taking temporary rust from iron or steel.

THE BESBEMER OSCILLATING SALOON.
As we shall probably soon hear that the oscillating saloon steamer Bessemer is running between England and France, conveying passengers over the uncomfortable and uncertain Straits of Dover, we present to our readers an engraving of the gyroscopic arrangement (by which the saloon is kept in a horizontal position. even under the greatest possible angles of variation of the ship), selected from Engineering.
The ordinary form of gyroscope (for an illustration or which see page 91, volume XXXI). is a heavy disk or wheel, made to revolve rapidly in any given plane, tending always to remain revolving in that plane; and it can only have the direction of its action of rotation changed by the application of considerable force, the amount of this force depending npon the weight of the revolving body and its speed of ro tation. The manner in which Mr. Bessemer has availed himself of this gyroscopic action will be understood by reference to our engra ring, which represents the con trolling apparatus as constructed for the steamer. 'Thegyroscope in this case consists of a stepl disk wheel A, 2 feet in diameter and with rim 4 inche spuare, this wheel be rim 4 inches; square, this wheel he ing made of sterl forged so as to make the mass as nearly homoge neous as possible, and carefully turned so as to insure its running perfectly true. As it may possibly be necessary under some circumstances to run the disk at as high a speed as 5,000 revolutions per min ute, it is evident that great care is necessary to ensure perfect balanc ing. The boss of the disk is bored out conically to fit the conical upper end of the spindle, $B$, the spindle and disk being ground together to secure a perfect fit. A nut and washer at the top secure the disk in place, no keys or pins being used.
The spindle, $B$, which is also of stefl, is steadied hy two berrings, C and D, through which it passes these bearings being capable of adjustment in one direction (that in which a disturling force will be brought upon the spindle) by set screws as shown. The bearings ar fitted to hoxes forned by casting fixed to the top and bottom of the gun metal casing or frame, F , this casing being strengthened by inter nal ribs, and heing slung on a pair of trunnions with which it is pro vided. The center line of thes trunnions corresponds with the center line of the ressel, and the casing, E, can thus swing athwart ships, but not in a fore and aft direction. The trunnion bearings are snpported by wrought iron stan dards springing from the floor beams of the saloon; and thus, if the axis, $B$, be kept perpendicular hy the gyroscopic action of the disk, A, the casing, $E$, must rock on its trunnions if the floor of the saloon departs from a horizontal position. The manner in which this movement of the casing, $E$, is made to control the action of the cabin we shall explain presently; meanwhile we must explain how the gyroscope is driven.
It is evident that in such an arrangement, where the slightest interference with the gyroscopic action is to be avoided, the use of belts or other similar driving gear would be inadmissible, and Mr. Bessemer therefore decided to give motion to the gyroscope by meaus of a kind of reaction turbine, or Barker's mill, formed on the spindle of the gyroscope itself. For this purpose, the spindle, B , has, as will be seen, a pair of arms formed on it, these arms being bored out, and the hole through them communicating with another hole, $J$, hole through them communicating with another hole, J,
iored up through the spindle from its lower end. Water hored up through the spindle from its lower end. Water
under pressure enters through one of the trunnions of the under pressure enters through one of the trunnions of the
casing, $E$, and passes down through a suitable pipe to a small casing, N , below the bottom of the spindle. Thence it passes up through the hole, $J$, in the spindle and through the radial arms, finally escapingthrough the lateral opening in the caps, I, with which the ends of the arms are provided. A small hole, forming a prolongation of J , conducis a supply of water to the upper learing, $C$, and any water escaping at the npper end of that bearing is deflected downwards by the dished plate, $Q$, and thrown back into the casing, E. A flexible waste pipe, not shown in the illustration, conductsaway the water irom the casing, E, back again to the tank from which the pumps draw, this tank being fitted with screens so as to keep the water perfectly clear, and remove any particles which, if allowed to circulate through the apparatus, might cause a stoppage of the openings in the arms, I.
An excredingly neat point in the design is the provision made for avoiding any frictional resistances due to the weight of the gyroscope. It will be seen that the lower end of the spindle, B , is considerably reduced in diameter, there being formed, at $K$, asquare and carefully finished shoulder. Below this shoulder the reduced portion of the spindle passes through a phosphor bronze plate, $L$, the spindle being a free
fit in this plate. Below the plate, L , are two metal disks, M , which also fit the spindle freely, and which are kept pressed lightly against the plate, by springs not shown in the engraving. These springs are only required to keep the disks, $M$, in place when the water is shut off from the appa ratus; when in regular work, the pressure of the water tends to force them upwards. As a result of the free fil of the lower end of the spindle in the plate, $L$, there is always a slight leakage at that point when the apparatus is in use; and this leakage, besides lubricating the lower bearing, $D$, serves an important purpose, as we shall now explain. The upward pressure of the water on the area corresponding to the section of the lower end of the spindle suffices to balance the greater part of the gyroscope; but inasmuch as variations in the pressure of the water migh otherw


THE CONTROLLING GEAR OF THE BESSEMER SALOON
against the seat at the lower end of the spindle, and it the revolves with the latter, until, from the water being cut of rom the arms, I , the gyroscope comes to rest. During this time, when the gyroscope is running down, as it may be called, the apparatus is still water-borne, as the pressure continues to be maintained on the box, N. When the gyro scope has come to rest, the water is shut off by a valve in the supply pipe; the leakage then reduces the pressure of the box N , and the ball, 0 , falls into its normal position at the bot tom of the box.
We have now to speak of the manner in which the gyro scope is made to actuate the valves by means of which the movements of the saloon are controlled. The saloon is hung on a longitudinal axis, and on either side of it are placed the hydraulic cylinders by which its movements in relation to the hull of the vessel are controlled. These cylinders are double acting so that a pull upwards on one side of the saloon is always accompanied by a downward pull on the other and vice versa, and the water has therefore to be admitted to, say, the top of the port and bottom of the starboard cylinder (or the reverse) simultaneously. The whole distri bution of the water is effected by a $r$ lindrical slide valve.
The connection between the valv and gyroscope will be readily un derstood. On the side next the valve the casing of the gyroscope carries an arm which is connected by a link with one end of a lever, the other end of the lever being connected to the valve spindle. Let us suppose that in our engraving we are looking towards the head of the vessel, and that the latter gives roll over to port. The effect of this would be that, the gyroscope spindle remaining vertical, its lower en would be brought nearer to thevalur casing, the arm raised in relation to that casing, the valve lowered, and water under pressure admitted to those ends of the hydraulic cylinders with which the pipe communi cates; this admission of water to th hydraulic cylinders raising the por side of the cabin in relation to the hull of the vessel, and thus counter acting the list of the latter to port On a roll taking place to starboard the opposite action would, of conrse take place.

It will be seen from this descrip tion that a slight movement of the saloon must take place before the gyroscope can actuate the control ling valve; but by adjusting the length of the lever in proportion to the length of the arm of the lever to which it is coupled, this move ment, it is expected, will be brough within such small limits as to have no practical effect on the comfort of the passengers. This, however, i the diameter of the lower part of the spindle is made such one of the points which of course can gnly be conclusively that, at the ordinary working pressure of the water, about decided by actual trial
fifty pounds of the weight of the revolving disk, spindle etc., remains unbalanced. If no means were taken to prevent it, this weight would rest upon the square shoulder, at $K$, and a rapid abrasion of the plate, $L$, would result. Bat the leakage to which we have already referred prevents this Thus the water leaking through the hole in the plate, $L$, around the lower end of the spindle comes against the shoulder formed on the spindle, at $K$, and it is thus brought to bear against an enlarged area, and is enabled to raise the spindle and its attachments. As soon as it has thus lifted the spindlo, the leakage water can escape between the plate, L , and the square shoulder, at K ; but it is evident that the amount by which the spindle is lifted is strictly limited by the amount of the leakage, and can never become excessive It is also practically independent of moderate variations in the water pressure, an alteration in pressure merely producing a slight alteration in the thickness of the film of water flowing away hetween the plate, $L$, and the square shoulder, at $K$. Thus in all cases, when in action it is insured that the weight of the gyroscope is carried upon what may be called a water bearing, and one that it is consequently practically frictionless.
If while the apparatus was in action, the supply of water was shut off by means of a valve fitted tothe supply pipe, the pressure of the water in the box, N, wotuld at once cease and the weight of the gyroscope, ceasing to be water-borne would at once cause abrasion to conunence between the square collar at $K$, and the plate, $L$. This result, however Mr. Bessemer has ingeniously guarded against as follows: In a recess at the bottom of the box, $N$, is a gun metal ball, $O$, whiie at the lower end the hole, $J$, in the spindle, $B$, is countersunk so as to form a kind of valve seat. Under ordinary circumstances, the ball, 0 , rests in its recess at the bottom of the box, N ; but when it is desired to stop the gyroscope, it is raised by means of the plunger and hand lever shown, until it is close to the lower end uf the spindle. Immediately this is done, the pressure of the water carries it

## Concrete Gravel Walk.

In Dick's Encyclopedia of Practical Receipts are the follow. ing directions for making concrete surfaces:
Dig away the earth to the depth of about 5 inches, then lay a bottom of pebbles, ramming them well down with a paving rammer. Sweep them off as clean as possible with a broom, and cover the surface thinly with hot coal tar Now put on a coat of smaller gravel (the first bed of pebbles should be as large as goose eggs), previously dipped in hot coal tar, drained, and rolled in coal ashes, with an intermix ture of fine gravel, and roll it down as thoroughly as possi ble. Let the roller run slowly, and let a boy follow it with a hoe to scrape off all adhering gravel. Next put on a coat of fine gravel or sand and coal tar, with some coal ashes, to complete the surface, and roll again as thoroughly as possi ble; the more rolling, the better. It will take some weeks to harden, but makes a splendid hard surface which sheds water like a roof. Do not use too much tar. It is only ne cessary to use enough to make the ingredients cohere under pressure, and a little is hetter than too much.

## Nickel-Plated Serews.

In car building, nickel-plated screws are rapidly coming nto general use. This grows out of the fact that, though their original cost may be a trifle more than silver-plated screws, yet, as nickel does not oxidize by exposure to air, the excess of cost is more than made up in the durability of the plating. Hence, in nearly all of the large car manufactories, nickel-plated screws are superseding silverplated for use in joinery work. There is a steady in crease in the use of nickel-plated screws in house joinery which argues well for their final adoption for all such work in which silver-plated screws are now employed.
A Telegraphic Congress is to be held in St. Petersburg during the present year. The Russian telegraph department has set aside some $\$ 20,000$ to pay the expenses.

## tUbUlar floating docks.

It is quite unnecessary to insist at the present day on the gusset plates, as to form transverse girders of ample strength general usefulness and merits of floating docks. The fact to support the vessel if its whole weight rests in the center that they can be employed in deep water, and in situations 'The whole forms a platform having sufficient buoyancy to where from the nature of the ground it would be impossible, support both the vertical sides of the dock and the vessel to cut docks on the ordinary system, and that, too, inde- itself
pendently of the hight of the tide, is so manifest an advan- The sides of the dock are also formed of similar tubes tage that it cannot be questioned that,at a time when increased which are fixed vertically. Each side is formed of from dock accomodation is urgently required, their principle will twelve to twenty four of these vertical tubes, braced together be largely employed. The comparative cheapness of their and connecied by a lattice work platform at the top running construction also tells powerfully in their favor. To this the whole length of the dock, forming a spacious gangway must be added the consideration that floating docks are capa- for the workmen. The longitudinal tubes are so connected ble of being moved from place to place, so that if the de- with theiron platform at the top as to convert the whole mand for their use be diminished at one port they can dock into a beam or girder of great depth and of immense readily, and at small expense, be moved to another where rigidity. The center longitudinal tubes are considerably the demand is greater; while from their comparative cheap- larger than the side tubes, so that the general plan of the ness they can at ness they can at
all times be all times be
more profitably more profitably
employed than tixed stone docks which have been built at a large out. lay. The story of the great Bermuda dock, safely towed safely towed across the At-
lantic without lantic without accident or un usual difficulty, must be fresh in the memory of all who take an interest in :shipping.
Floating docks of the ordinary type consist, us type consist, us is well known, of parallel or nearly parallel walls terminating in a flat bottom, the :space between being divided into a large number of wa tertight compartments, into and out of which water may lie pumpeed by methods which need no description, and so be raised or lowered at pleasure; so that vessels of various sizes may be put on the dock, and raised by pumping the water out until the workmen can obtain access to the whole of the hull, and perform the requisite repairs, and can then be lowered by admitting the water until the vessel can be floated off But the tubular dock of Messrs. Clark and Standfield, which we herewith illustrate, is of a totally different construction and is worked in a different manner. Both the bottom and the vertical sides of the dock consist of a number of circular wrought


CLARK AND STANDFIELD'S TUBULAR DOCK. attachment for the side tubes.

T'he tubes are divided within into a great number of water tight compartments or chambers connected together by pipes and the raising and submersion of the dock is effected by
trol of the valve engineer. When it is desired to sink the dock, the bottom valves are all opened and the air allowed to escape at the valve house until the dock settles down to its lowest level, ready for the reception of a vessel. When it is desired to raise the dock, air is forced into the tubes under compression, the water is expelled through the bot tom valves, which are closed as soon as the dock and its ves sel are fully raised; it then remains afloat with the vessel docked upon it, without any dependence on the air valves.
The engines are in two pairs, placed near the center of the dock within the vertical tubes, the mair from the:; being led into the valve house. The whole of the water tight compartments in the bottom are divided into four equal groups corresponding with the four corners of the dock. by means of four corresponding valves in the valve house; air is admitted into or out of these respective groups in any desired
proportions, so that the dock is maintained ut all times per fectly level bot in raising and owering.
'This novel form of dock has, to a great extent, the com bined merits of hestone grav. ing dock and of he ordinary hydraulic lift or pontoon dock, ogether with some alluanta fer which ar occuliar to it self. It has im mense stabilits. wing to it great breadth. and to the great number of con partments int. hich it is clivi ded. which pre. ent the tencl ney of the wa er to flow to he lower side -a molenc. hich may be dock resembles; somewhat that of an ordinary vessel. The moreover, corrected at any time by allow two outer tubes are of larger diameter than the others, so as pressed air (which is always kept stored in the vel:tical to give extra stability of flotation, and to afford convenient tubes) to act temporarily on any of the compartments. It is解 means of compressed air. The base of the dock is divided those of stone graving docks, so that even loaded vessels ma into about sisty airtight compartments, and the vertical be readily blocked and shored up to any desired extent; this sides form about forty additional chambers, and the whole is a point of great importance in the lifting of heavy iron of these last are hermetically sealed, so that the dock cannot ! clads. Moreover, by admitting water into some compart-

ron tubes, similar to egg.ended steam boilers. The bottom of the dock is formed of about eight circular tubes, which run the whole length of the vessel and extend some feet beyond its ends. These tubes are stiffened inside by angle irons every two or three feet, and are securely braced to gether by transverse beams of $T$ and angle iron above and
under any circumstances sink. A certain number of the bottom chambers are so hermetically sealed; but the remainder are provided with valves at bottom, which can beopened or closed at pleasure, and with wrought iron pipes which are grouped together and are all brought to a valve house on the top platform of the dock, and are placed under the con-
ments and expelling it from others, the lifting power can be to a great extent exerted directly under the load to be lifted The vessel when lifted is high and dry above water, an advantage common to all floating docks; but owing to the vertical tubes in this dock being well separated from each other, there are great facilities of access to all parts of the
vessel. Two large gangways of extra width, provided with cranes, are also formed at each side for the landing of heavy timbers, plates, etc. The open sides admit of the air and light circulating freely round the work, so that paint dries and hardens much more quickly than in a sunken dock. From the same cause, repairs can be executed in a much m prompt and satisfactory manner than in a stone dock.
In exposed positions, it is proposed to submerge the dock entirely whenever it appeara to be endangered by a cyclone or by stress of weather. The tubular sides afford great facilities for this operation; compressed air is pumped into them at leisure and kept stored up ready for use; after the dock is submerged, the opening of the valves will at any time allow it to expand and raise the dock to the surface. This use of stored-up power is also employed whenever it is desired to raise vessels rapidly-as, for example, in examining bottoms or screws; the power being stored up and ready for use, the or screws; the power being stored
aocking of a vessel occupies but little time; by opening comaockingof a vessel occupies but little time; by opening com-
munication with the water in the tubes, the air expands munication with the water in the tubes, the air expands
and expels the water, and the vessel is immediately raised.
Fig. 1 shows a general elevation of the dock, with a vesse stapported upon it by bilge blocks and shoring frames; Fig. 2 shows an end elevation and section of the same.
The floating dock appears to occupy an intermediate place between the old stone graving dock and the hydraulic lift dock. Where the number of vessels to be lifted is very great, preference will probably be given to the latter; but the floating dock has advantages of its own. In the first place, its greatly reduced cost renders it suitable for many positions in which the business is insufficient to warrant the cost of a stone dock or an hydraulic lift dock. There are several cases in which floating docks of the ordinary construction are paying dividends of 20 or 30 per cent, in positions in which stone docks would le impossible, or in which their cost would entirely preclude their adoption. It is not always easy to find a suitable position for an ordinary graving dock, and even the hydraulic lift system requires water of a certain limited depth; but a floating dock can be placed anywhere where there is sufficient depth for a ressel to ap. proach, and can be transported from place to place. It has been stated that the tubular dock is raised and lowered by pneumatic means; there is, of course, no theoretical reason why it should not be worked by ordinary water pumps in he usual manner
Flouting docks appear likely to be applied in future to another purpose, to which sufficient attention has hitherto not been drawn. We allude to their employment as bulld Ing slips for the construction or lengthening of vessels. On the ordinary system it is necessary that a building yard should be closely adjoining deep water, and that the vesse cess not always devoid of risk. By building on pontoons cess not always devoid of risk. By building on pontoons
this risk is almost entirely avoided; any shallow river or this risk is almost entirely avoided; any shallow river or
creek may be utilized, whatever its distance from deep creek may be utilized, whatever its distance from deep
water, and the ways may be laid on a pontoon, either floating in shallow water or resting on the ground in a shallow dry dock temporarily prepared for the purpose; and when the vessel is ready for launching, the water may be admitted to the dock, the valves closed, and the vessel floated out into deep water. In fact, Hoating docks have not yet assumed their proper place in the naval service. Constructed of ten in a temporary manner of wood or iron, and from imperfect designs, they have sometimes met with indifferent success or even with disaster; but experience has shown at once both their defects and their merits, and there is no doub they are destined in future to become one of the most im portant elements both in navigation and in naval construc tion.-Naval Science.

## COOrtespoudeuce.

## The Second mill River Disaster.

## To the Editor of the Scientific American

I have seen, in one of your city papers, concerning the late break in Hayden, Gere \& Co.'s dam on Mill river, the ques tion: If a dam constructed as this one was is not safe, what can be luilt that will stand?
The diniensions of the dam as stated were: Length 141 feet; width at hase, 13 feet; width at top, 6 feet; head of water, 20 feet. I consider those proportions entirely inadequate for that head of water. A dam for a head of 20 feet should have at least 30 feet width of base up stream, from a right angle with the breast or break-over of the water; and whatever width is given to the wall on top must be added to the length of base, thus: If the wall is 6 feet wide at top, the base must be 36 feet, provided the front wall is plumb; if it is angled, the base must be made still wider to suit; but the main things are to make the base up stream at least $1 \frac{1}{2}$ feet for every foot in hight of head, and to make the upper wall or sheeting as tight as possible, leaving the front comparatively open; for if the front wall is made perfectly tight and the other loose or open, the pressure really comes on the front wall, as the balance of the work is made much lighter by being in the water. By this way of building a dam, the weight of the water bears down on the work and not against it, as it does on a wall narrow at the base.
We have a dam here, built in 1852. It is 100 feet between the abutments, with a head of 20 feet. It is built of pine timber, on the above described principle; but it is constructed of trestle work, each trestle being entirely independent of the others, except as to sheathing plank laid across them; and they are in no way anchored to the abutments. It has never needed any repairs, and has never shown the least sign of moving.

Arrọn, Flk county, Pa.

## To the Editor of the Scientific American

I notice a query in a late issue of your journal as to the best method of placing locomotive cylinders in line
The most approved modern practice leaves but little to do n placing a cylinder in line, either in stationary or locomotive work, after the cylinder und its bedpiece leave the lathe and planer, except to test the accuracy of the draftsmen and machinists. If the machinists have accurate vertical and horizontal plan drawings for their guide, and work exactly accordingly, no after cutting or trimming will be needed to bring the cylinder into line. In locomotive work, one of the most difficult jobs is to fit the bedpiece to the boiler so that the two faces, upon which the cylinders are to be bolted, shall be exactly in their true position, which are usually indicated to the workman by the drawings.
In order to test the accuracy of the work after the bedpiece has been permanently fixed to the boiler, clamp a cylinder to its seat on the bedpiece and fit a wooden cross (with a pin hole through its center) to the bore of the cylinder at its front end; then pass a fine strong line through the hole, and ex. tend it back so that it shall occupy a point exactly at the intersection of the central line of the driveraxle with the ver-
tical piane of motion of the center of the crank pin and con-

ecting rod: draw the line tant and fasten it in this position then apply calipers or a gage at the rear end of the cylinder, between the surface of the bore and the line, above and below and right and left of the line; and if the cylinder is in line, the four distances will of course be exactly the same. It is essential that the two horizontal distances shouid coincide exactly, and that the central lines of the two cylinders of a locomotive should be exactly parallel with each other, but for obvious, reason the exact coincidence of the two vertical
distances is not essential to the efficiency or correct working distances is no
of the engine.
Instead of a wooden cross, as abore mentioned, a more convenient instrument, made of metal, may be provided, consisting of four bevel gears, A, which serve also as nuts, which work four sockets, B, with threads cut on their inner ends, all neatly fitted to a light casting, E, having a fine central hole for the iine, as shown. A central gear, C, works the four gears, of course all at the same time. Several sets of steel rods, D, may be provided if necessary, of different lengths, and thus render the instrument universal in its ap-
plication, each set of rods serving for cylinders varying two plication, each set of rods serving for cylinders varyi
inches, more or less, in the diameters of their bores.
To determine whether $A$ cylinder of an old engine is in line: Remove the front head of the cylinder, the piston, the stuffing box gland, and the crosshead; apply the cross and line, as above directed, extending the line, through the piston rod hole in the rear head, to a point exactly central with the crank pin when the crank is at its dead point; draw the line taut, and, if the cylinder is correctly in range, the line
will occupy a central position in the stuffing box, which may be determined as hefore directed. If the crosshead guides are parallel with the line, both vertically and laterally, they re also correct.
F. G. Woodward.

W orcester, Mass.

## Grit Wanted.

To the Editor of the Scientific American:
Little things in universal use, like the American postal card, are often of great importance. A small portion of silica or alumina, or any other grit, added to the sizing, would convert our cards into tablets which could be written upon with a metallic point, and from which no ordinary friction will erase the writing. The writing with the metallic point would also be more legible than the writing with most inks or pencils.
The addition of the small amount of grit required does not injure the surface for writing with a pen, and could not add appreciably to the expense of their manufacture. The gov. ernment furnishes the cards. Let it furnish also miniature metallic-pointed pencils for the vest pocket at one cent a piece. The goverament would make money by doing so, and a single pencil would carry on an ordinary citizen's card correspondence for a year.
These metallic points should be madr of lead with a small percentage of bismuth. There aretwo waysof making such pencils. A cylinder of the alloy two inches long and one ungth of an inch in diameter can be wound with fancy paper until the diameter equals one sixth of an inch; the paper
might be put on wet, compressed in a mold (maché) and var nished. Or a polished wooden cylinder,two and a half inches long and one fifth of an inch in diameter, can have a mevallic point inserted at one end in the common way.
The present postal card can be written on with a soft metal point, but not with an alloy hard enough to give a fine, black, permanent nark.
iv. F. ${ }^{\prime}$.

## Small Steam Enginen <br> To the Editor of the Scientific American

I will give you the result of my experience with a smal boat engine, the vessel being 47 feet long, $11 \frac{1}{2}$ feet wide aud $4 \frac{1}{2}$ feet deep. She has a three-bladed ucrew, 4d feet in diameter with 6 feet pitch, which is made to rise or fall in the water. The engine has two $6 \times 10$ inches cylinders, running at 120 revolutions per minute, with 70 lbs. steam. The engine exhausts into 75 feet of two-inch pipe, 60 feet of which is in the water outside of the boat, coming in again to conduct the water to the hot well. The pump takes the water to the boiler at $190^{\circ} \mathrm{Fah}$. This arrangement makes a very good condenser. The boiler is $7 \frac{2}{3}$ feet $\times 4 \frac{1}{8}$ feet. with 120 two-inch tubes.
I have with this boat towed a ship of 700 tuns at 4 mile;s an hour, with 80 lbs. of coal per hour. and I can make 9 milesan hour when not towing. I'he mistake generally made by those who have not had experience with boat engines is that they do not give sufficient boiler capacity; and I find that the ample boiler power above described gives an excellent result as to fuel consumption with my mall engine.

## Guilford, Conn.

P. M. Blatchley

Splicing Large Belte.
To the Editor of the Scientific American:
There is in the lipper Mills here, in which I am engaged, a 26 inca, 8 ply rubber belt, doing the following duty: It runs off the fy wheel of a $24 \times 48$ inch engine, the fiy wheel being 18 feet in diameter and making 65 revolutions per minute, driving an overhead line of shafting and two lines at right angles to it, said shafting driving two 8 inch guide mills by an 18 inch rubber belt to each, one at 230 , the other at 280, per minute. Each mill finishes sixteen tuns other at 280 , per minute. Each mill inishes sixteen tuns
gross of finished iron every 24 hours. Two pairs little mill gross of finished iron every 24 hours. Two pairs little mill
shears, one pair bar mill shears,and one 36 inch circular saw shears, one pair bar mill shears, and one 36 inch
for hot iron are also driven by the main belt.
In the early part of last summer, an accident occurred by which the above mentioned belt was torn into several pieces and ripped intostrips. Knowing that it was impossible to obtain a new belt without: ordering it from the makers, we had to do the best we could with what we had; so we patched upa ragged-edged strip of the torn belt (averaging 12 inches wide), thinking to run a part of the above machinery with it. Some laughed at the idea of attempting to run any part of it with such a cord as that looked to be: but to the surprise of all,it performed the entire duty of the original belt, and in so satisfactory a manner that the new belt was on hand some four weeks before a favorable opportunity was afforded to put it on.
A member of the firm here adopted some years ago "what was then a new way of fastening the ends of and splicing large belts; it has proved a cheap and reliable way, and is now in general use in this vicinity: Cut your belt perfectly square on the ends and to the proper length: then cut a piece of belt of the same width and thickness, about 3 feet long. Bring the ends of the belt together, and put the short piece on the back of the joint, or outside, and bolt the belt and piece together with what areknown as elevator bolts, used for fastening the buckets to elevator bands. Thetools required are a brace and bit to bore the holes and a small pair of blacksmith's tongs to tighten up the nuts with. "-
When a belt becomes dry or glazed, I have always found that a liberal dose of castor oil was a specific; and I have if it had castor oil on
Pittsburgh, Pa .
T. J. B.

## $\triangle$ NEW METHOD OF MEABURING SURFACES, $\triangle$ PPLIED

The fact that the modern chemical balance gives a greator degree of accnracy in the determination of weights, and with much more facility than is the case with any other kind of measurement, especially that of curved lines, has given rise to a method of determining irregularly shaped surfaces of land in square miles or acres, by tracing them on paper of uniforn thickness, cutting it out to the correct shape, and comparing the weight of the piece of paper thus obtained with that of a piece cut to the size of a square mile or of an acre, of the same kind of paper, to the same scale. By calcu lating how often the weight of the latter piece in contained in that of the former, it will give the number of square miles or acres contained in the land in question. This calculation consists, of course, in only a simple division. I can recom mend this method fully, as, when carefully applied, it gives results the correctness of which is not surpassed by those of
any other method whatsoever. This may be verified by taking regularly shaped forms, easily measured by the ordinary methods. I have in this way deternined the surface of islands and continents in square miles, of fanns in acres and rods, etc., and am compelled to testify that the method is far superior, in the correctness of its results, to that by means of he graphicmethod, with the help of Amsler's polar planime er, now so excellently made in Switzerland and to be ob tained in our large cities. The method by the help of the balance gives not much more trouble. less calculation, and
tion ; and the latter costs almost half as much as a good chemical balance, which is therefore far to be preferred. The planimeter is, however, an instrument enclosed in a box which can be carried in the pocket, and this is an advantage it has over the balance.
In order to test the degree of accuracy which can be obtained by the use of the balance for this purpose, and at the same time practically to demonstrate the fallacy of the assertions of such circle squarers as Lawrence T. Benson, who maintains that the surface of a circle is equal to three fourths of the square of its diameter, I took a piece of paper of uniform thickness, not varying $\frac{1}{\frac{1}{J 00}}$ of an inch from the average thickness of $\frac{7}{40} \overline{0}$ of an inch, as tested by the micrometic screw used for determining the correct thickness of the covering glasses for microscopic objects to be examined by immersion objectives of very high power. From this paper a square of 12 inches was cut, and its weight found to
be 3,511 millig rammes. A circle was then cut out of it, scrupulously made tangent to the sides of the square; its weight was found to be 2,757 milligrammes. This number, divided by the former, gives 0.7855 , the quarter of the square 3,511 being 878.75 , and three quarters, $2633 \cdot 25$ milligrammes. The actual weight of the circle, 2,757 , is thus $\mathbf{~} 23.75$ milligrammes more than the weight of three quarters of the square, while the quotient, 0.7855 , expressing the relation between the surface of the square and the circle, is remarkably near to the fourth part of the well known number $3 \cdot 141592$, etc., or 0.785398 , etc., which latter expresses the ratio between the square of the diameter and the surface of the circle.
In order to find how far the method of weighing could approximate the true ratio, another experiment was made, in which the graduated arm of the balance was used, on which a so-called rider makes it possible to weigh to tenths of milligrammes. [The balance, by the way, is one of the verybest of Becker \& Sons', and indicates even one tenth of a milligramme when charged with 100 grammes in each scale; it is
 other paper, if possible superior in regard to uniformity of thickness, was cut into a square of 18 inches; its weight was found to be 7,644 milligrammes. The circle, carefully cut from it, tangent to the sides, had a weight of $6,003 \cdot 5$ milligrammes; this, divided by the formernumber, gives 0.785401 which differs from the theoretical and more correct number 0.785398 , by $100 \frac{3}{1000}$ parts.

In order to have an additional test in regard to three quarters of the square of the diameter, the circular paper was folded in 16 radial lines, and 16 chords, spanning segments of $22^{\circ} 45^{\prime}$ each, were drawn and cut so as to change the circle into the inscribed polygon of 16 sides. Its weight was found to he 5,851 milligrammes, which is 118 milligrammes more than three quarters of the square: $\frac{8}{8} \times 7,644=5,733$. It is thus seen that not only the circle cut from a square, but even its inscribed polygon of 16 sides, has a larger surface than three times the square of the radius, which, for the diameter $=1$, is expressed by 0.75 , a number considerably smaller than the more correct expression 0.785398 , used by all mathematicians, not because it is simply accepted as true, but because its accuracy has been demonstrated.

It can also be demonstrated that the figure representing correctly three fourths of the square of the diameter is the
inscribed polygon of 12 sides. It is remarkable how this inscribed polygon of 12 sides. It is remarkable how this
also can be verified by the balance in the above manner. For instance, on a square of paper of 15 inches side and $4,801 \cdot 5$ milligrammes weight, a tangent circle was drawn, and then an inscribed polygon of 12 sides. When the polygon was cut out, its weight was found to be $S, 676$, and the piece cut off around weighed $1,225 \cdot 5$ milligrammes: together, $4,001 \cdot 5$. of which 3,676 is very nearly three fourths.
The above details are not given as a demonstration. Mathematicians do not need experiments of this kind to see into a truth; but it is given only forthe benefit of those whose minds are so constituted that they can perhaps only be convinced of their erroneous notions by a practical test, which any one wh.) has a chance to use a good balance can easily make
New York city.
P. H. Vander Wefde.

## The Electrolytic Preparation of Magnets.

The late Professor Jacobi proposed to determine experimentally whether, by proper arrangement, precipitated iron can be induced to arrange itself so as to form permanent magnets. The author maintains that he solved the question t welve years ago, and obtained magnets by electrolysis. He finds that iron precipitated from a solution of iron containing sal ammoniac is, in a very eminent degree, capable of permanent magnetism; that precipitated from other solutions of iron is magnetic only in a slighter degree. If the precipitate is obtained under the influence of powerful magnetism-prejudicial circumstances being avoided-strong magnets of homogeneous structure are formed from solutions containing sal ammoniac. On the other hand, solutions free from sal ammoniac yield magnets distinguished by their irregular structure, in consequence of which the feeble magnetism of the precipitate is rendered still weaker. A not unimportant
degree of coercive power cannot, under any circumstances, degree of coercive power cannot, under any circumstances,
be denied to iron, unless altered in its structure by ignition or other processes. The nature of the solutions themselves must be regarded as the cause of the irregularities of structure. While the sal-ammoniacal solution remains perfectly clear, a solid crystalline layer is separated upon its surface. If pieces are broken off, they fall to the bottom. Solutions of ferrous chloride become turbid, and continually deposit a slimy precipitate upon the electrodes. Klein's solution re mains tolerably clear, but upon the surface is formed a slimy foam. If any of this falls down, the electrodes are likewise soiled. Thus the iron precipitate is deprived of its homo
geneity, and by partial removal of the iupurities-for exam ple, by brushing and by the rise of gas bubbles-the fonna tion of partial magnets is explained.-W. Beetz, in Poggen. dorff's Annalen.

## Japanese Paper Clothing.

In the Japanese exhibit at the Vienna Exposition was displayed a remarkable variety of objects of common use made entirely from paper, the mode of manufacture of which has hitherto been unknown out of Japan. The articles included handkerchiefs, napkins, garments, lanterns, umbrellas, and many others, and solidity
A member of the Gerinan Society of Orientalists,M. Zappe has recently explained the process by which this paper is produced. The material used is the bark of the Broussoneti papyrifera or paper mulberry, the same source from which the natives of Polynesia derive their tapa cloth and mats hough treated in an essentially different manner.
The culture of the plant is quite simple. Pieces of root, some three inches in length, are placed in the earth so as to protrude slightly above the surface. These speedily send forth shoots, often of nine inches in length during the first year, and increasing threefold in size during the following twelve months. By the end of the third year, the plant at tains a hight of about thirteen feet, and by careful pruning eventually brought to a broad and strong shrub
In winter, the branches are removed and chopped in bits about two inches in length, which are boiled in water unti the bark comes off readily in the hand. Drying of the bark in the air for two or three days follows; and after immersion in running water for twenty-four hours, the material is sc:raped on a cutting blade so as to separate the two kinds of fibers of which it is composed. The exterior fibers are of dark color, and are called "saru kavo"": they serve to make paper of inferior quality.
The interior filaments, known as " sosori", which are used or fine paper, are rolled in balls weighing some 35 lbs . each. These are washed in running water and left to soak for short time, after which they are removed and squeezed dry Boiling then follows, in a lye made from the ashes of buck wheat bran, care being taken that the contents of the vats are constantly stirred. Another washing in water removes all remaining impurities, and the fibers are then pounded, for twenty minutes at a time, upon blocks of hard wood. They are finally massed into balls, and these, by ordinary means, made into pulp. Into the latter a small proportion of a iquid extracted from the root of the hebiocus manilıot is mixed, and a quantity of rice water, to prevent the ravages
of insects. The subsequent treatment of the pulp is similar to the usual process of paper-making.
Leather paper, so called, is made by the superposition of several sheets of the material previously soaked in an oil de rived from theyonoko(cellis Wildenosiana),subjected to stron pressure, and lastly covered with shellac. Clothing is made from a paper called " shefu", which is cut into threads more or less fine according to the fabric to be produced. These are twisted by the fingers, previously moistened with milk of lime, and are woven into cloth either alone or with silk The stuff can be washed and is of great strength and dura bility. Papier crépé, so called by the French from its hav ing the wrinkled appearance of crape, is produced by moist ening the sheets and pressing them under rollers havin suitable corrugations on their peripheries.

## stronomieal Discoveries in 1874.

Professor Daniel Kirkwood gives the following resume f new heavenly bodies discovered during the year just nded.
Six minor planets have been added to the list:
No. 185, discovered by Dr. C. H. F. Peters, February 18 t Clinton, N. Y.
No. 136, by Palisa, at Pola, Prussia, March 18.
No. 137, by the same, April 21.
No. 138, byPerrotin, at Toulouse, May 10
No. 139, by Professor Watson, at Pekin, October 8.
No. 140, by Palisa, at Pola,as above.
Four comets were also discovered, the most interesting of which, Coggia, we have fully described. The star shower of November 14 entirely failed, and no further return of the meteors in any considerable number can be expected until near the close of the century.
It has been found that the aphelion of Mars differs in longitude but one degree from the perihelion of the minor planet Aethra, discovered in 1873: and that the greatest distance of the former exceeds the least of the latter. These facts indicate the possibility of so near an approach of the two bodies that the disturbing influence of Mars on the as teroid may materially modify its orbit.

The Lake Shore railroad has had under construction for some time, and has just completed, at their car works in Adrian, a postal car of a new pattern, intended especially for newspaper work. It has already been put upon the routc between Chicago and Buffalo. The car has been built partially as an experiment, and partially from a knowledge of what the service demands. It is 60 feet and 6 inches in length, and weighs 49,300 pounds. It contains 122 distributing boxes in the center of the car, while the ends are arranged for the convenient storing away of the filled sacks. Besides these, the car is fitted up with all the modern con-
veniences for the rapid and easy disposition of the work. There is room for two men to work: and it is expected that with the convenience afforded they can conduct newspaper distribution as expeditiously as that of letters.

## Beginners.

## by PROFESBOR B. vogel.

Old and young, when they take up photography, have generally no ideal purpose in view beyond the practical project of gaining their daily bread with the aid of the camera. They care very little for the chemical reactions, or the action of the light, or the disposition of molecules, etc., and less still abont the question whether photography is really an art or not their object is to create a good business, and this goal they try to reach as quickly as possible. Generally speaking, they hegin by undergoing a few weeks' tuition under some other photographer, where they learn to coat a plate in a passable manner.
I am often asked how long is really necessary in learning o become a photographer, and I always reply that the matter very much depends upon the individual himself. Those who possess a knowledge of chemistry, and have natural ap titude, will learn to take negatives in a very short time. I could mention a well known scientific man who studied my manual carefully, and came into my studio impressed with a good deal of technical knowledge of the matter, therefore nd under these circumstances there was really nothing for him to learn but the practical manipulations, the pouring on of the collodion, developer, etc., and the adjustment and working of the apparatus, things ohviously that can only be raught by demonstrations. This gentleman was qualified to operate in five days. Of course during this short period he had not heen looking on with his hands in his pockets, loung ng about nnder the impression that he knew enough; but he practised at home what he learned from day to day, and was xceedingly successful in what he did.
Another pupil that I had, who was an exceedingly good chemist, and thoroughly acquainted with the materials which he had to manipulate, turned out quite the reverse, for, after six months' tuition, he was still a clumsy operator. He be onged to that numerous class which are usually terned butterfingers." When he took up a plate to clean it, it slipped through his fingers; the dipper he would infallibly break after one or two experiments; the developer ran off the plate, and the filter never acted under any circumstances. I was exceedingly glad to get rid of so awkward a pupil, for I could never have made anything out of him. These two are fourse, merely instances, and do nothold good in all cases There are people who enter a studio withont any previon knowledge, and who are exceedingly quick at picking up the first rudiments of the art. In a week they are so self-satis fied that they hasten home to follow np their success, but, unfortunately, find themselves stuck fast in a day or two over question about which they possess no experience.
The matter is easily explained. It is easy enough, when you have good plates prepared for you, good collodion, good dipping bath, good developers, intensifiers, etc., to secure a good picture, especially when found in a well regulated stugood picture, especially when found in a well regulated stu-
dio; success is here obtained without difficulty; but the beginner has to thank the pure chemicals and the photographe who has prepared the baths and solutions for it, for he does not know how soon these may become changed after working or standing some time. He finds that the collodion, especial y if the drainings go back into the bottle, becomes thicker and thicker; it gathers dust and impurities, and thus spots and stains are produced, whose presence he is unable to ex plain from his eight days' apprenticeship. It is the same with the dipping bath. Unfortunately a bit of lime or kaolin has fallen into the solution, and this has rendered it slightly alkaline, and at once the plates show signs of fogging; o again, the collodion is full of organic impurities, which pro duce streaks on the sensitive plate; or the film has other de fects, such as pinholes, patches of insensitiveness, flatness, etc. All these phenomena, which may not come unexpecter ly to those who have studied a photographic manual, are niof to confuse any beginner who relies upon his ow brief experience in the matter. If to these well known or intensifying, bad fixing or varnishing, we have no incon siderable host of disagreeables. I have pointed out in my manual as many as sixty different sources of failure, and this number is by no means complete. Those who desire to know something about these vexatious phenomena, and the mean necessary for their avoidance, will not be able to finish thei apprenticeship in a week, for it is only long practice and study that make the skillful photographer.
Dr. Jacobsen says that a little chemistry should belong to the culture of all men; and the photographer is a man. There are many operators who take excellent pictures, and yet boast that they know nothing of chemistry. This, however, is mere nonsense, for such people, if they have not studied chemistry theoretically, have been so long working with photographic chemicals, and observing the reactions, that they have be come possessed of the chemical properties of the things employed. They know from experience that iodide of ammonium when decomposed gives off iodine, and becomes red; that iodine colors collodion yellow, and starch blue; that nitrate of silver is easily dissolved in water, and in alcohol only with great difficulty ; that it freezes at a high temperature, and becomes decomposed in one still higher; that it dissolves iodide of silver; that it is reduced by organic substances, etc.
In the building up of this practical knowledge piecemeal, of course many a pint of collodion is lost, many a costly silver bath thrown into the residue pan, and much valuable time frittered away in aimless experiments. The same amount of chemical knowledge they could have acquired in a tenth part of the time and tenth part of the cost by studying photographic chemistry ; and this knowledge is readily acquired, for photographic chemistry occupies but a small section in the thick manuals on organic and inorganic chemistry.-Photo. Neros

As soon, however, as each cup emerges from between the
bristles its contents drop out, directly, however, into the drill bristles its contents drop out, directly, however, into the dril ter, as the machine advances, replace the soil in the furrow completing the planting. The knives in the cutter divide the seed into pieces of uniform size, and thus the constant filling of the cups is rendered more certain. Bothl inventions appear to possess labor-saring capabilities which will doubt less commend them to farmers.
Patented through the Scientific American Patent Agency, October 14, 1873, to Lemuel J. Mewborne, of Kinston, Le.

## IMPROVED POTATO CUTTER AND PLANTER.

We illustrate herewith two new agricultural inplements, one of which serves for cutting seed potatoes into any num ber of pieces by means of simple mechanism. The othe makes the drill, drops in the seed and finally fills the soil back into the furrow.
Fig. 1 of the small engraving is a perspective view of the cutter. The potatoes are contained in a suitable receptacle whence they are removed by hand and placed singly in the tubes, A . These last are of varying diameter to accommo date potatoes of differing size. B is a strap which passe longitudinally across the table, through a guide piece tbereon Fig. 2, thenceover a pulley, and is connected beneath with a treadle. On the upper side o treadle. On the upper side o blades (one of which is sontal blade (one which is show at C, Fig. 2) which carry one o more vertical cutters on the por tions contained within the pe ripheries of the tubes. A. These tubes, it will be seen, are slot ted in order to allow all the blades to be drawn through them, an operation effected through the strap and treadle already referred to. By in. already referred to. By in creasing the number of verti
cal cutters in any tube, the cal cutters in any tube, the
number of pieces into which the number of pieces into which the potato is divided is of course augmented. The system of knives is connected by bars underneath the table, secured to vertical arms extending down through slots, $D$, in the same. In operation, ufter the potatoes are deposited, one in each tube, pressure upon the treadle carries the knives through them: and thus divided, they fall, through apertures beneath the tubes, upon an inclined plane, and into any vessel placed for their reception.
The larger engraving represents the planter, into the hop per in the rear of which the cut potatoes are deposited. Se cured upon the axle is a castiron disk, A, around the peri phery of which a number of holes are made in order that the cups, B, may be fastened thereon, at any points or at any dis. tances apart. As this disk revolves, the cups, which are turned rearward, enter the hopper from beneath, passing through an orifice protected by bristles, which serve to pre

vent the escape of the seed. The cups thus become filled. As they are carried on out of the hopper by the disk, they pass through a box, C, (also shown larger, in Fig. 2). The sides of thisattachment are fitted with bristles, which, while offering no resistance to the passage of the cup, retain the eed in the same as it is reversed by the rotation of the disk.


## MEWBORNE'S IMPROVED POTATO PLANTER

aoir county, N. C.., by addressing whom further particulars regarding sale of rights, etc., may be obtained.

## BROADBOOK8' EXCELSIOR PRUNING SHEARS

 We illustrate herewith a novel pruning shears, the feature of which is a cam-shaped blade adapted for giving a very owerful drawing cut.Fig. 1 represents the shears partially open, showing how the drawing cut is secured. Fig. 2 is the wrench or lever, provided with a hook and stud that drop in perforations on the blade, Fig. 4. Fig. 3 is the other handle, with the blade turned back against the shank, forming, when used singly or without the lever wrench, a hatchet or knife, for trim ming small limbs, sprouts, or shrubbery. The cam-shapel knife blade is provided with a series of perforations to re ceive the hook and stud of the lever wrench. When the handles, Fig. 1, are brought toward eachother, as is evident the drawing cut is produced. The point of contact of the knife edge with the limb, where the power is to be ap

Fiq. 2 Fit. 7 lig. 3

plied to do the cutting, is inside the pivot or bolt that holds the blade. The shape of the hook, Fig. 3, is such as to bring which the bladeoperates. When the knife blade is applied it holds the limb firmly until cut, and prevents its slipping on the hook. Injury to the bark is prevented, also any crushing of the limbs, the ends being left sniooth enough for graft ing. In other pruning shears, where the power is applied outside of, and at a distance from, the fulcrum or pivo which holds the two jaws together, slipping of the limb of ten occurs, thereby mangling the bark. The very long handles also employed frequently crush the branches. The handles of the shears represented in the engraving are only eighteen iuches in length, so that the power is in the shears itself instead of in long handles.
The efficiency of the device is very remarkable, judging
from specimens of its operation forwarded to us. Two fragments of boughs are before us, one $1 \frac{1}{2}$ inches and the other $2 \frac{1}{2}$ inches in diameter, each of which has been divided with a clean, smooth cut, apparently at a single stroke. The wood is hard maple, and the length of the cut is greater than the above diameters, owing to its being made at an angle. For information, relative to the additional advantages of the tool, and descriptive circulars, address Broadbooks \& Co., Batavia, N. Y.

## BLAISDELL'S IMPROVED RAILWAY TIE

The invention illustrated here with is an iron tie, designed as a substitute for the wooden tie ordinarily employed, and also to provide a strong and elastic support for the rails, while constituting a portion of a permanent way.
The peculiar form of the cast iron body of the tie, clearly shown in Fig. 1, is calculated to give strength and stability, and, at the same time, to insure economy of material. At each end are formed rectangular sockets, open at the top and at the outer extremities. The lower parts of said sockets are flanged in order to retain rulber blocks, A, in the sectional view, Fig. 2 , above which wooden blocks, B, ahove which wooden blocks, B,
are laid. On top of each of the last, the rail chair is placed. The chair is made in two parts, so as to the adjusted readily to grasp the rail letween the lip and foot plate. Overlapping portions of the body, (') together with the bolts entering the wooden block, securely hold the chairs in position. Pass. ing longitudinally through the entire tie is a truss rod, 1 ) which is set up outside the
wooden blocks with nuts and washers. The apertures
through which this rod enters the metul part of the tie are made sulficiently large to allow the depression of the blocks when the rubber yields to superincumbent pressure.
It will be seen that the rubber blocks give an clastic stip port to the track, tending to nullify the results of jarring and compression. The wooden blocks serve a similar purpose, and may be used alone when any great degree of elasticity is not required. 'The chairs may be adjusted to hold ails having flanges of varying width; and owing to the firm bearing afforded by the abutting surfaces, they are retained in position with the least possible number of spikes.


The sloping contour given to the surface of the tie enables, it is claimed, the wheels of a train, in event of running off the track, to mount and pass over the ties, instead of crushing the same, as might otherwise occur.
Patented January 13, 1874. For further particulars address the inventor, Mr. George D. Blaisdell, Cambridge, Vt

## Mining in Massachusetts.

Some extremely rich mines of lead, silver, and gold have, recently been discovered near Newbury, Essex county, Mass., which are now being worked with profit and with the prospect of an extraordinarily valuable yield. A single shaft ã feet deep is now giving ten tuns per 48 hours, the ore con taining all three of the above metals. The net proceeds are $\$ 110$ per tun. A second shaft lately opened is being worked, and preparations are in progress for extended opera tions. The mine is supposed to extend for six or seven miles.
Although the above comes from the New York Tribune, we fear it is an over-statement.

Finely rubbed bichromate of potassa mixed with twice its bulk of sulphuric acid and an equal quantity of water will clean the dirtiest brass very quickly

## COMBINED AQUARIUMAND PLANT CABE.

We illustrate herewith one of the most beautiful accessories to indoor decoration and the cultivation of taste for na. tural beauty that has ever been brought under our notice. It is a plant case combined with an auparium, and must be re. gardecl as a happy thought of its designer (a correspondent of the London Garden), as, of all forms of vegetable life, aquatics or sub-aquatics are best suited for indoor gardening in towns. If the best results are to be obtained, a commencement should be made by arranging suitable rock work; the kind of plants with which they should be furnished and the best material in which to grow them should then be selected. For cases like that now represented, hundreds of rare and beautiful plants are suitable, and also plants neither rare nor costly, but yet not less interesting. Many grasses, sedges, cyperus, and ferns grow well in such cases if elevated an inch or two above the water level, For subinerged vegetation we have valisneria, anacharis, charas, the pigmy-blossomed water ily, the hawthorn-scented aponoIgeton diztachyon,fresh green disk. shaped sheath-rooted duckweed, shaped sheath-rooted duckweed, pontederia crassipes, the hollow filled with air, and many other filled with air, and many other
equally interesting plants, all of easy culture.
In the hands of an experienced sultivator, many rare plants would thrive as well in a case like this as in a cool plant stove; and then sarracenias, cephalotus, dionæa, droseras, and even fone dionæa, droseras, and even lone or two of the true pitcher plants, as nepenthes phyllamplora, or nepenthes sracilis, might be added, notwithstanding their reputed carnivorous tendencies. Given a few lumps of fibrous peat and a handful of fresh living sphagnum (moss), and even the gorgeous crimson-winged disa might be induced to display its rich colors and fresh, glossy foliage. Plant life, too, may be interestingly aslife, too, may be interestingly as-
sociated with animal life. In the sociated with animal life. In the
water may be lizards, golden and water may be lizards, golden and
silvery carp, brown-speckled and .green frogs, and a whole colony of water beetles and snails; while flitting about overhead, among the plants, may be butterflies of many hues, and a few of the most showy kinds of moths. "Are we, then, to capture such insects on the wing and introduce them? Fo, they must be bred in their new home, and this simplifies the whole affair, for specimens of all the more showy butterflies may be bought at almost any natural. ist's, in the chrysalis state, for at the most a few pence each; and these, if placed in a little box (without a lid) of dry earth, and introduced to the plant case, will come out in due season, like other buttertlies, and will delight us with their elegant forms and brilliant coloring. Even the common white speckled garden spider, added to such a case, tends to give it life and interest. This aquarium is divided into two. parts; the lower one, as will ls. seen, for water, fish, and true' aquatics; the upper one for sub. aquatics and other plants."

New Proccas for Rendering Wood Inconibustible. An English clergyman, the Rev. Dr. Jones, has distin. guished himself by inventing a process for rendering wood incombustible, for which he has obtained a patent. The wood is at the same time made impervious to dry rot and decay, so that two important ends are attained at once. Most of the old methods of preserving wood only render it more liable to fire, as was shown not long ago in the burning of the landing stage at Liverpool. Dr. Jones subjects the wood to a pickling process, in a solution of tungstate of soda and water of the specific gravity of $1 \cdot 2$. The tungstate is made by the addition of tungstate of lime to hydrochloric acid and salt,and it produces in the process as much chloride of limeas will pay all working expenses. The tungstate of soda, from experiments that have been made publicly and privately during the last three years, is proved to render soft woods, such as white and yellow pine, as hard as oak or teak, and it will also restore wood that has been affected by dry rot to the original condition of durability. The London Daily News gives the following account of some experiments recently made at Godstone to test the value of the new pro. cess:
The experiments made were three in number, and the
tests were undoubtedly very severe. 'Two small pyramids of sticks were made, one of prepared and the other of unpre. pared wood. These were then well saturated with paratfin and igrited. In the case of the prepared wood, the paraffin soon burnt itself out without commnnicating the flames to the wood, which was only slightly charred. The other heap burnt fiercely, and in half an hour was reduced to ashes. The next experiment was made with two wooden huts, one of which had been prepared, while the other, built of ordinary Scotch fir, had not. A strong fire suflicient to ignite the houses was made in each, and the effect was about the same as in the preceding experiment. A chest containing a
and shell. It would also be a great saving to the nation in preventing the necessity of continually docking and repair ing ships.

Car Wheells.
At a recent meeting of the Car Builders' Association, the subject of discussion was "Car Wheels-the Best Method of Fitting, Flange Wear and Causes, Mileage, and Breakage." Mr. Garey said he had been requested to ask why old wheels could not be remelted and recast. He thought there should be some process by which old wheels could be made available as material for new ones : yet wheelmakers objected to taking old ones to ive used a second time in manufacture


## COMBINED AQUARIUM AND PLANT CASE

was thrown into the flames when at their hight, and was taken out some time afterwards, charred indeed as to the outside, but practically uninjured in any other respect. The inside was quite cool, and the wax seals upon the document were intact. Perhaps the most important trial was that which took place with gunpowder. A government gunpowder keg which had been rendered fireproof was used for this experiment. A paper packet containing about two ounces of gunpowder was put in the bottom of the keg, and a sheet of brown paper impregnated with the tungstate was pasted over it and dried. The keg, which was open at the top, was turned upside down, and surrounded by shavings, which were lighted. A fire of petroleum and shavings was kept burning on the top for about a quarter of an hour, without producing the slightest effect on the keg. To make the trial still mose complete the keg was reversed again, and lighted shavings were thrown in upon the gunpowder, protected only by a sheet of brown paper. The paper stood the test admirably, and the solution rejected the fire so thoroughly that the paper did not even show a sign of charring. 'he gunpowder was then taken out and exploded. The properties of his invention, Dr. Jones states, would give the navy the advantage of being always sound in hull and free
from any danger of fire, whethe: from accident or from shot

Mr. Jonathan Scoville remarked that, if old wheels were unifomn in quality and sufficiently soft, there would probably be no objection to their use as nal terial for new ones. But they are. in fact, never uniform, and, us a general thing, they are hard and, when melted, get still harder. In an average lot of old or returned wheels, for every hundred fit for remelting, there were three hundred that were not fit. Mr. W. W. Snow, of the Ra mapo Car Wheel Works, said that nearly all wheels are supposed to be made of charcoal iron. If these wheels, when used a second time, were remelted with charcoal, he thought they would not deteriorate; but as anthracite coal was generally used in melting, and as this contained more or less sulphur, the iron becomes impregnated with it, and the quality is impaired in proportion. He had observed that, after the sulphur was once in the iron, there was an increased tendency to absorb more of it, and that the second and third melting, and perhaps the lourth, produced nothing but ommon anthracite iron, unless soft charcoal iron were mixed with it at each melting.
Mr. W. R. Davenport, of the Erie Car Works, asked whether some other disposition could not lie made of old wheels than put ting them into new ones. Old wheels, mixed with pig iron in H puddling furnace, will give splendid results in rolled bar iron. Every railway company uses enough merchant bar iron to consume every old wheel that they have to sell. Then why should wheelmakers be expected io take old wheels when they can be sold to the rolling mills, :here they can be used to ad vantage, and the quality of the iron improved?
Mr. Snow said his company had supplied parties with a certain number annually, who put them into plate iron, and tho testimony was that such plate iron was the best of any in the market. The old wheels are first puddled, of course, and ge through the regular process, which necessitates an increase in the cost of plate iron, and it would be the sume with bariron consequeutly, if railroad com pauies give us the wheels pauies give us the wheels put into new iron, they must ex pect to pay more for the iron produced. That theiron i better there is no question, according to the testimony of the best iron makers in the country.

## car wheel fitting.

Mr. W. R. Chamberlain, of the Boston and Albany Rail. road, said their wheels were bored out at a $\frac{3}{64}$ inch taper and the axles turned the same and fitted under a thirty tun pressure.
Mr. Adams said that most wheel fitters try to adapt the pressure to the strength of the wheel: that is, if $40,000 \mathrm{lbs}$. are applied and it is found the wheel will not bear it, the pressure is reduced to ten or fifteen tuns. There are wheels that will stand 75,000 or $80,000 \mathrm{lbs}$., and not show any signs of fracture, while others will fracture at 25,000 or $30,000 \mathrm{lbs}$. but of course this does not affect the question of what would be right. The wheels at the Boston and Albany road shops were fitted at about $50,000 \mathrm{lb}$., and they had very few loose ones.
Mr. Adams had noticed that the axles of many cars had abrupt square shoulders of $\frac{1}{8}$ or $\frac{1}{16}$ of an inch, immediately back of the hub. Did not such shoulders make the axles weaker than it would to run them straight back?
Mr. Snow was of the opinion that it would be better to
have no shoulder at all. If there were one, especially on a rolled axle, vibration would almost invariably eease at that point. In a hammered axle, perhaps not so much so. Iron would granulate from vibration, and this was one reason why hammered axles were considered so much better than rolled ones; and he believed that if they were turned down in the middle, better results would be realized from rolled axles.
Mr. L. Garey said the road with which he was connected some eighteen years ago had a good many broken axles, and on examination many of them were found to be turned with a shoulder at the inner end of the hub, while many of them had a slight check at the shoulder. He then had them made without shoulders, and in no instance had they broken at that point, which, to his mind, was conclusive against shoul ders at the point he had named. As to tapered wheel fits, he disapproved of them, especially for broad tread wheels run ing over different gages.
Mr. Chamberlain thought that 99 wheels out of 100 were bored with a tapered hole "after we had done our best," and that a strain was put on the outside end instead of uniformly along the bore. A wheel pressed on at a $\frac{3}{16}$ taper with a thirty-tun pressure will require seventy tuns to press it off again. A great many more loose wheels that were straight came over the Boston and Albany road than there were tapered.
rejecting doubtrul wheels.
Mr. Lobdell, a son of the proprietor of the Lobdell Car Wheel Works, of Wilmington, Del., read a paper written by his father, giving some of the results of his 40 years experience as a car wheel maker. He pressed on his wheels at a pressure of from 30 to 40 tuns, and had never had any complaints of loose wheels. Flange wear was produced by several causes, among which were mistakes in gaging and marking the wheels, and differences in the hardening of the chill. Fewer accidents were caused by broken wheels than by broken rails or other material, because more care was generally bestowed on their manufacture, and they were more thoroughly tested. His practice had been to break up all wheels that were at all doubtful, preferring to break up a hundred rather than run the risk of one doubtful one. Breakage in service resulted from inherent defects in patterns, or from reduction in weight in order to lessen the cost. The defects in the chill, he thought, were not due to the par. ticular kind of iron used, but rather to the manner in which the ore had been smelted, or to want of care. He had got perfect wheels from hematite, magnetic, specular, and other ores, and also from mistures of ores. All chilled wheels were liable to blotches or blisters, which of late have become more common, especially on tender wheels and others of small diameter. These blemishes, although unsightly, are not dangerous. Some specimens of wheels were exhibited
by Mr. Lobdell, which had been broken through the blisters on the tread, showing that the blisters were only surface defects, and that the iron was sound underneath. One of these wheels ( 28 inch), made of hematite ore, had run 70,000 miles under a 32 -tun engine whose speed was 40 miles an hour. mileage of car wheels.
Mr. Washburn, of the Washburn Car Wheel Company, of Worcester, Mass., said that for the last four or five years he had been making wheels of steel, and had not been able to get a satisfactory comparative statement as to the merits of steel and iron. The iron wheels, of all makers varied very greatly. Steel wheels if perfect, he thought, would eventually take the place of iron, and their mileage would exceed that of iron, six or perhaps eight to one, and would average 250,000 or 300,000 miles; while a chilled wheel had to be a good one to average 40,000 miles. A steel wheel costing $\$ 50$ would have to run from 100,000 to 125,000 miles to be as cheap as an iron wheel that would run 40,000 , but probably the average of the latter would notexceed 30,000 . He thought a steel wheel would run from 100,000 to 150,000 miles with out turning, and would stand turning two or three times before it was worn out. He had wheels now that had run
300,000 miles and were still good. Mr. Davenport said it had been supposed to be impossible to keep the mileage of anything but engines, but the Lake Shore road had found a way of keeping the mileage of pas. senger, baggage, mail, and express cars. Each conductor between Buffalo and Chicago reported what cars he took from the beginning of histrip and what cars he left at the end, and there was no difficulty in this way in getting at the mileage. The report on 1st of April last showed that the wheels removed during the previous six months had averaged over 57,000 miles, and the smallest average he be lieved was 54,000 . These were 33 inch wheels that had run under heavy cars at a high speed. The Lake Shore, he admitted, was not as hard a road for wheels as some others. With respect to iron wheels, he had some in mind that had run 200,000 miles and were good yet. He had the means of determining the data himself. Iron wheels will make a large mileage as well as steel wheels; they are not exhausted at 40,000 miles. There may be on some roads bad wheels that make small mileage. He had nothing to say against steel wheels, but he wanted iron ones to have a fair chance. The are capable of being greatly improved, as well as steel.
Mr. Snow said the Ramapo Works sold their wheels to the Pullman Car Company on a mileage basis of 50,000 miles, receiving credit for any excess and standing the loss for those that fell short, and it was a long time since they had paid any losses. He mentioned this merely for the informa tion of those who thought chilled wheels would not make over 40,000 miles. The lowest average forthelast six months was about 58,000 . He believed wheel makers could do much to improve the quality of their wheels by attention to deto improve the quality of the
tails - Nationnl Car Buider.

## Userfal Rectpes for the Shop, th the Farm. <br> Save the scales of the forge (oxide of iron) for use in an-

 nealing hard cast iron or steel.The best way to avoid water pipes freezing and bursting sto have a cock in the cellar, by which the water can be turned off from the entire house.
Rubber rings, slipped over bottles in packing, ensure afety against breakage.
Protosulphate of iron in powder, rubbed up with raw linseed oil, is an antidote for external poisoning by cyanide of potassium.
Leather can be made hard by saturation in a solution of shellac in alcohol.
In taking up belts, the time used in carefully cutting the belt square is always time saved.
Before washing almost any colored fabrics, soak them in water, to each gallon of which a spoonful of oxgall has been added. A teacupful of lye in a pail of water is said to improve the color of black goods. A strong tea of common hay will improve the color of French linens. Vinegar in the rinsing water. for pink and green, will brighten those colors; and soda answers the same end for both purple and blue.
To make silk which has been wrinkled appear like new, sponge on the surface with a weak solution of gum arabic or white glue, and iron on the wrong side.
The advantage in tensile strength, when holes are drilled in steel rather than punched, is calculated to be 25.5 per cent.

To test the quality of wool, take a lock from the sheep's back and place it on a measured inch. If the spirals count from 30 to 33 in the space of an inch, it equals the finest Electoral or Saxony wool grown. The diminution of the number of folds to the inch shows the inferiority.
An excellent bronze for small castings may be made by fusing together 95 parts of copper by weight and 36 parts of
Paraffin is the best material for protecting polished steel riron from rust.
Put hard sand instead of ashes on slippery sidewalks.
The parings of a bushel of apples are said to yield a quar of cider, by the aid of a hand press
A French meter is about fifty times the diameter of a five cent piece. The same coin weighs exactly five grammes.
A cracked bell which gives a jarring sound may be im proved by sawing or filing the ruptured edges so that they are not brought together by the vibration of the blow.
Photographers who use large quantities of nitrate of silver should allow all the excess of silver, acetic acid, and other matters from the plates undergoing development to run into stone jars containing fragments of zinc. By that means the metallic silver may be collected; it should then be digested with dilute sulphuric acid, washed, a
an oven, so that quite a large saving may result.
Lead 9 parts, antimony 2 parts, and bismuth 1 part is an alloy which expands on cooling, and which will be found rseful in filling small defects in iron castings, etc.
It is said that charcoal will fatten fowls and at the same ime give the meat improved tenderness and flavor. Pul a day.
Lampblack and butter are used to prepare ribbons in hand
tamps.
The following is a convenient table for sign painters, or others who have occasion to make lettering. Supposing the
hight of the capital letters to be ten, the widths are as folhight of the capital letters to be ten, the widths are as fol-
lows: B, F, P, ten : A, C, D, E, G, H, K, N, O, Q, R, T, V, ows: B, F, P, ten: A, C, D, E, G, H, K, N, O, Q, R, T, V
$X$, and Y, eleven: I, five: J, eight: $S$ and L, nine: M and $W$, seventeen : $Z$ and $\&$, twelve: Numerals: 1 equals five: $2,3,5,7,8$, nine: 4 , eleven: $6,9,0$, ted. Lower caseletters (hight six and a half): Width: a, b, d, k, p,q, $x, a n d z$, seven and a half: $c, e, o, s$, seven: $f, i, j, l, t$, three: $g, h, n, u$ ight: m, thirteen: $r, v, y$, six: $w$, ten.
Glycerin is an excellent coating for the interior of plaster molds.
A strong solution of sulphate of magnesia gives a beautiul quality to whitewash.
Glass can be drilled with a tool moistened with dilute sulphuric acid. This last is better than turpentine.
To wash calico without fading, infuse 3 gills of salt in 4 quarts of water. Put in the calico while the solution is hot, and leave until the latter is cold. It is said that in this way the colors are rendered permanent and will not fade by subquent washing
Rancid butter, pork, and lard casks may be purified by burning straw or shavings in them
White lead rubbed up with linseed oil to the consistence
of paste is an excellent application for burns.
Gelatin mixed with glycerin is liquid while hot, but an elastic solid when cold. Useful for hermetically sealing bottles.
To clean cider barrels, pour in lime water, and then insert trace chain through the bung hole,remembering to fasten a strong cord on the chain so as to pull it out again. Shake the barrel until all the mold inside is rubbed off. Rinse with water, and finally pour in a little whisky.
A piece of paraffin candle about the size of a nut, dissolved in lard oil at $140^{\circ}$ Fah., the mixture applied once a month. will beep boots waterproof.
Adding to the width of a belt and of the faces of the pul. eys increases immensely the power of conveying force A wide belt is always better than a narrow one strained to its tmost capacity.
Black cement for bottle corks consists of pitch hardened by the addition of resin and brickdust.
alum, boiled in a gallon of water, gives plate a beautiful whiteness. Dip the article in the mixture, remove, and rub whit
dry.

Soap and water is the best material for cleaning jewelry. Awnings may be made waterproof by plunging first in a solution containing 20 percent soap, and afterwards in another solution containing the same percentage of copper. Wash afterwards.
A handful of quicklime, mixed in four ounces of linseed oil and boiled to a good thickness, makes, when spread on plates and hardened, a glue which can be used in the ordinary way, but which will resist fire.
A good walnut stain for wood is composed of water, 1 quart; washing soda, $1 \frac{1}{d}$ ounces; Vandyke brown, $2 \frac{2}{2}$ ounces: bichromate of potash, $\ddagger$ ounce. Boil for ten minutes and apply with a brush, either hot or cold.
A piece of alum as big as a hickory nut will render clear a pail of muddy water. Dissolve the alum, stir. and allow the impurities to settle.
The length of the double whiffletree and the neck yoke for a sleigh should be just as long as the sleigh is wide from the center of one runner to the other.

## Amalgam Fllilngs for Teeth.

J. E. E., of Pa., writes as follows: "Having noticed in the Scientific American several articles on fillings for teeth, I will state a case of my own. In 1854, twenty years ago, in the city of San Francisco, Cal., I had several teeth filled by a dentist. Two of them (front teeth) were rotted ncarly half away and fully to the center of each tooth; so that the nerves were exposed, rendering the operation quite painful The dentist was not quite certain that the teeth could be saved,so he filled them with tinfoil, saying at the time: "If the teeth do not trouble you you can have the tin filling removei, and have them refilled with gold forl." But the tinfoil still remains in them, apparently as perfect as on the day it was put there. I never have received the least trouble from the teeth. One advantage in tin over gold is that it, being nearer the color of the teeth, is less conspicuous, and I believe that it is in every way as good as, if not better than, gold."

Erains.
" No sound working brain," says Oliver Wendell Holmes, without enough good blood to build it, repair it, and furnish the materials for those molecular changes which are the conditions essential to all nervous actions, intellectual and volitional, as well as those of lower grade. No good blood without a proper amount of proper food and air to furnish materials, and healthy organs to reduce a sufficient quantity of these materials to a state fit to enter the circulation. No healthy organs, strictly speaking, except from healthy parents, and developed and maintained by proper stimuli, nourishment, and use. No healthy parents-no help for it. We are, of course, applying the term healthy to the brain, as signifying much more than freedom from disease. A healthy brain should show, by the outward signs of clear, easily working intelligence, well balanced faculties, and commanding will, that its several organs, if such there be, or its several modes of action, if it works as a whole, are properly developed and adjusted by themselves and in rela. tion to each other.'

## Eaising Almonds in California

Mr. Olmsted, of Carpenteria, says the Santa Barbara Index, has finished picking his crop of almonds. He will have from his orchard this season over five tuns of the Languedoc or soft shell almonds. Mr. Olmsted's orchard is only four years old, and of course is not yet in full bearing. His trees bore a few nuts when two years old. The third year, the average yield to the tree was about five pounds. Two rows in the orchard, covering ground equivalent to two acres, that received great care in planting and special culture, produced 2,000 pounds of dried almonds. This yield,at the wholesale San Francisco market price for the soft shell almond, will give Mr . Olmsted about $\$ 230$ per acre, after paying all expenses of the year's culture, gathering, sacking, and marketing. Mr. Olmsted keeps the ground clear, cultivating nothing between the trees, nor allowing weeds to grow up to rob them. The trees should be at least twenty feet apart each way.
An Accident in a Lumber Dintrict.
On a hillside in Kingston, Tenn., a farner was cutting logs, and his two little boys were playing near by. The logs, as fast as worked into lengths and trimmed of branches, were blocked with stones or chips to keep them from rolling off down the slope. One of the heaviest became loosened, and began to move, slowly at first, and faster as it gained mo mentum. The father saw that the younger of the boys was playing, unmindful of the danger, exactly in the path of the immense rolling log, but too far away to be saved by him. He shouted, and the little fellow looked up. The log was then about a hundred feet distant, and increasing rapidly in speed. The boy, dazed by fright, ran straight forward instead of escaping to one side, as he might easily have done. He fled as fast as he could, but the log soon overtook him, rolling over his body and crushing him to death.

To true a corundum wheel, adjust it in the lathe and revolve it very fast, holding a piece of corundum stone against the surface. It is said the piece will melt and unite with the wheel, making the periphery perfectly true.
A well tempered bar spring will lose much of its elastic strength ly filing off a very thin scale from the surface.

## the physical phenomena of germination.

In order that a seed may gerninate, it must be acted upon by two agents-humidity and oxygen. These are necessary and also sufficient, and the truth of the assertion is susceptible to a vcry interesting experimental demonstration, the substance of which, together with the illustrations, extracted from La Nature, we now present.
It is first proposed to show that the part of the water is peculiarly to soften the husk or shell of the seed in order to render it permeable to gases. To this end the apparatus shown in Fig. 1 has been constructed by MM. Dehérain and Vesque. The shell of a seed-a hean, for example-is removed and placed behind two caoutchouc cushions, through which a central aperture has previously been made. To prevent the rubber from bulging, a ring of copper, $\Lambda$, is placed no as to inclose the ends of the cushions, and the latter arc forced together by the ter arc forced together by the provided in each apparatus, so that a uniforn pressure may be produced. Two tubes are next introduced, the lower of which enters the cork of a quart bottle containing only air. The upper
 tube enters an inverted test tube. Thus arranged, the apparatus is plunged in water, as shown in Fig. 2. The fluid penetrates the upper tube and reaches the inclosed seed shell; but the softening effect on the latter is not instantaneous, as, if mercury be poured into the tube, $G$, it will compress the air in the bottle, and remain stationary without drivinga bubble

of air through the shell. 'The test tube, $K$, remains filled with water. We have thus the proof that a dry shell, or even one recently wet, is totally impermeable to gas.

If the apparatus be left quiet for two or three days, a change takes place. A fine thread of escaping gas first en ters the tube, $K$, then, as the shell softens, alarger curren $t$; and finally the tube is emptied, the water being driven out by the entering air, thus proving the proposition which we set out to establish.
Seed which is slightly moistened by water has the peculiar property of condensing gases with which it is in contact. Grains thus treated are placed under a bell glass over mercury. During the first days of germination a sensible dimi nution of the volume of contained gas takes place, and this hefore any disengagement of carbonic acid. This condensa
tion of air cannot take place without a quite notable produc tion of air cannot take place without a quite notable produc-
tion of heat, resembling that which happens when hydrogen tion of heat, resembling that which happens when hydrogen
is condensed in platinum sponge or illuminating gasin a palladium plate. It is this elevation of temperature一as the investigators conclude-due to condensation of the gases, which determines the attack of the immediate principles of the grain by oxygen; it is, figuratively speaking, the spark which causes the beginning of the slow combustion which accompanies germination, and perhaps supports it.
The phenomena which take place, then, from the moment when life begins in the seed, happen in the following order: 1 . Passage of atmospheric oxygen through the envelope of the seed, already softened by water. 2. Condensation of gases in the tissues of the seed. 3. Slow combustion of the products contained in the tissues, and evolution of new sub-- tances destined to form the young organs.

It is the second point, the most important, which it is next prozosed experimentally to demonstrate. In the cork of a test tube is arranged a curved pipe, to serve as a manometer, Fig. 3. The tube is filled about one quarter full with seed the results, and the grains are well moistened. Water is poured into the manometer, and the apparatus is adjusted until the level of the liquid is the same in both branches of the pipe.
After the lapse of a few hours, the water will be seen to
ascend tube A, and to continue doing so for several hours; sometimes a few bubbles will rise through and enter the test tube, thus replacing that condensed by the seed. If the apparatus be set aside for a few days, the inverse phenomenon occurs. The seed gradually absorbs all the oxygen in the test tube without leaving a trace; but the emission of carbonic acid continuing, the water is forced back in the manometer, so that, if the whole be placed under water, a gas forned of a mixture of carbonic acid and nitrogen may be collected from the tube, B, Fig. 3.
That air and water are the only requisites for seed germination is proved in those beauti ful little ornaments which may be made by sprinkling a pine burr with grass seed and suspending it over wa ter, or by placing seed in the orifices of a damp sponge or on a piece of moist porous earthen moist porous earthen-
ware. The grain will ware. The grain wind
germinate, sprout, and germinate, sprout. and
grow. This will take grow. This will take
place even in the dark; place even in the dark;
but the plants will be yellowish whiteand not green, thus proving the well known fact that while light is not ne green foliage.

## (Translated from the owlial reports upon the Exposition.) TION, VIENNA.

## HY PROFESSOR DR. JULIUS WIPRNEI

## Number I.

Any visitor to the Exposition who attentively observed the the multitude of products from tropical lands, and especially the raw materials brought for exhibition from the English, French, Dutch, and Portuguese colonies, cannot fail to have been impressed with the richness of the display of fiberous materials, suitable for spinning, weaving, paper-making, and the like, many of which were (and are) quite unknown in commerce. The vegetable fibers on exhibition might have commerce. The vegetable fiber
been numbered by the hundred.
The prodigality of Nature in this domain of production is well calculated to arouse amazement in the mind of the casual observer, whose familiarity with the vegetable fibers is limited to the qualities and usesof hemp, flax, and cotton; while to the practical mind of the specialist, viewing the subject purely from a utilitarian standpoint, the collection is chiefly an exhibit of interesting novelties of questionable industrial value. Least of all, perhaps, this imposing array would im. press the botanist, who, familiar with the structure of the press the botanist, who, familiar with the structure of the
several orders of the vegetable kingdom, is aware that the number of plants that will afford a fine fiber, suitable for industrial purposes, is legion.
From the obvious differences in the character of threthee common textile fibers before named, it may reasonably be premised that the fiberous materials prepared from so many heterogeneous plants will vary greatly in value. A careful inspection not only verifies this presumption, but demonstrates further that many of them are of by no means trifling value, but, in everything that relates to quality and adaptability for industrial uses, will bear close comparison with cotton, hemp, or even flax. This assertion, incidentally remarked, is borne out by the fact that not a few of them have been employed from time immemorial by the native races of tropical countries for useful purposes, such as articles of dress, cords, ropes, etc., just as in Europe flax has been similarly utilized for many ages. The world's fairs, so popular in our times, afford the technologist the most admirable op portunity of becoming acquainted with the extent of our resources in the raw materials and products in which he is interested; and as an illustration of their utility in relation to the subject of this communication, it may be remarked that the former expositions at London and Paris contributed materially to the introduction of several now highly prized textile fibers-such as jute and China grass-as articles of European commerce and industry. It appears to us, however, that at Vienna the opportunity for extending this precedent was not properly appreciated.
We shall now invite attention to such of the raw materials of this class as appear to us to be deserving of introduction in our domestic industries.
At the time of the preparation of our report upon the Paris Exposition of 1867, the jute fiber-the inner fiberous bark of corchorus capsularis-was comparatively little known. At that time, we dwelt with emphasis upon the importance of the jute industry, illustrating our comments by reference to sumption had assumed in England. To preach the value of jute to-day would be labor lost and unnecessary, since the progress of its manufacture in our midst afio
It may be of interest, in this connection, to note the fact that spun and woven jute may be completely bleached; the practicability of this was formerly denied. The bleached product has not only a white color, but also a fine luster,
hemp. The greater bulk of the jute of commerce is brought from India and neighboring islands, its native home. Of late years, however, the attempt has been made, with prom. ising results, to introduce the culture of the jute plant into other tropical countries. As instances of these endeavors, the Exposition contained jute from Algeria, French Guiana, the Mauritius, and other localities.
The introduction of the China grass (tschu-ma)-the inner bark fiber of Böhmeria nivea-into the textile industries of Europe, does not keep pace with that of jute. This is to be attributed partly to the fac ${ }^{4}$, that fabrics woven of this fiber, although decidedly inferior to silk both in point of luster and durability, are more expensive than cotton goods of equal quality, and partly to the circumstance that European manu. quacty, and partly to the circumstance that European manu.
facturers have yet to master the mode of properly manufacfacturers have yet to master the mode of properly manufac-
turing this material, and thus far have been unable to proturing this material, and thus far have been unable to pro-
duce, from the crude bark of Böhmeria, the fine, lustrous, long-stapled fiber that is sent abroad from China under this name, either in the fibrous state or woven into its reputed product, the grass cloth. The future of the China grass in Europe will depend largely upon its price. If, by the extensive and systematic cultivation of the plant, the crude fiber is placed upon the market cheaply, and this is supplemented by the acquisition of the skill now wanting in its preparation, its superior qualities-as compared with cotton -cannot fail to secure for it, a wide field of usefulness. The cultivation of the Böhmeria nivea is spreading quite rapidly. Besides the exhibits of China and Japan, samples of this fiber were displayed from the East Indies, North America, Martinique, Jamaica, Trinidad, Queensland, the Mauritius, and Algeria; and the reports from these countries, as to the facility with which the plant adapts itself to climatic condi. tions, are generally quite favorable.
A material closely related in character to the China grass, for which indeed it is often mistaken, is the ramie fiber, the inner fiberous bark of Bijhmeria tenacissima, a native of the inner fiberous bark of Biahmeria tenacissima, a native of the
south and east of Asia, where it has been cultivated from south and east of Asia, where it has been cultivated from
a remote period. The fiber is coarser, and (in prepared con. dition) shorter, and less lustrousthan that of the China grass. In England, handsome and lustrous goods, both white and colored, are woven from the fiber, but they are inferior to the China grass products. The importance of the ramie, in our estimation, consists rather in the nature of the fiber itself than in the fine, cotton-like product that may be obtained from it Whoever has seen the unusually strong and hand. some ropes and cordage, made of this material by the natives of India, and is furthernore acquainted with the fact that the raw ramie fiber far surpasses hemp in point of durability and tenacity, will be forced to admit that its introduction into these last named industries will mark an era of decided progress. The acclimatization of the ramie has lately been attempted in a number of countries, among others in Central Europe. Concerning many of these experiments, nothing positive may be stated, although the specimens on exhibition from various tropical regions were not appreciably inferior to those from the land of its nativity.
Similar in this respect to the ramie is the so-called New Zealand flax, an article known in Europe, and especially in England, for a number of years. It is an extremely strong, tough, and (even in a wet condition) durable fiber, prepared from the leaf of phormium tenax (the New Zealand flax lily). It is possible to manufacture from this material woven fab. rics that may be used either bleached or unbleached, as many of the New Zealand exhibits demonstrated. But of vastly more importance than these are the wonderfully firm and tenacious ropes, cords, twine, and the like that are prepared therefrom. Phormium tenax is cultivated in New Zealand, Australia, the East and West Indies, the Mauritius, Réunion, and Natal; and quite recently its introduction into the south of Europe has been attempted, though with indifferent suc. of Eus.
cess.

Preeautions in Case of Pire.
An excellent sot of rules for guidance for the prevention of and in case of fire, by Dr , Hall, may be briefly summarized as follows:
Keep all doors and windows of the structure closed until the firemen come; put a wet cloth over the mouth and get down on allfours in a smoky room; open the upper part of the window to get the smoke out; if in a theater, keep cool : de. scend ladders with a regular step to prevent vibration. If kerosene just purchased can be made to burn in a saucer by igniting with a match, throw it away. Put wirework over gaslights in show windows; sprinkle sand instead of saw dust on floors of oil stores; keep shavings and kindling wood away from steam boilers, and greasy rags from lofts, cupboards, boxes, etc. ; see that all stove pipes enter well in the chimney, and that all lights and fires are out before retiring or leaving place of business; keep matches in metal or earthen vessels, and out of the reach of children; and provide a piece of stout rope, long enough to reach the ground, in a piece of stout rope, long enough to reach the ground, in fire, except police, firemen, or known neighbors; nor swing lighted gas brackets against the wall; nor leave small children in a room where there are matches or an open fire : nor deposit ashes in a wooden box or on the floor; nor use a light in examining the gas meter. Never leave clothes near the fireplace to dry; nor smoke or read in bed by candle or lamp light; nor put kindling wood to dry on top of the stove; nor take a light into a closet nor pour out liquor near an open light; nor keep burning or other inflammable fluids in rooms where there is a fire; nor allow smoking about barns or warehouses.

In " butting" or meeting belts, the crossings of the lacings should be on the outside.

DECISIONS OF THE COURTS.
United States Clrcuit Court.--District of Massachu

## patbat instaxtangols olez.-the miligan and hegine oliz

 In equity -Desided









## NEW BOORS AND PUBLICATIONS.

Outlines of Proximate organic Analysis, for the Identification Separation, and Quantitative Determination of Organic Com-
pounds. By Nbert B. Prescott, Professor of Organic and pounds. By Ubert B. Prescott, Professor of Organic and
Applied Chemistry in the University of Michigan. Vew York: D. Van Nostrand, 23 Murray and 2 Warren streets.

The author of this work polnts out, with much truth, that the raptaly ex-
tending list of known organtc compoundy tending list of known organct compoundy glves great importance to the
developulient of unalyttical sclence, (which has for many years been sorely taxed to tnd nieans of separating the constluent parts of the products of
modern dibcovery, , and of ddentfy yng them by their reactions and othcr charmodern discovery,y, and of identify thy them by their reactions and othcr char-
acterstic Indications. The book is a compendious, well arrangcd treatise,

SHEEP: THEIR HISTORY, MANAGEMENT, DISEASES, AND NATIONAL
VALEE; with hemarks on the Transit of Stok. By William
Read, Wool Broker. Edinburgh. scotland william P. Nimmo
This littlc book, written to wake up the Brtith wool grower to the import:
 uable information on sheep and the rallifing of the ueeful anlmale for meat
as weli is for wool. It may bo studccd with advuntagc by our farmers, and
as ${ }^{\text {read with interest by bovers of naturai mlitory }}$
Philosophic Reviews. Hy Lawrenee S. Benson, Author of "Ben-
son's Geometry" and other works. Pice $812 ;$ New York
son's Geometry" and other works.
city: J. S. Burnton, 149 Grand street.
The tryt of these essays 18 entlied "D Derwin Answered, or Evolution Myth." and In It the author launches thunderboltagas annt "those who deny a
creator," thum making the very common error that the theory of develop-
 \&peclmcn of the clrcle suuarer's art. He holds that the area of a clrcle te
cxacty three tilues the square of the radilus; and the well known fact that a
 produces no erfect upon ilis falth. Arter this, we ean haraly silppose that the
letter on mensuratlon by welght. publifhed on onother page of thisl ssue, whl

The Transnission of sofnd ay the Atmosphere. By John Tyndall, F.R.S. Also Gigantic Curtle Fish, by w. Saville
Kent, F.Z.S. Price 2 z cents. Boston, Mass. Estes $\&$ Laurlat, 143 Washington street.
The first of these essays 88 well known to our readers, haring leen already critclised and commented on in ourcolumns. The second paper is an interestug and exhaustive description of the vetopus spccles, whose appearance and
characterlstics have lately cxclted tic futcrest and somertmes the horror of Report of theproposed Enlargementorthe Montreal Water
Works, witha History of the Works up to the Present Date Works, with a History of the Works up to the Present Date.
By Louis Le Sage, Superintendent. With Photographic Illustrations, Maps, and Plans. Montreal, P. Q.: J. Starke \& Co., St. Frans,ois Xavier street.
Thtsis an elaborate account of some of the most imfortant arrangemcnts
or water supply ever organized on this contineni. The writer cstlmates that, n nine years' tlme, a dally anpply of $16,000,000$ gallons will be needed; and he describes a plan, tinanclal as well as practical, by which this cuantly can be
obtalned. obtained.

[^0]Shutile.-J. H. Le Bloyne, Boston, Mas8.
Skate.-J. L. Plimpton (of New Iork city), London, EnRland.
Sorting Nals._J. Coyne, Pittshurgh, Pa
Sparn Nails.-J. Coyne, Plttehurgh, Pa
Spring Motor.-N. Jenking, New Haven, Conn.
Stram Engink.- W. b. Reaney, Philadelpha, Pal
Stram enging.-W. B. Reaney, Philadelpha, Pi.
Scracing Tritile Fanrics.-W. Bell, New York city.
Scispender,-J. w. Wattlea, Mabaachuetta.


Transmitting Rotary Motion, etc.-F. H. Stmpbon, South Windham, Ct
Treting hydrocabbons,-G. h. Smith

Eecent Smerican and furciqn eqatents.
Improved Combined Cyinder and Sectional Boller John F. Taylor, Charleston, S. C.-The object of this invention
is to providea steam boiler in which the advantages of a cylinder is to providea steam boiler in which the advantages of a cylinder of heatare obviated. It consists in combining a wroughtiron cyliuder boiler with a cast iron sectional boiler, which latter encompasses the cylinder in the place of the masonry, and utilizes a great deal of the waste heat by heating the feed water, which is frrst admitted to
the sectional boiler, the draft from the furnace being so directed the sectional boiler, the draft from the furnace being so directed
among the portions of the sectional boller as to secure the
rreatest possible effective power of the fuel.

Improved Automatic Stgnal Telegrapin.
Joseph W. Kates, Richmond, Va.-The object of this invention is
to provide an automatic signal telegraph, to be used in hotels, public to provide an automatic signal telegraph, to be used in hotels, public departments, large business estahlishments, etc., which shall trans-
mit to a central supply station the most frequently recuring wants of the establishment, and the operation of which shall be so simplithed as to be adapted to the ordinary intelligence of persons unskilled in telegraphy. It consists in a series of non-conducting perforated tapes, each perforated to represent its peculiar want. Said tapes are wound around a grooved drum which is on the same shaft with the mainspring of a clock gearing, the said clock gearing, drum, and tapes being so relatively arranged that a withdrawal of the tapes
winds up the spring of the clock gearing: and the reaction or retrowinds up the spring of the clock gearing: and the reaction or retro-
grade motion of said spring, when the tapes are released, winds up the said tapes upon the drum, and sends the line current through the perforation in the tapes by means of conducting rollers, between which the sald tapes pass.

Improved Washing Machine.
John S. Shrawder, Falrutew, Pa.--This invention consists in a reciprocating washbox having front and rear ribs, and reversely
notched side rubbers rigidly attached thereto. It enables the ordinary washing to be done with unusual facility, while its work is very thorough and effective

Improved Cotton Scraper.
George $W$. Beard, Grenada, Miss,-This invention relates to the
shape of and mode of attaching scravers to a plov, and consist sin makshape of and mode of attaching scrapers to a plow, and consist sin mak-
ing the cutting edge come to a point at the middle of front, and forn an angle with the sloping upperand lower edges; also in the arrangement of the scraper with rcspect to the plow, so that what the former
shaves from the sides of the row will be transferredto the share and moldboard, turned with the furrow slice, and discharged into the middle space between the rows.

Improved Anti-Frietion Metal.
Jeremiah K. Guile, Hochester, N. Y., assignor to himself and Jotion metal for journal boxes and other bearings which, it is claimed, will not heat from friction, and will take a high polish. The inventlon is prepared of zinc, tin, antimony,glass, slaked lime, and borax.The entire journal box is made from the alloy. The inventor sub mits reports of United States naval engineers detailing extended
tests, which show that the use of the metal tenda largely to reduce friction as well as to save oil

## Improved Ore Separator

Benjamin F. Day, of Tamaqua, Pa.-This invention relates to machines tor separating coal from slate, and ore from other mate-
rials, when there is a difference in the specific gravity; and consists in exposing the coal or ores to the action of an ascending current of water moving with sufficient velocity to earry forward the coal or lighter material while the slate or ores of greater specitc gravity
pass down through the column of water. In this manner the desired pass down through the column of water. In this mann
separation is automatically and completely effected.
Side Bar and End Spring Connection for Vehicles. Ephraim Soper, Brooklyn, E. D., N. Y.-This is a tlexible coupling of leather or other substance, arranged in the forn of a strap, attached to the bar and looped around the bolt of a clip attached to
a spring for coupling the side bar to the spring. The torsion caused a spiring for coupling the side bar to the spring. The torsion caused
by the lengthening or shortening of the spring will thus be cxpeuded on the tlexible coupling, and the bars will be free to work without being exposed to the torsion to which they are subject when clipped directly to the springs, as in the common way.

Improved Step Ladder:
Orange M. Sweet, Forestville, N. Y.-In this ladder the standurd is adjusted to the main body of the ladder by a hinged brace, which od conne pivoted sleeve with fastening clamp screw along a guide casily adjusted, while sufficiently strong.

Improved Feed Bag for Horses.
'Thomas Medley, New York eity.-Thisis a horse's feedor nose bag
made of coarse horsehair, twisted into strauds and woven into a made of coarse horsehair, twisted into strands and woven into a reticulated cloth. By the construction, the meshes of the cloth are
of such a size as to allow air and the dust from the grain to pass of such a size as to allow air and the dust from the grain to pass
through readily, while the grain itself will be held securely.

## Improved Straw Cutter.

William Boyce, Lowell, Mich.-The hood is hinged to a lid, which
is fastened to the long pivoted arms. The hood folds forward, and is fastened to the long pivoted arms. The hood folds forward, and the lid folds to the rear with the hood, leaving the entire top of the cutter exposed, so that the front parts may be conveniently
reached for repairing, and the feed inspected at any period of the cutting process. Improved Tether.
Morgan \& McAfee, Talbotton, Ga.-Thls invention consists of a long elastic pole with a hitching line attached to the small end, the attached thereto, and another is secured a short distance above to a strong stake driven in the ground, so that it projects upward and stake in such manner as to form an efficlent mode of fastening stock to a center, around which they may graze without twisting the rope or becoming entangled in it.

## Improved Chuek.

George R. Stetson, Nuw Bedford, Mass.-In thisimproved chuck the radial guide ways for the Jaws are extended longitudinally through the solid body portion parallel with the axis, and drivers are with the Jaws by a flange on the side of one in a radial groove in the side of the other, so as to allow of radial motion to the Jaws at the same time that they are moved longitudinally. Theyare also geared
by screw threads on the outer edge and threads upon the inside of a ring turning upon the body of the chuck, to be moved forward and backward for driving the Jaws,

## Improved Forming Block for Fur Goods.

 Jefta Popovits, New York city.-The object of this invention is to stretch the waist and back parts of fur garments, so $u$ to impart an enlarged and rounded shape to the same without cutting and sewing up the parts. It is a forning block, of pyramidal shape, resting on its largest side, and having connecting sides of steeper inclination. The fur is triangular connecting sides of steeper inclination. The fur isstretched in wet state over the body of the block, and retained thereon by suitable fastening straps until completely dried.

Improved Earth Auger.
John Pickle, Kosciusko, Miss.-This invention relates to an earth borer, that cuts and lifts the earth readlly from the bore hole; and
t consists of a hollow cylindrical body, provided at its inner circumference with projecting and adjustable side-cutting blades, together with intermediate blades twisted toward the center, to form a dia-

Improved Metalis: Shutter.
Fisher F. Fletcher, Sioux City, lowa.-This invention contemplates the manufacture of a single sheet shutter, paneled and braced so as o possess the necessary strength with only a weight of about gin or edges by riveted sti1ps, and braced in the middle by a raised panel.
Journal Bearing for Cyllnders of Cliromatic Printing
Elié Griffe, Paris, Firance.-This invention consists in the adjustmer the purpose of securing accurate registration of the differen or the purpose of securing accurate registration of the differen tally to the presser roller through a set screw, and is adjusted verti tically by like means, the pivoted bearing of the journal preventin the change in its vertical adjustment from neccessitatinginy chang n its lateral adjustment, as the pressure of the set screw is alway line or always otherwise. A cush

## Improved Envelope.

Thomas H. Bomar, Spartanburgh,S. C.-This envelope is made with two folding sides, one of which is pasted down to narrow llaps after
they are turned inward on a central portion, thus forming a pocket for the letter, leaving one of the end flaps ready to be turned ove on one side, upon which is written or printed the name and address of the sender of the letter. When the envelope is returned to the
witer, the addressed portion with its flap is torm off, which still Witer, the addressed portion with its flap is torn off, which still
leaves a perfect envelope, havimgthe nameand address of the write leaves a perfect envelope, havmgt he nam
plainly written or printed on the outside.

## Improved Fare Box.

Patrick J. Stokes,New Yorkcity.-The opening and closing mechan ism attached to the inner side of the fare box cover consists of piece of sheet metal which are pivoted to the cover, so that they may be
turmed in order to make holes in them correspond in position with the holes in the cover. A spring fastencd to the cover has a hook at its end, which prevents the novement of the pieces until a wedge which is plvoted to the cover is pushed down to force the spring outward. This is done when the cover is closed down and placed in the
case, so that eatches will engage with and tum the pieces and ope case, so that eatches will engage with and turn the pieces and open
the apertures. When the box is withdrawn, the pieces are turned the apertures. When the box is withdrawn, the pieces are turne in the opposite direction ts Sliding Stur

Improvedz Sliding stem Valve.
Jabez Stone, Waterford. N. Y., assignor to Georyc W. Eddy, sume place.-Upon oneside of the upper part of the valvesten are formed
rack teeth, into which mesh the teeth of a pinion. The shaft of the pinion works in bearings in a chamber which is formed upon the upper end of an arm, upon the lower end of which is formed a eollar, which passes around a neck formed upon the upper part of a
cap, just below the stuffing box. This construction allows the stem cap, just below the stuffing box. This construction allows the stem ehamber and collar to beturued frecly in any direction to bring the handle attached tothe shaft of the pinion into any desired position
to avoid obstructions, or to enable it to be eonveniently reached by to avoid obst
the engineer

## Improved Neckite Plate

Martin Dreunan, Brooklyn, N. Y.-This is a littlc frame having
three vertical parallel looping holes, right angles to and below the others, for forining various bow knots, and ties of scarfs for neck wear. 'Therc are slots adapted for attaching the frame to a belt, to be worn $2 s$ a buckle, and it is pro-
vided with a pin for fastening it to the dress vided with a pin for fastening it to the dress.

## improved Lamp Chinmey.

Thomas W. Parker, firiggsville, Ill.-Wueh of the longitudinal halves of a glass lamp chimney is provided with cortespondingnotches In one of the adjacentedges. A sppingclamp having a lug is adapted to fit into said siots. Expansion of the chimlev from heat is thus permitted, and yet its parts archcld flimnly together, and length
movement of one on the other is preventer.

Improved Mashing Process for Brewerles.
John C. G. Hupfel, New York city.-This is an improved mashing process for breweries, consisting in the ahhnixture to the common to be mashed therewith for the purpose of impurting a stronger malt taste in the beer produced, without interfering with the draw-ing-ofl of the worts from the mash tub.
Improved Manufacture of Striping Brushes.
Thomas J. Elder, Lanark, Ill.-Thisinvention consists in making he handles of the brush of two pieces of wood, which clamp the wood are used with the grain runningin the same direction with the trands of hair, so that, when desired, the wide pieces maybe broken into a number of smaller sections, fonning brushes of less width dapted to the different styles of work.

Improved Ore Roasting Wurnace
Ernst Heiligendorfer, Belmont, Nev.-The ground ore is fed ferved by a screw, while a furnacc is heating it. Having arrived erved the ore is quickly spread over the surface thereof, so as on cause its particles to be subdivided in passing through the reticulaestreus so that thus pass down from the sill sides of each par ticle.
Improved Cutting Apparatus for Harvesters. Charles K. Myers, Pekin, Ill.-An1 arm having a crosshead and bent end is secured to the under sideof the sickle bar. It also passes hrough and works in a long notch in the upper side of the mlddle part of the finger bar. In the turned-down rear part of this arni is the sickle bar is driven. The sides of the head of the driving bar re rounded off, sothat the sald head may ft snugly in the squar mortise of the arm, at whatever angle the said driving rod may be Improved Horse Hay Rake.
Amos W. Coates, Alliance, o.-This invention consists in pivoting foot lever over a front-closed and rear-open box, so as to enable he usual toggles to be easily operated by the driver without stoopor to run the teeth of the rake high or low, according to the even fleld.

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## 1 Muct (4urins

E. will find details of the process of transferring engravings to glass on p. 298, vol. 31.-J. R.
M. will find a rule for calculating speeds of pulleys on pp. 28, 73 , vol. $25 .-$ L. K. Y. can make a copper
dip by the process described on p. 90 , vol. 31 .-G. dip by the process described on p. 90 , vol. 31.-G.
H. B. will find formule for calculating the horse H. B. will find formulse for calculating the horse
power of an engine on $p$. 16 , vol. 29 , and $p .54$, vol. 30. For a process for making ether, see p. 34, vol. hrough his pipes at any given head by the formuæ given on p. 48, vol. 29.-A. M. can refine rosin of ix given on $p$. 48 , vol.29.-A. M. can reane rosin on
by the process given on p. 268, vol. 31.-C. H. F. can
remove inkstains from woolen fabricsby themethremove inkstains from woolen fabricsby themeth-
od described on p. 139, vol. 29.-A.S.T. can temper tools for cutting granite by the process given on cilage on p. 202 , F . W11 and a good recipe for mucilage on p.202, vol. 31.-A. M.and H.A. do not send
sufficlent data.-G. H., J. F. S., and many others should refer to p. 48, vol. 29 , as to friction of water In pipes.-C. F. S. will tind directions for making
rubber stamps on p. 156, vol. 31.-G. D. F. will find method of softening paint brushes on p. 7 , vol 28. The manufacture of plaster of Paris from gypsum is described on p. 399, vol. 29.-C. A. S. will
find the details of engineers' pay in the navy on $p$. find the details of engineers' pay in the navy on $p$.
394, vol. dius of an arc, when chord and hight are known, by varying the formula given on p. 139, vol. 31.-
C. A. H. will find directions for making molds fo mall castings on p. 23t, vol. 24.-J. B. can ascertain the lif ting power of hydrogen by refercing to $p$. i4, vol. 31, and can calculate accordingly for other cas-
es.-G. F. L. will lind the reclpe for a hair stimulant on p. 3i3, vol. 31 .
(1) C. C. S. asks: Which has the most strength, a 34 inch bar of iron with a $3 / 8$ inch hole
in it, or a solid bar of $3 / 4$ inch iron? A. The solid
(2) G. H. B. asks: 1. Are cannon ever molded of wrought iron, so as to retain their mal-
leability? A. No. :. Is wrought iron ever run ineability? A. No. 2. Is wrought iron ever run in-
to molds? A. No.
(3) V. I. W. asks: If an engine will do carry just 40 lbs., or would it be better to let it go up to about :N or $\overline{5}$ l lbs ,in order to have dry steam? . If the steam of a higher pressure only the latter pressure; but in an engine with an automatic cutoff, the higher pressure would be the best.
(4) E. C. H. asks: What becomes of the exhsust steam when an engine running at full
speed is reversed? Does not the engine pump air ato the boiler?. A. No.
Is it at all probable that, during the great confla-
gration of Chicago, providing the wind ration of Chicago, providing the wind was favor able, that the smoke or scent of fire would be ob-
served in the vicinity of Philadelphia? A. No. Is the 1,000 foot tower all a hoax, or is to be erectWhat Centennial? A. Address the designers. What kind of joint should be used to close the most serviceable and reliable joint? A. It is suffiient to screw on the cap.
(5) Z. says : I read in Ganot's "Plysics," p. 390 , that "as a gas is increased $\frac{15}{5 / 5}$ of its volume
for each degree C., it follows that a temperature of $233^{\circ} \mathrm{C}$. the volume of any gas, measured at zero, is doubled. In like manner, if the temperature of a given volume at zero wereiowered through $83^{\circ}$,
the contraction would be equal to the volume,that the contraction would be equal to the volume, that
is, the volume would not exist." It appears to me is, the volume would not exist. It appears to me
that, if the volume is doubled for every $273^{\circ}$ of heat, it would be reduced one half for the same olume would be $1 / 2$ of what it would be measured at zero. At $-273^{\circ} \times 2$ it would be about $14 ;$ at $-273^{\circ}$
$\times 3$ it would be $1 / 6$. If this be correct, there appears $\times 3$ it would be $\%$. If this be correct, there appears o be no more reason for placing the zero of temperature at $-2^{73^{\circ}}$ C. than at any other point in the
cale. A. If the gas is heated $1^{\circ} \mathrm{C}$., itsvolume is increased $\frac{1}{2} \sqrt{3}$. Similarly if it is cooled $1^{\circ}$, its volume
is decrcased creased $\frac{श^{2}}{3} \mathrm{~J}$, and so on; so that on being cooled $273^{\circ}$,

(6) C. F. O. Jr. says: $A$ boiler whose dimen sions are 9 feet long and 2 feet 6 inches diameter, nches high, the shell belng $\frac{5}{16}$ Inch thick, and the heads $1 / 2$ inch thick: made of the very best $\mathrm{C} . \mathrm{H}$.
No. 1 Pennsylvania iron (except the sheets at the No. 1 Pennsylvania iron (except the sheets at the
bottom half of the boiler and the back head,which bottom half of the boiler and the back head,which
are of Eureka or Sligo fire-box iron) is to be used for supplying a steam heating apparatus with drostatic pressure of 50 lbs to the square inch. Is not thls high pressure injurious, and will it not weaken the boller materlally? A. If the test is
properly perforned, by fllling the boller with waer and heating it, we do not think that any matetal injury will result
(f) M. H. K. asks: What is the simplest mechanism which I can use to turn alight ma-
chine, very rapidly if possible, using an air pressure roma fan? I would like to have the air enter at the center and discharge at circumference of the motor. A. Something on the plan of the Barker
mill would no doubt serve the purpose.
mill would
(8) G. C. P. Jr. asks: What is the cause of the thumping noise in engi.
(9) W. S. S. says: 1. I want to make a cylinder casting with ports about $\frac{1}{16}$ inch wide.
What can I make the cores of so that I can clean What can I make the cores of so that I can clean
the ports out easily? A. Of baked clay and sand.
2. Would it do to make the patterns as for larg
cylinders? A. Yes. 3. Would ports 3 inches ? A. Yes.
(10) C. S. asks.
(10) C. S. asks: I want to use 2 horse pow er; could I not get it from a 10 horse engine a
cheaply as I could from a 2 horse engine? A. In omically as the small one, but in general, no What as do locomotive engineers and a get? A. Engineers from $\$ 80$ to $\$ 100$ a month, firemen from $\$ 40$ to $\$ 60$.
How is acid made out of wood, for setting the colors in cloth? A. It m
ing nutgalls with ether
(11) G B. asks: Does it make any differ ence as to the safety of a bridge whether a train is run over it at the usual or at reduced speed? A.I is safer
speed.
(12) C. B. W. asks: 1. What is meant by siffing valve? A. A blow-through valveattached 2. What is an equilibrium valve? A. It is a valve which can be moved without being affected by the pressure of the steam. 3. What is a gridiron valve?
A. A cut-off slide valve with several ports. 4. What multiple gearing?
(13) R. O. B. asks: Is the odontograph ap plicable to internal epleyclolds as well as to all
otherforms? I have tried in vain to adaptit to the above-named gearing; and if it can be applied to wheels gearing internally, I want the process and
also the radil of a pair of wheels so gearing, so as also the radil of a pair of wheels so gearing, so as
to occupy a space $24 \times 16$ inches and $11 /$ pitch. A. The odontograph can bc used as you suggest. Yo wood summary of the rules for proportioning wheel in the article on gearing in Appleton's "Diction-
(14) G. S.asks: How much will a brass tube expand in length when heated from the temper-
ature of cold water (as it comes from hydranta) to ature of cold water (as it comes from hydranta) to that of boiling hot water, the tube being $1 / 4$ inches
in diameter and the bore 1 inch, and the tube being in diameter and the bore 1 inch, and the tube being
1 foot long? How long a tube would be required 1 footlong? How long a tube would be required
to expand $3 / 8$ inch in length? A. It will expand about $\frac{19}{10} \sigma 0$ of its original length. From this you
can readily calculate the requisite length. 2. What hard metal expands most, and how long a tube of that metal expands $1 / 8$ inch in length? A. Zinc ex
pands
\$090
of
(15) C. F. asks: Is there a rule by which can ascertain the power exerted by a pump, say
with three plungers of $\overline{/ 4}$ inch diameterand 4 inch es stroke, driven at the rate of 50 strokes per min ute by a $t$ inch belt? A. It must be deterinined b experiment.
(16) C. N. say s: 1. I an making an engine to run a jeweler's lathe, of 1 inch bore and $11 /$ inch-
es stroke. Will such a cylinder be large enough, and will. inch be enough cushion? A. The dimenstions will answer very' well. 2. At what point should
stroke.
(17) N. A. J. asks: How can I ascertain the number of acres in a triangular piece of land My method is to add the three sides together and
take half therr sum. From this takethe three sides take half thell sum. From this take the three side
severally, and multiply the half sum and the seve ral remainders together and extract the square root of the product. Am I right? A. This method is correct.
(18) A. G. C. asks: In a plain slide valve
engine, is it better to have an extra large steam chest? A. No.
(19) H. M. asks: What is the weight of 1 cubic inch lead, wrought iron, and cast iron, re
spectively? A. Average: Lead 0.410 lb ., wrough iron 0.282 lb ., cast iron 0.261 lb .
Can yougiveme a rule for finding the side of an siscribed hexagon, also of an inscribed octagon . Side of hexagon $=$ radius of circumscribing cir
cle. Side of octagon $=0.7654 \times$ radius. What is meant by squaring the cir
Wh a square of the same area.
What is meant
See $p .240$, vol. 31 .
(20) II. H. asks: In what does indicated A. Indicated horse power is that due to the press ure of the steam, and includes the power required to overcome the friction of the engine. Effective after dedncting that consumed by prejudicial re sistances.
(21) A. S. P. asks : 1. Does compressed air
press equally in all directions? A. Yes. 2. What is the pressure per square inch of 1,2 , and 3 atm spheres respectively ${ }^{4}$


### 43.025

A cubic foot of distilled water of maximum dens ty weighs $62 \cdot 42:$ lbs.
(22) M. E. H. says: I have kept a gun in such good order that I have worn all the varnish on it, itis almost impossible to shoot well with it How can I revarnishit? A. Try chloride of anti-
mony, mixed with olive oil, heating the gun barrel slightly.
(23) G. \& Co. ask: What is the rule for gasing casks? A. The rule varies consdderably, according to the kind of cask. You will find a good summary of rules and methods, in Haswell's
"Mensuration." A general method is to ascertat the mean diameter by a number of measurements if it were a cylinder with this (mean) diameter.
(24) H. M. says: 1 . Are half inch oak
boards thick enough for the planking of a boat
feet long? A. Yes. 2. Would screws do in place of rivets, provided I countersink the head and putcylinder of 3 inches bore and 6 inches angine with a cylinder of 3 inches bore and 6 inches stroke, under
50 lbs. pressure of steam, be large enough to run 50 lbs. pressure of steam, be large enough to run
thesaidboat? A. Yes. 4. What power would the above sized engine, running 300 revolutions per above sized engine, running 300 revolutions per
minute, give\% A. Between $11 / 2$ and 2 horse power. 5. What sized screw would it take to run the above boat? A. One of 2 feet diameter and 3 feet pitch.
(25) G. E. P. asks: Who was Euclid: A. A celebrated
about 300 R. C
(26) W. M. W. ask s: 1. Is the coating on nclosed pills all sugar? A. It is principally sugar.
. What ismixed with sugar for coating pills? A. M. Garot recommends 10 parts gum tragacanth and 2 parts water. This is screened through finc
linen, and mixed with 20 parts of sugar of milk. It linen, and mixed with 20 parts of sugar of milk. It ized. The pill is first dipped in water and then owdered over with the above compound. Pure gelatin is sometimes used for this purpose, also
mixtures of gnm, sugar, and starch. M. Calloud gives the followingrecipe,and themixture is claimed by him to be less hydroscopic than any of the oregoing: Boil together1 partflaxseed,3 parts white sugar, and water sufficient to make a thick mu-
ilage. Evaporate to dryness, pulverize, and dip the cilage. Evaporate to dryness, pulverize, and dip the
pill in on the point of a pin, to which is to be given pillin on the point
(27) S. A. ask s: Can a person be cured who is suffering from trichinæ: A. Yes, if discovered in proper time, that is, before the trichine have
passed from the alimentary canal. 2. What are the passed from the alimentary canal. 2. What are the
are diarrhoea and abdominal pains, followed by muscular pains. "These symptoms occur within a few days after the ingestion of trichinous meat, that is, as soon as the young worms have been produced and become eveloped sufficiently to begin to migrate towards the muscles. It is not difficult to understand that the aggregated punctures of the mucous memdisturbance, when it is considered that the trichina which have been found to be containce in half a pound of meat may be sufficient to give birth in a few days to a brood numbering $30,000,000$. It is stated that peritonitis may be produced by the passage of worms into the peritoneal cavity. The sec-
ondary symptoms relate to the muscles. Pains reondary symptoms relate to the muscles. Pains re-
sembling those of muscular rheumatism are occasioned by the entrance of the triehinæ in the sioned by the entrance of the triehine in the
muscles. Certain of the muscles become contracted, in some cases, and their extension occasions or less marked, accompanies both the primary and secondary symptoms. The general symptoms are not unlike those of typhoid fever, for which the
diseaseis liable to be mistaken. Oedema of the diseaseis liable to be mistaken. Dedema of the times anasarca. Swcating is generally prominent a symptom. Death takes fering and exhaustion, being often preceded by coma. The danger, cotererisparibus, is proportionate to the abundance of trichinæ generated within the
alimentary canal. If the number be not sufficient alimentary canal. If the number be not sufficient to cause death from the amount of local and conery tional disturbance.which theyoccasion, recorery takes place very slowly, the illness lasting for
several weeks or months. The triching become encapsulated in the muscles, thereafter remaining quiescent, leaving the muscles more or less impaired. An accumulation of a larger number of cases than is at present practicable is necessary to
urnish data for a complete clinical history of the disease, and for deternining the relative proportion of deaths and recoveries. 3 . Do not trichinæ uch an occurrence 4. How long can a person live such an occurrence. 4. How long can a person live
with them in his body? A. That depends upon the constitution. 5. Can the disease be taken any way but through the stomach? A Not thatwe are aware of.
(28) (i. R. L. C. asks: 1. What kind of a curve is the tractrix? A. A traetrix is a transcendental curve in which the distance between every point of tangency and a fixed line, measured on
the tangent, is the same. 2. Is there an equation the tangent, is the same. 2. Is there an equation
for the tractrix? A. If $x$ and $y$ are rectangular cofor the tractrix A. If $x$ and $y$ are rectangular co-
ordinates, and $h$ the constant, the equation,referred to the center, is $x=h \times \log .\left(\frac{h+\sqrt{h-y^{2}}}{y}\right)-\sqrt{h^{2}-y^{2}}$
(29) S. and D. ask : Were potatoes first found
Ireland or America? A. The common potato is in Ireland or America? A. The common potato is anative of America, and wa
rope by Sir Walter Raleigh.
(30) R. J. K. asks: I wish to prevent pine oga from fouling the water in wells. Has burning or charring ever been tried for such a purpose?
A. Yes. The plan is frequently used, and is often efficaceous.
(31) H. W. J. says: I have the following idea for a planer: On the sides of the lathe bed are bolted two arns, with a cross piece at the top, to
which is attached the slide rest in a vertical (as which is attached the slide rest in a vertical (as sllde reversed; then a bed is made which moves on the lathe bed and is operated by a toggle amn connected at one end with the lower part of the head versing pother end being connected with the trawork very well. There is a somewhat similar planer in the market, which can be attached to a
vise. 1. I wish to build a model engine of 2 inches foot high by 10 inches diameter, with 1 tube 3 inches in diameter, answer? A. The boiler is rather too
small. 2. Of what thickness of metal should the oiler (of iron or copper) be? A. Make it $1 / 8$ of an inch thick.
Whats plane line of a governor? A. The What books can you ref the balls.
$\mathrm{S}_{\text {ee "The Iathe and Its Usea," }}$ chand Knight's "Me
chanlsm and Construction."
(32) N. N. B. asks: Does the north pole rise 21 (thus giving us the seasons), and June21 to 1 ing us the seasons), and vice versa from said that the earth has three motions, pamely, its diurnal rotation, its annual revolution, and its po lar inclination? A. The earth's equator is always inclined $23^{\circ} 17$ to the plane of its path round the sun. To illustrate this, make two balls of wood or cork representing earth and sun. Puta wire axis through the earth at an angle of $233 \%^{\circ}$ into the pivot of a hanging welght, fastened to a stick which turn gravity will then keep the cork earth' ${ }^{\text {and }}$ ually pointing in the samedirection.
(33) F. G. S. asks : How can I make a whit paint that cannot be softened by alcohol". A. Mix
any powdered white pigment with water glass. Is therean optical instrument in use by which can measure distances at a glance? A. Take a spy glass, a wooden rod, and a fatspider. Toss the spider from hand tohand to make him spin. Wind the thread spirally on a forked stick or wire. Gum two parallel spider lines on a ring of metal or card board, and place this ring in the focus of the ter restrial eyeplece. Mark the space included be Then as the space on rod included between the Then as the space on rod included between the an unknown distance, so is 100 feet to the distance equired. Simpler methods are described in Win gate's "Manual of Rifle Practice.
(34) A. F.-The sun's amplitude at summe soistice depends upon the obilquity of the echiptic and not upon his distance, as you suppose.
(35) A. S. asks: Is there any means by which I can render canvas or heavy musiln alr See p. 379, vol. 30. In the end, leather would be much the cheapest.
(36) J. F. and others ask, in reference to $S$ a northeasterly course: will you please explain how a man would arrive at the pole by travelin this course? It is our opinion that he would not,
but would travel in a spiral direction, approaching nearer and nearer, but never reaching the pole. A S. E. S. would come nearer to thepolethan any o the north pole expeditions, because if he kept sail ing he would be nearer than any concelvable dis-
tance; and unless we suppose his ship to be an inconceivably small one, some part of it wouldeven tually reach the pole.
(37) P. M. C.-The moon's axis, during the eclipse, was very much inclined to the horizon,the
latter belng inclined to the equator, besides the latter belng inclined to the equator, besides the
inclination caused by the obliquity of the ecliptic inclination caused by the obliquity of the ecliptic three causes, with the moon's motion from west to east, account for all correct observations.
(33) F. A. W. says, in reply to S. C. H., who asam as to the philosophical reason that a circula run faster: Circular saws of over 40 or 50 Inches indiameter are or should be hammered to run at a certain speed. This is more important when the
speed is as high as from 700 or 200 revolutions per minute. If a saw is so hammered as to do good work at 300 or 400 revolutions per minute, it wil not do as good work at 900 , for the reason that the
high speed expands the outside or rim, causmg high speed expands the outside or rim, causmg it press it. In such cases, and when it is inconvenient to reduce the speed, it will be necessary to gulde the saw out of the log so as to cause the cen-
tral part to rub against the log enough to heat it tral part to rub against the log enough to heat it
slightly, thus expanding the portion that needs slightly, thus expanding the portion that need hammering. An expert sawyer can in this wa manase indifferently well, though at an expense o considerably more power. A largesaw, to run wel part until it is slightly dishing, or, as it is variously expressed, "loose at the eye," or "rim-bound." It may be loose at the eye when it is the reverse of rim-bound, namely, too open at the rim, which is the most frequent trouble with suchsaws, and the all become so eventually from use, and then the should be re-hammered. I would not advise any take to hammer one, for the operation to under delicate one, and requires considerable skill. A We have known of several cases in which larg saws seemed to do equally well under considerable changes of velocity, and we imasine that saws are quite as often run at different speeds as at those recommended by the mukers. Wilhin l'mits, how-

Minerals, etc.-Specimens have been re ceived from the following correspondents,and examined, with the results stated:
A. J. R.-It is impossible to say whether a stone is ithographic, or suitable for printing from, from your queer specimen, but must request, before an swering your questions, to know whether it is a manufactured or a natural product. HOw an Where was it found Is it genuine? If natural,
has anything been done to alter it ?-J. H. A.-The specimens contajn iron pyritea in quartz.-We bave any letter two specimens in an envere, whot containing 40 per cent of sulphur and 60 per ce of iron. No. 2 is a mixture of small scales of blac mica, carbonate of lime, and a rock composed of silex, iron, and magnesia.
J. C. C. asks: If it is high water at the Bat tery, New York city, at noon, how high will th of the disagreeable odor of corduroy, when that fabric becomes wet from any cause?-J. H. M asks: How is theoll flalsh put uponmelodeons an sewing machines, and what kind of oil is used?

## COMRUNICATIONS REGEIVED.

The Editor of the SCIENTIFIC American ac-
nowledges, with much pleasure, the recelpt of orinal papers and contributions upon the following bjects:
On the Crystallization of Carbon. Ily C. T. On Hydrophobla. By C. R
On a Suicidal Scorpion. By J. B. T
On the National Currency. By
On Fruits and Electricty. By
On a Withdrawn Charge. By C. G. F
On Gas Machines. By W. H. E
On Smoke Consumption. By O.F. M
Iso enquirles and answers from the following: S.-L. W.-J. B.-M.-H. V. M.-T. A. J.-A. J.X
W. H. X.-H. T.-J. T. N.

## HINTS TO CORHESPONDENTS.

Correspondents whose inquiries fall to appear
hould repeat them. If not then published, they should repeat them. If not then published, they my conclude that, for good reasons, the Editorde anes them. I

## ways be given. Enquiries rela

Enquiries relating to patents, or to the patentaubilshed here. All such questions, when initia aly ure given, are thrown into the weste would fll half of our paper to print them all; but we generally take pleasure in answering briefy mall, if the writers addrem is given Hundreds of enquirles analogous to the following n tobace paper for fumigating ersis Where btained? Are there any fuming greenhouses be aw silk in New York city? Who publishes the best work on electroplating? Whese book on mechanical drawing is considered the best?" All such personal enquiries are printed, as will be observed, in the column of "Business and Person," Which is specially set apart for that purpose, ubject to the charge mentioned at the head of in this way be expeditiously obtained.
[OFFICIAL.]
index of inventions
Locters Patent of the United Statea wore

## Granted in the week ending

 December 22, 1874
## AND EACH BEARING THAT DATE.

Akalies, putting up caustic, A. K. Lee............ 158,034
ikalies, restoring spent, A. S. Lyman
uger, C. F. King Auger, eartb, A. S. Ballard (r)
Auger, earth, J. B. Christian
Auger, earth, J. B. Christlan....
Bagailler, J. Cline....
Bale tie, J. N. Smith
Bale tie, cotton, R. M. Taylor.
 Dell ringer, Dutome.
Bellows, M. Doyle. elting, making rubber, T. J. Mayail. Beverage or summer d
Bill fle, E. J. Smith..
Bird cage, J. Maxheime
Blacking, harness Hquid,
Blid detop, F. G. Boggs
oller incrustation compound, J. J. Lavo
Boller water cagne, c. c. Redmond
Boiler water gage, C. C. Redmo
Bolts, machine for heading, A. A
Bookcloth, cutting, J. W. Jone
ooks with metal, stitching, E. D. Avere
oot and shoe, J. Lanham
Boot heel, L. W. Buxton
Boot uppers and soles, uniting
Bottle cleaner, J. R. Smith.
Bran duster, J. T. McNally (r)
Brush, tooth, M. A. R. Lowd.
urner, Argand gas, S. G. Dare.
Burnishing machine, N. F. Mathewson...
Butterworker, J., A. J. \& J. E. Lind
Butterworker, J., A. J., \& J. E. Lin
Butter worker, A. Whitaker..........
Can holder, presere, J. H. Winalo
Caraxles, coollog, w. E. Tindey..
Car coupling, N
Car coupting,
L
Car coupling, E. C. Eaton
Car coupling, H. Luther .......
Carcoupling, C. E. MeCornick
Car couplling, J. W. Melkle
Car coupling, c. Surpite..
Car gear, rallway, 0 . McC. Chamberlatd
Car wheel, lubricatink, s. \& s. L. Hall
Car wheel oll box, Calla han \& Gallagh
Cars, lifting rallroad, B. F'. Phelps
Carrlage, child's, H. J. Sull1.
Cartrldge case, B. B. Hotchkiя
Caster stand, H. Sclade.
Castlng, pattern for, S. R
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Chura dabher, R. M. Case.
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Cigar box, C. A. Slecke...
Cigarb, aging, J. L. Boone
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Clevis, L. E. Smith
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Cloth measure, H . Carlon.
Clothes washer, E. Crowell
Coalmining machine, $G . M$. Read......
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collar, fur, A. D. Levy....
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Column, Iron, J. M. Corne
compounds, anti-corrosive,
Cop tubes, making, J. F.
Corn busker, D. Babbit...

Cradle and crib, W. A. Weant.....
Culliary vessel, J. H. \& N. Weare
Curry comb, M. Sweet............
Digger, potato, H. D. Herringto
Distiling spirte, R. C. Brooks.
Dress elevator, A. B. Smith (r).
Drill, steam roek. j. C. Githen
Drill, portablerock, T. E. Mendenhal Drill, rock, E. S. Whachester
Drlil, well, Morgan \& Kelly
Electrotype mold, S. P. Knight...........
Engine, automatic pumping, H. S. Maxim
Engine, rotary, A. C. Gailahue....
Engine, self-propeling, N. S. Bean
Engine side valve, steam, R. Gobs.
Engine spark extingulsher, Smith \& Helmkee.
Fabrics, creasing, J. Shepard.
Feathers, shaving, G. M. Rich
Feathers, shaving, G. M. Richmond.
Fence, Iron, Devoe \& Wulker
Filter, Hanck \& Voegele.
Fire escape, J. B. Gathright.
Fire egcape. Strong \& Peterson.....
Gageller,drop light, F. C. Hamilton
Gate, farm, L. \& J. C. Merrill.
Gearing, sbifting, M. Kolp .
Generator, steam, A. L. Boga
Girder and column, J. Mat
Giove, E. B. Whitney....
Gralning, transfer sheet for, F. w. ilttell
Hame tug, J. W. Denton......
Hammer, bush, H. H. Harvey
Harness Hquid blacking, J. A. Sefton....
Harness saddle joint
Harrow, D. T. Gllite.
Harrow and planter, w. J. Covington
Harvester 亿ingerbar, R. Dutton
Harvester platform, S. Luce
Harvesting machlne, J. F. Selberiling
Hatbodes, stretcblng, E. Hechler....
Hat \#nishing machine, J. W. Corey
Hay loader, C. W. Whlliamo.
Heater, steam, w. H. Sbock.
Heater, steam, W. H. Sbock........
Heating apparatug, G. H. Perklos.
Hogcatcbing
Hog riog blank, J. J. Hutbon (r)..
Hoop dressing machine, P. Fl
Horse power, J. G. Taylor...
Horsepower, endless cbaln, D. S. Heebner et
nkstand, S. Hall..
Key fastener, s. T. Proudman.
Viln, progrebsive, F. E. Horfm
Kife sharpener, J. B. Bolloger
Knife, shoe, M. A. Tyler
Knife, table, A. Grimm.
Knife, table, J. O. Ely
Lamp, R. Marsh...........
Lamp lighter, head, M. Malle, E. Walte.
Lamp wlcklng, E. Watte................
Lantern ChImney, Rlcharda \& B
Lantern. Breet, J. M. Bruce...
Latch, ocking, H. Rogers...
Leadintobars, forming molt
Lead, cutting and siltting, W. A. L. Kirk. Kirk
Leather dressing macbine, o. A. Smith. Kirk
Lime and cement, hardening, F. W. Colby Linke and cementing and welding, A. Alexand
Lock for furniture, etc., H. Willard..... Lock for furniture, ett., H. Willard
Locomotive and car, H . Handyside. Locomotive and car, H. Handyside............
Locomotive watering pipe, Dodge \& Palmer Locomotive watering pipe,
Loom, Crompton \& Wyman. Lubricator, Hofrmann \& Belsinger...
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machines for produclog such metal work by splnning, machines for produclng such metal work by spinning,
called "Improvements in Metalic Shields and Sup. ports for Use under Stoves and Analogous Articles of
Metal, and In Machines for Produclog such Metal Work by Splaning." Dec. 17, 1874
4,188-S. G. Smith, Hollls, York count y, Me., U.S. Im.
provementein machines for removing snow from rall. roads, called "Smith's Improved Machine for Removiug Snow from Rallioads." Dec. 18, 1874.
4.189.- A. Webber, Detroft, Micb., U. S., and A. McCor-
mick, London, Ont. Improvement in carriage springs, mick, London, Ont. Improvement in carriage springs,
called "Michell's Carriage Spring." Dec. $18,187$. . ,190.- W. Irvine,Rochester, Monroe county, N.Y., U.S.
and S. Trees, Toronto, Ont. Improvements on horse col. lars, called "Irvine's Adjustable Horse Collar." Dec.
18, 1874 . 18, 1874.
ri91.-G.
Wentworth county, Ont. Hisefuldevice for preventing

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 4.19y.-S. S. White, Phiadelphis, Pa., U. S., asiggee of
J . W. Glibert, same place. Improvements on hand pleces for dental englines, called "Improvements on Dental fanu Ploces. Dec. 2, . county, Ont. Ymprovements in the method of heallo and protecting steam bollers, called "The Royal Arc
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ments on

on bed springa, called ''Jones'Compound Bed Spring. Dec. 22. 1884.
2033...G. Huntingtoa, Brantiford. Hrant sounty, Ont Waster." Dec. 20, 1874.
4,204.-A. N. Chrlstie, St. Louls, Mo., U. S., and Hon.
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