

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

## A NEW GRAIN ELEVATOR.

A new grain elevator in New York city is now in process of construction by the New York Central and Hudson River Railroad Company, which is designed as the beginning of arrangements for the accommodation of a great grain trade which ultimately will tend to direct a large trade, to New York city in this line.
The magnitude of the future facilities for cheaply handling grain in New York can be inferred both from the requirements of the large traffic of the Central and Hudson River Railroad and from the fact that, with that line, other lines wil necessarily be brought into active competition, and so led to provide adequate terminal accommodations for their own benefit. The Pennsylvania road has already recognized this, and, it is reported, contemplates the erection of an elevato as large as that of the New York Central Company, and sub sequently of building one of double the size, capable o holding $3,000,000$ bushels of grain; while the Erie, we learn, proposes to construct a small transfer elevator of 100.000 bushels capacity, and probably in the future a building of much greater size.

At the present time New Yerk suffers from no lack of storage capacity for grain taken from vessels. There is an abundance of floating elevators, and the stationary edifices will, together, accommodate some $12,000,000$ bushels. The absence of railroad elevators has, however, rendered the handling of the enormous quantity of grain arriving by rail both costly and difficult, in a degree which may be estimated from the fact that the same has now to be shoveled by hand from the cars of the New York Central and Hudson River road into canal boats. and by the latter transported to storage houses to the lower part of the city.
The opposition to building elevators on the part of the railroad managers has been based on economical motives. The grain-grading system now existing, through the agreement between the Produce Exchange and the roads, has hitherto not been favored; and as a result, under the old plan (it being necessary to deliver the identical grain received for storage) such grain would have to be stored in a separate bin even if it did not nearly fill the latter, so that it was
practically impossible to utilize even half the capacity of the accommodations provided. The present system obviates this trouble, and admits of the employment of nearly the full capacity, through proper weighing and inspection, by which urned to the storer: though such is not the identical mate rial, as several consignments may be mingled in one or more bins, in order that the latter may be completely filled. An ther obstacle has been found in the fact thet the build ings must be erected on the Hudson River, and suitable bot tom for laying foundations has hitherto not been reached This difficulty has, by dint of persevering search, been over come, and now the Central, Erie, and Pennsylvania road have, on their respective properties, found solid bottom at a epth of some 75 feet.
The New York Central and Hudson River Railroad Com pany's elevator, at the time of writing, exists partially in he shape of foundations and partially on paper, in the form of plans. Mr. Charles Hilton is engineer in charge, and througb the courtesy of Mr. C. B. Gerard, the assistant engineer, we have obtained the following facts in regard to the edifice, and rom the drawings ourartist has prepared the accompanying ccurate representation of the structure as it will appea hen completed one year hence. The building is located be ween 60th ced reats, and an with Twelth ave
 feet in hight, and contains 264 bins, each 65 feet high, hav ing a capacity of 6,000 bushels each, or an aggregate capa ity of over 1,500,000 bushels of grain. The foundation is composed of some seven thousand piles driven into the river bed at intervals of 2 feet 9 inches between centers. These are cut off below low water level, filled in with sand, and trans versely capped with heavy timbers. Two diagonal cappings follow above, and a series of granite piers, pyramidal in shape, finally support the ponderous timbers which sustain he bins. The superstructure is of brick outside to the top of the bins, and slate above.
At the north end, four tracks enter, and between the out de pairs twenty-two receiving pits are made, each pit hold ing one car load of grain, and so located as to come just
abreast the car doors. Steam shovels are to be used to re move the grain from the cars; and the grain is then carried by he elevator leg, which enters each pit, to a receiving hopper above the bins. The power for elevating is furnished by a 500 horse power double engine. As soon as the receiving hopper is filled, an attendant on the ground floor opens a valve and allows its contents to run into a weighing hopper laced beneath. The scale rod is also in the lower story, placur conected with the hopper far above by suitable de vices, so that the weight is easily read off. The weighing hopper may be rotated on a vertical axis, and is provided hopper may be rotated on a vertical axis, and is provided
with an inclined spout. This spout traverses the interior with an inclined spout. This spout traverses the interio periphery of a ring, into which opens a series of conduits,
leading to twenty-four adjacent bins. By means of a wheel and index hand, the attendant can adjust the hopper spout gainst any desired bin chute, and it only remains to open valve to deliver the grain into the bin. Meanwhile the re eiving hopper valve has been closed, and the hopper is be ing refilled, so that the raising of the grain is continuously carried on. At the bottom of tach bin is a spout, and unde every fourth row of bins there is an endless moving belt Bags, after being filled at the spouts, are thrown upon the belt, and thus transported to the vehicles at the delivery door.
In order to accommodate shipping, a separate hopper is provided, and a spout therefrom leads outside the building to the hold of the vessel. Arrangements are also provided for removing grain from boats, the elevator leg for this purpose being 60 feet in length and capable of vertical adjustment over a distance of 20 feet, to suit varying conditions of tide, etc
Our engraving represents the new elevator, and also affords an idea of another edifice, probably the largest of its knd in the world, and of the extensive yards owned by the New York Central and Hudson River Railroad Company and let to the Union Stock and Market Company as a receiving station for the immense droves of live stock received from the West over the Hudson River road. The sheep and hog house, which very recently has been completed, is shown in the distance It is a brick structurce 370 feet long by 200 feet wide, and is


THE NEW YORK CENTRAL RAILWAY'S GRAIN RLEVATOR AND STOCK YARD
divided into one section 100 feet in length and three stories high, for the reception of hogs, and another occupying the remaining space, but fourstoriesin hight, for beeves, calves, and sheep. The ground floor is utilized for cattle and the upper stories for the sheep, broad inclined planes being the means of ascent. The interior is thoroughly illuminated by a large skylight and innumerable windows, and the ventilation, obtained by flumes and hundreds of apertures in the walls, is thorough ; $20,000 \mathrm{hogs}, 30,000$ sheep, and 2,000 calves can be accommodated at once on the various floors, calves can be accommodated at once on the various floors,
which aggregate in area nearly seven acres. The yards outwhich aggregate in area nearly seven acres. The yards out-
side offer quarters for 4,500 head of cattle. The land in. side offer quarters for 4,500 head of cattle. The land in-
cluded in these new improvements, for conducting freighting cluded in these new improvements, for conducting freighting
business by this company, is some 20 acres, nearly all of which is made or filled.in ground, which has heretofore been useless.

## Srientific Ammricam.

MUNN \& CO., Editors and Proprietors. PUBLISHED WEEELY AT
NO. 3 ' 7 PARK ROW, NEW YORK.


## PUBLISHERS' CARD

The present volume of the Scientific American is draw ing rapidly to a close. The next number ends the year Some eighteen thousand of our subscribers will find, printed on their wrappers covering this week's papers, the announcement that their subscriptions are about to expire, and the request that they will remit for the new volume. To prevent any break in the conti- nuity of their subscriptions, and to enable the publishers to know how large an edition to print at the commencement of the year, subscribers are invited to remit for a renewal as early as possible. Simultaneously with the mailing of this weck's paper, an envelope, containing Prospectus for 1876, a beautiful chromo Name List, a Catalogue of our Publica tions, and an Illustrated Hand Book, useful for inventors and others, will be mailed to all our subscribers; and we hope to receive all the lists back again filled with the names of those who wish in the future to take our paper

To save our friends all the trouble possible, we also in close an envelope with our address printed thereon, so that all the subscriber and getter-up, of a club has to do, is to place his name or list of subscribers in the envelope, with the postal order, draft, or money, put a 3 cent stamp on the former, and drop it into his post office.
The terms of subscription remain as heretofore- $\$ 3.20$ per
annum, postage prepaid by us, for single subscribers, with
discount for a number. See terms for clubs in special prospectus. All news dealers throughout the country will, as usual, receive subscriptions and have our publications on sale.

## DIPHTHERIA.

There has been recently in this city, and throughout the country, quite an alarming spread of diphtheria, amounting almost to an epidemic. The disease is one which fastens on children most readily, although it attacks adults with often fatal effect. Its chief causes are neglect of proper sanitary pre autions and the inhalation of foul sewer gas and of the eman ations from damp and badly drained ground. We believ that it is not realized, by dwellers in and owners of our city houses, how imminent the danger of such disease is, or els we should see more efforts directed by private individuals to-
ward the closing up of any possible avenue of entrance for mephitic gases into dwellings. It may be laid down, as a general rule, that the merest whiff of sewer gas pervading a hall or room should be considered as a signal of impending peril, and not a moment's delay should intervene before measures are taken to discover its origin. If the drain pipes in a house are properly constructed, there should be no smell whatever; and the first points to look to are whether there is a good trap in the sewer pipe in the cellar, and whether there is a ventilating tube leading from the soil pipe into a chimney, or to a hight at least two feet above the roof. If not, these additions should at once be made. If a tenant be the sufferer by foul odors, and the proprietor neglect the prothe sufferer by foul odors, and the proprietor neglect the pro-
per safeguards, in this city, the former has only to apply to per safeguards, ind when an inspector will examine the prem-
the Health Board, when the Health Board, when an inspector will examine the prem-
ises, and the result will be a peremptory summons to the recreant landlord to make the necessary alterations within three days or thereabouts, or in default pay a fine, and als the cost of the work which the Health Board will proceed to perform for him. It is well for tenants to remember this, as we happen to know of cases where many people have al but risked their lives, perhaps through inability to take the precautions themse
About a yor Health Department, published some useful suggestions rela tive to diphtheria which are well worth remembering. Un der the heading of precautions, in addition to the removing of sources of sewer gas escape as mentioned above, he ad vises the removal of every kind of filth from around th house, the cleaning and white washing of dirty walls, and th disinfection of cellars and ventilation of all apartments, es pecially those which have been occupied by people suffering with the disease. It is well, in such rooms, not only to lime wash the ceilings but to paint the woodwork, boil or subject to a high degree of heat every article that can be so treated and expose the room and its contents to currents of fresh air for at least a week before reoccupation. Children that are well should not be allowed to kiss others affected with sore throat, or sleep in the same room, or use toys cles previously handled by the sick. It is safer to isolate in
ones from all the family, except, of course, the necessary at tendants. The air in the sick room should be changed at least hourly, and all discharges from the mouth and nose should be received into vessels containing disinfectants, such as solutions of carbolic acid or sulphate of zinc, or upon cloths which are to be immediately burnt or else boiled or soaked i disinfecting fluid.
Diphtheria, like many other serious maladies, is not difficult to check if attended to in time; but it frequently baffles the highest skill if allow to run. Its distinctive feature is the form ation of a false membrane in the throat, which shows itsel in grayish brown patches. Sometimes the whole membrane forms suddenly; but as a rule, the patches first appear ac companied by fever and prostration. The first symptoms of the disease, sore throat and abnormal heat, are too often con sidered as premonitory of a simple cold; but there is no ne cessity of such error if parents will carefully examine the
throats of their children as soon as soreness is complained of. throats of their children as soon as soreness is complained of.
The patches can almost always be well recognized, and a competent physician should be instantly summoned. Home made remedies and gargles should not be depended upon and the only treatment worth practising before the doctor arrive $s$ is to administer pounded ice, the use of which was Oneida very effectual during the ravages of the disease in the peculiar to the of cases of the malady. It is well therefore to keep in mind that there are but three safeguards: first, cut off the fou ir ; second, watch all sore throatsin the family; and thirdly summon the doctor inmediately.

## A VALUABLE GIFT BY CHEMISTRY TO THE WORLD

A celebrated physician, the late Dr. Valentine Mott, used to say that iodine was the greatest gift which medicine had ver received from chemistry; and it may now be said that ne of the most remarkable and important services rendered by chemical investigators to the arts and sciences is the dis covery of bromine, by Balard in France, just 50 years ago Berzelius, while describing it in his "Chemistry," mention that no use had been found for it, but he cautiously adds the
words " thus far," showing that he confidently expected that words " thus far," showing that he confidently expected that
a use would ultimately be found. The discovery was fruit lessinu a period of 15 years, when daguerreotypy was in vented; and bromine soon took an important place as one of the most valuable ingredients in the necessary materials, and now bromine compounds are indispensable to the photo
grapher. Another 15 years elapsed; and then physician commenced to experiment with the new element, and the soon ascertained its great value as a remedial agent, and the salts of bromine now form a series of the most important substances in the materia medica. Lately it has been found that bromine and some of its compounds are the very best etching materials for engraving metals, surpassing all acids and other agents, as described on page 369 of our current volume. But there is no reason to believe that this will close the list of the uses of this remarkable elementary substance, which is found in sufficient abundance in the waters of the which is found in sufficient abundance in the waters of the
sea and of many saline springs to make it comparstively sea and of many saline springs to make it comparatively
cheap. A short account of the manner in which it is produced will undoubtedly interest many readers.
Bromine is commonly obtained from the mother liquor or bittern of salt works, which is rich in bromine compounds he latter being retained in the liquor, as they do not crystal ze out as easily as the chlorine compounds, of which com mon salt is the principal. The old method is to pass chlorine gas through the liquor, which, as the chlorine has greate affinity to the bases than bromine, sets the bromine free. Th latter is then absorbed by shaking portions of the thus chlor inated liquid with ether, which dissolves out the bromine, and is darkly colored by it. Then the ether is shaken with caustic potash or soda, which combines with the bromine caustic potash or soda, which combines with the bromine, which the bromine mat be set free again in the same way as hich the bromine may be set free again in the same way a chlorine is disengaged from common salt, namely, by mixing
it with sulphuric acid and black oxide of manganese, and heating, when the bromine distils over.
According to an improved method, the bromine is obtained directly from the mother lye or bittern, by heating the latte with the sulphuric acid and black oxide of manganese, which decomposes the chlorides and yields chlorine gas; this in its turn sets the bromine free from the bromides, and the vapors, with that of water, pass over to a cool receiver, where they condense; while the pure bromine at last floats over a layer of saturated solution, containing 1 part bromine to 40 of wa ter. We ought to add that pure bromine is a virulent corro sive poison. When a small piece of phosphorus is throw sive poison.
on a few drops of bromine in a tall beaker glass, it is at on a few drops of bromine in a tall beaker glass, it is at
once violently projected upward with an explosive noise, and once violently projected upward with an explosive noise, and
in an ignited condition; this forms a striking lecture room experiment, illustrating the effects of very active chemica ffinity.
Bromine is a very disagreeably smelling brown liquid, freezing at - $8^{\circ}$ Fah., and boiling at $150^{\circ}$, when it changes into a deep red vapor, nearly 6 times heavier than the air. According to Wagner's last Jahresbericht des chemischen Tech nologie, the total production of bromine at present equals $245,000 \mathrm{lbs}$., of which the United States and Germany pro duce the greatest part, namely, $100,000 \mathrm{lbs}$. each. Scotlard produces $30,000 \mathrm{lbs}$., and France $10,000 \mathrm{lbs}$.

## MAKING EXCUSES

It has been said that a person who is good at making ex cuses is good for nothing else. Nature never accepts a excuse, the law seldom does, and yet in ordinary affairs of life excuses play a large and pernicious part. There ar some people who spend half their time in inventing excuses for what they do in the other half of the time. What a pity this inventive power could not be directed into a useful chan nel, and made to benefit instead of injuring their fellow men The habit of making excuses grows on what it feeds upon If excuses were never accepted they would be seldom offered but on the contrary, our whole primary school system is buil on a plan that fosters the fabrication of excuses, many of on a plan that fosters the fabrication of excuses, many o
which are little better than lies. There is a story of a school master who called up one of his favorite scholars and asked him why he was late. "Oh," said the little excuse maker, "I dreamt I was going to California, and when I heard the chool bell I thought it was the steambort bell." Glad t avoid punishing his favorite, this absurd excuse was ac cepted and the delinquent pardoned. We fear there are to many parents and teachers so willing to accept excuses that they greatly encourage excuse making, and indirectly en courage lying. As these pupils grow older and begin to fee a personal responsibility for their actions, they naturally foil nto the habit of making excuses to their own conscience and of deceiving themselves. How quickly an ingenious excuse heals the prick of conscience
We do not mean to assert that, frail and imperfect mortals s we are, we should require perfection of our fellows, nor, like Shylock, demand that the letter of the bond be fulfilled. Just ce must be tempered with mercy, but sometimes we must b cruel in order to be kind. Nature's laws are inflexible; there is no escape from the severities of her just penalties. If we breathe infected air through ignorance, we suffer as much a if we had entered it with full knowledge; ignorance of the aw does not relieve us from its penalties. Our statute an other laws distinguish between murder committed with pre meditation and malice from that committed without fore thought. The insane escape punishment for their crimes however heinous. The man who shoots his sister by acci dent is at once acquitted. But does the bullet discharged by accident, or by a lunatic, or by any one in the heat of passion prove less fatal than it would had murder been intended The severed artery, the pierced lung, the congested brai listen to no excuses. To him that is murdered it is all on whether it was premeditated or not.
The infraction of any and all of Nature's laws brings as certain punishment as does Recorder Hackett's court, nay more certain, if less speedy. The tight shoe, whether o satin or cowhide, worn voluntarily or involuntarily, by city belle or a rustic clown, is sure to produce the well knowil corn. Undue exposure leads to consumption; over studyand
excitement produce brain diseases as frequently in the pulpit as in Wall street. How often are people engaged in charitable work stricken down by disease incurred in the fulfilment of a holy mission! Most undeserving of such a fate, we are
inclined to exclaim; but Nature accepts no excuses. Violate inclined to exclaim;
her laws, and ye die
But what is the great harm in excuses? we think our reader begins to inquire. First, it encourages story telling, untruth, prevarication, and white lies. Second, it makes people careless. Rail way trains are our best examples of punctuality; if you reach the depôt but 15 seconds too late, you are left and must wait, perhaps for hours. It is of no avail to tell the doorkeeper that your delay was unavoidable, that the omnibus broke down, or the street was blockaded, or the car ran off the track. People knowthat the rule is as inflexible as the law of the Medes; they do not flatter themselves, as does the tardy school boy, that their excuse is a good one, and thus loiter along at a convenient gait. One of the blessings of railway travel is that it makes people more prompt and more diligent. The banks are another class of institutions that will not accept excuses; if your note is not paid by three o'clock, it goes to protest. It matters not that the money promised you fails to come to hand in time, the train bringing your draft was delayed by snow drifts, or the telegraphic remittance was stopped by a broken wire, or the messenger on his way to the bank fell into an open coal hole and is maimed forlife: the bank asks none of these questions,
listens to none of these excuses; the law is carried out.
The publishers of the Sclevtific Amfrican discontinue sending it to a subscriber as soon as he stops paying. The forgetful subscriber, who would continue forgetful if his paper kept on coming, arouses from his lethargy, and the next year he does not forget to renew it in time to avoid any loss.
The poorest of all excuses is forgetfulness, and the best method of cultivating the memory is to resolve never to accept this excuse from yourself nor make it to others. forgot" and "I didn't think" have caused untold misery, and should be stricken from the vocabulary of every ambitious youth. Conductors and switchmen sometimes forget that a certain train is due, and the next morning we read in heavy head lines: "Fearful Railroad Accident! Dreadful Loss of Life." The innocent (?) conductor is acquitted of the murder because he renders an acceptable excuse, and history goes on repeating itself. In some eastern countries, it is said, when a house burns down, the owner, instead of getting paid for it, loses his head. Fires are not of frequent occurrence there.
The old saw, that where there is a will there is a way, is true more frequeatly than is generally supposed. Let a man know that no excuse will avail for the omission of duty, and nine times out of ten he will contrive to accomplish what he had supposed to be impossible.

## WEAK SPARKS.

Poggendorff's Annulen for February, 1875, contains an interesting account of many experiments by the celebrated German electrician, Professor Reiss, concerning a new form of electric spark, which he discovered several years ago, and which he denominates "weak sparks." He states that they differ from the ordinary strong electric sparks, not only in form, light, and sound, butin other and very various properties. For example, the length of the conductor makes no
difference in the production of the weak sparks; in referdifference in the production of the weak sparks; in refer-
ence to length, light, and sound, they are independent of ence to length, light, and sound, they are independent of
the composition of the circuit in which they occur; they produce no marked indication of heating in the circuit, and no magnetization. So far as we have examined the accounts
of M. Reiss's results, he appears to have experimented of M. Reiss's results, he appears to have experimented
chiefly with the Holtz frictional machine; but doubtless he has tried other apparatus. We however do nut observe that he anywhere suggests any form of apparatus for telegraphy or other practical uses of the weak sparks.
It would naturally follow, from what we know of electricity and from the extensive series of experiments and the carefulinvestigations of the nature of the weak sparks by the author, that they might be produced by any of the various known forms of electrical apparatus; and this would appear to be confirmed by cartain recent experiments of Mr. T. A. Edison, the well known telegraph engineer and inventor, of Newark, N. J. Mr. Edison has recently ascertained that the weak sparks may be produced by means of an ordinary electro-magnet, and has also put the $n \in w$ sparks into working harness in the form of a telegraph apparatus. As before intimated, we have not carried our examination of Professor Reiss' experiments far enough back to determine whether he describes any method of obtaining them from magnets, and will therefore leave that branch of the subject for further consideration, giving briefly an account of Mr. Edison's new experiments, and what he supposes he has discovered.
The method by which Mr. Edison generates the weak sparks is so simple that any telegrapher or electrician can test it. A war of metal (cadmium seems to be best) is placed on or over
an electro-magnet in an electric circuit: attached to the metal an electro-magnet in an electric circuit: attached to the metal conveys the current of newly discovered force. On breaking the electric circuit with an ordinary telegraphic key, sparks are observed when the free end of the wire is brought in contact with any metallic substance. When the wire from the cadmium is attached to a gas pipe, sparks may be drawn from any part of the entire system of gas pipes simply by louching it with a piece of metal. By this simple means signals have been sent for long distances, as from Mr. Edicity: the only connection being the common system of gas
pipes. Mr. Edison states that signals have also been sent the distance of seventy-five miles on an open circuit, by'attaching a conducting wire to the Western Union telegraph line.
For some time Mr. Edison has been industriously studying he weak sparks, and the developments, he thinks, are unceasingly novel and surprising.
Thus far his examination has resulted chiefly in determining the fact that the weak sparks, first supposed to be a phase of inductive electricity, have really no further likeness to electricity than similarity of origin, the power of furnishing sparks, and the ability to transverse electric conductors. On conductors with equal facility, a glass rod or a strip of hard rubber conveying them as well as a bar of metal. They require no closed circuit. They cannot be grounded, and seem to be incapable of insulation. They are retroactive, sparks appearing when the conducting wire is turned back upon itself, just when the conducting wire is turned back is ane when the free end of the wire is brought in con tact with any other metallic substance. They have no polarity, tact with any other metallic substance. They have no polarity, and points of several metals, the spark is highly actinic ; yet the current seems to have no physiological effect, and does
not influence in any way the most sensitive of electroscopes not influence in an
Such, in brief, are the leading points of Mr. Edison's observations concerning weak sparks from magnetism, and they closely correspond with the long prior observations of Professor Reiss.
We shall recur to the subject in our next.

## WORKING MEN'S READING ROOMS

We are very much in favor of the plan, which some contemporaries are just now discussing, of free evening reading rooms for workmen ; and if such resorts could be started and maintained in every manufacturing village, we believe that an immense amount of good would be done, both in educating the men and checking the spread of intemperance. The average workman gets very little time to read except during the evenings; and if he be single and live in a board ing house, the lack of light, fire, and otber necessities for comfort effectually precludes his doing so there. The tavern is, however, open to him, well lighted and well warmed and there, perforce almost, he spends his evenings in idleness and in the acquisition of habits which are the reverse of beneficial. The trouble with most reading rooms which we have seen in country villages is the fact that they are generally the work of excellent and pious people who unfortunately imagine that a selection of religious literature and a pious cast over the general surroundings of the place are beneficial. However good the motive, this often fails to in duce workmen to visit the places. The effect is indeed or
dinarily the reverse; for working men are but human beings, dinarily the reverse; for working men are but human beings,
and prefer the joviality and lack of restraint at the tavern to the perusal of tracts or the mental digestion of Sunday school books, be the morals and precepts of the last never so good.
The true way of making a reading room both successful and useful is first to render its advantages absolutely free, and secondly to make the room both comfortable and attractive so that every man of average intelligence may avail himself of its privileges. The literary fare may consist at the beginning of periodicals alone, leaving the formation of a library to the future, when a membership becomes established and the members feel like subscribing to enlarge its scope of useful ness by adding a library. Publishers will generally send their journals to such reading rooms at reduced prices: or
the charitable in the town or village may often be successthe charitable in the town or village may often be success-
fully appealed to for contributions of papers, magazines, fully appealed to for contributions of papers, magazines,
and sometimes books which they have read. If there be a local journal, and few towns in this country exist where one is not published, the editor will gladly contribute such of his exchanges as he does not need. In this way, it will be found, plenty of good reading matter can, with a little energy, be collected, and it will prove serviceable in benefiting the community without much expense.
Our plan for a working men's reading room is a plain aparment, as easily accessible to everybody as the tavern. There is no need of costly appointments of any kind: but plenty of good light and a warm fire are indispensable. A few shelves for books, include all the furniture absolutely necessary. If the philanthropic projectors can afford a few pictures, a tasteful paper for the walis, or any other ornamentation, so much the better; money thus laid out will not be lost, as such articles lend a home-like air which, to most people, is attractive beyond all else.
A few weekly papers and three or four monthly magazines will be enough for a start; and then, as it becomes apparen that the people of the town are growing more interested in the work,plans can be matured for a wider selection of reading matter; and perhaps, as we before intimated, a subscrip tion among the readers can be taken towards putting the es tablishment on a broader basis. This is the season of church and similar fairs, for raising money for various benevolent purposes. Perhaps we may venture the suggestion that a small amount may be raised in this way, thus enlisting the coöperation of the young people in the good work. Cer
tainly a free reading room would be a noble Christmas gift tainly a free reading room would be a noble Christmas gift
from the churches of a village to the working men residing in its limits, or from the proprietors of factories to their fm ployees.

A piece of rubber belting fastened around the belt pul loy of an engine will keep the belt from slipping.

## that obnoxious postal law.

Postmaster General Jewell, in recommending in his recent report the repeal of the Act of Congress passed last January which doubled the postage on transient newspapers, books and similar third class mail matter, raising the same from one cent for every two ounces or fraction to one cent for
every ounce or fraction, simply reflects public sentiment reevery ounce or fraction, simply reflects public sentiment relative to that illconsidered and obnoxious law. It was a stupid blunder, on the part of those who framed the bill, that, contrary to their intent, by their own admission, lan guage open to construction as affecting anything but the miscellaneous merchandise which the mails are allowed to carry should ever have entered into it; and the passage of the act shows even more reprehensible negligence on the part of those members who voted for it, in not subjecting the measure to proper examination. Except in the opinion of the express companies, who have been greatly benefited, and by whose influence the act was adopted, there was no necessity for increasing rates even on the miscellaneous matter, as the cheap postage on similar parcels, like seeds, bulbs, samples of merchandise, etc., was a great convenience to the public, and especially such to people living in out-of-the-way ocalities.
The Postmaster (ieneral excepts this mixed material from his recommendation to return to the old rate on printed matter, but fails to show a good reason therefore, based on a possible benefit to the Department. In fact in this respect the report logically contradicts itself flatly, for it may be justly inferred that: if, as the writer paradoxically asserts, " the sending of public documents through the mails has not delayed the delivery of ordinary mails or perceptibly increased their cost," some 200 to 300 tuns being the estimated amount sent: the sending of small parcels, not exceeding, if altogether aggregating, in weight the hundreds of tuns o documents which the members of Congress heretofore sent free through the mails, would, if the matter were paid for at any price, result in positive gain. It may be remarked in passing, that the sentence above quoted is unfortunate from another point of view, as it apparently offers an argument to those who are seeking the return of the franking privilege for it is easy to predicate the assumption thereon that, if several scores of tuns of matter is imperceptible in point of cost or trouble, then as many hundred tuns would be practically inconsiderable.
There are rumors that Congress will act upon this subject early in the session. We trust that the same are well founded, and that our representatives will use no delay in restoring the old and popularrates, including all articles coming under what is "third class matter"

## IX GOOD REASONS WHY EVERY MANUFACTURER MECHANIC, INVENTOR, AND ARTISAN SHOULD BECOME

## A PATRON OF THE SCIENTIFIC AMERICAN

I. It is a publication devoted especially to their several in terests. Every number contains sixteen pages of useful mat ter pertaining to mechanism, new discoveries and inventions and themes interesting and useful to all persons engaged or interested in mechanical or manufacturing pursuits of what ever kind.
II. It is a cheap publication-furnished so low, in fact, that no mechanic, manufacturer, or inventor can plead inability to spare from his earnings or business the small sum charged for a year's subscription.
III. lt is printed on a good quality of paper, in a form for binding, every number being embellished with original en gravings of new machinery, new scientific and chemical dis coveries, and all $\uparrow$ he important inventions.
IV. No other paper published in this country, or any other in fact, furnishes so much useful information for the manu facturer, mechanic, inventor, or man of Science, as the Sci entific American. This is a fact admitted by all our con temporaries, both in this country and in Europe; and the wonder to all is, how a paper containing so many expensive engravings and so much new and useful matter can be fur nished weekly at so small a cost to the subscriber.
V. In subscribing to the Scientific American, the reader receives the latest foreign as well as home intelligence on all subjects pertaining to the industrial pursuits of the world. All the best scientific and mechanical periodicals published in England, France, and Germany are received at this office, af fording us facilities for presenting to our readers the ver latest news relating to science or mechanics in the old world VI. Subscribers who preserve their numbers have, at the end of the year, two handsome volumes of 416 pages each containing several hundred engravings, worth, as a work of reference, many times the price of subscription.

## A Gas Shadow.

A striking and curious experiment, showing the superior weight of carbonic acid yas over air, may be made by pro jecting the shadow of the gas, as it is poured from its con taining vessel, upon a screen. The latter should be of white paper and bright sunlight should fall on the stream of gas which should be poured from the spout of a pitcher held within 10 inches of the screen. The curious result, of a shadow produced by apparently nothing, will be seen, the former resembling descending smoke, quite black at th spout of the vessel, but brightly illuminated whenever the sunlight is concentrated by passing through the gas.

To prepare tin for tinning brass, copper, and iron. Melt the metal in a crucible which has previously been slightly warmed; and at the moment the metal begins to set, and when it is very brittle, pound it up rapidly, and sift when crld to remove any large particles.

## STEAM CULTIVATION.

The Fowler system of steam plowing has been frequentl mentioned in these columns as being the most successful of many attempts to solve a problem of somedifficulty and of great importance to the future of agriculture. We illustrate herewith a cultivator, intended by the makers for use where the double machine would be unnecessarily large and expensive; it is constructed so as to be readily turned and operated in the reverse direction after one set of furrows has been cut. Messrs. Fowler have made some improvements in this apparatus, one of which deserves special com ment This consists merely in making the lever, to which
the screw working in the water of replacement was to tak ${ }^{e}$ away some of the pressure which drives the ship. Bat with reference to the advantage of housing in a tunnel if the screw were driven al excessive speed, he thought it not unlikely that the housing would produce a beneficial effect by preventing the seattering of the water, and whatever reaction the water supplied would be more effectively directed into the line of motion; nevertheless he considered it would involve the drawback of adding largely to the surface friction of the vessel, and he expected that nearly the same ad vantage, but less encumbered by surface friction, would be obtained with any kind of shrouding given to the tips of
water, which, being sucked in by the action of the screw, frequently break some, if not all, of its blades. Mr. Griffiths also considers that the effects of racing will be much decreased, on account of the water being taken in from below, and therefore he thinks that the whole of the after part of the vessel will have to be lifted out of the water before any racing will take place. There can be no doubt, however, that for ships of war it is a matter of no small importance that the screw should be protected from shot and shell, and, if possible, completely cased with armor plates. It is well known that at present the helm has to be put over to port or known that at present the helm has to bs put over to port or
starboard, according as the screw is left or right handed. and


## FOWLER'S STEAM CULTIVATOR.

the ropes are attached, of a forked shape, as shown. In use that arm of the fork to which the hauling rope happens to be attached is of course brought into a direct line with the strain; while the other arm is thereby caused to project laterally, thus bringing the tail rope clear of the wheels, and causing it to be in a favorable position for turning the im plement when the headland is reached. The tail of the draf lever is coupled to a short chain; and when, on arriving at a headland, the strain is transferred to what was pieviously the tail rope, and the draft is thus brought at right angles to the implement, this chain is tightened and, by acting on a segment, turns the main axle, which is cranked, and this, by depressing the supporting wheels, lifts up the main frame, and raises the tines clear of the ground. The tines being maintained in this position by a lever and catch, the turn is readily made; and on its being accomplished, the steersman allows the frame and tines to fall again, and the implement starts on a fresh journey. The action of this turning ar rangement is admirable. The turns are made with great promptitude, and within a very limited space, while the im plement is altogether thoroughly manageable, and there is nothing about it liable to get out of order.

## RECENT IMPROVEMENTS IN THE SCREW PROPELLER.

It would be by no means an easy task to enumerate the many inventions which have been made, since the introduction of steam navigation, to improve the form of the screw. The modification of the screw propeller devised by Mr. Griffiths has been generally admitted to be one of the best. Mr. Griffiths, however, has since arrived at the opinion that we have hitherto been neglecting the true principles in screw propulsion; and after a series of experiments he concludes that thedifference, between the amount of power exerted to propel a ship by a screw and that required to tow her, which in one case Mr. Froude found to amount to a loss of 58 per cent of the power supplied, is due to the screw not being sufficiently supplied with water. With a fullsterned ship this is greater than in one having a fine run, as the water runs into the space left by the stern, and deprives the screw of its full suppls.
To remedy this, Mr. Griffiths' plan is to put the screw in to a casing of 50 to 75 per cent larger area than that of the screw's disk, and provided with an opening underneath, so that the screw is not supplied with the water which would otherwise flow into the space left by the ship, nor does the ship rob it of any of the water which it requires to force back in order to give the thrust to the screw shaft for propelling the ship. This view of the case was not, however, assented to by Mr. Froude, who thought that the effect of


## THE GRLFFITHS SCREW PROPELLER

the casing. It being thus evident that Mr. Griffiths was cor rect in his conclusions, that greater speed would be obtained with a screw in a casing than with one fitted in the ordinary manner, it may be as well to inquire into the other advan tages which he claims for his system. No small value is attached by him to the fact that a complete protection will be afforded to the propeller by the casing, as a safeguard against the dangers a screw usually is liable to from pieces of wreck, ice, etc., floating on or near the surface of the of similar deposits.
that some loss of speed is thereby occasioned; but with th screw in a casing this is not necessary, and perhaps a good deal of the quarter to half knot increased speed obtained with the Bruiser may be due to this cause. Mr. Griffiths' system, however, is not all included in placing the screw in a casing for he also proposes to divide his power into two parts, by using two small screws instead of one large one, and putting using two small screws instead of one large one, and putting
one at the bow and the other at the stern of a ship. The engines and shafts, also, would be placed lower down in the engines and shafts, also, would be placed lower down in the
ship, and therefore, in men-of-war, be more protected against shot. But perhaps the most important improvement claimed for this system consists in having two separate sets of en gines, boilers, and propellers, so that if one were placed hors de combat the other would still be available to keep the ship off a lee shore, or from getting into the trough of the sea. The experiments with the casing round the screw hav ing proved so far successful, the British Government have now placed a small screw launch at Mr. Griffiths' disposa with which to try still further experiments.

Three Curious Discoveries.
A recent examination of the bottom of an old Roman well, located near the hot springs of Bourbonne les Bains, in France, has resulted in threeremarkable discoveries, two in France, has resulted in threeremarkable discoveries, two of an archæological nature,
a geological point of view.

After the excavation had been thoroughly drained, and a thick layer of refuse penetrated, the first discovery was made in the bringing to light of thousands of small metal lic objects of art. These in cluded ornaments, statuettes, and coins, the last of silver, gold, and copper, dating back o the times of Nero and H drian.
Beneath the layer of orna ments, etc., a second layer was found, composed entirely of fragments of sandstone, which together with the metallic ob jects, were completely covered and held in masses by metallic erystals, evidently deposited by the water above. Thes crystals were subjected to care ful investigation; and as a re sult they have been pro nounced to be of such a nature that geologists would unhesi tatingly describe their forma tion to natural causes, workin through ages. That such is not the case is plainly evi denced by the known eras of the coins above which the have formed. It will be seen that the circumstance, which constitutes the second discovery, may throw serious doubt over a large quantity of important geological deductions as to lapses of time, when the same, as is the fact in many in stances, are wholly based on supposed slowness of formation

The third discovery relates to the fragments of sandstone

By comparing these with other pieces, already found in similar localities, the investigators have concluded that such fragments were thrown into the wells as votive offerings to local divinities by the ancient inhabitants of the country, and that the same custom, continued through centuries, accounts for the presence of the much more recent Roman money. A chain of proof, mainly circumstantial, has been elaborated, which refers the stone fragments to the neolithic epoch, in prehistoric ages, and further shows that the pieces probably represent the earliest money used by man.

## Self-Acting Car Couplings.

At a recent meeting of the Master Car Builders' Association, the subject for discussion was " Freight Car Couplings ${ }_{\text {, }}$ Draw Bars, and Buffers," upon which Mr. Partridge made an address.
Mr. Adams was called upon for information on what is required by railroad companies, and said that he had no speci fic facts to present in relation to the repair of drawbars throughout the country. It was very difficult to get very specfic data. The habits and customs of our car men have not been of the character to present these data accurately. The committee appointed on this subject, in looking over the matter, had made up their minds as to some important points to arrive at in the way of improvements. 'We have been shown by Mr. Partridge some of the defects in the present arrangement, which had been considered by the committee But there were some other things that presented themselve to their minds, and one of the most startling of the whole of
them was the expense of links and pins. Upon some roads this expense was enormous, amounting to anywhere from $\$ 10,000$ to $\$ 60,000$ or $\$ 70,000$ a year, according to the size of the road. The ordinary roads perhaps would average $\$ 30,000$ to $\$ 40,000$ a year. We need something to couple our freight trains which will enable us to dispense entirely with pins and links. This was one of the points to was an absolute necessity for improvement was a greater power of resistance in our buffer springs, and a greater range of motion. Our resistance is altogether below the line of connection. If the springs were made stronger, given more motion, and placed in the direct line of resistance, the difficulty would be materially obviated. Various devices have been presented to us during the past year; a good many models have been brought out, and some of them have approximated somewhat to the accomplishment of the idea, but we have not seen any yet that meet our wants, in the opinion of the committee. The thing, after all, is progress ing, but yet there is room for improvement. We have go to have a device that will couple freight cars without a link and pin, and, in addition to that, a separat ebuffer placed di rectly in the line of the frame or bottom of the car, and we have got at the same time to use our present stock; that de vice must be made to connect itself with our manner of coup ling. We have got to use our present stock until it is worn out. But the committee is not as yet prepared to recommend anything. They have not found anything that will entirel accomplish the purpose. A buffer must be so built that it won't couple when you don't want it to. Many inventors seem to think that you must get something that will couple every time it strikes. There have been but few models tha seemed to embody the idea to dispense with links and pins, bnt I think we shall have to make it in two parts, a separate buffer and separate hook, because we want our connections to be in the floor of the car. Mr. Stone in his model has accomplished considerably towards it, and I have no doubt he may be able to bring it perhaps to something near what we want."

Mr. L. Garey said that it was easy to find fault, and diffi cult to apply the remedy. "The necessity for improvemen in the attachment by which cars are coupled together has been felt for a great number of years, and it was still evi dent that the improvement had not been got. The necessity of these improvements was shown by the immense number
of patents granted year after year. The real necessity is an automatic coupler with buffing attachments, either connected or with another device placed on the line of resistance. The buffing requires from one half to double the resistance of the drawing to make it substantially strong. Now if some of our inventors will dispense with the use of the links and pins entirely, provide us with a coupling, automatic or not, which can be uncoupled from cars from the top or side, and give us a buffing attachment which is sufficient for the work, that ought to make a dozen fortunes for him and secure him the blessings of all the people, not only those that travel, but especially of the men employed on railroads. He thought that the railroads would say that, out of the cars which were side-tracked for repairs, eight tenths were owing to some defect in the drawing or attachment. If this could be reduced to three tenths, it would be a great deal. There was more difficulty from the failures of the attachments than in the drawbars themselves.

## Dont Leave a Legitimate Business for Financiering

 It is an evil of the intense competition in great mercantile communities that it drives many from the walks of legitimate business into schemes of speculation with reference to sudden and extravagant gains. The history of frauds teach es that they originate chiefly in the attempt to grow rich rap idly by financiering rather than by diligence in business. Financiering hasits place in legitimate business. Some men have a talent for this, which is as true a mark of genius as is poetry or art. But it is not a talent that every man can acquire, and it is fortunate that this is so; for if all the world should turn financiers, the earth itself would soon gointo bankruptcy. Now, the calamity of a great city is that every one who gains a little money takes to financiering as a readier mode of increasing it than regular business. Wall street, the focus of financiering, gives a tone to the whole business community.
But financiering is a deep game; and he who leaves an honest toil in a business that he does understand, for calculations of chancein matters where he has no skill, is very apt to become the loser, and, as in all lotteries, to grow des perate in the attempt to make up his losses. We do not speak of investments in stock as property, but of the spirit of speculation; and we have no doubt that a just verdict upon many cases of fraud would be: "This man lost his capital and his character by speculation in stocks." Keep, therefore, to honest toil in a legitimate business, and do not aspire to become a financier. "Be content with such things as ye have."

## ROBERTSON'S IRON FENCE

The use of ornamental iron fences is no longer confined to expensive city residences, but is gradually extending to the more humble suburban or village houses; and they would be used much more but for their great cost ; to lessen thistis the object of an invention lately patented by Mr. T. J. W. Ro bertson, which is illustrated in the accompanying engraving, Fig. 1 representing an elevation, and Figs. 2, 3, and 4 show ing sections through the lines, $a b, c d$, and $e f$, respectively This fence is made up of castings having the metal so dis posed as to allow rods to be passed through the ornamenta openings in the sections or pickets, whereby the latter are so effectually secured to the formerthat they cannot be removed when the panel is in place between the posts by which it is when the panel is in place between the posts by which it is
supported;and this is done without fitting, riveting, or other fastening, except that necessary to secure the rods in the osts. To accomplish this, the sections or pickets are made with three vertical bars, $h g h$, where the tie rods are to be connected to them; and these bars are so formed as to admit the tie rods between them, in the same manner as the weft thread passes through the warp in weaving cloth. Tha he tie rods may readily pass through the sections, the two side bars, $h h$, have recesses on one side, and the central one $g$, on the other, so that an edge view of the castings would show holes through it about the size of the rods, C C, through which the latter are passed.


With sections thus cast, all that is required to make panel of fence is to pass rods or gas pipes through a suffi ient number of sections and the posts, and then bind th whole together by screwing nuts on the ends of the tie rods, when the panel is ready to be erected. Where large hollow posts are used the nuts may be concealed in their interiors. From this it will be seen that the cost of a fence of this character may be reduced to that of the castings, rods, etc. s no time is spent in fitting, boring, riveting, etc.; and al though thus cheaply built, it is one of the strongest fences made, as the whole strength of the materials employed is atilized in fastening the parts together.
For further particulars, or the purchase of State or coun y rights, application should be made to the patentee a 8180 street (N.W.), Washington, D. C.

## A NON-RETREATING BUNSEN BURNER.

In consequence of the low pressure of gas during the day ime, in this place, we have long experienced trouble from the retreating of Bunsen burners of the usual construction. his having repeatedly proved a source of annoyance and loss, I was led to a series of experiments with the view of moving the difficulty, if possible, by some modification in in which the relation of hight to diameter in the main tube in which the relation of hight to diameter in the main tube
and the size of the gas jet were varied, I was led to the and the size of the gas jet were varied, I was led to th
following consideration of the subject:
The retreat of a burner will evidently occur whenever any part of the ascending column of mixed gas and air is moving at the orifice with a velocity less than that at which the same will burn. Now, in an ordinary burner, with its main tube of regular cylindrical bore, it is evident that the fric tion of the surface of the ascending column of mixed gases will cause that portion to move at a less velocity than the central part, and that even currents of the nature of eddies will be developed. It will thus happen that, while the cen ral portion of the ascending column of gaseous mixtur issues at a velocity much greater than that at which the ma-
terial can burn downwards, and thus is quite free from any danger of retreating, the marginal portions of the column or jet of gas will be escaping at a rate so much less that the velocity of their combustion downwards will exceed that of their upward motion, and retreat of the flame will ensue.
It is well known that, to secure a jet of water or of an ther fluid whose particles shall move with equal velocitio in all parts, and thus avoid currents and eddies, it is only ecessary to make the orifice of efflux an aperture in a thin wall. In following out this idea, I made a burner of a bore rather large compared with its hight, and then drew in its upper edge into the form of an open-ended thimble, so conracting the orifice of escape to about two thirds of the area of the tube, and rendering this orifice practically an opening in a thin horizontal wall or plate. The results of this modi fication far surpassed my anticipations.

A burner thus constructed, as shown in the engraving, gives a a perfectly non-luminous flame with gas pressures varying between $1 \frac{1}{2}$ inches and $\frac{1}{1} 0$ of an inch of water, and with the lowest of these pressures cannot be made to retreat by the most violent hand ling in the way of sudiden move ment or waving about in the air even when this violence is carrie to the extent of extinguishing the flame altogether. Under like con rdinary construction is ir or a very moderate amount of motion
These burners are being manufactured, for our own use and for other colleges, by George Wale \& Co

## CHarespuondente.

## The Purification of Water.

To the Editor of the Scientific American:
In 1869 I took occasion through the columns of your valu able journal to call attention to the beneficial action of ai for purifying water which had become foul with decompos ing organic matter, and to offer my patent air treatment for thefpurpose, for domestic uses, free of charge. At that time the subject was new to the public; and few perhaps attached to it the importance which more recent developments have shown it to possess, especially for dwellers in cities. Recent articles by various writers on the subject tend not only to fully support my statements, but to show that bad water in variably suffers for want of oxygen, the degree of foulnes ndicating the diminished proportion or the absence of free xygen.
The putrid water of a river can be reclaimed by absorptio of oxygen, and it will arrive at sweetness and wholesome ness as soon as it possesses $\frac{2}{8}$ of 1 per cent of free oxygen; this amount is necessary for fishes to thrive in water. But
such water would not necessarily be suitable as a beverage such water would not necessarily be suitable as a beverage for man.
Great apprehensions are now entertained that the horridly putrid condition of the ponds in Central Park will spread disease over the neighborhood, and these fears will be too fully justified if the present state of things continues. But there is no necessity for pond water to be putrid, or to becorine unwholesome, at any time. By the moderate annual expend ture incurred in running an air force pump or pressure lower, requiring about 20 horse power, in a place conveni ntly central, conveying the air by light but durable main f about 12 inches bore to pipes of smaller bore near the bottom of the ponds, with perforated branch pipes through which the air issues, all apprehension of the re-occurrenc of foulness in ponds can be entirely removed. Sufficien oxygen can be supplied by thoroughly agitating the water or about one hour daily, by pumping in air, to keep the ponds sweet. To purify them in their present state, the most rigorous air treatment for several days is needed; it may take a week to do it. The Croton water has suffered with this malady for years, and if it be not speedily provided against, it will fill our cemeteries at a still higher rate than 27 in 1,000 per annum, a death rate only exceeded by Bom ay with 29.
R. D'Heureuse.

New York city

## The Treatment of Diphtheria.

## To the Editor of the Scientific American

I wish to make known to the public a method of treatment for diphtheria, which has been uniformly successful, in the ractice of the writer, during a number of years, which in luded two epidemics; and in a large number of cases, not case has been lost since this treatment was adopted. I feel confident that, by its general use, the mortality may be re uced to one per cent, or even less. I have heretofore de ayed publishing the results in order to make sure that th reatment was really what it promised to be, and I now wish o use the columns of your journal, in order that the public enerally may have the knowledge in their own possession. An attack of diphtheria is usually ushered in with a high fe er and headache, and, in children, with nausea and vomiting. There is great prostration. Upon the tonsils and surround ing parts are seen white, snow-flaky patches. In malignan cases, the patches are often yellow or brownish, and a terrible odor is perceived.
The remedy found successful by the writer is permangen te of potash, in conjunction (not combination) with the tincture of belladonna. The method of administration is as
follows: From 2 to 3 grains (not more) of the permanganate are dissolved in from 2 to $40 \% \mathrm{~s}$. of water in a goblet. Five drops of the officinal tincture of belladonna, or, better, from 10 to 20 drops of the 1 st decimal homoopathic tincture of the same drug, are put into another goblet with an equal quantity ( 2 to 4 ozs.) of water. A teaspoonful is to be taken from each goblet alternately at intervals of a half or one hour. It is, perhaps, needless to say that separate spoons should be used, and the goblets kept covered.
In twenty-four hours, frequently, a favorable change will be seen, but quite as often the disease seems to go on unchecked, save that the fever may seem a little more moderate; but I can assure my readers that, during the second day of the treatment, a most marked change will take place. The fever will entirely subside, the mind will brighten, the tongue will begin to grow clean, and the deposits upon the fauces will peel off at their edges or gradually break away The patient will be upon the highway to recovery, and a day or two more of the treatment will bring back the normal
hue of health, and an appetite to correspond. In rare cases, hue of health, and an appetite to correspond. In rare cases,
however, when the constitution is bad (cachectic), a longer time, five, six, seven days, may be requirea; but even here the treatment has not failed.
I think that, under this treatment, diphtheria is not a disease to be dreaded by the profession. The belladonna may, in special cases, find a substitute, but not the permanganate of potash. The only case in which the above treatment will promise unsatisfactory results is when the disease rapidly invades the larynx and bronchial air passages (diphtheritic croup), when suffocation threatens to supervene before the remedy can act, or when the mere presence of large detached deposits in the air tubes imperils the success of the case. Such an instance recently occurred, which was successfully treated with inhalation of the vapor (not the spray) of a dilute aqueous solution of bromine.
I know that the permanganate has been used as a disinfectant, locally applied, in putrid diphtheria heretofore, in dilute form (as a gargle), and upon general principles as an antiseptic ; but I am not aware that the persistent use throughout the disease has heretofore been made known to the public or profession. That it does not act as an antiseptic is shown by the fact that the other antiseptics have no analogous effect; that it does not act locally may be inferred, because its marked curative effects appear in the system before they are seen in the fauces. The theory of the writer is that diphtheria finds its nutriment in partly devitalized organic matter in the biood, which the permanganate, rapidly absorbed, attacks and destroys by oxidation (being the most powerful non-poisonous oxidizer we have): thus cutting away the pabulum of the disease, when the deposits die a natural death and disappear. The process certainly sometimes appears magical in its action. I trust that, if others employ this treatment, they will not attempt to modify it till they have first given it a fair trial in the manner above proposed.
I have also found the permanganate of potash very successful in the treatment of certain slow forms of putrid and typhoid fevers, with loaded tongue, foul breath, etc., and in recurring boils. This lends additional force to the theory of its action above indicated. I am sure that this drug, so rich in oxygen the life-giver, so harmless in its action upon the human system, will well repay study by the profession geterally, which it has heretofore only received, and that in very inadequate degree, from the homœopathic branch.
Philadelphia, Pa.
I. W. Heysinaer.

## To the what Flies Do.

An article on this subject, in a recent issue of your paper, by Mr. Emerson, an English chemist, has induced me to send you the result of some careful observations made upon the parasites that infest flies. It is not my purpose to dispute the theory, advanced by Mr. Emerson, that flies are foul places, they collosphere, and that, while flying through foul places, then on their bodies various organisms, which they feed upon at leisure. My desire is only to draw
attention to the fact that the common house fly (wusces domestica) is at certain seasons possessed of parasites. In examinations made during the summer months, I have failed to detect the parasites; but in the autumn, as a rule, they can be discovered in large numbers around the coxa (the joint of the leg that is attached to the thorax); and when disturbed, they become very active, running up and down the spines or hairs of the fly. They somewhat resemble in form the acarina tellarius, the little red mites of our hothouses. They differ from them in having but six legs; and in fact, they possess every quality, excepting wings, neces sary to constitute perfect insects. They are half a line long, and, by the unaided eye, can be seen as mere specks, and therefore do not belong to the animalcules which repre sent the smallest and imperfect forms of life. By placing a fly possessed of these parasites upon a piece of clean glass, and then killing the fly, the parasites will immediately leave the dead body and wander away upon the glass. By holding the glass up to the light, the parasites can be seen as atoms, moving. Under frequent careful microscopic examinations, I have never observed that these parasites were eaten by the fly. On the other hand, I am very much of the opinion that the fly is consumed by the parasite. In every case of my observation, the fly possessed of these parasites was in a sickly condition.

By a recent fire in the arsenal at Rendsburg, Holstein, forty thousand new Mauser rifles, an equal number of rifles of older construction, and much other war material were destroyed.

## In pursuance of past promises, and in compliance

 In pursuance of past promises, and in compliance with numerous requests, we invite competition designs for a clasof structure which commends itself to notice. Of the vari of structure which commends itself to notice. Of the vari ous kinds of building open to selection, not one seemed to us
more suitable, in calling into exercise the skill and ingenuity of architects and the younger members of the profession than the ore we have chosen. We have thought of dwell ings for the poor and middle classes, hospitals and asylums churches and schools, all deserving subjects, but they have been more or less used up, and there appeared to us little in them to provoke inventiveness or to afford so ready a re sponse as a villa designed in a material comparatively new and affording ample scope for an independent architectura solution.
condrions or competrrion

1. The design to be adapted for a villa of the ordinary suburban class, suitable for a corner site.
2. The accommodation provided is to comprise a porch hall, morning room, library, dining room, kitchen, and neces sary domestic offices on the ground floor: two principal bed rooms, dressing room, bath room, and three other bed rooms on the first and second floors. Coal, wine, and beer cellar to be arranged in the basement. A servants' staircase to be provided. The sizes of the rooms are left to the discretion of the designer
3. The cost of the villa not to exceed $\$ 9,000$, calculated a 14 cents per foot cube of the whole building, the content being measured from the foundation level to half way up the roof. Preference will be given to a design that exhibits economy of plan combined with a suitable architectural reatment of concrete.
4. The general drawings to be to a scale of one sixth of an inch to a foot, and to comprise the following: Cellar plan showing drainage, ground plan, first floor plan, three eleva tions, one section taken through principal staircase. A sheet of details, illustrating any important part of the construction or decoration, drawn to an inch scale, on a sheet of paper 22 by 14 inches, may accompany the drawings. The whole of the general drawing to be arranged on a sheet o double elephant paper (hotpressed), $37 \frac{1}{\frac{1}{2}}$ inches by $27 \frac{1}{2}$ inch es, and to be sent in unmounted. The designer to be at lib erty to send in a perspective view with the general drawings, in lieu of one elevation, but no account will be taken of this in selecting the design.
5. All the drawings to be drawn in black (Indian ink) lines, and to be suitable for photo-lithography. No wash of any kinc to be used. The shadows, if any, should be hatched in kinc
line.
6. 
7. The drawings to be accompanied by a general specification of the method of construction proposed to be adopted, the scantlings of timbers, etc., with a general statement of the reasons that have influenced the designer, and the di ensions of the several rooms.
8. Particular regard will be paid to the constructive and sanitary merits of the designs submitted.
9. The drawings to be sent in under motto, accompanied by a sealed envelope containing the name and address of the designer, to the editor of the Building News, London, on or before the 25th day of January, 1876, carriage paid.
10. The decision will be published in the columns of the Building News, with a report of the judges.
11. The editor reserves the right of publishing any or all the designs.
12. Thesum of $\$ 50$ is offered for the best design; $\$ 35$ for the second ; and $\$ 15$ for the third, all in gold.-The Building Nems.

## Tænia and Raw Meat.

Seventy years ago tænia (tapeworm) was such a rare affec tion in France that many physicians of large experience had not met with it; or if they had, the cases were extremely few. To-day tænia has become so common that every practitioner meets several or many cases yearly. To what is due this sudden multiplication of treniæ? It is twenty or twenty five years since Trousseau first, and many physicians after him, and more recently Professor Fuster, began to employ raw meat as a remedial agent; and it was at first received with distrust, but at present it has become of general use. This coincidence alone permits us to suppose that raw
meat may have something to do with the production of tenia meat may have something to do with the production of tænia,
and most physicians have adopted this etiology, which ap and most physicians have adopted this etiology, which ap
pears absolutely certain. Beef frequently contains the germ of tænia, which germ, transported into the stomach of man, developes, taking the form of the tapeworm. In Abyssinia, where the use of raw meat is general, every one has tænia. At St. Petersburg, Dr. Weisse observed, according to Cauvet that children fed upon raw meat were frequently attacked by trenia.
"'For my part, I have observed a great number of cases o tenia during the past few years, and in every case the indi vidual had made use of raw meat or was at the time under that regimen. In a convent I recently administered raw meat to four nuns, three of whom were seized with tæni afterward.
' M. Laborde (I'ribunc Médicale, page 472) does not believe that raw meat is the cause of the increased production of the worm. 'Each of the three varieties of tænia which are found in man,' says he, 'argues its origin in an absolute of the cysticer cellulose results from the transformation is produced by fish. The tania mediocanelle is the only one that can be communicated by beef or mutton, and we all Ir where the error lies. The taenia mediccanelle is precise
not
on the contrary, it is at least as frequent in our time as the conicu solium; and it is readily recognized by a simple mag ifying glass. If M. laborde were to examine the tenia hat follows the ingestion of raw meat, he would see that he tenia mediocanelle has become very common in Franc rom our new therapeutical habits, while the frequency of he occurrence of tenia solium has not increased, for por meat slightly cooked or raw remains exceptional. Thus we see that it is beef or mutton which furnishes these frequen cases of trenia. Have we any means of doing away with his terrible inconvenience
'It is at least probable, if not certain, that the addition of alcohol to raw meat, following the method of Fuster, of Montpellier, sutfices to kill the germ. For that, the alcohol employed must needs be strong, and the meat should be well mixed with that liquid and allowed to macerate for some time. Thaniss to heaven, the moment trenia becomes frequent, the materia medica enriches itself with the knowquent, the materia medica enriches itself with the know ledge of a new tænifuge, at least as efficacious as any other,
and superior, inasmuch as it is absolutely innocuous, and and superior, inasmuch as it is absolutely innocuous, and that its abundance and low price place it within the reach
of every purse. Freely administered pumpkin seeds consti tute a sure and inoffensive tienifuge, that seldom misses its ffect. Some precautions are necessary in the employment of this medicine.
1st. The intestine is previously emptied by recommending he patient to abstain from eating on the eve of the day on hich he proposes to take the remedy.
2d. Early in the morning we administer on an empty stom ch 60 grammes ( $1 \mathrm{oz}, 7$ drachms) of pumpkin seeds, deprived of the skins and ground with sugar, then mixed with water orming a sort of milk of almonds.
3d. When the patient feels the worm detaching itself, we dminister 70 grammes ( 2 oz., 125 grains) of castor oil in a cup f hot broth or black coffee, and the worm, in all probability will come away during the day
If the head of the worm is not found, the same treatment repeated in eight or ten days, or the day following the first treatment, if desirable. To recapitulate: It is certain that raw meat as prescribed to-day expose the patient to tapeing the meat with alcohol lessens the danger The tænia, once developed, is easily removed by pumpkin seeds properly administered."-G. Régnault.

## Punctuality in all Things.

It is astonishing how many people there are who neglect punctuality. Thousands have failed in life from this cause lone. It is not only a serious vice in itself, but it is the fruitful parent of numerous other vices, so that he who be omes the victim of it gets involved in toils from which it s almostimpossible to escape. It makes the merchant waste ul of time; it saps the business reputation of the lawyer and it injures the prospects of mechanics who might other wise rise to fortune : in a word, there is not a profession, no a station in life, which is not liable to the canker of this de structive habit.
In mercantile affairs, punctuality is as important as in mil tary. Many are the instances in which theneglect to renew an insurance punctually has led to a serious loss. Hundreds of city merchants are now suffering in consequence of the want of punctuality among their Western customers in pay ing up accounts. With sound policy do the bavks insist nder the penalty of a protest, on the punctual payment of otes; for were they to do otherwise, commercial transac ions would fall into inextricable confusion. Many and many time has the failure of one man to meet his obligation brought on the ruin of a score of others, just as the toppling down, in a line of bricks, of the master brick causes the fall of all the rest.
Perhaps there is no class of men less punctual than me chanics. Do you want an upholsterer? He rarely comes when he agrees. So with carpenters, painters, and nearly all others. Tailors and shoemakers often do not have their articles home in time. The consequence is that thousands remain poor all their lives, who, if they were more faithful to their word, would secure a large run of custom, and so make their fortunes. What would become of the Scientific American if it were not punctual in going to press? or if ur paper makers were not punctual in delivering paper? or f our compositors were not punctual in coming to work Be punctual, if you would succeed.

Railway Tronclads.-Cologne is to be surrounded by chain of forts in the same manner as are Metz and Stras burg. The works, which are now in course of construction are connected with each other by a protected circular rail way, which, now used for transporting material, is designed as an additional means of defence, as it will convey portable ironclad batteries from point to point. Within the outer for tifications there is to be a second line, and a series of revolvng iron turrets.

Professor James Orton, of Vassar College, proposes t an early day to make an exploration of the Madeira and Beni rivers, which are branches of the Amazons, with the view of opening to science and commerce that portion of
South America which is watered by those rivers. The Chamber of Commerce of New York city heartily seconds Profesor Orton's project, and has addressed a memorial to the Seretary of the Navy, urging the importance to the United States of a knowledge of that district, and asking his coperation in the enterprise. Professor Orton has had much experience on the Amazons.

Wrinkles andRecipes" is for sale at all book stores.

## Nilk Preserving.---How an American Invention is

 Worked in England.The Anglo-Swiss Milk Condensing Company has three establishments in England, one at Middlewich, one at Ayles bury, and the other at Chippenham. Perhaps a better situation for a milk-preserving depot could not be found than at Chippenham, a town long famous for the excellence and the large quantity of its dairy produce, and in the heart of one of the richest milk counties in England. By the kindnes of the company's manager, Mr. Bosworth, we were lately allowed the privilege of going over the works in that town and thinking that what gave us great pleasure might also interest our reade
Close by the side of the Avon (not the Swan's Avon), on the right hand side as you walk from the railway station to the right hand side as you walk from the railway station to the ancient town of Chippenham, a nice, clean, white stone build-
ing attracts the eye. A tall brick chimney suggests a factory ing attracts the eye. A tall brick chimney suggests a factory
of some description, but the general appearance of the building is so clean, and there is so little noise or bustle, that a first one is inclined to think that, whatever work it is dedicated to, business has not yet been commenced. This, however, is not the case, for a busy and successful summer has just been concluded. Entering the large double doors we went upstairs to the office ; and on making our desires known, a gentleman, Mr. Page, kindly undertook to show us round. Like Alice in Wonderland we wished to "begin at the beginning and go right on to the end "; and so we went to the other end of the building, where the farm carts bring inthe milk every morning. At present this yard is open, but inthe milk every morning. At present this yard is open, but preparations are being made for roofing it in, so that the
horses may stand there in comfort while the unloading is horses may stand there in comfort while the unloading is
proceeded with. In the first room, into which the milk is proceeded with. In the first room, into which the milk is
taken from the carts, we noticed a number of tin saucers taken from the carts, we noticed a number of tin saucers
with brass plates on them, all numbered, and about half filled with milk. These, we were informed, were used for testing the cream-producing qualities of the different lots of milk; a small equal quantity from each farmer's consignmen being poured into one of these neat little saucers,and allowed to stand until the cream was thrown up. It struck us that testing cream must be a most agreeable occupation. Here the milk is carefully weighed (measures are not used) and tested. It is then poured out of the farmers' cans into those of the company, and taken into the next room, where the cans containing the milk are placed into large tanks full of hot water. In the first room the milk cans used by the farmers are washed, the company prudently preferring to have this important duty performed in a thorough,systematic manner by its own servants rather than to trust to the tender mercies of the farmers' servants, and risk the loss of milk in hot weather. The way the cans are washed is at once simple and effective. First, they are roughly rinsed in a large tank nearly full of water; then the can is taken to a table, on the top of which a round hole is cut, the exact size of the can's mouth. In this hole are two pipes, pointing upwards, on a over this hole; and a handle being turned, a jet of spring water rushes with great force up one of the pipes into the can, thoroughly cleansing it. After this another handle is turned, when a jet of steam acts in exactly the same manner. Another turn of the first handle, and the cold spring water finishes the washing. Thus a very large number of cans ar thoroughly, washed in a marvelously short time, with very little labor. Leaving this room,we went into the next, where,
as we said, the milk cans are placed in tanks containing hot as we said, the milk cans are placed in tanks containing hot
water. From these the cans are lifted, and the milk poured into large open round copper tanks, and boiled by the action of steam. After remaining here for some time it is pumped up into the condensers in the room overhead. These con densers, of which there are three in this room, are also worked by steam, and in them the milk remains for from three to seven hours, according to the quantity. In these condensers a vacuum is created of about 20 lbs. to the square inch, and thus the vapors are drawn off from the milk, which process, and that on which the future keeping properties of the milk chiefly depend. When the milk has remained in these condensers sufficiently long, it passes into another room, when it is cooled by being put in cans and placed in cold water. The final process is unknown to us, being the one secret of the establishment, but we have a shrewd suspicion that, like many other secrets, there is no great mystery connected with it. Be that as it may, when next we saw the milk it was in exactly the condition we see it in when the
little cans are opened for table use. The filling room is a little cans are opened for table use. The filling room is a
large airy apartment; and as the little cans are filled, they large airy apartment; and as the lule cans are filled, the ready for the market.
Everything is made, and all the work is done, on the premises, upwards of 100 people being employed, of which premises, upwards of 100 people being employed, of which
about forty are boys and girls. One engine of four horse power is sufficient to do all the work, but the boiler requires power is sufficient to do all the work, but the boiler requires
to be much larger in proportion, in consequence of the amount to be much larger in proportion, in consequence of the amount
of steam used for other purposes. Owing to this the boiler of steam used for other purposes. Owing to this the boiler
is large enough to supply working steam for a forty horse power engine. Not the least interesting part of the establish ment is the portion devoted to the making of the tins, in which the milk is put when ready for sale. Here nearly all the work is done by boys and girls; and as each has only one part of the tin to make, the work proceeds rapidly. Thus, one boy cuts the sheets of tin into the proper sizes for the between two little rollers, which curl them up ready for joining. From here they go to another little fellow, who sits and solders the two edges together, and so quickly is this
done that a boy can turn out 2,000 a day. After this, the
ends, which are punched out by machinery, are fitted on,
and milled, or squeezed tightly to the top and bottom of and milled, or squeezed tightly to the top and bottom of the little cylinders which form the tins, when they are soldered and the tin is labeled. The milk is then run in through a small round hole left in the top, and then this hole is cov ered ; the tin is?rolled in paper and packed, which work is en tirely performed by girls. The chief characteristic in thir milk-condensing is cleanliness, and the quantity of wate used for this purpose is enormous. Ventilation is anothes necessity, and thus the employment is pleasant and healthy. With foot and mouth disease increasing, it is satisfactory to be able to get a pure article of food for children, and as the milk from diseased cows cannot possibly be used by the Preserving Company, it is particularly suitable for young or delicate persons. It has also the great advantage of being always at hand, ready at a moment's notice, and in any kind of weather, which is a matter of some importance. Con densed milk has long been largely used on board ship and in yachts, butit is only lately that it has begun to come into general use in families; so that,with increased consumption, it is probable that other establishments will have to be formed by the energetic Anglo-Swiss Condensing Company, and if so we
it.
[The above from Land and Water, describes the valuable process invented by the late Gail Borden of Texas, and by him first put in operation in this country about fifteen years ago. Since that time it has spread to all parts of the world, and his condensed milk has become a staple article of commerce and manufacture. The adoption of Mr. Borden's invention in England is only one of many examples of American improvements there worked.-Eds. Sci. Am.]

## Uncertainty of wealth.

"Theabsence of thelaw of primogeniture causes a frequen change of ownership in the private residences which contrib te so much to the adornment of our cities. While the head of the family lives, the home may be retained-though very often a reverse of fortune compels him to seek humbler quarters-but when he dies the heirs are obliged to get rid of the too expensive luxury. How many of the houses built in St. Louis twenty years ago are now owned by the men who erected them, or their descendants? How many of later date, now occupied by their builders, will be in possession of their present tenants, or their descendants, twenty years hence? Other influences beside the lack of primogeniture contribute to this, in some respects, unfortunate result There are more ups and downs in life in the new world than n the old. Fortunes are made much more quickly, and dis appear much more rapidly. Wealth is seldom transmitted eyond the second generation, and in many instances does not last through the first. The boy born with a silver spoon in his mouth frequently has to taste pewter before his pil rimage is over, and he may have the pleasure of being plashed with mud from the carriagewheels of the man who was once his father's porter. This is a free country, very free indeed, and among the consequences of that freedom is he exceeding uncertainty of financial matters. Yet in no country is less provision made for the evil day so far as ou children are concerned. The wealthy parent brings up hi ons and daughters as though there were not the remotest pos ibility that they couldever be poor. If a rich father should insist upon his boy learning a trade he would be set down a mild-mannered lunatic. If a rich mother should instil into her daughter rigid ideas of economy and industry, she would e looked upon as either very mean or very foolish-proba bly both. Yet every day we are taught the necessity of this reliminary discipline; every day we see men and wome falling from affluence to poverty, who, if properly trained might not have fallen at all, or, if they did fall, could have risen again. It is a shame and disgrace that, in a land wher abor is supposed to be honorable, and where the law recog izes no distinction of caste, so small a proportion of the ons of the wealthier classes learn trades. No young man as a right to consider himself thoroughly independent un less he has some avocation by which, health permitting, $h$ an always make a living. And the best and surest avoca ions are those for which there is always a demand.
ers, doctors, preachers, professors, clerks-all these and their kindred are frequently a drug in the market; but how seldom is it that a good carpenter, blacksmith, machinist wagon maker, shoemaker, tinsmith, book binder, or printer has to travel far in search of remunerative employment ewer genteel drones in the national hive."
There is probably no subject on which more has been written than the above. Almost everybody has seen evidences of the fact about them; and how many who will read his article (from the St. Louis Republican) can realize its truthfulness!

## Gas for Heating Purposes.

We confidently look forward to the time-and we hope it is not far distant-when, in all large cities, at least, a heat ing gas will take the place of solid fuel for culinary and general heating purposes. What the consumption for that use
would be, were the price sufficiently low, can scarcely be would be, were the price sufficiently low, can scarcely be
calculated; but if the consumption of illuminating gas on the island of Manhattan alone may be roughly estimated at fifteen million feet per day, the consumption of heating gas would, probably, amount to one hundred million feet; and since it must be made on an enormous scale, at a very low cost, and sold with a narrow margin for profit, there is reason to hope that the efforts to solve the question of an economial heating gas will solve also the problem of cheapillumin ating gas; for though the essential properties, and even the
composition, of these two will differ greatly, yet any process that will enable us to make a heating gas, at, say, 20 cents per thousand feet, can, probably, be adapted to the manufacture of a cheap illuminating gas. In the interests of metallurgy, of manufacturing, and of general needs of civilization, we welcome every step toward the attainment of this great desideratum; and it seems, indeed, that no more inviting field for the application of science, skill, and economy exists than that of gas-making. This art has stood almost stationary for nearly half a century, while every other branch of productive industry has made enormous progress; and if the signs of the times are not deceptive, the day is approaching when the demands of consumers will force gas-making out of the rut of conservatism into the path of progress that is characteristic of our time and people.-Engineering and Mining Journal.

How to Reach the North Pole.
C. S. says: "I propose to reach the north pole by the construction of an overground tubular railroad, under the auspices of several governments, which should pay sufficient money to construct suitable shops for the making of a wooden tube, 5 or 6 feet in diameter, to be made in light sections for transportation. After some suitable landing place has been chosen, the road could be commenced at the ock. The sections of the tube could be placed on a ca which would run inside of the tube and be propelled by hand, and furnished with a light, strong, convenient dummy engine and boiler, to be used when required. Theoretically this idea has many points of great benefit to the explorers. A car can be made and furnished with nearly all the comforts of a home; and the tube, getting covered with snow in the winter, would be quite warm. With properly constructed winter, would be quite warm. With properly constructed
stoves, plenty of provisions, and fuel, a scientific party could pass a winter in the tubes quite comfortably. I have no doub but that there are plenty of civil engineers who would jump a the chance of constructing a road of this nature if solid overnment support was guaranteed. If this idea proved easible, and the barrier of 120 miles thatis supposed to exist could be overcome, and the unexplored supposed open sea ound, this road could be made the means of carrying mate rial for the construction of suitable fishing vessels. If the pen sea does exist, there is no doubt but whales are to be ound there in immense numbers, so as to make the road rofitable, and furnish oil for the people when the products of the oil region commence to give out. Shelter in nearly all mergencies would be found in a road of this description. Who can tell of the benefits that might come to the nation the mysteries of the vast unknown region could be rought to light? The outlay on a road of this characte would be a mere bagatelle to the results that would accrue from it."

## A New Fumigator

A new and excellent fumigator has recently been devised by Mr. Thomas Shaw, of Danville, Pa. (P. O. Box G12). We are indebted to the inventor for one of the machines, which we have practically tested to our satisfaction. It consists n a hopper in which the tobacco, sulphur, or other fumiga ng material is placed, resting on a perforated bottom. pipe from the hopper enters a miniature fan blower, above the casing of which the hopper is placed. There is a hand wheel which is belted to the fan shaft, so that the latter is very rapidly revolved, causing a down draft through the material ignited in the hopper, and a strong current of smoke to be delivered through the outlet tube of the blower. The device is made large enough for use in large greenhouses o f a size convenient to be carried in the hand. It will also b found admirably adapted for smoking plant lice from win dow gardens, and forburning coffee or other disinfectants in ospitals and ships.
To Prevent Glue from Cracking.-Glue frequentily cracks because of the dryness of the air in rooms warmed by stoves. An Austrian contemporary recommends the addi ion of a little chloride of calcium to glue to prevent this dis greeable property of cracking. Chloride of calcium is such deliquescent salt that it attracts enough moisture to pre vent the glue from cracking. Glue thus prepared will ad here to glass, metal, etc., and can be used for putting on abels without danger of their dropping off.

Engineers and shipbuilders on the northern rivers in England feel the effects of the general depression. At some of the engineering shops and shipyards there is scarcely sufficient work to employ foremen and apprentices. Nothing better is expected till the spring of 1876, when it is hoped that the trade will vie with the promising season of the year.

A German astronomer has discovered two new small planets, not visible with the naked eye, in the constellation Aries. This makes the number of the lesser planets one hundred and fifty-three

AT Bonn, Germany, headaches, dyspepsia, etc., affecting ved patients, have been traced to evening studies purfrom which arsenic was set free by the heat of the flame.

Eugene Schneider, the French statesman and mechanial engineer, died recently, at Paris, at the age of 70 years. He was called to the Paris Cabinet in 1821.

Recently there was a lifting match at Eureka, Nevada, between two men, for a prize of $\$ 200$, the winner ifting a 15 lbs. dumbbell at arm's length the greatest number of times. The loser lifted it 1,130 , the winner 1,144 ,

## PLATE SHEARING MACHINERY

A plate-shearing machine, with revolving cutters, of which we give an engraving herewith, was recently exhibi ted at Manchester, England. It is provided with an adjustable grooved table and sliding bar, with a stud on the lat ter, for shearing plates to different radii. A special feature in the machine is that the top cutter shaft is mounted in eccentric bushes, so that by turning these bushes it can be brought nearer the bottom shaft, so as to take up the wea of the cutters. The eccentric bushes are graduated on the edges, so that the two may be turned equally, and the two shafts be thus maintained parallel The machine will maintained parallel. The machine will shear plates up to three sixteenths of
an inch thick, and it is altogether of a neat and good design.

Natural Gas Fuel.
A few weeks ago a line of pipe was laid from wells in Butler county, Pa. to the mills of Graff, Bennett \& Co on the West Pennsylvania Railroad, in Sharpsburg and Atna, a distance of eighteen miles. It was not known be fore the connections were made whe ther there would be a sufficient pressure of gas to make the scheme a practicable one. At a fixed time, however, the connections were made at the well; and the air having been exhausted from the eighteen miles of pipe, the gas rushed through, and in twenty minute was pouring in great quantities out of the pipe at the furnaces [The velocity maintained is doubtless a mistake. Eds. Scr. Am.] When the gas wa lighted the flames flared up 40 feet high, with a volume sufficient to supply double the quantity of heat required. It is expected that in these two furna ces a saving in fuel of from $\$ 40,000$ to $\$ 50,000$ a year will be made. In Ro gers \& Burchfield's rolling mill, the gas has been used for more than a year
and the saving in fuel is $э s t i m a t e d ~ a t ~ \$ 60,000 ~ p e r ~ a n n u m, ~$ although only 125 men are employed there. The gas has been flowing with apparently undiminished force for ten or twelve years, and there is no known limit to the supply. Some enthusiasts in Pittsburgh prophecy that within a few years the majority of the furnaces and mills in that great manufacturing city, as well as the parlor grates and kitchen cooking stoves and ranges, will be heated by this new fuel.

## DONKEY PUMP.

Subjoined we give a perspective view of a form of donkey

ump which is now being made by Messrs. Hayward, Tyler
of the Royal Agricultural Society at Taunton, England. As will be seen from the view given, the pump is adapted fo being bolted up against a wall or boiler, and it is of a neat and compact form, while the pump valves are very readily accessible. The arrangement is so clearly shown by our en graving that no further description will be necessary.

## Hygiene for Smokers.

The following are Dr. Berthand's precepts and advice to

God's First Temples.
Bayard Taylor, in his interesting work entitled " Home and Abroad," in a graphic account of the mammoth trees of California, thus describes the felling of one of the largest specimens of the Sierra Nevada: "After a steady labor of six weeks the thing was done, but the tree stood unmoved, so straight and symmetrical was its growth, so immense was its weight, and so broad its base, that it seemed unconscious of its own annihilation, tossing its outer branches derisively against the mountain winds that strove to overthrow it.


## PLATE SHEARING MACHINE WITH REVOLVING CUTTERS.

 neighboring pine of ciant size was then selected, and felled in such a way as to fall with full fore are a way as to fall with full force againstit. The top shook a little, but the shaft stood as before; finally the spoilers succeeded in driving their wedge into the cut. Gra-dually, and with great labor, one side dually, and with great labor, one side of the tree was lifted; the line of equilibrium was driven nearer and nearer to the edge of the base; the mighty mass poised for a moment, and then, with a great rushing sigh in all its boughs, thundered down. The forest was ground to dust beneath it, and for a mile around the earth shook with the concussion." The work was performed by two sets of hands with the aid of long pump augers. The tree was a mass of solid wood ninety feet in circumference, containing some two hundred and fifty thousand feet of timber; and according to the annual rings, its age was three thousand one hundred years. The stump is now used for a ball room, and the trunk fo a bowling alley. Dr. Bigelow said of this specimen: "It requires thirty-one of my paces, of three feet each, to mea sure its circumference at the stump and the mere felling of it cost, at Cali fronian prices for wages, the sum of five hundred and fifty dollars. An idea of th sublime proportions of these wonderful fathers of the forests can be formed af ter seeing a man on can be formed a gars a day and if it is possible limit yourself to two dre and

It is unwholesome to smoke on an empty stomach or imme diately before or after a meal. Whatever be the mode of smoking, direct contact of the tobacco with the mucus buccalis mucous lining of the cheeks) and the teeth must be avoided. Cigars should be smoked in an amber, ivory, or enameled porcelain mouthpiece. To smoke, by relighting them, por tions of cigars that have been extinguished, together with the system of blackened and juicy pipes,constitute the sures way of being affected by nicotene. Every smoker would do well, if he could, to rinse his mouth after smoking. A for tiori is the same precaution applicable to chewers. For the same reason it would be well to subject pipes and bowls, in which tobacco has been burnt to frequent washings eithe with or or with with alcohol or vinerar It is difficult to choose betw the different ways of in I ir ing. I give preference to the cigarette, by reason of its sligh quantitative importance and the paper which interferes with the contact of its contents with the buccal mucous membrane But to realize all the desiderata, it would be necessary to have the papelito made of flax thread and to abstain from the practice which has become the ne plus ultra method of its kind, retaining the aspiration at the back of the mouth, so as to pour it out of the nostrils afterward. The premature habit of smoking is certainly hurtful to childhood and during the adolescent period of organic evolution. The economy cannot but suffer, at this period, from the narcotic influence, be it never so slight, and from the salivation which is inseparable from this act. All persons cannot smoke with impunity. There are pathological counter-indications or idiosyncrasies to this habit that it would be imprudent and culpable to in fringe. Diseases of the lungs, of the heart, chronic affections of the mouth, nose, eyes, throat, and stomach, are the result of the principal incompatibilities. The airing of apartments where smoking has taken place should be well attended to. To sleep in rooms where tobacco smoke exists,slowly constitutes a grave infraction on the elementary laws of hygiene."-Tri bune Médicale.

Chloride of Silver Battery of 3,240 Element Messrs. Warren de la Rue and H. W. Müller have constructed a battery composed on the one part of 1,080 elements, each consisting of a tube of glass 6 inches in length, and of 2,160 elements formed of glass tubes of 5 inches in length only. All the tubes are 0.75 inch in diameter, and are closed with stoppers of vulcanized india-rubber, perforated with a hole near the edge to permit the introduction of a rod of amalgamated zinc, 0.2 inch in diameter and 4 inches in length for the first 1,080 elements, and 3 inches for the in length for the first 1,080 elements, and 3 inches for the of silver is placed 220 grains in of silver is placed, 220 grains in weight, compressed strongly with wooden rods, a flattened silver wire having been first introduced to the bottom of the tube. The silver wires are covered in their upper part, above the chloride of silver and up to the point where they emerge from the vulcanized stoppers, with leaf gutta percha, to isolate them and preserve them from the action of the sulphur in the stoppers. The electromotor force of this battery is to that of a Daniell's battery as 1.03 to 1

A Splendid Holiday Gift.-"Wrinkles and Recipes." See advertisement on another page.
distance of seventy-five feet through a hollow trunk, and emerging from a knot hole in the side."

## IMPROVED SCREW CUTTING DIE AND HOLDER

We illustrate in the annexed engraving a new adaptation of an improved screw cutting die, made so as to be conveniently held in a bit stock instead of in the ordinary plate. The con struction will readily be understood from Fig. 1, and also from the representation of the die taken apart in Fig. 2. The screws shown at A, in Fig. 1, serve to close the part f the die together from the sides, and the taper screws, B Fig. 2, spread the die when driven in, thus regulating the size of the cut. By operating either screws, A or B, the por ions of the die may be adjusted and held with great nicety while wear, at the same time, is compensated for in a very imple and effective manner.
The die does its work in a single cut, thus forming the

screw thread at once, neatly and sharply, and without rais ing the thread above the normal surface of the material operated upon. The die also allows of nuts and bolts for different purposes being made to fit together tightly or loosely, as desired.
For further particulars, address the manufacturers, the Wiley and Russell Manufacturing Company, Greenfield Mass.

THE KRUPP TWELVE HUNDRED POUNDER GUN In a recent issue we published an engraving showing the most important types of the armored vessels which have been built during late years. These floating fore contesting the theories of one party, of the two which are contsing he question whether the victories in future naval conflic will be gained by the thickest armor or the heaviest guns The result of this competition is constant transition in the prevalent system of warfare; and hence upon what strength, whether of shield or of gun, combatants will rely in conflicts yet to come, neither opinion nor prophecy can be predicated. The naval engineers construct vessels with solid iron walls, some 24 inches thick; but hardly are the ships launched before a gun is produced by the artillerists, capable of penetrating the armor at long range; then follows a new vessel, succeeded by a yet more powerful gun; and so the duel continues, each side gaining the advantage in turn until one can see no definite end unless he venture into the realms of theory, and vainly endeavor to imagine the impossible conditions of that time-honored mechanical puzzle, "the irresistible force meeting the immovable body."

The majority of the experiments, and very costly ones they are, are carried on in England. New ironclads are almost entirely of English construction, the exceptions being a few built by Russia. In the making of heavy guns, however, England is not alone, as Germany, through the great steel works of Krupp, enters the field as a rival-the German policy apparently being first to allow England to vanquish the armor of her own engineers, by the heavy guns of her own artillerists, and then to produce German cannon superior to the English gun. A very recent instance of this has occurred in the construction of the 81-tun gun by England, the tests of which are hardly concluded before Krupp announces the undertaking of a $124-$ tun cannon, capable of throwing bolts which will pierce 23.8 inch armor at seven and a half miles range. The distinctive features of the English guns we have already described. In the pre in sent article we give an excellent engraving of one of the
large Krupp guns (which we take from the pares of Knight's " New Mechanical Dictionary"*), from which the general characteristics of the German breech-loading system will be understood

The gun itself is made of crucible cast steel, of a quality especially adapted for the purpose, and is constructed on the built-up system. It consists of an inner tube weighing 20 tuns, upon which are shrunk cast steel rings, forming at the breech a three-fold, and at the muzzle a two-fold, layer of metal. Both tube and rings are formed from massive ingots without welding. The caliber of the gun is 14 inches, weight 50 tuns, total length $17 \frac{1}{2}$ feet; weight of solid shot 1,212 lbs. ; weight of shell 1,080 lbs.; charge of powder from 110 to 130 lbs . The breech-loading is on Krupp's from 110 to 130 lbs. The breech-loading is on Krupp's patent plan. The shot or shell is raised by a tackle and is rolled into the side of the breech through an aperture closed
by a slide. The gun is mounted on a steel carriage weighby a slide. The gun is mounted on a steel carriage weigh-
ing some 15 tuns, supported on a center pintle chassis weighing 25 tuns.

Postal and Telegrap
The twenty-first annual report of the British Post Office has just been issued, giving the postal and telegraphic statistics for 1874. It appears that the estimated number of letters sent through the post during the year was $967,000,000$, besides about $79,000,000$ post cards, and $259,000,000$ newspapers and book packets. On an average there were 30 letters to each head of the population in the United Kingdom,
but the national average was 33 per head for England, 25 for Scotland, and 14 for Ireland, showing some interesting facts in regard to the comparative educational, social, and commeramounted to about $4 \frac{1}{2}$ millions, giving an average of about one on each 220.

THE TRINITY SHOALS LIGHTHOUSE.
An interesting application of iron to the construction of

a 1 uilding requiring exceptional strength and stability is represented in the annexed engraving of one of the two similar lighthouses erected at Trinity Shoalsand at Timbalier, in the Gulf of Mexico. The structure is supported upon
nine screw piles-a central one surrounded by eight others,
at distances of somewhat less than fifteen feet four inches | each being twenty feet distant from the central one and secured together at the ground by adjustable wrought iron links, and above by diagonal braces and by radial struts to the central pile. The summit of each pile is incased in a cast iron socket for receiving the column and the radial and diagonal braces. The jointed columns which support the diagonal bre imilar provis for their diagoport the lantern the arrangement for which will be understood from the il lustration, which we take from Knight's " New Mechanical Dictionary." The different series of columns are joined together by sleeves. The first series above the foundation is 20 feet long, the second 15 feet, the next two 18 feet. The fourth, fifth, and sixth are respectively 15 feet 6 inches, 14 feet, and 12 feet 6 inches. The"columns of the first series are of wrought iron, forged tapering; those above are of hollow cast iron, each series successively decreasing in diameter. The lantern is supported on a cylinder of boiler iron, resting on a platform at the top of the columns.

## Anthracite Coke.

The high calorific power of anthracite, consisting as it does of nearly pure carbon, and the low percentage of sulphur and ash contained in most varieties, naturally render it of great value as a fuel in the cupola and the blast furnace; while from its abundance in many districts, and the cheapness with which it may generally be worked, it should at once be the best and the cheapest fuel that could be used. The practical drawbacks to its use, which diminish its value and to a great extent restrict its employment, are the difficulty of great extent restrict its employment, are which a good dea
utilizing the slack or small anthracite, of utilizing the slack or small anthracite, of which a good deal
is made in mining and handling, and in breaking the large pieces, and the tendency of many anthracites to sp!it up into small particles if suddenly heated. In the blast furnace this decrepitation is especially injurious, as the fine dust is apt to form, together with the cinder, pasty masses that can neither be melted nor burnt away, and may choke the furnace up or seriously derange its working.
These difficulties in the way of using anthracite generally in its natural or raw state, have led to many attempts to make it into a serviceable coke, by coking it in admix ture with a greater or less proportion of binding coal, pitch, or other bituminous substances. None of these attempts, until very recently, appear however to have been commercially successfully; none, at least of those made in South Wales, have been carried out largely or continuously as, though coherent coke was made, it was friable and of inferior quality.
Some samples exhibited would appear, however, to show that the production, on a working scale, of a hard and sound anthracite coke is not at all impossible.
They are fair specimens of the coke now being made by the process of Messrs. Penrose and Richards, of Swansea. to whom the writer is indebted for them, as well as for the in formation as to the mode of manufacture, and the character of the coke obtained, on which the present note is based.
The materials used are any quality of anthracite or semi anthracite, if free from shale or stones, good bituminous or binding coal, and pitch, in the following proportions

Anthracite, 60 ; bituminous coal, 35 ; pitch, 5.
Specimens have been shown of coke made of Messrs. Brock and Sons' anthracite, from Cwmllynfell Colliery, near Cwm Amman; of a mixture of this with Yniscedwyn anthracite and of culm or semi-anthracite from Birch Rock Colliery, near Pontardylais. The bituminous coal used in making all the samplss exhibited was that from Tyrissa Colliery, nea Swansea.


KRUPP'S MONSTER FIELD GUN

## The British Channel Tunnel

The proposition to unite England and France by means o a railway tunnel beneath the waters of the English Channel, which has, during the past few years, figured largely among the items and comments of the engineering press and in the discussions of various learned bodies abroad, has at length assumed such definite shape that the actual undertaking of the enterprise in the near future is rendered highly probable.

To cut a tunnel of the enormous length of twenty miles, beneath the waters of the ocean, is an undertaking which, to most minds, will appear to be attended with so much hazard and uncertainty-to say nothing of expense-as to be practically impossible of completion; nevertheless, after a mos thorough investigation of the subject, and full consideration of the difficulties, dangers, and uncertainties surrounding it, the most eminent engineers of England and France have pro nounced their conviction that the project is feasible, and that
the building of the Channel Tunnel is simply a matter of expense. We present herewith the main facts connected with the history of the prospected entireprise.
The Channel Tunnel Company was established in 1872, and comprises two societies-one French and the other English. t was first intended to form an international company; but owing to certain differences between the French and English laws, the promoters of the undertaking were forced to resort to the abovenamed combination. Under this arrangement each society, before expending money upon preliminary investigations, made application to its own government for the legislative concessions needed before the work could be un dertaken, which concessions, it is announced, were obtained withoutdifficulty. The first society will therefore open the door of France beneath the sea in conformity with French legislation, and the second society will do the same on the English coast according to English legislation. The assent of the two governments having been obtained, the prelimi nary work was begun. The first inquiry was a geologica one, by carefully measuring to ascertain on each side of the channel the outcrops of the beds that lay underneath, accur ately as could be done by that process. The gray chalk-a mass of strata about 500 feet thick and impervious to water -which forms the principal mass of the cliff at both Dover and Calais,strikes across the channel so with little divergence from horizontality that a tunnel could be pierced within the vertical bounds of its thickness, presuming it to be continu ous all the way across. From the geological map constructed on the data thus obtained, it appeared that a line between S . Margaret's Bay (a depression in the chalk cliffs about fou miles east of Dover) and a point on the French side, abou midway between Calais and Sangatte, would be suitable to carry the tunnel through the lower chalk.
To verify this presumption, an examination across the chan nel was made by dropping froma steamer a weighted instru ment in 500 places, the apparatus running with great velocity to the bottom, and bringing up chalk wherever it was ex pected. The device employed in this work consisted of an iron tube,over which a hollow shot,fitting loosely, was raised and let fall upon a flange attached to the tube, the end of which is in this way driven into the substance of the se bottom, the core thus obtai the rock perforated. The results obtained afforded a com plete confirmation of the correctness of inferences drawn
from the maps previously made, and were sufficiently satis from the maps previously made, and were sufficiently satis
factory to establish the feasibility of the project on purely factory to establish
geological grounds.

The line of the main tunnel as proposed, which is to be large enough for a double line of railway, is drawn straigh between the proposed termini on both sides. In longitudi nal section it presents a slight fall of 1 in 2,640 from the center towards either extremity, and the vertical depth of the highest point of the floor is 436 feet from Trinity high water mark and 200 feet below the sea bottom. From the land levels of the existing railways, the two approaches make long descents of over four miles, each with gradients of 1 in 89 into the tunnel ends, over two miles being under the sea, the total of the whole amount of tunneling amounting to over thirty miles. The maximum depth of water on the line of the proposed tunnel nowhere exceeds 180 fee below high water mark, the water being deepest in the cen ter, and gradually diminishing in depths towards the sides Below the railway approaches, and continuous with the floor of the submarine tunnel, there will be at each end a drift way leading to vertical shafts ashore for ventilation and drainage. These terminal shafts and driftings comprise the preliminary work which it is intended to make as a test of the general practicability of the undertaking, and of which they will, when completed, form essential portions. On the French side the work of sinking the shaft has just been commenced, while that on the English side is nearly or quite completed. It is proposed to execute the work with the aid of the tunneling machinery recently invented by Mr. Dickinson Brunton. This machine works after the fashion of an auger, and ton. This machine works after the fashion of an auger, and
the débris excavated falls upon an endless band which carries it to the wagons in the rear. By this means a driftway, seven feet in diameter, can be advanced at the rate of abou a yard and a quarter per hour, at which rate it would only require two years to pierce the channel through, a machine being worked from both sides. For this preliminary work, the engineer's estimates of time and cost are four years and $\$ 8,000,000$ respectively, but experienced contractors declare that only half the time and money would be required. It four years' time and $\$ 20,000,000$ will complete the entir work.

It has been ascertained by actual experiment that, provid
ed the chalk be solid, the water will not permeate it, i
proof of which, the Brighton tunnel ( 54 miles in length, in close proximity to the seashore, and from 12 to 20 feet below the sea level, and excavated in the comparatively incompact upper chalk) is offered in illustration. In this case compar tively little water was met with. Taking everything into consideration, therefore, it is reasonable to infer that the only natural obstacle that could hinder the completion of the work would be the existence of open, unfilled fissures in the bed rock, reaching from the sea bottom to the depth of 200 eet through the rock. The probability of the existence of such fissures and the chances of striking them on the line of the proposed tunnel are extremely small.
The preliminary work abovenamed is being steadily ad vanced; and should the results obtained continue to verify he anticipations formed by the engineers in charge, the ac ual undertaking of the tunnel proper will not be long de layed. The funds for the preliminary work are guaranteed by several prominent corporations and the Rothschilds, and there is every reason to believe that the two governments in terested will come to the aid of the projectors of the work, at the proper time, by the grant of a liberal subsidy. - Dr . W H. Wahl.

## The Mass Copper of Lake Superior Mines, and the

 Method of Mining itThe occurrence of enormous masses of pure copper has given the mining districts of Lake Superior worldwide re putation. The first masses brought from there excited great attention, and directed the notice of the mining world to the few particular mines from which they were taken. It may not now be generally known that nearly all the veins which are worked, and which cut across the trap ridge, conain mass copper, and that large masses are continually being rised from them.
The largest continuous mass which has been taken out was probably that from the Minnesota in 1857, which is various y stated as weighing 420 tuns and 470 tuns. Its length wa about 45 feet, its breadth or hight 22 feet, and its greates hickness 8 feet. All such masses are very irregular and ragged in their form and thickness, thinning out gradually rom a foot to a few inches, and struggling through the vein ntil they connect with other large masses. This was the haracter of a mass found in the Phœnix mine, one of th oldest on the Lake, which mass altogether weighed some 600 tuns. But this was really a series of masses more or les connected by strings of metal, yet no one large part of it weighed, singly, over 200 tuns. A similar series of masses, weighing about 600 tuns, was extracted from the Minnesota ome of the Phœnix masses were four or five feet thick of solid copper. The Cliff mine has yielded masses weighing rom 100 to 150 tuns in one piece. One of 40 tuns was take out this year, besides numerous blocks weighing from 1 to 8 tuns. This mine and the Central are now y:elding mass opper in abundance.
It is of course impossible to pick, or to drill, or to break ou such huge masses of solid metal, when they are found by drifting upon the course of the vein. The method is as fol ows: The miner picks out, or excavates, a narrow passage or chamber upon one side of the mass, laying it bare as fa as possible over its whole surface. It is usually firmly held by its close union with the vein stuff, or by its irregular pro jections, above, below, and at the end. If it then cannot be dislodged by levers, the excavation of a chamber is com menced behind the mass, and this excavation is made larg nough to receive from five to twenty or more kegs of pow der. In one instance, in the Cliff mine, a charge of 21 kegs o powder threw down 200 tuns of copper. Bags of sand ar used for tamping, and the drift is closed up by a barricad f refuse and loose dirt. After such a blast the drift is, of course, charged with foul air, and it cannot safely be entered or hours afterwards. If entered too soon, men lose al trength in their limbs, and fall down.
The huge masses of copper dislodged in this way are too large to be handled and got to the surface. They have to be cut up. The copper cutters are called in, and the mass is marked off in squares or blocks of suitable size. Copper cut ing is a distinct art, and requires considerable skill and ex. perience. Ordinary miners, however skillful they may be annot cut up copper without long training
The tools are simply narrow chisels and striking hammers The chisels are shaped like the parting tools of turners. The re made of flat bars of half inch steel, about 2 inches wid and 18 inches long. They are chamfered each way like cold chisel, to form the cutting edge. This edge is made little longer than ihe thickness of the bar. The cutte holds the chisel and two men strike it. A thin slice or chip of copper is in this way cut out in a narrow channel across the mass of copper The operation is repeated until the nar row cut, but little over half an inch wide, has been carried through the mass. The chips cut out in this way are long narrow sirips of copper only about half as long as the groov rom which they are taken, the metal being condensed and hickened by the force of the blow
This work is necessarily slow and tedious, and it costs $\$ 12$ per square foot by contract. At this price, the cutters mak $\$ 2$ per day.
It is inconvenient to handle masses weighing over 6 tuns Such masses, when hoisted, are landed upon very strong plat form trucks, and are then dumped in the rock house upon a large pile of dry pine logs. When a considerable number of masses has accumulated, the logs are fired and the whole pile is heated to redness, for the purpose of loosening the ery considerable quantities of vein stone which are enclosed in the ragged cavities. This vein stone consists chiefly of
greater portion can ioe knocked ont by pounding upon the copper

The masses are then marked, numbered, and recorded, and are shipped to the smelting works, where they are melted down in reverberatories.

## Knight's Mrechanical Dictionary

This excellent publication, from which we often give ex tracts and select engravings, has lately been purchased by the firms of Messrs. Hurd \& Houghton, New York city, and Messrs. II. O. Houghton \& Co., Riverside Press, Cambridge, Mass., from Messrs. J B. Ford \& Co., the former publishers. The well known reputation of the new publishers is abundant assurance that the work will lose nothing, in point of superiority, in the manner in which the few parts yet to be issued will be brought before the public. We learn from Mr. Knight that the Dictionary will be rapidly pushed for ward to completion, and will probably be finished within four months. Some twenty seven numbers have already been published.

## NEW BOOKS AND PUBLICATIONS

Camp life in Florida, a Handbook for Sportsman and Settlers, Compiled by Charres Hallock. New York city : Published by
the "Forest \& Stream" Publishing Company. American News Company, Agents.
We have heard so much of the Adirondacks, during late years, as the
"sportsman's paradise" par excellence, that it is altogether refreshing "sportsman's paradise", par excellence, that it is altogether refreshing
to take up a book which suggests the advantages of one of the most beautiful and, save a small part of Florida visited by invalids, least fre-
quented portions of the country. The compiler has embodied, in a handy volume, some excellent papers published in Foresta tand Stream, which were
the result of the labors of an exploring expedition sent out by the enterprising publishers of that journal during the last two winters. We can commend it as something very much better than the hybrid productions, half fact, half fiction, in which modern writers, d
past sporting adventure, are very prone to indulge.
Ornamental Designs for Fret-Work, Fancy Carving, and Home Decorations. Part 1, price 75 cents; Parts 2 and $3, \$ 1$
each. Edited and Published by Henry T. Williams, 46 Beekman street, New York city.
Since the introduction of the ingenious machine saws for amateurs, with
some of which the readers of the ScIENTIFIC some of which the readers of the SCIENTIFIC AmRRICAN are already familia
through the illustrations and descriptions published from time through the illustrations and descriptions published from time to time
there has been a growing taste for this most fascinating and artistic branch of woodworking. So many beautiful home adornments can be cut out of
various colored woods that an endless fund of amusement is found in the various colored woods that an endless fund of amusement is found in the
manufacture, and in many instances considerable profit beside. The work (published in numbers), the title to which we give above, is one which will he an invaluable aid in the designing of objects to be carved, embracing
artistic designs for picture frames, wall pockets, brackets, book racks, artistic designs for picture frames, wall pockets, brackets, book racks,
book stands, baskets, easels, platters; in fact, a great variety of other fancy articles can be produced by fine saws. The numbers are mailed on receipt of price.
Gasfitter's and Plumber's Gume. By Joseph D. Galloway
Gas Engineer. Published by the Author. Price, in paper, 7 , Gas Engineer. Published by the Author. Pri
cents. Philadelphia, Pa.: 1332 Chestnut street.,
cents. Philadelphia, Pa.: 1332 Chestaut street.,
handy volume of practical suggestions for the trades to which it is addressed. There are a large number of useful recipes, and a few illustra-
ted descriptions of patented devices invented by the author, together with ted descriptions of patented devices invented by the author, together with
tables relating to weight of pipes and wire. and other data referred to constantly by workmen. The directions are clear and concise, and compre-
hensible by any one of average intelligence. The book contains about 100 pages; and its accuracy is vouched for by the long practical experience o its author.
IMPROVED

Record Diary and Marginal Indexed Book of Daily Record. Revised and Arranged by M. N. Lovell. Mailed,
post paid, for $\$ 2.00$. Erie, Pa.: Erie Publishing Company. This diary is so arranged that, by means of marginal indexes, the use
can at once turn to the page on which the events of any day are recorded can at once turn to the page on which the events of any day are recorded;
and also, through an alphabetical index. he can easily find notes of various
days on which similarevents have happened. It is available for flve yeas days on which similar events have happened. It is available for five years.
For inventors desiring to keep proper chronological records of their Ideas, For inventors desiring to keep proper chronological records of their ideas,
it will prove a useful aid. It is especially well suited to be in one's pocket
during visits to the Centennial as it affords excellent facilities for jotting lown notes, and grouping and easily finding them at will.
Report of General Charles K. Graham, Engineer-in-Chief of
the Department of Docks, for the Year ending April $30,18 \% 5$. the Department of Docks, for the Year ending April 30, 18\%
New York city : M. B. Brown, 201 William street.

## 

## NEW AGRICULTURAL INVENTIONS.

improved combined culitivator and hakrow. George Croll, Tontogany, O.-This relates mainly to a new me-
hanical construction, which is such that the beams which receive hanical construction, which is such that the beams which receive
the shovel plows may be adjusted to run level, whatever the posithe shovel plows may be adjusted to run level, whatever the posi-
tion of the draft bars, and so that, when the said bars are parallel, may be adjusted to correspond with the draft bars.
improved anti-suckivg bit for calves, mic. John H. Bailey, Toledo, Iowa.-This is a novel device to prevent
the sucking of calves or colts. It consists in a tubular bit, the sucking of calves or colts. It consists in a tubular bit, having
open ends in communication with the external air, and an opening open endsin communication with the external air, and an opening suck, air only will be drawn in through the bit.
improved machine: for binding grain. Argyle W. Tucker, Waxahachie, Tex., assignor to himself and L
J. Stroop, same place.-This machine combines several novel and ingenious devices, which together operate as follows: A band procurer moves forward into a band trough and takes upenough straw for a band. On the latter the gavel is caused to fall and then is
compressed between fingers. The free end of the band is next carried over and caught by a forked needle, by which it is twisted ried over and caught by a forked needie, by which it is twisted
around the stationary end. As the needle makes its last half revolution, it draws the stationary end out of the jaws of the band procurer and tucks the free end of the band under the body of the
same. The mechanism then leaves the sheaf free, and a fork, movsame. The mechanism then leaves the sheaf free, and
ing upward and outward, throws it from the machine.

IMPROVED CORN-SHELLER FEEDER
William B. Quarton, Fremont, Iowa.-This invention relates to
certain improvements in feeders for corn shellers in which the certain improvements in feeders for corn shellers in which the ears of corn are carried up by means of endless belts and delivered
to the holes or feeding throats of the machine. The improvement consists in using a single broad apron, or wide endless belt, which moves beneath the channels in the feeder, and is provided with buckets, which receive and carry up the ears. It also consists in
dividers of considerable bight, which are applicable to machines
having four or more throats, and divide the channels into sets of

Two, thus causing the ears, which are dumped promisenously, to
assume a longitudinal position in the channels, and therehy in creasing the ferding capacity of the device.

## NEW MECHANICAL AND ENGINEERING INVENTIONS.

improved autographic telegraphic instrument.
John C. Ludwig, San Francisco, Cal.-This invention relates to a new telegraphic instrument belonging to the autographic or $f a c$ imile class, and designed to produce a record in the same hand
writing as the original written message. The invention consists in writing as the original written message. The invention consists in
an oscillating traverser, vibrating in unison with a similar traverser t another station, which first traverser makes the circuit through the conducting lines of writing upon a slip of paper, and the second traverser effects the record by puncturing the paper through the nstrumentality of a spark from an induction coil, so that the mes sage is recorded in facsimile by a series of little holes or punctures. nother important feature of the invention is the meth it consist treating it with a mixture of ferrocyanide of potassium and coal oil, which renders the paper non-conducting except in the ines of writing made by an ordinary lead pencil. The inventio also consists in numerous other details of construction for whic eference must be made to the specification
improved sewing machine frame.
Harriet Ruth Tracy, New York city.-This invention consists in an improved construction of the end frame for sewing machines, hich frame is provided with peculiarly arranged castersor rollers nd with lugs or ears which adapt the rame to receive a hinge
folding section of drawers without alteration or injury to the said fording
frame.

MMPROVED CAR LINTER.
General John D. Imboden, Richmond,Va.-This invention relates hat of another without breaking bulk. It consists in using in clines located in a pit under the railroad track, movable truc rames, and a vertical lifter; also in combining with the latter rutches, a pitman and stirrups connected with the crosshead of a engine.
lmproved cotton press.
W. W. Wallace, Neckesville, Tex.-This invention relates to the mode of actuating the follower of a cotton press so as to combine
convenience and facility of operation with a maximum of comonvenience and facility of operation with a maximum of com-
pressing power. It consists in connecting the lever arms and fol ower by arms that are pivoted to each, while the windlass is ar of levers.
mproved eyelfeting madine
John J. Allred, Charlotte, N. C., assignor to himself and Alson $G$ elets and the chute for conducting them to the inserting too slide forward to carry the eyelet over the tool by a spring, and ar orced back by a cam lever worked by the slide of the tool. In go ing back they work the feeder, by which the eyelets are delivered also the magazine into the chute. The slide of the inserting too ing shaft and a spring. The general arrangement is simple and doubtless effective.

## NEW HOUSEHOLD ARTICLES

IMPROVED CLOTHES HOLDER.
James Lesh, Warren, Pa. The invention is an improved device for holding bed clothes or coverings properly stretched, and pre-
venting their being thrown or pushed off in consequence of the estive movements of children while asleep. It is also applicable for holding lap robes when riding. The same consists of an elastic band having a sheath or guard hook attached at one end, and tape or cords attached to the other. The hook is inserted through the clothes or robe, and the strings are tied to the person or to some
fixed object. The elasticity of the band enables the clothes or robe fixed object. The elasticity of the band enables the clothes or robe
to yield and adjust themselves to the movement of the legs or body. improved Ironing stand.
Jobn Finfrock, Piqua, Obio.-The invention relates to the manufacture of ironing stands, so that garments can be conveniently readily folded up and packed in a small space. The stand consist of two posts, provided with crossbars at top and connected by a rail ointed at one point, the board being open at the end and provide with a clamp screw.
Willian IMPROVED INVALID BEDSTEAD
William Huntress, Richmond, Va.-A portion of the mattress is and a chute to be adjusted in a portion of the bed convenient fo he requirements of the occupant.

IMPROVED PICTURE NAIL
John P. Stockton, Jr., New York city.-This inventor proposes a
ail having a stationary disk upon itwhich presses close against the nail having a stationary disk upon it which presses close against the wall, and so affords an additional support, and having a knob com llow of the ready adjustment of the suspending cord or wire with out requiring the raising of the suspended object.

## NEW WOODWORK AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED WAGON BRAKE.
Halvord Markrud, Ettrick, Wis.-This inventor proposes an ar rangement of brakes in connection with the tongue, which is pivoted to the hounds and has rear branches which act upon the hori-
zontal brake levers. By this, when the wagon presses forward zontal brake levers. By this, when the wagon presses forward
against the tongue, the levers are operated to press shoes forward against the tongue, the levers are operated to press shoes forward
against the wheels, and the friction of the wheels causes the shoes gainst the wheels, and the friction of the wheels causes the shoes
to rise, bringing their wider part against the wheels and making the to rise, bringing their wider part against the wheels and making the
ressure greater. When the wagon is backed, suitable devices pre vent the shoes from acting upon the wheels.

IMPROVED WAGON BOX.
Timothy Jennings, Moulton, Iowa.-This invention relates mainly may at any time be used with or without top box, which forms rigidly attached extension of the same. The different binding strap and stays connect the body in a solid and durable manner, so as to mpart to it the required strength and resistance to heavy loads, while they may be readily replaced without difficulty when they get oken or in
mproved shifying buagy top.
Henry M. Gillespie and Virgil True, Laolede, Mo.-This inventio relates to certain improvements in shifting tops for carriages, bug-
gies, etc; and it consists in a horizontal bottom rail, to which the op frame is attached, which said rail is slid into grooves around the ists in a double set of vertical supporting props for the top, where by the latter is more securely held in an elevated position.

Wm. C. Margedant, Hamilton, Obio. The object of this inveution is to provide a straining device for a scroll saw adapted to a great ength of stroke, and of uniform tension or strain through all part of said stroke. It consists in a spring bent in a circular, elliptical or oval form, so that the two ends approach each other, in combieither an independent or imaginary fulcrum, so that as the lever is epressed the ends of the spring are active upon the same upon op posite sides of the fulcrum, and as the lever approaches its limit of movement the ends of the spring approach an alignment, and th train of the spring is correspondingly diminished, just in proportio as the leverage of the lever increases, thus rendering the strain un frm throughout thentire on a hollow pitman pin to be filled with ubricating material, and designed to operate as an automatic lubricator.

## improved band sawing machine

Wm. C. Margedant, Hamilton, Ohio.-This invention relates to in genious and valuable improvements in band sawing machines and wheel, which is made with an undependent loosely sliding fand eriphery, or o obviate the bad effects arising out of the momentum of the sai upper wheel when the lower wheel and actuating mechanism ar opped. The invention also consists in a double acting brake, de wheel to preventstrain and unies of wear upon the shaft, and als in the peculiar construction of back thrust guides, which consis in a series of balls or spheres, which are so arranged as to pre sent always a new surface to the back of the saw blade. The inven tion also further consists in the means for adjusing the upper ban w wheel, and in other details of construction.
improved water supply and vent for traps
John H. Morrell, New York city.-This inventor has recently demany of which have been illustrated in late issues of this journal He now suggests certain new improvements in conducting wate rom the roof of a building to the water closet, or other traps con nected with the building, by leading a pipe from the roof, and connecting it at a point below the drop cup or pan of the water closet,
either to the bowl or pipe leading therefrom to the trap. The object is to prevent the escape of sewer gas into the house.

IMPROVED MACHINE FOR BORING BLIND-STILES. Freeland H. Dam, St. Cloud, Minn.-This is a machine for boring blind stiles, fence rails, and other articles with holes of uniform depth at equal space from each other, and for carrying on the bor
ing operation continuously. By suitable mechanism the exact feed of the boring tools, in either direction, is easily and quickly pro duced; and by the alternate action of the same one stile is bored while the other strle is fed forward, so that a continuous work of the ma chine is obtained.

## NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

IMFROVED COMbINED CANE AND WHIP.
Oliver H. Saxton, Washington Court House, O.-This inventor made solid, and attached to tubular sections, which are telescopic, so that, to exten the whip, they may be drawn out and secured by their screw joints.

IMPROVED BOTTLE STOPPER
Adolph Luthy, New York city.-In this a curved-wire spring lever, that carries the stopper, is secured on the bottle by bal pivoted to the neck band of the same, binding on a recessed top
rest of the stopper plate. The lever is first pressed tightly on the opper, and the bail then slid up over the same, holding both sto er and lever firmly in position by the spring action of the stoppe nd lever. The device is cheap and easily operated

$$
\begin{aligned}
& \text { IMPROVED SCHOOL DESK. } \\
& \text { pe. Sheffield. England, assign }
\end{aligned}
$$

Thomas Redmayne, Sheffield, England, assignor to William Red mayne.-This inventor proposes to make the plane surface whic orms the desk capable of being adye in a slightly inclined position to serve as a desk, or in a nearly vertical position, to serve as a back to the seat, which is ordinarily arranged in connection with such desks. The invention consists in mechanism for adjusting and altering the angle of the desk, and also of mechanism for locking or fixing the board or desk when it has been adjusted in the
required position, so that it cannot be altered, except by releasing the locking mechanism.
mproved tailor's apparatcs for drafting patterna John Bellamy, New York city.-This inventor has devised an
ingenious chart, which represents, in miniature ingenious chart, which represents, in miniature, the forms of the
different parts of the shirt. The points to draw and cut to are numdifferent parts of the shirt. The points to draw and cut to are num scale of proper size for laying off the true measures on the cloth to of shirt.
mproved bell me'tal toy ball
Jonathan C. Clark, Middle Haddam, Conn.-This is a hollow ball, hich is made of bell metal, and in one side of which is formed a lot to allow the metal to vibrate, and thus give a sound. In the freely, and within the cavity of the bell is placed a small ball, to act as a hammer to cause a sound as the said ball is rolled o shaken.
mphoved cigar pipe
Robert L. Weed, New York city.-This inventor proposes to vercome the prejudices of people who object to pipes by a little evice which enables a smoker to enjoy his favorite tobacco, an t consists in a hollow sectional tube, resembling a cigar, a ciga It consists in a hollow sectional tube, resembling a cigar, made o
wood or other suitable material. The tobacco may be readily com pressed by the finger into both sections, so as to form a filling cor responding to that of a cigar, while the smoker can always secure
and know the kind and quality of tobacco which he is about to use.
improved yarn-printing machine.
James Short, New Brunswick, N. J.-This is a very ingenious ma dine, devised for printing the yarn used in carpet manufacture Is mechanism it would be impossible to explain without the aid of ive mand reatly simplified.

IMPROVED GLOBE ATTACEMENT TO CLOCKS.
Henry Fick, New York city.-In order to show the position of the arth at any hour, this inventor arranges a globe so attached to clock that it turns in unison therewith, and, at the same time, is it may be required to do so. When let bo the hand the cas will automatically return to its true position, relatively, to the clock.

Gusincss and exsunal. The Charge for Insertion under this head is One Dol-
lar a Line. If the Notices exceed Four Lines, One lar a Line. If the Notices exceed Four Lines,
Dollar and a Half per Line will he charged. Every Mechanic and Artizan should have a copy
of "Wrinkles and Rectpes."
Price $\$ 1.50$ by mail. of "Wrinkles and Recipes," Price 81.50 by mayl.
H. N. Munn, Publisher, 73 Park Row, New York city. Plumbago--Dixon's Perfect Plumbago Lubrica-
tor. Send for samples and information, furnished free by Joseph:Dxxon Crucible Co.. Jersey Clty, N. J.
Hearing Restored-Great invention. Book free. G. J. Wooring Restored-Madison, Ind.

Hotchkise Air Spring Forge Hammer, best in the
warket. Prices low. D . Frisble $\&$ Co . New Haven. Ct.
 Vols., well bound,for 880. Address A. F.R., Box 7 T3,N.N.Y.
Wanted-A a d hand Watchmans Clock, cheap. Bright tincing Gray Iron Castings-Instructions.
or sale. Samples free. J. M. Simpson, Oshkosh,Wis. To Engine Builders-see Adv't in this paper. Centennial Exhibitors, see Advertisement of
Blackmer $\&$ Co., page 396. For Sale, Cheap-113 inch Schlenker Bolt Cutter
(new) complete. E. Gould, Newark, N.J. Wanted-A good patented article to introduce
n South, one suitable to that locality. Address J. R. Mc Nalty, 107 Clark St., Chicago, III.
The eheapest and best portable oil cook stove.
Agents wanted ly T. B . Jeffery, 253 Caral St., Chtcago. $\quad$ A Great Business Success.- Messrs. Geo. P. Row-
 Nos. 4 and 41 Parks Row, where thousands of newspapesis
are received dally, examined and puta away, and hundreds of letters read and replited to. The place isa business beehive in fact, and adminably. illustrates one of the most re-
markableinstitutions of our time, theAdvertising Agency. markable institutions of our time, theAdvertising sgency.
The offlces are well arranged in counting-house fashion, add are among the most pleasantly and advantageously
situated in the city. We congratulate our enterprising neighbors upon the success which persistent industry, a
keen eye to business, and uprightness in the doing of it, have obtained for them.-[Evening Mail, N. Y. elty.]
Railroad M. M.- Send for Circulars of Gardiner's
Pat. Centering and Squaring Attachment for Lathes. R. E. State, Springfield, Ohio

For the Best Hand or Power Bolt Cutter and
Nut Tapper for Rallro use use, address R. E. State, Flat Iron Polisher and Knife Sharpener-New
thing. Dealers and Agents, send 30 cts. The Varnishes of the London M'f'g Co. have ob tained a wide celebrity for their superior finish. rand Streè, New York.
Self-Feeding Bolter, f fr Sawing Handles, Head-
hg, Shingles, Lath, Crair Stuff, Wagon Stuff, Bed Post ng. Shingles, Lath, Chair Stuff, Wagon Stuff, Bed Posts,

For Sale - 6 fi. Pla Rer. Chanks and Ton's, $\$ 275$
5 in. x 7 ft . Lathe, Chuck and Tools, $\$ 175 ; 17$ in. 66 ft Lathe, $\$ 175 ; 20 \mathrm{in}$. Drlll. 850 ; 36 in. Drill, $8125 ;$. Shear Wanted-Correspondence with parties manufac-
uring Lawn and Parlor Games. M. C. Burr, Minneapos, Minn. Wanted!- $\$ 1,000$ to complete arrangements for
he $m$ 'f're of a newly Pat'd Article in Stee'. One half terest in Jusiness and Pate
P. O. Box 190, Brooklyn, N. Y.
Williamson's Tannate of Soda removes and preC. O. D. D. D. Williamson, 268 West St., New York.
Some beautiful Electrical Apparatus for Sale Some beautiful El
siltable for lecture pur
Street, New York City.
Grelot-A new Lawn and Parlor Game. Will
icense to the right party, or sell outright. M. C. Burr Minneapolis, Minn.
Water, Gas and Steam Goods-Send eight stamps or Catalogue, containing over 400 illustrations, to Balley,
Farrell $\&$ Co., Pittsburgh, Pa. $\underset{\text { address C. Van Haagen \& Co., Philladelphia, Pa. }}{\text { Fatic }}$ Painters and Grainers, send at once for Sample
and Catalogue of the Celebrated Metallic Grainin Tools;
40,000 now in use. Address J. J. Callow. Cle veland, 0 . Small Engines. N. Twiss, New Haven, Conn.
Patent Scroll and Band Saws, best and cheape
in use. Cordesman, Egan \& Co., Cincinnati, Ohio. Camp Lounge, \$5. C. L. Co., Troy, N.Y., and
walk, Ct. N. Y. City salesroom. Ti7 Broadway.
Boult's Paneling, Moulding and Dovetailing Ma chine is a complete success. Send for pamphlet and sam
pie of work. B. C. Mach's Co., Battle Creek, Mich. For best and cheapest Surface Planers an 1 Uni
versal Wood Workers, address Bentel. Margedar ; \& Co. H milton. Ohto.
The Original Skinner Portable Engine (Im
proved), 2 to 8 H.P. L. G. Skinner, Erie, Pa. Single, Double, and Triple Tenoning Machines
of superior construction. Martin Buck, Lebanon, N.H. Gothic Furnace, for coal and wood, heats houses
$\&$ churches. Send for book. A.M.Lesley. 226 W .23 d st.,N.Y. For best Presses, Dies, and Fruit Can Tools, Bliss
W Williams, cor. of Plymouth and Jay, Brooklyn, N. Y. For Solid Wrought-iron Beams, etc., see adver
tisement. Address Union Iron Milis, Pittsburgh, Pa., Por lithograph \&c
"Pantect," or Universal Worker-Best combina-
tion of Lathe, Drill, Cruluar, and Scroll Saw. E. O.
Cinase. 7 Alling Street, Newark, N. J. Hotchkiss \& Ball, Meriden, Coñ., Foundrymen
and workers of sheet metal. Fine Gray Iron Castings nd workers of sheet metal.
For Sale-Second Hand Wood Working Machin ery. D. J. Lattimore, 31st \& Chestnut St.. Philla.. Pa.
Price only $\$ 3.50$-The Tom Thumb Electric Telegraph. A compact working Telegraph Apparatus, for
sending messages, making magnets, the electric ligbt. gifing alarms, and various other purposes. Can be put in in
operation by any lad. Includes battery, key, and wires. Neatly packed and sent to all parts of the world on re-
ceipt of price. F.C.Beach \& Co. 246 Canal St.,New York. Peck's Patent Drop Press. Still the best in use
Address milo Peck, New Haven, Conn. Adress Millo Peck, New Haven, Conn.
All Fruit-can Tools, Ferracute W'ks, Bridgeton,N.J. Amerisan Metaline Co., 61 Warren St., N.Y. City. Fenume Cnncord Axles-Brown.Fisherville.N.H.
For Solid Emery Wheels and Machinery, send to For Solid Emery Wheels and Machinery, send to
the Union Stone Co., Boston, Mass., for circular.
Faught's Patent Round Braded Belting-The
Best thing out-Manutactured oxis by c. W. Arny,

Diamond Tools-J. Dickinson, 64 Nassau St., N.Y. Magic Lanterns and Stereopticons of all sizes and
ices. Views illustrating every subject for Parlo Dices. Views illustrating every subject for Parlor
amusement and Public Exhibitions. Pays well on small nvestments, 72 Page
Jassau St., New York.
Temples and Oilcans. Draper, Hopedale, Mass. The "Scientific America?" Office, New York, is ng little buttons on the desks of the managers signals are sent. $t$ ) persons in the various departments of the
establishment. Cheap and effective. Spliendid for shops, oflces, dwellings. Works for any distance. Price $\$ 6$,
with good Batery. F C. Beach \& Co. 246 Canal St,. New Fork, Makers. Send for freetllustrated Catalogue. For best Bolt Cutter, at greatly reduced
wdress H. B. Brown \& Co.. New Haven Conn. The Baxter Engine-A 48 Page Pamphlet, con-
taining detatl drawings of all parts and full particulars, now ready, and will be
18 Park Place, New Pork.
Hydraulic Presses and Jacks, new and second
hand. Lathes and Machinery for Polishing and Buffing Spinning Rings of a Superior Quality-Whitins-
ville Spinning Ring Co., Whitineville, Mass. Solid EmeryVulcanite Wheels-The Original Solid Emery Wheel-other kinds imitations and in ferior. Cau-
tion-Our name is stamped in full on all our best stand-tion-Our name is stamped in full on all our best Stand-
ard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packin
Company, 37 and 38 Park Row. New York.

## 

D. L. M. (steam pressure in caldron), do does not send sufficient data.--J. S. F. and other
are informed that there is no such instrumen as a rod that will indicate the locality of coal in the earth.-H. M. T will find a recipe for cement for leather on p. 119, vol. 28.-A. will find direc
tions for pickling cucumbers on p .155 , vol. 31 A. B. will tind a recipe for a white metal on p. 363 , china and glass on p. 379 , vol. 33 .-M. will find full descriptions of friction gears on pp. 227, etc , vol. 26.-J. S. S. can polish his gun barrel by following
the directions on p.11, vol. 32.-W. W. S. will find the directions on p. 11, vol. 32.-W. W. S. will find
directions for cementing leather to iron on p. 347, vol. 30.-J. C. P. will find directions for calculating the teeth of compound gears on p. 187, vol. 29. -E
H. can fasten emery to a belt with grod glue.-G B. S will find full directions for constructing friction gears on p. 227, etc., vol. 26.-J. C. W. can calculate the amount of friction of water in a pipe
by the formula given on p. 48, vol. 29.-M. G. will by the formula given on p. 48, vol. 29.-M. G. wil
find that a treatment of catarrh was described on p.85, vol. 32.-J. S. W. can cement cloth to wood waterproof leather by the method described or $p$ 155, vol. 26, and paper by that detailed on $p$. 146,
vol. 31.-E. W.C. can put a black enamel on his ron castings by following the directions given on p. 208, vol. 26 .-T. D. B. can fasten emery to wood
by the method described on p. 203, vol. $32 .-$ G. B M. the method described on p. 203, vol. 32.--G. B
M. clean tly specks off gilt moldings by the frocess detailed on p. 27 , vol. 31.-J.V. R. will fin 219, vol. 32 --J. E S. can copper cast iron by fol-
lowing the directions on p. 90 , vol. 31 .-A. McK. will find a description of meerschaum on p. 1 vol $32 .-$ G. C. U. and others will find an explana-
tion of an iceboat sailing faster than the wind on oion of an iceboat sailing faster than the wind on
p. 331, vol. 33.-S. B. will find full directions for polishing magnifying glasses on p. 363, vol. 31.-F plating in No 34, p. 284, vol. 33.-J. V. B. P. will find directions for hardening files on p. 212, vol. 26 .
-W. E. and G. W. McB. will find a recipe for 1 l -W. E. and G. W. McB. will find a recipe for li-
quid glue on p. 90, vol. 32 .-J. F. C. and others are quid glue on p. 90 , vol. 32 .-J. F. C. and others are
informed that the force of a falling blow is dis-
cussed on p. 90 , vol $32-$ H. G. B. will find a recipe for bronzing on iron on p. 283, vol.31.-W. W. S can cut glass bottles by following the direction
n p. 399, vol. $24 .-$ H. J. B. can remove fruit stains by the method described on p. 283, vol. 31.-E.J. C: will find a description of a straw-burning en-
gine on p. 214, vol. 30 .-W. H . $\mathbf{C}$. will find a detailed account of the sand blast on p. 296, vol. 25.-N. T 409, vol.31.-N. will fiad directions for gilding pic ture frames on p . 347 F , vol. 31 .-C.W.S. can preserve his skates from rust by the met hod detailed on p.
283, vol. 31.-E. J.O. will find dicections for makin artificial stone on p. 350 , vol.25.-H. B. B. will fin directiors for making rubber printing stamps on
p. 156, vol. 31.-W. E. will find directions for crysalizing the surface of tin on p. 304, vol. 31.-P. H
H. will find a good recipe for shoe blacking on p. 283, vol. 31.-J. L. K. can galvanize iron articles b he process described on p. 59, vol. 24.
(1) F. F. asks: Is there any way to pre
vent lamp chimneys from breaking by heat, y cold in daytime, when the lamp is not burning will not easily break, if ordinary care be taken
whe the the not to spatter them with cold water when very
(2) S. 'T. R. asks: Will you please state carbonic oxide in the atmosphere of rooms in dwelling? A. There is no simple method of doing this satisfactorily, owing to the solubility of all the combinations into which it enters. A solu tion of the bichloride of copper in hydrochloric
acid, or of a salt of the dioxide of copper in ammonia, gradually absorbs carbonic oxide if am monia, gradu.
tated with it.
(3) J. A. R. asks: How can I make liquid . Procure a to be used for writing on paper leaves gently and grind them in a mortar with a piece of honey about the size of a hazel nut, until add a little water and rework it; put the whole ro a phial and the gold will deposit at the bottom
the phial. Pour off the liquor, and add weak pre
pared gum in its stead, sufficiently to make it flow freely from the pen. When required for use shake it occasionally.
(4) G. H. asks: Is there any marking ink laundry washing removes all marking by $\mathrm{Ag} \mathrm{NO}_{3}$
ink, probably usingKCN. Somekinds of indelible printing ink are not affected. Can you give th ingredients for any such ink, to be used with a pen? A. Make a solution of genuine asphalt in
alcohol. This is one of the best indelible ink known. You may find it, already prepared for sale, under the name of indelible carbon ink. Aniline black also gives very good results.
(5) W. F. W. says: 1 . We have at our
works three steam diameter, with 2 flues in each of 14 inches diameter. Furnace is 11 feet wide and grate bars 4 feet long. Bolers are set 15 inches from surface of
bars; smokestack is 42 inches in diameter. We require 80 lbs . of steam to do the work, and it re quires skillful firirg and constant hard work to of fuel occurs. Weuse river water, and wash out the boilers once a week, and we find a deposit of scalein each, about two quarts in quantity, collec ted in a circle 8 or 10 inches in diameter, 40 inches rom front of boiler. It is in the same place every week. Would the use of grate bars 12 or 15 inche and give more heat? best plan would be to put in another boiler you fore doing this, however, we advise you to have your boilers tested, so as to ascertain whethe they are as efficient as they should be. 2. Is he in tense heat on the front sheets that causes the cale to collect in a circle in the same place? The reason suggested for the forma
in particular spots is very plausible.
(6) J. S. E. says: We tried preserving egg y coating them with paraffin, but the warm parat n was chilled the instant it touched the pgg, an done? A. Send us a copy of the directions that ou made use of.
(7) J. N. P.
(7) J. N. P. says: On a three story house oot over $150 \mathrm{lbs} . ;$ the rigging of the scaffold wa nade of $3 / 8$ inch rods, and chains, the links of which were also made from $3 / 8$ rods. An acciden occurred when there were two men on the scal told, weighing probably 150 lbs. each. The scaffol with a bridge between. At the time of the accident one man was near one end of the bridge, and he other about the middle of the bridge, which was about 12 or 15 feet long. All at once, without ny warning, one of the rods pulled in two, and the scatiold fell; the strain was from end to en tensile) ; the end of the broken rod showed no f the appearance of coarse cast iron; the crystals were very distinct. The iron was bought for th best Swedish wrought iron. 1. Do you think the
ods were overloaded? The rigging has been in se about four years, and has been used in al inds of weather. A. From your account, we in fer that the accident was caused by a defect in the
ron. 2. What do you think would be a safe load or a scaffold fitted with such rods? The tota od, if of the bridge was not ove should be capable of sustaining with safety about 1,000 lbs.
(8) C. D. asks: Please give the formula for arocing the white finish upon thermometer and times seen is made by fusing together hard flin lass and white arsenic, in the proportion of 10 parts of the former to 1 part of the latter. In of the arsenic. The proportions in this case are the same as in the former
(9) T. D. H. asks: How can I make a goo barometer? A. Obtain a good strong glass tube
about 34 inches long and having as smooth and ven a bore as possible. Close one end by mean of a spirit lamp and blowpipe, or Bunsen burner nd fill the tube with pure clean dry mercury, beng careful to exclude all bubbles of air. Then
place you finger over the open end of the tube nd carefully invert it into a small vessel, partial filled with mercury. Be careful not to remov covers is safely below the surface of the mercury in the reservoir. When the tube is thus inverted the contents will fall until the hight of the column is about 30 inches above the level of the mercury in the iittle reservoir below. In the barometer the nercury never rises above 31 incbes, and rarely the tube which lies between these mits. This scale may be adjusted properly by mith some standard instrument
(10) M. O. asks : Of what metal shall the me? A. You fail to state what kind of ink. nk varies greatly in composition. As a general
ule, the metals (gold, platinum, etc., excepted) ould not well be employed for this purpose, as in many cases they would contanimate the ink. Tr bore, wood.
(11) C. W. H. says : Herewith is a rubbe and which has the appearance of having been abject to heat sufficient to destroy its elasticity, round a bundle of letters, and put the bundle way. From that time it has not been disturbed I find this band in its present condition, while the and, as well as all papers lying next to it, are dis olored and have the appearance of being scorched. time, except clean bundles of letters.
account for it? A. The specimens forwarded be surprising if the results noted could be traced to this. The degree of heat necessary to have scorched the paper, as stated, would have caused a partial decomposition of the rubber, leaving it
(12) J. B. asks: How can I carbonize, decarbonize, and extract phosphorus from iron, when melting it on a small scale? A. Fuse with a sm
quantity of cubic niter and calcium chloride.
(13) J. S. B. asks: Can you inform me of the process for a detonating compound composed
of chlorate of potash and amorphous phosphorus, nd the nature of the explosive conditions unde which it explodes, etc.? A. Glue, or gum, or any tity of water to the with which, having been heated to $122^{\circ}$ Fah., the phosphorus (amorphous in powder) is incorporaed, by gradually adding it and keeping the mixure stirred so as to form an emulsion, to which is previously well pulverized. The amount of phorus should be in the proportion of $\frac{1}{10}$ or $\frac{1}{12}$. A rop of this mixture, if allowed to dry, detonates contact with flame
(14) A. B. B. asks: How can I remove grease potsfrom paper? A. Warm the paper and cover it on both sides with dry, finely ground pipe clay, hours Then dust off the clay, and remove the fine dust that still adheres by means of a iece of india rubber.
Can carbonic acid gas be collected and liquefied of fermenting grain, as in distilleries or your trouble.
(15) H. \& W. ask: We wish to dissolve some bleached shellac, and have tried alcohol failed. Can you tell us what will do it? A. If the ubstance in issolve it readily. Shellac is also soluble in a hot
(16) E. S. C. says: I am building a side wheel boat, 18 feet long and of 5 feet beam. Tb engine cylinder is 3 inches by 6 inches. Pleas
ive proper dimensions for paddle wheels to rum at the rate of 7 miles per hour. How fast should they revolve? Is it best to speed back with cog gear or belt? A. It is not probable that you can ealize the speed you mention. We would recom mend wheels about 3 feet in diameter, making 30 earing to advantage.
(17) P. asks: What buoyancy in sea wate will a globe of glass containirg 100 lbs . weight o depth? In other words, if a utensil containing 100 bs. of air is submerged in water, how much weight will it carry or hold up without sinking How many cubic inches of space contains 100 lbs of air? What is the weight of air by the gallon . You do not send sufficient data; but we wil? The weight of one cubic foot of air, at ordinary

(18) W. T. A. says: I am using two return ue boilers 28 feet long and 3 feet 4 inches in d meter, and a new high pressure Corliss engine
burn wood and have plenty of draft. The wate is full of lime, which stops my gages up and pre cipitates in large quantities throughout the boilers and engine. If I use a heater, exhausting from the engine into it and then allowing the steam to
escape at the other end of the heater, would it escape at the other end of the heater, would it
purify the water at all, and help me out of my purify the water at all, and help me out of my
trouble? A. The use of a good heater would probably prove of advantage in your case. It er in the boiler once or twice a day.
(19) W. B. asks: What sized wheel is roper for a side wheel steamboat 80 feet long, o ouse be perfectly feet deep? Shou want to slan outat the bottom? A. Make the wheel as larg as convenient. It will answer very well to use a
round wheel house, leaving some clear space be
(20) W. B. G. says: I am using several wa er wheels, which I think will be sufficiently de cribed by calling them center vent turbin heels. If I gear them so that, to do the sam olutions, do I thereby increase their power? lso use more water. In other words, djes the
mount of water vented bear any relation to the peed of the wheel, and can a small wheel bemad do the duty of a larger one by simply increasin its speed relative to the work to a dertain $\cdot$ A. Gent which it gives the greatest efficiency.
(21) C. J.H. asks: How can I insulate copper wire for an irduction coil? A. Cover the wire
with silk. The longer the wire, the greater the
(22) N. B. A. asks: Please give me a recipe hen first applied to the paper, in a few moment urns buack or purplish black. I think it is called hromium ink. A. Dissolve 3 ozs. solid extract of ogwood in 3 gallons hot water; to this add $1 / 2$ oz. ater. The ink, when cool, is ready for use
(23) F.O. asks: 1. With what can I fasten eather to wood? The cement must not be solube. A. Melt together equal parts of pitch and merged in kerosene be destroy ed? A. We think ot. 3.
(24) J. A. C. asks : Does the electric current
used in sending a message to Europe or elsewhere used in sending a message to Europe or elsewhere
return again to the instrument from which it manated, either by a wire or by the ground? If way of the earth in a direct line, and havin an affinity for the place from which it came, pas by all other attractions in its passage to that? A. Tue current does not return through the earth but is absorbed by it at each end, thus causing movement in the wire the same as if the end current returned through the wire, but this has been proved to be incorrect.
(25) M. M. M. asks: By what method and nent steel magnet be kept exactly the same for any length of time? A. The most effective way is to place a bar of iron across the poles.
(26) W. M. J. asks: 1. Would good varnish or parafin make a good insulator for wire intended tote used in the heltices of a relay? A. Silk
or cotton we better. 2. In what way does insulation act upon the condition of a magnet other than to separate one wire from another in the conls? A. Insulation of the wires is only in-
tended to separate them, and prevent any conductended to separate them,
tion betweea the layers.
(27) E C. G. says: 1. I am about to make an electro-motor. What metal must I use on What kind and size of wire must I use? A. No. 14 copper wire.
(28) N. W. L. says: You state that grease or paint applied to the cells of a telegraph battery
will prevent creeping. Having been annoyed by the creeping of our battery, and acting on the hint, we applied butter to it, that being the only Irease at hand at the time. Sicce the application great deal weaker. Is the butter the cause?
(29) W. L. asks: 1. What bright large star 1s in the northeast. not very high,at about 6 P.M.?
A. It is Capella, the principal star in the constellation Auriga. 2. What bright bluish star is high overhead to the westward? A. It is Vega, but more frequently called Lyra. It is the principal star in the Harp. 3. What large star is near Orion on the west side? A. It is Aldebaran, the largest
star in the constellation Taurus.
(30) W. P. H. says : 1. I have in my possession two glass disks 2 inches in diameter, made by
Chance \& Co., of Birmingham, England. One Chance $\&$ Co., of Birmingham, England. One
consists of hard crown glass and one of dense achromatic objective: what should be the radii of curvature for the surfaces of the disks in order to have a focus of 10 inches? A. If the flint is of medium density, the curves of the crown may be $3 \cdot 4$ inches radius. The fint glassshould be double concave, one side to fit the crown, the other side
of 25 inchesradius. If the flint is very dense, the curves may be of $3 \cdot 5$ inches radius for each side of the crown, and 26 inches for the long side of the flint. 2 What would be the negative and positive
foci of the disks? A. The focus of the crown will foci of the disks? A. The focus of the crow
be the radius, that of the flint $\$ / 2$ its radius.
(31) C. M. B. says: I have a soapstone griddle which, by accident, was thoroughly greased.
How can I extract the grease? A.Wash it carefully How can I extract the grease? A.Wash it carefully
with hot potash lye, and rinse with clean cold wawith hot potash lye, and rinse with clean cold wa-
ter until all trace of the alkali has been removed.
(32) R. F. S. asks: 1 . What are the diameter, focus,and shape (plano convex or double convex) romatic? A.The lenses of the eyepiece of a microscope are both plano-convex, made of single pieces of glass. The field lens is usually larger the diameter, focus, and shape of the field lens, and is it achromatic, and what is the proper distance between the eye lens and field lens? A. For medium powers, the field lens may be of 2 inches
focus and the eye lens of 1 inch focus, set $11 /$ inchfocus and the eye lens of 1 inch focus, set $11 / 2$ inch-
es apart, with the convex sides toward the object. As they correct each other, the combination is achromatic. 3. What is the proper shape of an achromatic objective, plano-con vex or double convex? A. The best objectives for high powers are
made of three separate leoses, each lens of two made of three separate leases, each lens of two kinds of glass. The best form for a single lens o onepiece of gla
are as one to six.
(33) I. J. asks: How shall I clean the lenses of optical instruments? A. Breathe on the glass,
and wipe with chamois skin or the nap side of cotton flannel. Paper of any kind would be very ${ }_{\text {likely }} \mathrm{l}$ to scratch the glass. This also answers A
(34) H. S. asks: What is the magnifying described in home-made compour 30, 1875? A If the tube or body of the home-made compound
microscope be 12 inches in length, the magnifying microscope be 12 inches in length, the magnifying
power would be about 100 diameters. The same eyepiece, with an objective of $1 / 2$ inch focus, would
give a power of about 200 diameters; then by lengthening the body, the power may be easily increased to 300 or more. A common and convenient way of determining the power of a microscope is to focus an object of known size, and place a rule on the stage outside, then look with one ethe
at the object in the microscope and with the othe at the object in the microscope and whe large the object appears to be on the rule,
(55) H. M. says: I am getting up a small will furnish steam to flll a $3 \times 3$ cylinder, and I pu n 6 cylinders each $3 \times 3$, cut off each at $\frac{1}{6}$ stroke and use thesteam expansively the rest of the way could you recommend such a course? A. We cannot recommend the plan
(36) R. J. F. asks : Is it possible to improve
n object glass of a telescope by change of figure if the fringes around objects are equally colore with green and purple? would the thicksess o are usually made of a double convex crown and concave flint. In small objectives, of less than nches diameter, the flict is usually double concave, and in large glasses, concavo-convex. The ollowing curves for a 614 inch objective, of 8 fee
focus, answer very well: Outside curve of crown 50 inches radius, contact curves $299^{\frac{4}{0}}$ inches, and combination forms side and liches. Th get rid of your trouble.
(37) R. M. asks: How must the lenses be the home-made microscope, recently described by you? I want it to magnify from 1,000 to 1,500 times. A. The lenses must be set as described in the article. The focal length of the objective should be about $1 / 8$ of an inch, and of the field inch. Then, by lengthening or shorte lens $1 / 2$ body, Then, by lengthening or shortening the of 1,000 or 1,500 may be obtained
(38) J. B. says : I am building a machine showing the earth turning on its axis at an inclin earth, and all around the sun. Is there such an apparatus in existence? A. There are very per fect instruments for showing the movements of the solar system. They are called plaretaria. Would it be best to make it vertical or horizontal ?
A. For the sake of convenience they are mad A. For the sake of convenience they are made
vertical. They cannot be made correct, but only approximately so. 3. Do the planets return to the same places in a year? Will they be seen next year in the same place on the same day at the same time? A. The planets never return to the same place on the same day of the year
(39) W. H. D. L. says: If milk is not properly cooled, or is confined in a tight can before the ed. Would bacteria or some similar organisms be presentin sucha case? A. Yes. 2. What must be the magnifying power of a wicroscope to reveal show organisms? A. A power of 200 diameter doubt it would be all you would require. A less power, even, might answer your purpose.
(40) S. D. T.-You could not see anything stant movement of the mirror and the highly magnified condition of the light coming from the mirror to the observer.
(41) E. R. asks: Does any one manufac zure cast steel that can
steel can be tempered.
(42) T. G. asks: It is asserted that water, in running out of a basin through a hole in the bottom, takes a rotary motion, and, when unmo lested, the circular motion is always one way, namely, the same as the hands of a watch laid on
its back. Is this true? A. We think not. (43) F. R. B. asks : Can I arrange a small compound microscope so as to throw an enlarged
image on a screen, as a stereopticon does? A. You cannot do it, on account of the high magnifying power,
lumination.
(44) C. T. P. says: Please inform me which the flesh side next to the pulley. A. The grain
(45) W. H. P. says: I am running a 50 horse power tubular boiler, but have not got draft enough at times. The main flue is of iron, 2 feet building about 4 feet, and then on a level 17 feet to the chimney. Will a jet of steam help the should it enter the flue? A. A jet of steam in the iron flue will help your draft without damaging the chimney. The size of your jet must be determined by experiment.
(46) T. W. C. says: I have a boat, 50 fee long by 18 feet beam by $31 / 2$ feet depth. What should be the dimensions of engine, boiler, and
feep pump respectively? She is to have a stern wheel, and her engine is to work at high pressure 12 inches, and a vertical boiler 5 feet in diamete 7 and 8 feet high. Feed pump should be $21 / 2$ inches in diameter and of 12 inches stroke.
(47) J. M. says: Please give us the best it the nearest resemblance of gold. A. Mix 10 every 100 lbs . of the brass.
(48) S. M. C. says: Bloxam's "Chemistry " of iron ore, a large sized blast furnace consumes daily 50 tuns of ore, 30 tuns of coal, 6 tuns of limestone, and 100 tuns of air. Is not the amount of
air exaggerated? The working of a blast furnace air exaggerated? The working of a blast furnace
is familiar to me; and considering the size of the is familiar to me; and considering the size of the
blowers and number of strokes per minute, I cannot conceive of this amount of air passing through is correct. It falls under, rather than over, the truth.
(49) S. H says: In regard to your article n "FlatSurfaces" (October 23, 1875) I would like To are obtained? You say the factor of safety used is 8 , but that seems to me to be indefinite unless we know what modulus of strength is used, ulæ in such a way as to bring in the ultimate teracity or some other modulus easily determined $\mathrm{f}(\mathrm{r}$ different qualities of metal, you would, it seems to me, make them much more useful to engineers
Perhaps you will inform us what different quanti
ties are included in the constants of the given etc. A. The constants are those for tensile trength. It is assumed in the article that the ultimate strength is as follows: Cast iron, 20,00 square inch. Steel, 80,000 lbs. per square inch.
(50) A. J. M. says: I have an eltectromagnet 16 copper wire on it. What amount of hors power will I require to make an electro-magnetic marhine to cause that magnet to lift 100 lbs.?
(51) S. W.
tis of the old chemists. It is common copperas, or
Minerals, etc.-Specimens have been rt cived from the following correspondents, enc oxamined, with the resulte stated:
A. G. S.-It consists of manganese, with iron umina, and silex.-J. M.-It is made of burnt ugar and chicory.-W. A. W.-The paper was
covered mostly with a pigment havicg clay und lime for its basis, and no poisonous matters we etected in the small scrap forwarded.-O. P.of iron.-W. L. W.-It is iron pyrites, and is wort working if the quantity is very large and the cost of miniog small.-C. P. C.-It is carbonate of mag nesia.-J. M. R.-It is yellow hydrated sesquioxide of iron on mica schist.-E.S. B.-lt is galena, with
a trace of silver.-A.M. C.-It is gold.-H. J. R.If the specimen referred to was inclosed in a box (unlabeled) marked "Fine Steel Cutlery," it is detected). No. 2 is an inferiorkaohn. Use Dana' "Mineralogy."-J. F. F.-They are fragments of quartzand amethyst, with magnetic iron sand. P.J.M.-We were unable to detect any foreig and spar and hornblende.-A.J. H.-Both are oxide of
iron.-J. H. P.-Nos. 1 and 2 are quartz rock with E. P McL mica. No. 3 is bituminous slate jasper.
A. C. S. asks: Can you give me a recipe for emoving black smoke marks off a brick wall? We do not want to paint the wall.-W. A. K. asks street railway cars
On page No. 396 of this paper will be found an ished, which will be new recipe book, just pubeference by every one.

## COMMUNICATJONS RECEIVED.

The Editor of the SCIENTIFIC American ac
knowledges, with much pleasure, the receipt o original papers and contributions upon the follow ng subjects
On a New Method of Ventilation. By L. B. G On Instinct. By C. T
On the Formation of Planets. By H. L
On the Wagner Free Institute. By W. H. W and R. G.
On Explosive Oils. By J. R. C
On Spectral Lines and Atomic Welghts. By
A. K.-J. R. T.-J. B. O.-S. W.-N. F. F.--R. M

HINTS TO CORRESPONDENTS. Correspondents whose inquiries fail to appear hould repeat them. If not then published, they
nay conclude that, for good reasons, the Editor declines them. The address of the writer should lways be given.
Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be
pubiished here. All such questions, when initials only are given, are thrown into the waste basket as it would flll half of our paper to print them all; but we generally takepleasure in answering briefly by mail, if the writer's address is given.
Hundreds of inquiries analogous to the following are sent: "Who makes rubber tires for traction engines? Who sells machines for bending cold
iron bars! Who sells carrier makes screw-cutting dies, made to the Whitworth thread? Whose is the best engine governor?' Allsuch personal inquires are printed,as will be abserved. in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in
this way be expeditiously obtained.

## [OFFICIAL.]

INDEX OF INVENTIONS

Letters Patent or the United states

## November 16, 1875

and each bearing that date
$\qquad$
Addressing machines, R. Dick........ ... 170,068, 170,069
Album, photograph, H. T. Anthony...
Anti-incrustation compound, E. Weiss Apple slicer, I. C Richards.
Bale band tightening device
Apple sicer, f. C Richards.................
Bale band tightening device, c. H. Chase
Bale hooks, bending, B. R. Springsteen..
Bale tie, J. P. Radley.
Bar for landside blanks, J. Sandage
Bearings, anti-friction, Lathrop and Weber (r)
Ced bottom, , c. W. and S. Purcell
Bed bottom, spring, w. Goforth.

| Bedstead, invalid, W. J. Kerr. <br> Bedstead, sofa, J. B. M. Fifield. Bedstead, sofa, F. Fischbeck Bedstead, sofa, J. H. Gould, Jr. Beer, etc., preserving, L. Wienmar. Belt, chain, H. Bushnell. Billiard table, H. W. Collender. Blood, offal, etc., treating, T. Webb Blotter and paper weight, W. H. Bab Boiler covering, I. L. Merrell Boiler, reversible steam, S. S. Vail. Boiler, rotary steam, C. W. Pierce Boiler. sectional, Firmenich and Str Boiler tube, S. W. Martin. Boiler, wash, C. W. Guenther. Bolt, shutter, J. Mitchell. Bolts, heading, Hull and Thomas (r) Book cover protector, G. W. Holden Boot and shoe, W. B. Rice Boot stiffeners, cutting, J. M. Watso Boot and shoe tip, Straw and Sparro Boot crimper, W. H. Eddy Bottle, J. Ernst. <br> Boxtrimming machine, C. Bopp.... Bracelet, J. N. Thomson. Broom, R. H. Eastburn. . Brush, paint, G. P. Hunt.. Blickle, S. Porter. Buckle, P. Whitney. Buckle, reversible lock, L. Lewine. Buttons, etc., fastening for, William Can, milk, J. H. Lester. Cane, W. R. Park. Car axle box, L. R. Faught Car axle box packing ring, T. C. Har Car coupling, Carson and Whiting.. Car coupling, O. E. Ford. Car coupling, G. E. Lacy.. Car coupling, J. Singer (r). Car coupling and brake, F. M. Camp |  |
| :---: | :---: |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Card for wrapping thread, H. Sutro (r) .
Carriage. child's, M. Medart.
Carriage wheels, Must guard for, M. C. Na
Chair, dentist's, J. B. Ne
Chair, folding, I. N. Dann
Chair for schoolhcuses
Chair seat, L . Atwood....
Clgar machine, C Talbo
Clasp, Frost and Phelps.
Clothes dryer, w. Adams
Clothes pounder, E. Crowell
Cock, compression
Cock, compression and swing, W. L. Brownell
Coffin screw, F. W. Cabot.
Cog wheel, C. E. Brooks.

Cooler, milk, C. A. Douglas
Copy holder, L. Conant....
Cord binder, W. B. Snyder ...
Corn cutcer, P. McI. McLeo
ooupling. G. W. Rowell.
Cow tail holder, G. Stickney
Crank stop, w. H. Phillips
Crank stop, W. H. Phillips..n.
Curtain fixture, w. H. Maine
Curtain roller and bracket, 0 . Ellswort
Curtan rolier and bracket, O. Ellsworth....
Dental engines, hand piece for, E. T. Starr
Dental engines,
Dental plugger, S. D. Strohm..... ..............
Dental plugger, electro-magnetic, w. G. Bonwil
Derricks, operating, A. Jackson...
Die stocks, threading, A. Saunders
Elevator, platform, G. .
Explosive compound, H. J. Detwill
rare box, recording, E. H. Scnnell.
Fats, rendering animal, w. E. And
Faucet, D. W. Goodell.
Feed cooker, J. S. Brubaker
Feed cutter, B. A. Wilton...
Feed regulator, Ford \& Hicks
Fence, H. B. Cluxton.........
Fence, iron, D. C. Guttridge
Fence, wire, T. S. Seabury...........
Fire arms, lock for, G. E. Williams.
Fries, extinguishing, J.
Fluting iron, M. Newton.
Foot rest,
Foot rest, F. A. Farnham
Fork, horse hay, E. Raber
Fringe, J. Hirner....
Fruit gatherer, I. Co
Frunt gatherer, I. Coe.......... .
Funeasuring, R. A. Landon
Furnace, ore-roasting, W. Mc
Furnace, singeing, B. Rose...
Gas apparatus, J. H. Eichho
cas retort lid, H. Collinson
Glass, underlay for printing on, J. L. Wells.
Globe for schools, N N. Brown
Garness, elastic back band for, J. W. Hollis
Harness rosette, S. S. Sar
Harvester. J. H. Whitney
Harvester, corn, Blood \& Hager
Harvester rake, P. F. Hodges.
Harvester rake, J. H. Whitney.
Harvester, grain wheel arm, C. H. Salzman
Harvester, slididg rake. Brown \& Hoo
Heel - burnishing machiue, C. J. Adds
Hides, coloring
Hides, coloring, Mer1
Hinge. L. H. Rogers.
Horse-hitching device, J. Schoonmaker
Horses, checking, J. Knight..
Hose nozzle. ©. s. Westland...
Hose nozzle, C. S. Westland...................
Indicator, navigator's bearing, J. D. Leach..
Jewelry, braided, w. w. Alden. Jewelry, braided, W. W. Ald
Kaleidoscope, J. F. Adams.
Kitchen shelf, A. A. Carter.
Knitting machine needle, C. J. Appleton
Lamp extinguisher,
Lantern. R. Nutting.
Lantern and dinner kettle, w. W. Pric
Latch,
Lathe
Lathe and belt saw, H. A. Kimbal
Lathing machine. C. B. Trimble
Letter box. D. J. Wilcoxs
Lock till, G. H. Peacock....... ....... .....
Locking device, drawer, . H. Wwilit ms...
Loom let-off mechanism, ,J. H. Moore......
Loom shuttle check and binder.
oo. T. Hurd
Loom stop motion fork, J. McCaf
Lumber dryer, M. Harris.........
Malt, stirring, A. Von Schlemmer

Matching machine, G. T. Riddle.......
Meat cutter, G. L. \& J. B. Chadorn.
Milk, preserving, J. H. Lester........

Mill burr furrow gage, wilhelm \& Leyde Millstone, G. T. Smith..
Molding apparatus, P. W. Doherty
Music leaf turner, w. Miller
Nail plate feeder. M. Leach
Nail plate feeder, G. H. Ryan
Nail, screw, picture, T. C. Richards..
Navigator's bearing indicator, J. D. Leach
Nut lock, C. B. Rager.
Ointment, J. B, \& S. W. Brown
Organ, reed, G. Blatchford..
Organ, reed, H. N. Goodma
Organ, reed, H. N. Goodma
Paper box, J. P. Buckingham
Paper box, D. L. Hawkins...
Paper box machine, Heyl et al. (r).
Paper box machine, J. E. Williams
Paper box machine, J. E. Williams
Paper boxes. making, J. E. Jeffrey
Paper fastener, endless, J. w. McGill.
Pencil sharpener and eraser, J. S. Hale
Pianoforte agraffe, E. Gabler.
Pianoforte pedal , w. F
Pianoforte pedal, W. F. Ulman............
Pianoforte stringing device, W. F. Ulma
Piano, upright, E. Gabler.
Pipe coupling, J. A. Cole.
Pitcher, self-closing, McGrew \& Clar
Planter, check row, G. C. Flagg
Planter, check row, G. C. Flag
Plow, double. S. D. Williams
Press, cotton, W. S. Frost...
Press, power, A. H. Merriman
Printing press, sheet delivery, c. B. Cottrel
Pump for driven wells, P. A. A.
Pump plunger, J. S. Engle..
Pump, steam, McCormack \& Kell.
Pumps, attaching handles to, O. E. Furber.
Purifier, middlings, J. W. Metz.............
Railroad rails, roll for ends of. H. Chisholm
Railroad signal, detonating, H. J. Detwiller.
Railroad signal, detonating,
Rake, horse, J. Badger....
Rake, horse hay, L. A. Tay
Registering gate, J. T. Aldrick
Rivets, making, B. C. Quimby.
Sack holder, adjustable, H. W. Clark
Sand andgravel dryer, S. S. Daish..
Sash fastener, E. K. Breckenridge.
Sash holder. Torrey \& Lyman...
Saw-fling machine F. W. Lutts
Saw-filing machine, F. W.
Saw, scroll, W. H. Briggs...
Scaffold, adjustable, H. Hill
Scaffold, window, G. Roberts....
Screw fastening, J. o. Ahlstrom
Separator, coal and ore, J. B. Wilfor
ewing machine, C. S. Cushman.
Sewing machine wheel journal, D. Snit je
Sheet metal bends, etc., making,
shingle packer. R. B. Taylor (r)...................
Shirts, S. Gutmann..............170,

Shirt, J. H. Myers ( r )
hoe sole fastening machine, S. Harris
Shoe tips, making, J. A. Stock weil
Sieve, A. Root.
Signal, electric, Edison \& Batchelor
skia, portable, G. E. Harring
Soap, composition for, w. F. Darnoby
park conveyer. C. K. Cullers.......
tencil plate, J. L. \& H. L. Turbox (r)
Still,Deyman \& Melchers....
Stump extractor, W. F. Keng
sumpender, w. Sto
Table, ironing, A. H. Swain
Table work, J. Cannon.....................
Telegraph, etc., pressure. C. E. Buell ..
Telescopes, eye piece for J. w. Nostrom
Thill coupling, w. L. Rayment
Ticket case. Vine \& Shuler............
Time check, watchman's,L. Aldrldge.
Trace coupling, H. G. Brow
rap, moth, B. F. Danie
rellis, 弓rape vine, T. S. Seabary
Truss, F. G. Otto..
Underwalst, Frost and Phelps
Valve, steam and cut off, A. J. Ley (r)
Vault, burglar-proof, C. O. Yale
Vegetable cutter, S. Hauck, Jr
vehicle seat, J. Bond
Vermin, destroying, J. G. Steele
Wagon axle skein, Fetta\& Tuttle
Wagon brake, H. Decker.
Wagon brake, Gourley \& Lovelace
Wagon, dumping, W. H. Cookse
wagon end gate, J. P. Outson...
Wagon jack, J. C. Crawfora.
Wagon, side bar, J. F. Barnecol
Washing machine clamp, Camp \& Osterhou
Watch, stem winding, C. D. P. Gibson
Watchman's time check, L. Aldridge
Water raising, electrical, E. Ponvert, Jr
Wate, wheel, G. H. Darlin
Water wheel, W. C. Grove
Welts, etc., S. D. Tripp..
Windmill, A. O. Campbel
Windmill, M. Crossma
Window screen, H. B. Walbridge
Wire fabric, A. C. Garrett
Wringer, J. Smith
DESIGNS PATENTED.

8,795.-. Endromery...E. Crisand, New Haven, Conn herd, Boston, Mass
,

170,148
170,120
169,907
. 170,070

6,740
$.170,103$
170002
10

## Lo, 0878 List of Patents Grantrd in Canada,



## Back Page :-:-: 81.00 a Inno. Inside Paze Enoravings may head advertizements at the same rate <br> Enoravings may head advertisements at the same rate per line, by measurement, as the letter press. Adver-

 tisements must be received at publication offlce at$\mathbf{W}_{\text {or }}^{\text {ANTED-FFor a Steam Tannery, some device }}$ or invention to prevent Sparks from esceaning
from the Chimeeve Adress, with articulars and price,
CYRIL FRANKLY N, Box 202, Halifax, Nova Scotia.
TO ENGINE BUILDERS-NEW ENGINE-One Cylinder Eccentric, Steam Chest, one Bed.\&.
Sives same result astwo Cylinders in Locomotive Style-

A N EXCEELLENT OPPORTUNITY OFFERED














TO ELEETBOPDTATERAKEY.



Merchants contemplating changes in their Partnerships, or the formation of New Firms, will oblige by communicating the same to us, that their names may appear correctly in the "Commerclal Agency Register.
Desiring to have our Records as accurate as possible, we will accept the Statements and References of any Merchant
Bankers, Mrgatin
bill隹 knowledge and werk do not harmonize with and reports. We ask this that we may, by fres are found to exist.
The "Commercial agency Register" will be ready for

Stone Channeling
Quarrying Machine,

H.W. JOHNS, 87 Maiden Lane, N.Y

NIAGARA STEAM PUMP,

Sole mandfacturers,
Engines and Boilers, a Specialty.
 EAGLE FOOT LATHES,


OR CUTTING STONE INTO VARIOUS SIZES AND DIMENSIONS IN ALL KINDS OF QUARRIES
steam stone cutter co., rutland, vt
OPIOME = waw




 II. P. ImDBPARD,

##  <br> 

## s250 $=$

Dolytechnic Chemicals, Soluble Glass, Hypro-




##   Machinery of lmproved Sylestor making SHINGGESEAEADING NNDSTAVES ITIIIIIT+J WROUGHT THE UNION IRON MLLS, Pittsburgh, Pa.  

THE
"HARD IIINE" LISTI
How to Save Monees.

| a papel and a magazine for little more than the price of one. |  |  |
| :---: | :---: | :---: |
| Until Jan. 1, 1876, we will send the tribune |  |  |
| (Weekly \$2, SEmi-weekly \$3), with either |  |  |
| of the popular Magazines, at the following greatly |  |  |
| reduced rates-far the cheapest ever offered by |  |  |
|  |  |  |
|  |  |  |
| Pric | Tribune. |  |
| $\$ 4$ | 847 |  |
|  |  |  |
| Harper's Weekly.... 400 | 475 | 575 |
| Harper's Sazar...... 40 | 475 | 575 |
| Scriboer's Monthly. 400 | 475 | 575 |
| Atlantic Monthly.... 400 | 475 | 75 |
| St. Nicholas......... 300 | 400 | 500 |
| Scientific American.. 300 | 426 | 520 |
| Christian Union..... 325 | 410 |  |

THE TRIBUNE camot furnish specimen copies
Address THE TRIBLNE, New-York.


SCIEICE RECORD For 1876.


##  <br>  <br> 

 NATURAL HISTORY AND ZUOLOGYGEOGRAOLOGY, TERRESTRIAL PHÝSICS, AND MINERALOGY,
 teresting and Valuable Boors, and should have a place
 ings. Price 82.50 . Sent, post-pala, on receipt of price.
All the preceding volumes of SCIENCE RECRD may be had separately at $\$ 2.50$ each, or $\$ 10$ for the
munn if Co., Publishers,
Park Row,
New York

## 

CLARK \& COMPANY'
PATENT SELF-COILING, REVOLVING STEEL SHUTTERS




Brainard Milling Machines
ITONE SAWING MACHINERY. MRRRMANS PATENT. ALSOHAND AND STEAM
DERRICKS \& TRAVELIERS

PATENT FRICTION PULLEFYS Triction Clutch for V-Pullegs.
D MA W IN G INSTRUMENTS-DRAWING


##  

 FiNEMACHINISTS ASAMAEUR TOOLS



PATENT
Planing and Matching









EINETOOLS

TMPORTANT FOR ALL CORPORATIONS AND TMA Mricic




## Amateur Workers in <br> EANCT WOODS



## Geo. W. Read \& Co.,








 SECDNDHAND
 8,00Oin Use Blake's
EAM PUMPS






## 

P. BLAISDEII \& 00


 BOOKWALTER ENGINE Compact, Substantial, Economical,
and Eastl Managed. Garanteed to
work welland givefull
Gower
 boxing, at the low price of of shipping
3 Horse Power....... $\$ 25200$ $\frac{412}{2}{ }^{2}{ }^{2}$

AS. LEFFEL \& C0 Springfield, Ohio; or
109 Liberty St., New York City TAECount's, Patent






VOLNEY W. MASON \& CO.,


 IMPROVED MACHIN ERY for STAVE

 VINEGAR HO WADE IN
 $\$ 3{ }^{\text {Pre }}$
Printing Bo Presses,
MACHINERY

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

1eBIAK Reade sts. N. Y. Cits Stone and Ore Breaker


Mann \& Co.'s Patent Oficices.

## Established 1846,

The Oldest Agency for Soliciting Patents in the United States
sTENTY-EIGH? $\overline{\text { YEARS EXPERIENOA. }}$
MORE PATENTS have been eeoured through this agenoy, at home and abros, than through any other in the world. perienced men as examiners, specifics of the most ax prienced men as examiners, speciflicstion writers, and
dransmon that can be found, many of whom have been se eeted from the ranks of the Patent Offcc.
SIXTY THOUSAND inventors have avalled themselves of Munn $\&$ Co.s services in examining their inventions, and procuring their patents.
MUNN \& Co in
MUNN \& CO., In comnection with the pablication of the SoIRNTIFIO ANERIOAN, continue to examine inventions
confer with inventors, prepare drawinge, specitcations, and assignments,attend to flling applications in the Patent Offloc, paying the government fees, and watch each case step by step while pending before the examiner. This is done through their branch office,corner F and 7th Streets, WashIngton. They also prepare and flle cesveats, procure deelign
patents, trsdemarks, and reissues, attend to rejected cases patents, trsdemarke, and reissues, attend to rejected cases
(prepared by the inventor or otherattorneys), procure copj(prepared by the inventor or otherattormeys), procure cops-
righte, attend to interferences give written opinions on righte, strend to interferences attend to every branc
Prtents obtained in Canada. Kngland, France, Belgium Oermany, Russia, Prassia, Spain, Portuggi, the Brition
Tolonies, and all other countriles where patents as granted.
$\qquad$
$\qquad$
Persons desiring any patent issuued from 1886 to Novem-
ber 26,1867 , can be supplied with sonable cost, the price depending upon the extent of drawngs and length of specifications.
Any patent issued since November 27, 1867, at which
time the Patent Office commenced tme the Patent Office commenced printing the drawings
and specifications, may behad by remitting to this office 11 and specifications, may be had by remitting to this office $\$ 1$
a copy of the claims of any patent issued since 1886 wil A copy of the cle
be furnished for $\$ 1$
be furnished for $\$ 1$
When ordering copies, please to remit for the same as
above, and state name of patentee, titlo of invention, and above, and state
all inventilions notio is made in the Boimitimo angerioas of all inventions patonted through this Agenoy, with the name and residence of the patentee. Patents are often sold, in part or wh
by such notico.

## by such notice

A pamphet of 110 pages, containing the laws and full dr-
rections for obtaining United States patenta, alsos circular pertaining exolusively to Forelgn Patente, stating cosis in each country, time granted, etc., sent tree. Addrese MUNN \& CO..
Pablishers SoIENTIFIO AMERIOAT;
Bynago Oprice-Oormer Fand Fth strcete

## gadurtisemencs,

 Engravings may head advertisements at the same rate ertisements must be received at publication office as early as Friday morning to appear in next issue.


"TYPE WRITER" A machine now superseding the pen for all writing ex-
cept bok-keeping. It write in plain type 8 to 100
words per minute. and at


 LOCKE, YOST \& BATESS,
707 Broadway, New York
HAIR-FELT----HAIR-FELT. BOILERS \& PIPES.

PATENT RIGHT FOR SALE.-The one-half


$\underset{\text { Havenovel deves }}{\text { Shaping Machine }}$ length ofstroeve whilieein motiong
aslos, automaticdown feed and
quick return. Four sizes.
 Worcester, Mass.
Manufacturers of all kinds Manufacturers of all kinds of
|ron Working Machinery
Shafting Pulleys, \&c.






Todd \& Rafferty Machine Co. manufacturers of


 MAGNETS-Permanent Steel Magnete

RICHARDSON, MERIAM \& CO.,




## Elgin Watcies.



DECLARED by Railroad Oficers, Engineers, As-


PRICES ranging foom a few dolarar for platin
 AVOID all co. D. .ajer eriestand aply to dealers








(4)The TAIITE EIMERY WHEEL




Address THE TANITE CO.,









## COVERING

 PORTLAND CEMENT

IRON PLANERS

the southern:states and industriat EXPOSITION

 AMES I A A. BLLDWIL






Schlenker's Stationary Revolving - Die Bolt Cutters, HOWARD IRON WORKS, $\underset{\text { BUFFALO, N. Y. }}{\text { send } \text { for circular. }}$ HARTFORD
STEAM BOILER
Inspection \& Insurance COMPANY.
W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y

 Hese
Portland Cement
THE BE S T INJECTOR For Locomotivo and stationary B
FRIEDMANN'S PATENT.
Over 15,000 Now in Use Here and in Europe Throws more and hotter water, with less steam, than NATHAN \& DRE 10 FUS, Sole Manufacturers,
(Niberty St., Now York for Catalegue.

THOMAS'S FLUID TANNATE OF SODA


## Mill FurnishingWorks




##  <br> 

$\$ 5$ a year by mail, post-paid. Send 10 cents for Specimen Copy. TO ILLUSTRATE AND DESCRIBE the many interesting themes and objects presented in the
GREAT CENTENNIAL INTERNATIONAL EXPOSITION Great Centennal international Exposition
of 1876, and also to meet the wants of that large of 1876, and also to meet the wants of that large
class of readers who desire an increased supply class of readers who desire an increased of the
of Scientific Information, particularly of more Technical and Detailed character, we shal issue a special publicaition, entited the sci-
ENTIFIC AMERICAN SUPPLEMENT, to be printed weekly during the Centennial year of
1876, and, perhaps, permanently thereafter. Each 1876, and, perhaps, permanently thereafter. Each number will have sixteen large quarto pages,
issued weekly, printed in the best style uniform with the SCIENTIFIC AMERICAN, but separately paged.
The SCIENTIFIC AMERICAN SUPPLEMENT, in addition to the special matter pertaining to the International Exposition, will embrace a very
wide range of contents, covering themost recent wide range of contents, oovering themost receat
and valuable papers by eminent writers in ALL nd valuable papers by eminent writers in ALL THE PRINCIPAL DEPARTME
USEFULKNOWLEDGE, to Wit:
1.-Chemistry and Metallurgy.-Embra-




--Electricity, Light, Heat, Sound.-
 Architecture.-Examples or the best New Structures, with detalis and drawings.
5.-Teechnology. New and CJefull Inventione


6.- Agriculture, Botany, and Hortcul-


7.-Rural anal Household Economy.


8.-Materia Medica, Therapeutics,
 perations, Reo Haeath Applan ces, and much in

| 9. - Natural History and Zoology. The |
| :---: |
| Latest Investigatoons D. Discovereres, and mosit inter | 10 d 11 -Meteorology, Terrestrial


12.-Geology and Mineralogy.-The Lates and most Interesting Geological Investigations
and Reports, and New Discoveries. 13.-Astronomy.-Recent Interesting Discover-
 TERMS:-Sclentific American Supple ment, One year, post padi, 85.00 ; half year, 82.50






## IRON AND STEEL DROP FORGING.

THE HEALD \& SISCO Patent Centrifugal Pumps.



## WESTON'S

DifferentialPulley BLOCKS,

Doyle's, Hall's \& Bird's, re now all merged and are con
trolled exclusively by the YALE LOCK M'F'G CO., Henry R. Towne, Prest.
Stampord, Cons.

## Wart \& MoCox

 New York Agents,$134 \& 136$ Duane Street
T. A. Weston, Mechanita
Engineer, with the Company.

## THE

## Sowiminitur

## For 1876.

The Most Popular Scientific Paper in the World.
Thirty-First Year.
Only $\$ 3.20$ a year including Postage
Esend 10 cents for Specimen copy
THE SCIENTIFIC AMERIC AN, now in its 31st year, enjoys the widest circulation of any weekly
newspaper of the kind in the world. A new volume commences January 1, 1876. Published week . Now is the time to subscribe and to form
The Contents of the SCIENTIFIC AMERICAN embrace the latest and most interesting informa tion pertaining to the Industrial, Mechanical, and
Scientific progress of the world; Descriptions, with beautiful Engravings, of New Inventions, New Implements, New Processes, and Improved Industries of all kinds; Useful Notes, Recipes, Suggestions and Advice, by Practical Writers, for
Workingmen and Employers, in all the various

EVERY NUMBER contains sixteen large quarto Eages, elegantly printed and illustrated with many engravings. The year's issue contains 832 large
pages, equal to four thousand book pages, at a cost, includıng postage, of only $\$ 3.20$ a year to the sub
scriber.
THE SCIENTIFIC AMERICAN will be especially
enriched during the current year by splendid enriched during the current year by splendid en-
gravings and descriprions of the most noticeable gravings and descriptions of the most noticeable
objects in the great Centennial International Exhi-

Engineers, Mechanics, Telegraphers, Inventors. Manufacturers, Chemists, Photographers, Physicians, Lawyers, Clergymen, Teachers, and People of all Professions, will find the SCIENTIFIC AMERICAN most useful and valuable. Its pages and conversation, and are an unfailing source of new and instructive information. As an Instructor and Educator, the SCIENTIFIC AMERICAN has noequal. It is promotive of krowledge and progressin every community where it circulates It should have a prominent place in every House-

## 10 cents.

TERMS OF SUBSCRIPTIONS.---POSTAGE One copy Scientific American, one year.... $\$ 3.20$ One copy Scientific American, six months.. 1.60 One copy Scientific American, three months 1.00 One copy Scientific American, and one copy
Scientific American Supplement, both
for one year, post-paid.
7.00
and one copy Science Record........ .. 5.20
and
We make a liberal discount and give advan tageous premiums to those who form Clubs or procure Subscriptions. A beautifully illuminated
Subscription List, also Prospectus and Rates sent Subscription List, also Prospectus and Rates, sent
free. Address

MUNN \& CO.


