
a WeEkly Journal 0f PRactical information, art, science, Mechanics, CHEMISTRy, and manufactures.

Vol. XXXVII.- $\underset{\text { [NEW SERILEs.] }}{\text { No. } 20 .]}$
Experiments with the Turkish Bath.
Some interesting observations were related at the last meeting of the British Medical Association, by William James Fleming, M.B. (Glasgow). These experiments were performed by the author upon himself. and consisted of ob servations on the effect of the Turkish bath at temperatures of from $130^{\circ} \mathrm{Fah}$, to $170^{\circ} \mathrm{Fah}$., upon the weight, temperature, pulse, respiration, and secretions. The results showed that immersion of the body in hot dry air produced loss of weight to an extent considerably greater than nor mal, amounting, on the average, to the rate of above forty ounces an hour. This was accompanied by an increase in the temperature of the body and a rise in the pulse rate, with at first a fall and then a rise in the rapidity of respiration. The amount of solids secreted by the kidneys was increased, and coincidently the amount of urea. The sweat contained a quantity of solid matter in solution, and among other a quantity of solid matter in solution, and among other
things a considerable amount of urea. The most important things a considerable amount of urea. The most important
effect of the bath was the stimulation of the emunctory action of the skin. By this means the tissues could, as it were, be washed by passing water through them from within out. The increased temperature and pulse rate pointed to the necessity of caution in the use of the bath when the circulatory system was diseased.

## IMPROVED PORTABLE LUNCH HEATER.

The annexed engraving represents a convenient apparatus for keeping a lunch or dinner warm while being carried from the place where it is cooked to the place where it is to be eaten, and for warming a lunch or dinner quickly, should it become cold.
A box, of rectangular shape, is provided with legs of conve nient length. At A are shelves, the ends of which rest upon cleats attached to the box. A narrow space is left at one end of the shelves to receive a cup, B, to contain coffee, tea, soup, or other liquid. The bottom and one end of the box are made with double walls, to form a hot-air chamber for the heated air from the lamp to pass through. The lamp is placed in a chamber of perforated sheet metal, and lamp is placed in a chamber of perforated sheet metal, and
is secured in place by flanged cleats or angle strips. To the

NEW YORK, NOVEMBER 17, 1877.
top of the box is attached a handle for convenience in carrying it; and also on the top of the box is attached a rim to form a tray to receive and carry knives, forks, spoons, napkins, and other articles.
This invention was patented through the Scientific Amer-

ican Patent Agency, Septemiver 18, 1877, by Mrs. Maria Bradley, of New York city.

A German contemporary recommends etching with a preparation of 250 grammes of perchloride of iron, which is allowed to slowly decompose in half a liter of water. The dvantage of this preparation is said to be that it has an ef fect on metals of all sorts without giving off noxious vapors. The object will need constant cleaning with a brush. The solution is rectified with oxide of iron when choked with
metal; the etched ground is cleaned with turpentine.

## INGRAM ROTARY MACHINE FOR PRINTING

 ILLUSTRATED NEWSPAPERS.We illustrate herewith the new lngram rotary printing press, from which engravings are printed from circular forms. It is the invention of Mr. William James Ingram, M.P., the son of the founder of the Illustrated London News. It is now used for printing that journal, from the pages of which we take our engravings.
At one end is placed a roll of paper about three miles long; and the machine is no sooner started than the paper is caught in the first instance by the cylinders immediately above the reel, receiving an imprint of the inner letterpress form; thence it is carried diagonally downward to the picture cylinders which print the illustrations on the other side of the sheet; it is next conveyed to the species of guillotine which cuts each number to its proper size, and being carried therefrom by tapes to the folding machine, this finally delivers a perfect copy of the paper-well printed on both sides, and folded-at the rate of 6,500 an hour. One marked advantage claimed for this new machine is the great saving of time in making. ready the illustrations for printing, from the fact that the cylinders are more rigid, and require a thinner "overlay" than any other machine we know. As for the letterpress form, neither " underlaying" nor "overlaying " is required, and the machine is constructed to work without roller lifts or bearers on either form. We may remark in further illustration of its many advantages over the ordinary press, that in the second week it was in use for printing a large issue its average work exceeded that of four of our fastest "two feeders"-a rapidity which may be realized all the more forcibly when we add that, whereas the new machine prints both sides of the paper, cuts each sheet, and delivers it folded, the old horizontal machines simply printed one form in the same time, and did not fold the sheets. There is thus a considerable saving of manual labor, only four men being engaged on the rotary machine, whilst twenty-four men were employed on the four machines. Let it be added that the "Ingram" machine only occupies the space of an ordinary perfecting machine; and little more
[Continued on page 306.]


INGRAM'S ROTARY MACHINE FOR PRINTING ILLUSTRATED NEWSPAPERS.

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NEW YORK, SATURDAY, NOVEMBER 17, 1877.

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VI. ASTRONOMY.-Star or Star Mist. By RICHARD A. Proctor.
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A WONDERFUL INVENTION. - SPEECH CAPABLE of
indefinite REPETITION. FROM AUTOMATIC RE-

## indefinite repetition. From automatic re cords.

It has been said that Science is never sensational; that it is intellectual not emotional; but certainly nothing that can be conceived would be more likely to create the profoundest of sensations, to arouse the liveliest of human emotions, than once more to hear the familiar voices of the dead. Yet Science now announcesthat this is possible, and can be done. That the voices of those who departed before the invention of the wonderful apparatus described in the letter given below are for ever stilled is too obvious a truth; but whoever has spoken or whoever may speak into the mouthpiece of the phonograph, and whose words are recorded by it, has his own tones long after he himself has turned to dust. The possibility is simply startling. A strip of indented paper travels through a little machine, the sounds of the latter are magnified, and our great grandchildren or posterity centuries hence hear us as plainly as if we were present. Speech has become, as it were, immortal
The possibilities of the future are not much more wonderful than those of the present. The orator in Boston speaks, the indented strip of paper is the tangible result; but this travels under a second machine which may connect with the telephone. Not only is the speaker heard now in San Francisco for example, but by passing the strip again under the reproducer he may be heard tomorrow, or next year, or next century. His speech in the first instance is recorded and transmitted simultaneously, and indefinite repetition is possible.
The new invention is purely mechanical-no electricity is involved. It is a simple affair of vibrating plates,. thrown into vibration by the human voice. It is crude yet, but the principle has been found, and modifications and improve ments are only a matter of time. So also are its possibilities other than those already noted. Will letter writing be proceeding of the past? Why not, if by simply talking into a mouthpiece our speech is recorded on paper, and our cor respondent can by the same paper hear us speak. Are we to have a new kind of books? There is no reason why the orations of our modern Ciceros should not be recorded and detachably bound so that we can run the indented slips through the machine, and in the quiet of our own apartments listen again, and as often as we will, to the eloquen words. Nor are we restricted to spoken words. Music may be crystallized as well. Imagine an opera or an ora torio, sung by the greatest living vocalists, thus recorded and capable of being repeated as we desire.
The invention, the credit of which is due to Mr. Thomas A. Edison, should not be confounded with the one referred to by us in a previous number, and mentioned in our cor respondent's letter. That device is illustrated on another page of this issue, and is of much more complicated construction. Mr. Edison has sent us sketches of several mod ifications and different arrangements of his invention These we shall probably publish in a future number.

## To the Editor of the Scientific American:

In your journal of November 3, page 273, you made the announcement that Dr. Rosapelly and Professor Marey have succeeded in graphically recording the movements of the lips, of the vail of the palate, and the vibrations of the larynx, and you prophesy that this, among other importan results, may lead possibly to the application of electricity for the purpose of transferring these records to distan points by wire.
Was this prophecy an intuition? Not only has it been fulfilled to the letter, but still more marvelous results chieved by Mr. Thomas A. Edison, the renowned electripublic not only the fact, but the modus operandi. Mr. Edison in the course of a series of extended experiments in the production of his speaking telephone, lately perfected, con ceived the highly bold and original idea of recording the human voice upon a strip of paper, from which at any subsequent time it might be automatically re-delivered with all
the vocal characteristics of the original speaker accurately reproduced. A speech delivered into the mouthpiece of this apparatus may fifty years hence-long after the original speaker is dead-be reproduced audibly to an audience with sufficient fidelity to make the voice easily recognizable by those who were familiar with the original. As yet the apparatus is crude, but is characterized by that wonderful simplicity which seems to be a trait of all great invention or discovery. The subjoined illustration, although not th

actual design of the apparatus as used by Mr. Edison, will better serve to illustrate and make clear the principle upon which he is operating.
A is a speaking tube provided with a mouthpiece, C$X$ is a metallic diaphragm which responds powerfully to the vibrations of the voice. In the center of the diaphragm
is secured a small chisel-shaped point. D is a drum re volved by clockwork, and serves to carry forward a contin uous fillet of paper, having throughout its length and exactly in the center a raised V-shaped boss, such as would be made by passing a fillet of paper through a Morse register with the lever constantly depressed. The chisel point attached to the diaphragm rests upon the sharp edge of the raised boss. If now the paper be drawn rapidly along, all the movements of the diaphragm will be recorded by the in dentation of the chisel point into the delicate boss-it, having oo support underneath, is very easily indented; to do this, little or no power is required to operate the chisel. The tones of small amplitude will be recorded by slight inden tations, and those of full amplitude by deep ones. This fillet of paper thus receives a record of the vocal vibrations or air waves from the movement of the diaphragm and if it can be made to contribute the same motion to a second diaphragm, we shall not only see that we have a re cord of the words, but shall have them re-spoken; and if that second diaphragm be that of the transmitter of a speak ing telephone, we shall have the still more marvelous per formance of having them re-spoken and transmitted by wir t the same time to a distant point.
The reproductor is very similar to the indenting appar tus, except that a more delicate diaphragm is used. The reproductor, B , has attached to its diaphragm a thread which in turn is attached to a hair spring, $H$, upon the end of which is a $V$-shaped point resting upon the indentations of the boss. The passage of the indented boss underneath this point causes it to rise and fall with precision, thus conributing to the diaphragm the motion of the original one, and hereby rendering the words again audible. Of course Mr . Edison, at this stage of the invention, finds some difficulty i reproducing the finer articulations, but he quite justified by esults obtained, from his tirst crude efforts, in his prediction that he will have the apparatus in practical operation withi year. He has already applied the principle of his speak ing telephone, thereby causing an electro-magnet to operate the indenting diaphragm, and will undoubtedly be able to transmit a speech, made upon the floor of the Senate, from Washington to New York, record the same in New York utomatically, and by means of speaking telephones rede iver it in the editorial ear of every newspaper in New York In view of the practical inventions already contributed by Mr. Edison, is there any one who is prepared to gainsay this prediction? I for one am satisfied it will be fulfilled and that, too, at an early date.

Edward H. Johnson, Electrician.

## INFLUENCE OF FEAT ON THE TENACITY OF METALS

A very important series of experiments has recently been conducted by the Admiralty at. Portsmouth, England, with a view of ascertaining what loss of strength and ductility takes place in gun metal composition when raised to high temperatures, the especial object being to discover whethe gun metal would be more or less suitable than cast iron for making such articles as stop and safety valve boxes, steam pipe connections, fastenings, etc., which might be subjected to high temperatures, either from superheated steam or from being placed in proximity to hot uptakes or funnels. The gun metal was cast in the form of rods one inch in diameter, and composed of five different alloys as follows No. 1. Copper, $87 \cdot 75$; tin, $9 \cdot 75$; zinc, $2 \cdot 5$. No. 2. Copper 21; tin, 7; zinc, 2. No. 3. Copper, 85; tin, 5 ; zinc, 10 No. 4. Copper, 83 ; tin 2; zinc 15. No. 5. Copper, 92.5 ; in, 5 ; zinc, $2 \cdot 5$.
The specimens were heated in an oil bath near the break ing machine, and the operation of fixing and breaking were rapidly and carefully performed so as to prevent, as far as possible, loss of heat by radiation. The strength and ductility of the above alloys at atmospheric temperature were as follows: No. 535 pounds, 12.5 per cent; No. 2,825 pounds, 6 per cent; No. 3, 525 pounds, 21 per cent; No. 4,485 pounds, 26 per cent; and No. 5, 560 pounds, 20 per cent. As the heat was increased a gradual loss in strength and ducility occurs, up to a certain temperature at which, within few degrees, a great change takes place, the strength falls to about one half the original, and the ductility is wholly one. Thus in alloy No. 1, at $400^{\circ}$ Fah., the tensile strengt had fallen to 245 lbs ., and the ductility to 0.75 per cent, the precise temperature at which the change took place was scertained to be about $370^{\circ}$. At $350^{\circ}$ Fah., the tensile trength was 450 lbs ., and ductility 8.25 per cent. At temperatures above the point where this change begins and up $500^{\circ}$ Fah., there is little if any loss of strength.
It is scarcely necessary to point out the practical impor tance of this discovery; $370^{\circ}$ is a comparatively low tempera ture and easily reached under no abnormal conditions in cannon and in many parts of machinery which are now mad of gun metal. If specimens of the best alloys of that de scription are liable to become so seriously impaired in strength by the change, the question of course arises as to what alloys may be substituted for gun metal which shall what partake of its unreliable character.
Various other alloys have been tested during the same series of experiments in order to investigate this, and the subject will be further pursued in other trials. It appears that phosphor bronze, the only metal in the series which from its strength and hardness could be used as a substitute was less affected by temperature, and at $500^{\circ}$ retains more than two thirds of its strength and one third of its ductility The experimenters suggest however that before adopting
phosphor bronze as a substitute for gun metal, it should be determined what difference may arise from variations in the process of casting or difference in the quality of the material used, also whether it is possible to harden any of the other compositions without loss of strength.
It is further stated that rolled Muntz metal (copper 62, zinc 38 ) and copper are satisfactory up to $500^{\circ}$ and may be used as securing bolts with safety. Wrought iron, Yorkshire and remanufactured, increases in strength up to $500^{\circ}$, but loses slightly in ductility up to $300^{\circ}$, where an increase be gins and continues up to $500^{\circ}$, where it is still less than a ordinary temperature of the atmosphere. The strength of
Landore steel was not affected by temperature up to $500^{\circ}$, Landore steel was not affected by temperature
but its ductility is reduced more than one half.

## a new and remarkable strike

For three weeks past a strike has been progressing in this city which, both in its origination and the manner in which it has been conducted, presents some remarkable features The striking workmen number about ten thousand, and their trade is the manufacture of cheap cigars, maiuly of Connecticut tobacco. There are over 1,800 cigar manufacturers in this city. By far the larger number are small manufac turers, who employ from five to fifty hands in a shop. The present strike is almost confined to the large manufactories, some sixty in number, and which are run by piecework under two systems. Either the han 3 s come to a "shop," or the work is given out to families who live in tenements be longing to the firm. In the tenements the pay averages from $\$ 4$ to $\$ 4.50$ per thousand for the cheapest grade of cigars; in the shops the pay for the same kind is $\$ 1$ higher per thousand. In the latter, however, the leaf is furnished stripped and booked, while the "house workers" have the additional labor of doing this themselves. "Stripping and booking" is worth 75 cents per 1,000 cigars. The real disproportion
between shop and tenement work is, therefore, $\$ 1.75$ per thousand. There is no reason for the distinction, and to equalize the rates is the main object of the strike. Of the 10,000 strikers, about 6,000 are "house workers," and the hardships which it is now sought to obviate mostly relate to the tenement house system. In shops, division of labor ex ists-in tenements it does not, except so far as different members of a family divide it among themselves. To make clear this distinction it is well to state that, in a shop, the to bacco leaf is first "stripped" by children, who remove the stems. It is then "padded" into " books" of 50 or 100 leaves each, which are dampened. The best leaves are used for "wrappers," or outer envelope of the cigar; the next bes for "binders," or inner wrappers; and the small and broken leaves, together with the cuttings and scraps, are cut up by machines fur "filling." The " bunch maker " rolls the filling in the binder and places it in a cigar form or mould, where it is pressed into shape. It then passes to the "roller," or, as he is technically called, the "cigarmaker," who encloses it in the "wrapper" and applies the finishing touches. The finished cigars are then handled by the "packer," who se lects and classifies them into various grades, according to strength, color, gloss, and other variations. They are then put in boxes and stamped.
In hand work moulds are not used, each cigar being rolled and put together by one man, who must be a skilled workman. The form cigars are the cheapest made.
The revenue laws require that a license should be paid and a bond filed for every place where cigars are manufactured. To make the expense as little as possible, manufacturers who have work done outside hire a block of tenements and put their "house workers" in possession. The hands to obtain
work are obliged to live in these tenements. A family occupies from two to three rooms, for which they pay one third more rent than for similar apartments elsewhere; $\$ 11$ is paid, when $\$ 8$ would be a fair sum. These families are supplied simply with forms and crude leaves, so that they are obliged to do everything up to the packing, which involves special skill. The "house workers" are almost all Bohemians, and their entire families, even to children as young as five years,
work to eether. The children usually "strip," the husband work together. The children usually "strip," the husband
"bunches and moulds," and the wife, who is generally the most skillful, does the final rolling. A fair week's work for a family of four or five is 2,500 cigars, and to accomplish this they must often work sixteen hours a day. They would earn about $\$ 11$ per week. If there are three adults working, $\$ 15$ per week would be a high figure. The tobacco supplied is often poor, fragile, and difficult to handle, and then stiil fewer cigars per week are made. The "shops" are illventilated, improperly drained, and consumption among the workers is frightfully prevalent. The tenements are, per-
haps, a little better where improvements have been introhaps, a little better where improvements have been intro-
duced; in many instances they are, if anything, worse than the shops. The destitution and physical condition of the "house workers," especially the children, is very great; the mortality among them has frequently caused the Health Board serious alarm.
The manufacturers explain this condition of affairs with the statement that the tenement worker3 are inferior hands, making the cheapest cigars, and that the competition of Western manufacturers compels them to keep wages down. On the other hand, the manufacturers who have shops only condemn the tenement system in unmeasured terms.
The cigarmakers now demand that $\$ 6$ per 1,000 be the lowest rate paid either for shop or tenement work, and that the rates on higher grades of cigars be raised to a fair sum. is doubtful whether it would be profitable under the above
conditions. The strike first attained prominence among the house workers," but soon spread to the large shops, until
he above mentioned total was reached. Bunchers averaged from $\$ 7$ to $\$ 10$, and rollers from $\$ 9$ to $\$ 12$, in shops. No in imidation, no coercion was resorted to, absolutely nothing has been done to compel the disaffected to join the move ment. The only means adopted, besides simple argument, ment. The only means adopted, besides simple argument,
were the stationing of pickets at the doors of striking factoies and tenements, who reasoned with men who came to ake the places of the strikers, and if possible induced them to join the union. If the men persist, they are peaceably
permitted to accept employment, but no union man will permitted to accept employment, but no union man wil
work in the same shop with them, nor can they afterwards join the union except on paying a large fine.
No sooner had the strike been fairly started than an organization was effected. The striking shops and tenements elected delegates proportioned to their numbers, who me and formed the Central Association of Cigarmakers. Of
this body an executive committee arbitrates and equalizes prices for the various shops, manages financial affairs, etc. An organization committee organizes each individual shop, making each a perfect sub-organization, controls pickets and matters of discipline. A relief committee collects funds,
examines applications for relief, personally investigating the examines applications for relief, personally investigating the
condition of each applicant, and if worthy delivering certificates in proof of authenticity. These certificates when presented to a sub-relief committce are exchangeable for orders on the relief stores. The orders give details concerning the holder and his family, and call for a ration in accordance. An order for a family of six is exchangeable for seven pounds of flour, two pounds of coffee, four pounds of sugar one peck of potatoes, three heads of cabbage, besides pease beans, rice, salt, and soap. This is a weekly ration, ind one dollar in cash for small expenses accompanies it. A daily ration of meat and bread is given out, the applicant's name For the sick there are special rations of wine, etc., and pro vision made for a doctor's attendance. All this organization is entirely separate from the trades' unions. People who receive its benefits are not necessarily union members, although all have since joined the unions. But the unions, of which there are three in the city, contribute largely to the suppor of the organization. Aid is also furnished by unions out of the city, by unions of entirely different trades, by private
subscription, but mainly by weekly contributions from hands subscription, but mainly by weekly contributions from hands
in factories which have yielded to the strike and in small shops where adequate wages are paid.
A very strong manufacturers' combination is opposing the strike, so that its success is yet problematical. We have entered into the details of the uprising because they are in marked contrast with the characteristics of other strikes of late occurrence. At the time of writitig 2,000 families, num-
bering over 6,000 people, are drawing upon the relief stores, and nearly all of them are in a state of total destitution. Nevertheless there have been no outrages, no immoderate harangues; in fact, were it not for the published accounts
in the daily journals, few would know that 10,000 people in in this city were carrying on a great strike.

## notes of decisions of the courts.

In the case of Lane vs. Peck, lately decided by Judge Shipman, the complainants sought to restrain the defendants from the infringement of letters patent for a self-closing faucet, which were issued to Nathaniel Jenkins, June 27,
1875, and which had been duly assigned to the complainants. The defendants admitted the infringement; and the sole question before the court was as to the novelty of the
alleged invention. The invention consisted in opening a self-closing faucet by means of a quick-threaded screw fol lower, the threads of which were inclined at so great pitch that, when the power to turn the screw was removed, the pressure cf the water, and of a spiral spring under the valve, forced the valve to its seat, where it was held by the pressure of the water. As self-closing faucets opening by means of a lever, and also by means of a quick-threaded
screw, have long been known, the invention in question was the combination of a quick-threaded screw, valve, and spring.
The French patent of Chrétien Morand, dated November 14, 1851, was chiefly relied upon by the defendants as antici patory of the plaintiff's patent. The Morand device wa designed in part to prevent what is called the "water hammer," or the unpleasant sound which is caused by the reac tion of the water when the valve is suddenly closed. The Morand faucet was of two parts of an unequal size; the in duction way was of a larger size than the eduction way There were two valves, also of unequal size. The outer
valve was in rigid connection with and was turned by a valve was in rigid connection with and was turned by a
quick-threaded screw spindle. This valve was so connected with the inner one that the inner valve was guided longitu dinally, and was forced to its seat by the same rotation of the screw follower which operated upon the outer valve The connection of the inner valve with the spindle was by means of a swivel joint. Below the inner valve was sring, which, with the pressure of the water, caused the
valves to be closed when the power that turned the screw was removed. By the use of two valves, the body of water lying between the valves formed a cushion. which checked
the force of the sound, or of the blow of the water hammer the force of the sound, or of the blow of the water hammer,
when the faucet was suddenly closed. Morand stated in the specifications of his patent that, while he preferred two valves, it would be understood that in certain cases he could then be constructed he did not describe.

It will be seen that the principal elements employed to produce a self-closing faucet, to wit: the screw follower with a quick threaded screw, valve, and spring: are found in both the Morand and Jenkins patents; but the double valves of Morand, and the general method in which the mechanism of the inner valve and the spring were arranged, with reference to each other and the water way, caused his aucet to be cumbersome and lacking simplicity and econ omy. It was a contrivance of many parts, and lacked genral utility. Jenkins omitted one of the valves, and of course discarded the connection between the two, and made the passage ways for the entrance and discharge of the water of the same size, and connected the valve and the screw foilower by a swivel, and generally materially simplified the construction and arrangement of the valve and spring mechanism. He thus made a simple and economical self-closing faucet. He produced the old result of Morand in a more economical and beneficial manner.
The court, in determining the question of novelty, holds that while the invention of Jenkins is subsidiary to that of Morand, yet Jenkins has essentially changed the Morand device in such a manner that, by the change, the thing which is produced is practically a new structure; that the change introduced by Jenkins is not merely formal, but is, to a certain extent, a structural change and modification of the parts of the Morand faucet, which change required inventive and not merely mechanical skill, and required a sufficient exercise of the inventive faculty to justify the grant of a patent. The Jenkins' patent is therefore sustained, and an injunction and an account decreed against the defendants.

## PROFESSOR JAMES ORTON.

We regret to announce the sudden decease of Professor James Orton of Vassar College, one of the foremost of American naturalists and geographers. He was on his homeward journey from Bolivia, and was crossing Lake Titicaca to Peru, where he was seized $\dot{\text { with }}$ a malarial fever and died on the 24th of September. He was interred, the Panama Star and Herald says, "on a little island within. gunshot of the shore in the port of Puno, " 130 miles rom Arequipa. Professor Orton was born at Seneca Falls, N. Y., April 21, 1830. He graduated at Williams College in 1855, studied theology at the Andover, Massachusetts, Theological Seminary, and was ordained a congregational minister in 1860, after traveling in Europe and the east. Attracted by scientific pursuits he left the pulpit and in 1866 became an instructor in natural sciences at Rochester University. In the following year he took charge of an expedition fitted out by Williams College to explore the northern regions of South America. Landing on the Pacific coast this expedition proceeded to Quito and thence crossed the continent through the valleys of the Napo and the Amazon, discovering in its course the first fossils ever found in the Amazon valley. On his return in 1869 he became Professor of Natural History at Vassar College. In 1870 he published his well known work, descriptive of his South American journey, entitled "The Andes and the Amazon." In 1873 Professor Orton made a second journey across South America landing at Pará on the Atlantic coast and crossing the Peruvian Andes to Lima, from which city he proceeded by invitation of the late Henry Meiggs to Southern Peru, and by way of Arequipa and Puno reached Lake Titicaca. He came home in 1874. About a year ago he went back to
South America for the third and last time, to complete the South America for the third and last time, to complete the
exploration of the great Beni river, which carries the waters of Eastern Bolivia to the Amazon, by way of the Madeira. For some reason he relinquished his purpose and started, as we have stated, for home, when the disease overtook him. Besides "The Andes and the Amazon," he was the author of many other valuable scientific works.
Professor Orton was'a brilliant writer possessing descriptive powers of a high order, as the many letters which he has contributed to these columnswhile pursuing his South American explorations abundantly testify. His last communication was an excellent paper on the "Sugar Interest in Peru' which appeared in our issue of September 15th last. His death leaves a vacancy in the ranks of workers in
Science not easily filled, for it is rarely that the qualities of the scientist, the explorer, and the writer are found united in such eminent degree.

## Influence of Light on Metals.

We have already noted M. Siemens' discovery of the infuence of light on the electrical resistance of selenium, and his construction of a new photometer based on this principle. Recent experiments have shown that light similarly acts upon tellurium, but in less degree. In a note to the Philosophical Faculty of Heidelberg, M. Bœrnstein states that light also affects platinum, gold and silver, and probably all the metals.

The Sir John Franklin Relics Probably Discovered. Mr. Thomas Barret, mate of a whaling brig recently lost in Hudson's Bay, has, it is reported, discovered proof of the existence of the records of the ill-fated Arctic expedition, which was commanded by Sir John Franklin. The natives ave specified exactly where the books, etc., are to be found, o that Mr. Barret is about to organize an expedition to sail from New York in the spring to obtain them. Some years ago Parliament, it is stated, offered a reward of $\$ 100,000$ for the recovery of these relics, and on the present maintenance of this offer, the sailing of the new expedition will be contingent.

Continued from first page.
need be said to prove that it bids fair to effect as great a revolution in the printing of illustrated newspapers as the latest Walter and Hoe rotary machines have effected in the printing of daily newspapers.
We may here quote from Mr. Ingram's specification to the Commissioners of Patents the passages referring to the principal improvements which he has introduced:
'It has been found in practice that 'cuts' or engravings require much more careful inking than the letter press, and that the ordinary inking arrangements, which are found to answer very well for printing letter press, will give but very imperfect work from engravings or cuts. It has also been wellnigh impossible to obtain satisfactory impressions from 'cuts' or engraved plates bent to the sharp curve required to correspond to printing cylinders of the ordinary size.

The large printing cylinders will therefore perform two ing roilers, snatch or break the paper at the places wher thirds of a revolution while the smaller or type cylinder is it has been perforated, and form it into separate sheets. making one complete revolution.
"My next improvement relates to the inking apparatus, which is used in conjunction with the large printing cylin der, and consists in the use of an increased number of ink ing rollers and distributing rollers. so that the engravings may be more perfectly inked than heretofore. The ink, as is usual, is transferred by a vibrating roller frowa the ductor or fountain roller to the first distributing cylinder, from second distributing cylinder, to which an endway motion is given by means of any suitable mechanism. The ink is thereby evenly distributed over the surface of this second cylinder, from which it is transferred by other rollers to two other distributing cylinders, in contact with which four

As it is found that machnery for folding newspapers works much better at a moderate speed, in this case it has been arranged in duplicate, so that each folder only works at half the speed of the printing machine. The vibrating arm, H , delivers the sheets alternately to K and J , which are carrying tapes leading to the two folding machines. I the sheets are wanted unfolded, the arm, H , is moved to it ghest position and there fixed; it then delivers the sheets to eroller L, and, by means of a blast of air and a flyer, the re laid in a pile on a table provided for them. This change an be made without stopping the machine. Another machine is stated is being constructed embodyingfurther improve ents which will make it possible to print two whole sheet and two half sheets of the Illustrated London News on the


INGRAM'S ROTARY MACHINE FOR PRINTING ILLUSTRATED NEWSPAPERS.
" In order to overcome these difficulties I considerably increase the diameter of the printing cylinder to which the 'cuts' or engraved plates are to be adapted, so that the curves to which these 'cuts' or engraved plates are bent may be gentler and of longer radius than the curved surface of the other printing cylinder. By this means I am also enabled to place on the same printing cylinder two, three, or more copies of the cuts or engravings, so that while the surface speed of the large and small printing cylinders is the same, the small cylinder, if it contains only one set of stereotype plates for the letter press, will rotate two, three, or more times for every revolution of the large cylinder. The impression cylinder, which acts in conjunction with the large printing cylinder, is also correspondingly increased in size, and rotates at the same surface speed. If desired, the type cylinder may be increased in size so as to be capable of receiving a duplicate set of stereotype plates for the letter press, while the large cylinder will have triplicate or other suitable number of sets of cuts for the engravings.
inking rollers rotate and take therefrom the ink, which the ransfer to the printing surface. In this manner the cuts or gravings are plentifully and evenly supplicd good impressions are obtained therefrom.'
We add particulars of the side elevation view, represent ing the action of the "Ingram" machine:
$A$ is the roll of paper, containing a length of from two to three miles. B B, the type and impression cylinder for printing the inner form, or type side, of the paper. C C, calendering or smoothing rollers to remove the indentations produced by the impression of B B, so that a smooth surface is preserved to receive the outer form, or illustrated side of the paper, which is printed by D D. E E are cylinders, one provided with a saw-toothed knife, and the other with a corresponding indentation, to perforate the paper between each impression.
F F are rollers for holding the paper securely, to resist the effect of G G, which are called snatching rollers, and,
machine. The size of the page of the Neros is about the same as that of the Scientific American.

## IMPROVED BORING AND TURNING MACHINE

- We illustrate herewith a new combined boring and tureing machine, constructed by_Messrs. W. B. Bement \& Son, f Philadelphia. The headstocks for the boring and turn ing tools are both mounted on the same carriage, which has vertical traverse given to it, by means of the screw and bevel gearing driven off a pulley mounted on the horizontal haft at the top of the frame. The headstocks can be tra ersed horizontally, or set at any desired angle, and the dis ance apart of the boring and turning tools can be regulated at will. The tools are fixed, the table on which the work is placed being caused to revolve by the gearing introduced as shown. The weight of the boring and turning bars is balanced by counterweights passing over pulleys on the top of the frame, and the cutters are fed down to the work by a pinion gearing into the rack on the bar.


BEMENT'S BORING AND TURNING MACHINE.

## GRAPHIC PHONETICS

In 1875 the French Linguistic Society called for investi gations to determine some method which would furnish an objective trace of the phonetic movements produced by the concurrence of the thorax, larynx, lips, tongue, and palate. The object set forth was not merely to discover the part

played by each of these organs in producing sounds, but to find how these different motions combined with and followed each other. The matter was referred to Professor Marey who, in conjunction with Dr. Rosapelly, who had already begun similar studies, and M. Havet, of the Society's Commission, undertook a series of experiments. These have proved of considerable physiological importance, as they may lead to the definition of the laws which govern the evo lution of language, the discovery of the transitions through which a letter changes in degree, order and family, and subsequently to the determination of the relative force and the succession of air vibrations and of those of the phonetic organs which are called in play in the production of vo-

Fig. 3.

consonants, such as $b$ and $p$ : of the latter kind, in the emission of the $v$. The apparatus represented in Fig 4 is designed for the examination of the vertical lip motions. The upper lip is placed in the bent meta arm, $l$ ', and the lower lip in the similar piece, $l$. Du ring the elevations of the lower lip the arm which ter minates with the portion, $l$, moves about the articulatio placed near its middle. It extends the small rubber ring which connects it by opposite end to the upper arm, and so draws toward it the rubber membrane of the drum, $T$, to which it is connected by a small metal bridge. Air is thus drawn into the drum, T , by the tube, $t$, which also commu nicates with a drum having an inscribing lever; the pen on which, as the upper lip is raised, makes an ascending line. This will be better understood by examining the broken lower trace in Fig. 3, and in pronouncing the syllable $a b$, The sinuous line expresses the opening of the lips when it occupies the upper horizontal position. It corresponds to their complete closure when it occupies the lower horizonta place. The oblique lines mark the moment of passage from one of these positions to the other.
The movements of the palate, which are of great impor tance in the articulation of certain syllables, such as am $m a, a b-m a$, cannot be explored except by introducing in the rear nasal fossæ instruments annoying to the experi menter, and, besides, likely to impair the clearness of the sounds produced. Czermack, however, suggested the idea of registering these movements by holding before the nos trils a cold, highly polished mirror. Whenever the veil of the palate is drawn back a displacement of a small quantity of warm moist air occurs, which dulls the surface of the mirror. In order to obtain an inscription of this feeble air current, a small tube is introduced into the nostril, which leads to a drum having, as before, an inscribing lever. By this means, in conjunc tion with the other apparatus, it was possible to obtain graphic traces simultaneous ly of the movement of lips, and palate, and larynx vibrations, and thus to determine the problem of studying the dura tion and succession of the combined movements.
The diagram, Fig. 5, is an example of the graphic result reached. The column on the left indicates cal sounds. Of this, the practical result anticipated is the $\mid$ the nature of the lines, namely, nasal pre ssure, viorigination of a more scientific method of education for deaf mutes, by conveying to the mind of the latter the necessary instruction through the medium of graphic traces. By performing the motions of the organs called for by these it would follow that the mute would produce exactly the sounds, etc., indicated.
In La Nature we find the annexed engravings of the ap paratus for the exploration and inscription of the vibrations of the larynx, the movements of the lips, and those of the veil of the palate. In speech the larynx emits the fundamental sound, the timbre of which is determined by the resonators, namely, the pharynx, the nasal fossæ, and buccal cavity. Vibrations, therefore, corresponding to a simple sound are produced, which it has been found possible to register by applying laterally to the larynx the apparatus represented in Figs. 1 and 2. This contrivance is analogous to that devised by Professor Marey for recording indications of very rapid movements, and is based on the inertia of a mass elastically suspended. As this mass is capable of obeying only the rapid movements which are communicated to the parts surrounding it, it constitutes a sort of fixed point against which a series of shocks are produced. M is the mass of copper suspended at the extremity of a spring, R. Below the mass is a platinum point, P , which is exactly in contact with the mass, so as to close an electric circuit which follows the path indicated by the wires marked + and - : in the outer portion of this electrical circuit is placed a battery and a Deprez apparatus for rapid signalling. The mass and the point on which it reposes are inclosed in a small light case formed of wood and hardened caoutchouc, so as to obtain insulation of the two ends of the battery circuit, except at the point of contact of M and P . A regulating screw, V, placed near the spring, in the vicinity of the mass. M, limits the movements of the apparatus around the mass which is placed at the center. It will be seen that each vibration of the larynx, on which the apparatus is applied, will cause the separation of the circuit. The Deprez signal indicates each rupture and each closing of the circuit in which it is placed. Its sensibility is such that a great number of signals may be inscribed in a second, and thus all the vibrations of the larynx causing breaks and establishments of the current are accurately registered. In Fig. 3 are shown the vibrations of the larynx corresponding to the vowel, $a$. These disappearwhen $p$ or $f$, in the syllables $a p$ or $a f$, is pronounced; and persist, on the other hand, when the $v$, in the sylla ble $a v$, is uttered. The same figure shows, besides, the trace of the larynx vibrations, that of the lip move ments registered simultaneously.
The lips execute vertical movements of raising and lowering and antero-posterior movements in a horizon tal plane. During the latter the lips are carried more or less forward. The type of the first kind of movement is observed in the emission of the labial explosive
curve the same order is observed. Thus the nasal pressure at the top may be normal when noted during the occlusion of the veil of the palate or elevated by the air pressure when the veil is partly retracted. The middle line corresponding to laryngeal vibrations is straight when that organ is mute, and undulatory during the emission of laryngeal sounds, finally the lower line of each series expresses lip movements as already described.

According to recent statistics there are in the United States 227 horses to every 1,000 inhabiiants.

Fig. 5


The Technical Uses of Cobalt.
The application of ores of cobalt for blue coloring of lass appears to have been known and practised by the an cient Greeks and Romans, since the presence of this metal has been occasionally detected in ancient glass and porce lain. The general use of cobalt ores for the manufacture of

smalt did not occur until about the middle of the sixteenth century, about which time the art was practised in Saxony The metal cobalt was first isolated and described as a new lement by the Swedish ismist Brandt in 1783. It closely allied to nickel in many of its proper ties, and its ores generally occur associated with those of the latter metal. Its chief ores are smaline, an arsenide of cobalt, iron nickel. some speci

mens of which often contain as much as 26 per cent of co balt, cobaltine, or cobalt-glance, a sulph-arsenide of cobalt and iron, and cobalt bloom, a hydrated arsenate of cobalt The preparation of pure metallic cobalt is one of the most tedious and difficult of chemical processes, and ss our pur pose here is simply to call attention to the practical uses of the compounds of the metal, its metallurgy need not concern us. The metal has a reddish gray color, and is susceptible of taking a superb polish. It is less infusible than iron, but more so than gold. Like iron and nickel it is magnetic, but does not lose its magnetism by heat. Itsspecific gravity is about $8 \cdot 5$. In conducting qualities for sound, heat, and electricity it is about the same as iron. It is somewhat malleable at a red heat, when free from manganese or arsenic. It is quite unaffected by air or water at ordinary temperatures, but when intensely heated it burns with a reddish flame. It is only slowly dissolved by hydrochloric acid, but nitric acid or aqua regia dissolves it readily. The solutions of cobalt salts have a fine rosy tint, easily recognizable when once seen. Cobalt has been found to make a very handsome plating upon coppor, brass, and iron, rivaling or even surpassing nickel in beauty. Its expense, however precludes the possibility, at least at the present time, of competing with nickel for this purpose

Compounds of cobalt possess the property of impart ing a beautiful blue color to glassy substances at a red heat. The important blue color known as smalt is made by fusing cobaltous oxide with siliceous sand and potassic carbonate in crucibles, and pulverizing the resulting blue glass. This substance was formerly extensively employed for the blue coloration of paper, linen, etc., but its use is now mainly limited to enamel ing and glazing. A very impure cobaltous oxide is made by roasting smaltine or cobaltine, mixed with siliceous sand, and comes into the market under the name of zaffre. It is also employed for the blue coloration of glass and pottery. Thénard's blue is prepared by mixing alum with a cobaltous salt, and precipitating the mixture with sodic carbonate; or by decomposing the aluminate of soda by means of cobaltous chloride. The precipitate is an intimate mixture of hydrate of alumina and lydrated oxide of cobalt. After being well washed, dried, and heated, the resultant blue pigment bears a close resemblance in color to ultramarine It is indifferent to acids, alkalies or heat, and is used for staining glass or porcelain, and for oil and water colors.
Cœruleum, another blue color, is a mixture of cobaltous stannate with stannic acid and gypsum. It is also unaffected by heat or by acids and alkalies. Riemann's green is a compound of cobalt and zinc, made by precipitating with sodic carbonate a mixed solution of white vitriol (zinc sulphate) and a cobaltous salt. Cobalt yellow is a mixture of nitrite of cobalt and potas
sium, made by passing nitrous vapor through a solution of cobaltous nitrate to which potassic hydrate has been added. A remarkable series of compounds of cobalt with ammonia have been observed and studied by Genth, Gibbs, Frémy and others. The employment of cobalt salts in a laboratory for thedetection of manganese, alumina, zinc, etc., by means of the blowpipe, is very important to the analyst. The sensitiveness of cobalt salts to heat and moisture has been utilized in the production of sympathetic inks, which are invisible at ordinary temperatures, but are rendered visible and legible on heating. For this purpose the chloride of cobalt, mixed with a small quantity of gum or sugar, is very well adopted This "magic ink," as it is called, is rendered visible by holding against a heated surface. It has lately been recommended as very suitable for postal card messages, which would thus be exempt from curious inspection. The sensi tiveness of cobalt salt to moisture, which is indicated by a change from blue to a pinkish tinge, has been suggested and employed in the construction of a hygrometer or measure of moisture. In Paris, a late scientific toy is a flower baro meter, which is simply an artificial flower of white paper which has been treated with a solution of cobaltous chloride These flowers when exposed to the sun and dry air become deep blue, but when the air is saturated with moisture they turn of a pinkish hue, thus affording an approximate estimate of the condition of the atmosphere. Landscapes have similarly been painted with cobalt and nickel salts, which on heating develop the characteristic shades of sky and grass. The above facts contain in briefly condensed form the chief features of importance presented by the metal cobalt from a technical standpoint.-Journal of Applied Science.

## Communirntious

## Coal Dust as Fuel.

To the Editor of the Scientific American :
Thinking it might interest the readers of your valuable paper, and also call out the experience of some others, I send you the following items of the difference in cost be$t$ ween coal and coal dust asfuel for steam boilers, it beingmy habit of always keeping a record of the amount of fuel used, kind, cost of same, also number of hours run. This account only includes the actual time run; besides which I have al ways kept up steam to 40 lbs ., all and every night except Suys ke
Boiler is horizontal, 3 feet diameter, 15 feet long, with 24 3 inch tubes running the full length of boiler, grate surface 16 square feet. It supplies steam to the engine, cylinder 9 $\times 18$ inches, steam cut-off at three quarter stroke. It drives an elevator, hoist 40 feet, capable of carrying a safe load of 4 tons, 1 pair of heavy rolls, 1 large skiving machine, 1 McKay sewing machine, 1 No. 2 Sturtevant blower, 1 sand-paper machine, and 30 Howe and Wheeler \& Wilson manufacturing sewing machines. It also supplies steam to heat the factory, which is a three story and basement, with 128 large findows, 5 outside doors, and 8 scuttles in the upper story. Windows, 5 outside doors, and 8 scuttles in the upper story.
It furnishes steam to an office heater also. The comparison It furnishes steam to
of coal is as follows.

| Amount of coal burne | $94 \frac{1}{2}$ tons |
| :---: | :---: |
| sst of coal burned.. |  |
| Number of hours run. | 2,698. |
| Average cost per hour. | 21c. and a trifle over. |
| Amount of dust burned | 1337 tons. |
| Bost of dust burned... |  |
| Number of hours run. | ${ }_{\text {3, }}^{3} \mathbf{3} \mathbf{0 8 8}$ c. |
| Average cost per hour |  |

The coal was used during the first 18 months the boiler was ever used, consequently everything was in the most favorable condition, while at the time 1 commenced to burn the dust, scale had accumulated to the thickness of at least 1-16 inch.
Another thing, I was allowed much more time to clean the boiler when burning coal, as the business was quite slack, as compared with it since using dust. I find that it takes no more time to fire with dust than with coal, if as much; but it is very dusty work and trying to the eyesight, while the heating surface of boiler requires double the care to keep it free from ashes and soot. The expense incurred in making the change did not exceed $\$ 200$. Milford, Conn.

Walter F. Sage, Eng.

## Canceling Inks and Pads.

To the Editor of the Scientific American:
Noticing in the Scientific American of October 13 a receipt for marking ink for Post Office use, I give those used in my office for the last two years. I have tried printer's and a great variety of other inks, and find this the best. To one ounce of good sweet oil add, for black, an equal volume of lampblack, and mix thoroughly in a mortar. For blue, use Prussian blue in same proportions. For red, use 6 grains aniline red, dissolve in a small quantity of alcohol, say 1 drachm fluid measure, then add 1 ounce glycerin. To make a pad, take a piece of inch board, previously planed smooth, 5 inches square, cut pieces of any heavy cashmere goods the same size, and place them in layers, say an inch deep, on the block, and smear the ink on alternate layers of the cloth, then sew over all a piece of the same cloth, tacking around the edges of the block to hold the outside cloth firm. Postmasters will find the above excellent for post
marking letters.
J. M. H. Silverton, San Juan county, Col.

## The Manufacture of Jewelry.

Fine gold, both on account of its higher value and its ductility, being more difficult to work by modern processes than when alloyed with other metals, has been almost universally succeeded by alloys of a lower grade. For diamond mount ings and the better order of jewelry, 18 carat gold has found general acceptance, while for jewelry in general, 14 carat is used. Due to the present depression of business, alloys
from 4 carat to 12 carat have been extensively employed for from 4 carat to 12 carat have been extensively employed for
cheap ware. According to the relative proportion of silver and copper added in alloying, the yellow or red color of the gold is regulated. Fine gold being taken as 24 carat, 18 carat red gold consists of fine gold, 18 parts; fine copper, $5 \frac{1}{2}$ parts; finesilver, $\frac{1}{2}$ part. Total, 24 parts.
The shade more or less red being regulated by the greater or lesser quantity of silver. For yellow gold, to the 18 parts of fine gold, even quantities of silver and copper are added, and the shade regulated by copper. Green gold is made by adding to the 18 parts of fine gold, silver alone; and blue gold, though very difficult to make, due to iron not making an intimate union with gold, is produced by adding 6 parts of iron to 18 parts fine gold. The alloys are melted in a crucible with the addition of borax as a flux, and cast into ingots-either as bars or plates. These are hammered or laminated according to the purpose for which they are in tended. The diamond mounter, or jeweler proper (for the factory workman who works after given rules and patterns, and whose whole duty is to solder together the stamped parts that are given into his hands, scarcely merits the name), receives the crude metal and the design, generally in the form of a drawing, and the execution is left to him We will select a design and follow him in its development, of two pearls and thirty-one diamonds given him. The main
points to be kept in view are to show off the stones to the points to be kept in view are to show off the stones to the
best advantage, and, if they are perfect, to have no mor best advantage, and, if they are perfect, to have no more gold than is absolutely necessary, so that their effects may not be marred." It withe stings" for the stones. For this purpose he works out a piece of gold about 3-16 inch high and at the bottom 1-16 inch thick. From this he bends the boxes for the pearl and five upper stones. Of these he makes the settings by scalloping them out, first from the top and then from the bottom, and then solders the small frame under them for a finish. The solder consists of gold of a lower grade, which, melting at a less heat, firmly unites the parts between which it flows. Having done this, he next makes the " cluster." Into a piece of gold about an inch in diameter, and $\frac{3}{8}$ inch thick, he makes holes just so much smaller than the stone as to allow setting. Next the outer edge of the " cluster" is finished like a setting, and scalloped " bizzle" and frame soldered under. Now he makes the mounting for the other diamonds. A frame like the contour is made, which is scalloped, and upon which a thick plate is soldered, and into which the diamonds are afterwards carefully mounted. The " knife edge wire" is made from gold bent into the shape of the design and filed sharp at the top. The gold band for the enamel is so arranged that it can be secured after all the rest is finished, in order that the entire work need not go through the enameling fire. The small shot are made by melting particles of gold, which thereby assume a globular form and retain it upon cooling. And now all is ready for construction. This is done by placing the pieces upon a flat charcoal, applying borax and small pieces of finely cut solder to the places where the pieces are to be joined, and heating
them by means of a gas jet and blowpipe till the solder them by means of a gas jet and blowpipe till the solde
"runs." After all the soldering has been completed the work is boiled in dilute sulphuric acid, to clean it of oxide and borax, carefully trued with files, all the file marks removed with a scraper and emery paper, and the task is ready for polishing. This is done first by means of tripoli and oil, and afterwards with rouge and alcohol. By means of gravers, rests for the stones are cut in the settings, and the gold securely pressed over their edges, and the brooch is completed. In the manufacture of the so-called "Etruscan ware," the delicate wire ornamentations are all ben into shape first and then soldered on the jewelry, according to the design. The neat fine gold-like appearance is pro duced by immersing the jewelry for a few minutes in a boiling solution of muriatic acid three parts, saltpeter two parts, salt one part. This eats out the alloy and brings the ily than silver, a finer effect is produced by alloying the gold with an excess of copper. A very praiseworthy attempt has of late been made to reproduce flowers in their natural colors and details; but, due to the amount of labor necessarily expended upon them, they command higher prices than is generally invested by the majority of purchasers. It is sincerely to be wished that they may gain the approval of
the public. By the combination of platinum with red gold for seals, rings, and chains, many novel and very effective designs have been produced. In making plain linked watch chains, the links are wrapped about a mandrel having the exact shape that they are expected to assume. They are then cut apart at one end, hung together, and the joints sol dered. Oxidized silver, so much in vogue a few years ago, is made by treating silver with ammonic or potassic sul phide. Enamel is a fusible glass melted into cavities in the gold. Niello, lately fallen almost entirely into disuse, is a black composition of gold, silver, copper, and lead heated together, and melted into a design prepared in the same manner as for enamel. The metal is then scraped and burnished, and produces the effect of a drawing in black upon a gold or silver ground.-Herman T. Wolf.

The Purification of Drinking water.
Chief Engineer McFadden of the Philadelphia Water Works, in his recently issued annual report, gives the follow. ing information relative to the purifying of drinking water: Water, though theoretically made up of only two elements, without perceptible taste, color, or smell, is never supplied by nature chemically pure. Analysis proves that it always contains, in a greater or less degree, foreign matter gathered from many sources. It is only where these impurities exceed certain percentage that they become dangerous to the health of a community, and make a purifying process neces. ary to fit the water for domestic use.
These impurities may be classified under three general heads:

## I. Floating débris

## II. Mineral sediment.

## III. Organic impurities

Impurities of the first class are confined mainly to the surface, and are made up of floating wood, leaves, etc. A properly arranged system of screens will arrest them and bviate this trouble
The second class is made up of such mineral sediment as is derived from the abrasion of rock, and the washing of the different soils forming the river basin. Unless present in very large and unusual quantities, these impurities are sel dom injurious to health, but society demands clean looking water, and the manufacturer of ten requires it; therefore it is well to get rid of this sediment whenever possible.
Subsidence or gravitation is the simplest plan to pursue but requires a storage capacity of at least one week's con sumption, to give the particles time to settle
It is in the third class of impurities-those derived from organic bodies-that we find the elements most dangerous to the community; and while their removal is of vital importance, they present the most formidable obstacles to the engineer.
The principal source of organic impurities is decomposing animal and vegetable matter, sewage, dissolved fertilizers, waste from manufactories, etc. These matters remain in suspension until decomposition has removed so much of their volatile natures that the mineral components can sink, but heir really dangerous elements frequently so unite chemi ally with the water that no artificial system of filtration can separate them, and under the guise of pure limpid water they convey the seeds of disease to the consumer.
Subsidence will only partially remove organic impurities oxidation, by exposing the water in thin sheets to the action f the air, as in running it over weirs, is beneficial; but even n elaborate and costly system of filter beds will not elimi nate all those deleterious particles held in solution by the water.
The only true method of furnishing pure water is to main ain the purity of the source of supply, by diverting from it s much as possible, all sewage, manufacturing refuse, etc Economy and common sense should teach us that it is fals in principle, to first pour all manner of filth into our wate supply and then attempt to get rid of it by co tly and seldom fficient processes. The advice of an eminent hydraulic authority is: "If any water intended for domestic purposes is found to be charged with organic matter in solution, the very best plan of treatment is to let it alone, and take the re quired supply from a purer source." The next best plan, when we have no available purer source, is to so perfect the system of sewers-the most fruitful sources of dangerous organic impurities-that they discharge their contents as far as possible from the stream from which we derive our wate supply.
A very brief sketch of the methods of artificially purify ng water for the use of a community may not be out of place.
Evaporation and the use of chemicals, though really the most effectual, cannot be applied economically to a large public supply. Simpler and cheaper methods must be re lied upon.
Carbon, prepared in large plates, and so placed that the water must percolate throught it, especially reacts on all organic matter, but when the demand is heavy this process is very expensive, owing to the large area of filter made neces sary by the slow rate of progress of the water through the carbon plates, 3,330 square feet of the most porous being re quired to supply $1,000,000$ gallons of filtered water per day, In England magnetic carbide, made by roasting hæmatite ron ore with granulated charcoal, is used in layers of from 2 inch to 12 inch, in a sand filter bed, and is said to give wonderful results in remcving organic matter.
Infiltration basins are used in a number of our towns and cities. These are simply galleries excavated in the porous margin of a lake or river, or in water-bearing sand formation, as at Brooklyn. These galleries are sunk below the water level, and are supplied by percolation. They are usually formed of two side walls, say 8 feet apart, arched over, and of a length commensurate with the demand. The amount of water furnished by them depends on the porosity of the sand and gravel beneath and around them, and the head of water under which the filtration is maintained. When the location is favorable, ald the volume required not too great, they are simple and effective.
Filter beds purify the water by passing it downwards through intercepting strata of sand and gravel into a clear water basin beneath, from which it is supplied by pumpage to the consumer. They are much used in England and on the Continent, but their first cost and the constant expense of maintenance have discouraged their use in this country.

The requirements of an efficient sand filter bed may be briefly set down as follows, quoting from the most success ful and economical practice
Kirkwood, in his "Report of the St. Louis Water Com mission," recommends as of vital importance to the success ful working of a filter bed, and as the first step in the sys. tem, the formation of a subsiding basin sufficiently large to hold at least one whole day's consumption of water, thus getting rid of the grosser particles by gravitation; this makes the filtration more economıcal, and is useful in time of flood and for storage.
The filter beds themselves are usually located at some con venient point on the river bank, or even in the river, if suf ficiently protected from floods and from ice, but the great area required for a large supply, and the consequent expen sive nature of the protecting works, renders the latter or river plan unadvisable to say the least.
The filter area is subdivided into beds averaging 250 by 150 feet each, and should be not less than 12 feet deep. The sides and bottom must be made impervious by puddle clay or concrete. There are many plans of arranging the interior of the filter bed, but perhaps the best and most economical is one in which the entire floor area of each individual bed is covered with ranges of small brick piers placed a short distance apart, and sufficiently high to form a storage basin for clean water. Upon these piers rests a flooring of rough flagging laid with open joints, and this flagging supports in turn the layer of cobble stone, coarse and fine gravel and sand, through which the water must pass by percolation. When the water flows into the filtering bed from the subsiding basin, all its impurities, except those in solution, are intercepted, and remain on the surface of the sand stratum which forms the uppermost of the filtering strata. The finer this sand the more perfect the filter, but at the same time the slower its action. The deposit of impurities on the sand clogs the filter, and must be removed at intervals of from one to eight weeks, depending on the condition of the water to be filtered. It is to make possible this cleaning process, without stopping the supply to the consumer, that the filter is divided into independent beds, but this at the same time requires a surplus area sufficient to keep one or more beds constantly out of service.
Filter beds should be covered over, to protect them from ice in winter and the heat of summer, which latter especially, acting as it would on shallow and still beds of water, would render the supply unpleasantly warm, and promote vegetable growth in many objectionable forms. Experience has proven that filtered water must be used at once. Unless kept protected it soon spoils, much more readily than turbid water.
Humbar, Kirkwood, and other hydraulic authorities all unite in saying that, to be cleansed of its impurities and made potable, water should not pass through the filter bed at a more rapid rate of descent than six inches per hour, or twelve feet per day, and in this simple fact lies the expensive feature of the system, for, to purify $1,000,000$ gal lons of water per day, requires, at the above rate, 13,500 square feet of filtering area; and as the present maximum demand of Philadelphia is $75,000,000$ gallons a day, we should need more than 23 acres of filter beds, without counting the surplus area required for cleaning.

The above is a mere outline of the cheapest form of a sand filter. The actual cost of a perfect system of subsiding basin filter and clear water basin will vary with the nature of the site, the material, and the volume of clear water required The constant expense of attending these basins is likewise a serious item, not to be lost sight of.
Dr. Medlock, of Amsterdam, strongly advocates the use of iron as a purifying agent. In experimenting in the canals of Holland, where the water is very impure, he found that iron gratings and strips of iron placed in the weirs reacted very energetically on water containing ammonia, or matter capable of yielding it, the organic impurities being precipitated by contact.

Tale Mills in St. Lawrence County.
Among the great variety of minerals found in this country there is one which is fast becoming an important article of commerce. The mineral referred to is a hydrated silicate of magnesium known as talc. It occurs in foliated masses, has a soapy feeling, is fibrous but not elastic. Large beds of this mineral are found in various sections of the county. It is quarried, broken into small pieces and ground by means of attrition mills and bolted similarly to flour. It is used in the manufacture of writing paper, fifty per centum of the mineral with fifty per centum of cotton making a fine paper. Being, like asbestos, fireproof, it is used largely in the manufacture of roofing paper. There are at present three talc mills in the county, which are "turning out " daily about fifteen tons of ground material.-Utica Herald.

## Drawing Fine Platinum Wire.

M. Gaiffé states that microscopic examination of very fin platinum wire shows that the latter always breaks during drawing at points where no sign of injury exists before the wire is put through the draw plate. After drawing, how-
ever, spots appear on the metal surface which look like im ever, spots appear on the metal surface which look like im
purities. M. Gaiffé suggests that these are due to particles of dust which adhere to the metal as it is drawn, and which cut into it during the operation. By carefully excluding dust he has succeeded recently in drawing wire $\frac{1}{T 170}$ inch in diameter with great ease, and he considers that with finer plates much finer wire can be produced.

## Mixing and Melting Irons,

The foundryman cares little or nothing for a chemica analysis of iron, which merely shows the ex ct amount of different impurities it may contain; but the question that can I mix them so as to produce a good, clean, strong and cheap casting? This is a question that it is almost impossible to answer, as it is impossible to give a complete vocabulary of all the impurities which iron may contain, with their effect upon the iron in different proportions, as these proportions may be varied in remelting and produce differ ent results; and even if it were possible, the foundryman does not wish to go the trouble of making a chemical an alysis of every lot of iron he gets in, to ascertain its impuri ties and to keep track of how it may be mixed with some other lot of iron. Little can be told by looking at an iron in the pig, whether it will run hard or soft when remelted and run into castings, or whether it will mix with another brand of iron. The foundryman, or an expert, may by actual tests become acquainted with all the iron and ores used in a certain locality, and, by looking at the iron in the pig, tell very nearly what it will do when run into castings; but the best expert in the country can tell little or nothing about an
iron that he has not been accustomed to working, and he iron that he has not been accustomed to working, and he
will often be deceived in those he has been accustomed to, by merely looking at the iron in the pig. True, he ma make a good guess, and he may tell whether an iron will run extremely hard or soft, but that is all that can be told by the looks of the iron in the pig.
It is impossible to qualify the various kinds of pig iron brought into the market by local terms and marks. It would not, after all, be of any use, because the furnacemen may change their ores or their mode of charging the stock, and change the product of the furnace from a No. 1 iron to No. 2, or even No. 3 iron, which makes a great difference in its application in founderies; or a furnace may change its qual ity of iron without any change of the ores, and without any apparent cause for the change in the quality of iron. When operating at Lewisburg, Pa., last spring, I found a lot of pig iron that was made at the Dry Valley Furnace, Pa. This iron, when remelted and run into a cylinder head that was nearly two inches thick, was so hard that it could not be
drilled, yet the iron in the pig was of a dark gray color with drilled, yet the iron in the pig was of a dark gray color with
a large open crystal, and to all appearance was a No. 1 soft foundry iron. This iron was made from the same ores that the furnace had been using for years. In making a No. foundry iron, no change had been made in the mode of stocking the furnace, and there was no apparent cause for had been in blast for a short time, got to working so badly that it became necessary to blow it out. It was then found that, when putting the furnace in blast, it had scaffold on one side, which was the cause of the hard iron. If a blast furnace, with the fire only on one side of it, will change the nature of iron as this furnace did, then a cupola, with the fire or the blast all on one side of it, will change the nature of iron when remelted. I have seen two cupolas melting the same iron, and one produced good soft, strong castings, and the other produced hard or brittle castings. I have al ways found that the cupola that produced the hard or brit tle castings either had the blast all on one side of it, or that the fire was not burnt up evenly, and that the stock was not charged regularly.

Cast irons admit of a division into three classes and seve grades. The three classes are: the red-short, the cold-short and the neutral iron. The seven grades are the seven quali ties or seven numbers of iron, as No. 1, No. 2, or No. 3.
Red-short iron is an iron that has no strength when red-hot, and has a great deal of shrinkage. An extreme red-shor iron will shrink as high as one fourth of an inch to the foot. Red-short iron, when used for casting pipe on their end, will cause the body of the pipe to shrink down and leave the bowl of the pipe before the iron has thoroughly set; and when used in other castings, such as grate bars, it will tear off and form cracks in the corners while hot: it will cause chill cracks on the tread of a car wheel, but they are not deep and do not injure the wheel. Red-short iron may be either hard or soft, and is liable to go to extremes eithe way. It never breaks from shrinkage when cold.
Cold-short iron is an iron that has no strength when cold, and has very little shrinkage; it will resist very little strain, and if the patterns are the least bit out of proportion the casting will break from shrinkage after it is cold; it will cause stove plates to crack under the sprews. Cold-short iron may be either hard or soft, and is liable to go to extremes either way; but it never breaks from shrinkage when hot.
Neutral iron is an iron between the extreme red-short and cold-short irons: it is made by mixing the red and cold-shor irons together, A neutral iron is the best iron for foundry purposes, and furnacemen who make a business of manu facturing foundry iron make it a point to mix their ores so as to make as near a neutral iron as possible. Yet in some be used to excess, which may make an iron inclined to be either red-short or cold short, yet not extreme either way. The foundryman that is using three different brands of iron may find at times that he has two brands of iron inclined to be cold-short, and one brand inclined to be red-short. If these three irons are mixed in equal proportions they will make a casting inclined to be extreme cold-short. Yet one
fourth of the two brands and one half of the third brand, mixed together, may make a neutral iron and a good stron
casting; or by leaving out one of the brands, and using one half of each of the other two brands, the same results may be attained. The only practical way to ascertain whether an iron is either red-short or cold-short is by actual tests in mixing and melting the iron in different proportions, and testing the strength and shrinkage. A neutral iron should not shrink more than one eighth of an inch to the foot. not shrink more than one eighth of an inch to the foot.
Stove foundrymen should be careful to use as near a neutral iron as possible, and to change their brands of iron as little s possible; as the changes of iron often change the shrinkge, and will make trouble in mounting the stoves when much odd plate is kept on hand. When new brands of iron are introduced, test bars should be made to ascertain the shrinkage, and the different brands of iron should be varied o as to keep the shrinkage as near alike as possible
The same theory may be followed in mixing irons to make a soft iron, thus: three brands of irons, mixed in equal proportions, may make a hard iron, while any two of the same brands, mixed in equal proportions, may make a soft iron. Tests were made last fall at Perry \& Co.'s stove works in melting the three brands of iron, namely: Crane, Hudson, and Jagger. These three irons were melted at the rate of fifteen per cent of Hudson to eighty-five per cent of Crane and Jagger together. This mixture made a hard iron. One third of each brand was then melted together, and made ard iron. One half Hudson to one fourth Crane and one fourth Jagger were then tried, and the result was a hard iron. The Hudson and Crane were then tried together-one half each-and made a good soft iron. The Hudson and Jagger were then tried together-one half each-and made good soft iron. The Crane and Jagger were then tried to-ether-one half each-and made a hard iron. Thus the Hudson would neutralize either the Crane or Jagger separately, but would not neutralize them when put together in any proportion.
Iron will combine with almost all of the sixty-four known lements; and these elements, combined with irons in differ ent proportions, will destroy the affinity of one brand of ron for another; and foundrymen, in mixing their iron, will generally use equal proportions of all the brands of iron hat they are using; thus one half, one third, or one fourth f each brand. If the castings come hard, they will reduce the No. 2 and increase the No. 1 iron; and I have often see foundries that were using all No. 1 iron, that were still roubled with hard iron. This was because they were using irons that had no affinity for each other, and would not unite o as to form a homogeneous iron; and throwing out the No. 2 iron gives only a temporary relief by the excess of carbon in the No. 1 iron, overcoming the non-affinity of the irons; and if the No. 1 iron happened to be a little poorer, one day than another, the iron was hard and uneven. I have often seen foundrymen that had one brand of iron in heir yard that they had had on hand for years, and could not use it; and perhaps the next foundryman that I would meet would be using that same brand of iron, and could not get along without it. This was because the one foundry man was using other iron as a mix that had an affinity for that particular brand of iron; or the two foundrymen might be using the same iron as a mix, and mixing them in differ ent proportions, which produced different resul.s. Two poor irons can often be mixed together so as to make a good iron; as is the case in mixing the extreme red-short and cold-short irons, which forms a neutral iron that is superio to either the red-short or cold-short irons for foundry pur poses. In mixing irons, I should recommend mixing them and varying the mixture by the local brands or marks, and not by the numbers of the iron. To make a good iron, at least one third of No. 2 iron should be used; and if all No 2 irons can be used and make a soft iron, they will make superior casting to all No. 1 iron. In melting iron I should recommend melting it hot, and as fast as possible. A quan tity of molten iron should be kept in the cupola, or in a large ladle, so as to give the different brands of iron a chance to mix. In most all the foundries at Wheeling, West Va. the cupolas arenever stopped in from the time the blast is put on until the bottom is dropped. A large ladle is set on restles in front of the cupola, in such a manner that the iron can run into it from the cupola, and be poured out into the smaller ladles at the same time. The iron is all run out of the cupola as fast as it is melted, and is mixed in the large ladle. I think this is a good way of mixing irons.-From the Founding of Iron, by Edward Kirk.

## To Brighten Iron.

The following method of brightening iron, which appear suitable for some of the less important parts of large clocks, is recommended by Boden. The articles to be brightened are, when taken from the forge or the rolls, in the case of uch articles as plate, wire, etc., placed in diluted sulphuri cid ( 1 to 20 ) where they remain for about an hour. This as the effect of cleansing them, and they are washed clean with water and dried with sawdust. They are then dipped or about a second in commercial nitrous acid, washed care fully, dried in sawdust, and rubbed clean. It is said tha ron goods thus treated acquire, withoat undergoing any of the usual polishing operation, a bright surface having a white glance. Care should be taken by any one using the nitrous acid not to inhale the fumes.

Packing paper may be made watertight by dissolving 1.8 bs. of white soap in 1 quart of water, and in another quart 1.8 oz . of gum arabic, and 5.5 of glue. The paper is soaked in the mixture and hung up to dry.

NEW STANDARD LIGHT AND MEDIUM GRINDING MILLS. In last week's issue we gave illustrations of a portable grinding mill manufactured by Edward Harrison, of New Haven, Conn., in which was shown an improved heavy 20 inch mill, with which were combined pedestal and dressing frame. In the annexed engravings we present two other patterns of mill by the same manufacturer, also embracing bases and dressing frames. The bases, however, are here cast separate from the mill cases, and are attached to them by bolts. They are thus adjustable, and obviate the necessity of frames or foundations, while the dressing frames enable one person to handle the heavy parts of the mills, in which the burrs are encased for the neoessary purpose of dressing.

Fig. 1.


The mills illustrated, in common with all produced by the above named manufacturer, have burr stone grinders set in a vertical position and driven at high speed. They are re spectively known as the new standard light and medium 20 inch mills. The grinding surface of the light mill, at 1,200 turns per minute, is claimed to be equal to one quar ter more than an old style 48 inch run at 175 revolutions per minute. The grinding capacity per hour is from 6 to 40 buskels, and the weight 700 lbs. Fig. 1 shows the mill (either light or medium) with base attached, and Fig. 2, the same open for dress.
A large number of patented improvements are embodied, notably improved side hangers, duplicate discharge spouts, safety bridge trees, adjusting burrs, large oil cup, self-cooling step, besides a new safety spring box and set lever, whtch permits foreign substances to pass through without damage to the faces.
The grinding surface of the medium 20 inch mill, at 1,300 turns per minute, is equal, it is claimed, to one half more than an old style 48 inch run at 175 revolutions per minute. The grinding capacity per hour is from 9 to 60 bushels, and the weight 1.050 lbs . The larger mill of the two occupies a floor space of 2 feet 6 inches by 4 feet 3 inches.
In our previous article we reverted to the advantages claimed for the system of milling peadvantages claimed for the system of milling pe-
culiar to these machines. It embodies vertical culiar to these machines. It embodies vertical
burrs, rigid runners, and high speed, producing large grinding surface and capacity. The construction is also substantial and durable. For further particulars address the manufacturer, Mr. Edward Harrison, No. 135 Howard Ave., New Haven, Conn.

## woad.

Woad is an annual which is cultivated in Europe for dyeing purposes. It furnishes a beautirope for dyeing purposes. I furnishes a beauti-
ful yellow color, which is specilly present in ful yellow color, which is specially present in
the tops of the flowers. The plant comes into the tops of the flowers. The plant comes into
commerce in the form of dried bundles. M. commerce in the form of dried bundles. $M$.
Chevreuil has found in it a coloring matter to which he gives the name of luteoline. A decoction made during a quarter of an hour, with a portion of the terminal leaves mixed with pods of the woad and ten parts of boiling water, deposits, when cocl, according to M. Chevreuil, flakes of a slight olive brown yellow, which are formed of lutenline, of a crystallizable white matter, an azote matter, oxide of iron, lime, and silex. When the decoction is filtered it is a reddish yellow. It has a disagreeable and peculiar odor, with a sweet bitter taste. It only affects glue slightly, and is acid with sunflower paper. To these characteristics Chevreuil adds the following: It contains sulphate of lime and chloride of calcium in small quantity, and a great deal of
soluble salts with a lime basis. Potash changes the color from goldea yellow to a greenish shade. Baryta gives a flaky precipitate of a fine yellow. Alum gives a slight yellow precipitate. The hydrochlorate of protoxide of zinc and especially the acetate of lead, give a more abundant yellow precipitate. The precipitate which is formed by the acetate of copper is a red approaching to green. The sulphate of protoxide of iron colors it an olive brown, and only leaves a slight brown precipitate. Sulphuric acid concentrates the color in red and precipitates some flakes; when the acid is weak it only roils it.
Nitric acid without precipitating darkens its color. Oxalic acid precipitates the oxalate of lime, and the filtered liquid is of a very pale yellow. Acetic acid without precipitating weakens its color, but much less so than oxalic acid. The watery solution of iodine produces nothing remarkable A little chlorine changes the color red and precipitates flakes. If an excess is exhibited the red disappears, and the liguid changes to yellow. The luteoline, the coloring matter which M. Chevreuil has extracted from the woad, can be sublimated in needles; the largest are transparent and of a light yellow; the smallest, as seen on the surface of the glass where they condense, seem of a deeper yellow and have a velvety appearance. Its reaction on litmus is rather acid than alkaline. It is very soluble in water, and although it scarcely colors this liquid, it gives it the property of dyeing silk and wool (which have been impregnated with alum, and which are put into it at a slightly elevated temperature) a fine greenish yellow. It is soluble in alcohol and in ether. A watery solution of potash colors it a splendid gold yellow, which gradually changes to greenish yellow, then russet, by which gradually changes to greenish yellow, then russet, by
absorbing oxygen. The solutions of baryta, strontium, absorbing oxygen. The solutions of bary
lime, and ammonia, act in a similar manner.
lime, and ammonia, act in a similar manner.
The acetate of lead, alum, and the acetate of copper precipitate its watery solution yellow. The sulphate of peroxide of iron precipitates it an olive brown. Concentrated sulphuric acid developes a yellow color which approaches red rather than green.
Gradually red flakes are produced. The concentrated nitre acid, in which it is diluted, will dissolve it; the solution is of a greenish-orange yellow; it precipitates by water. The volatility of the coloring matter and its resistance to the action of concentrated acids place it among the most stable substances of this order. M. Chevreuil has found qualities in it very similar to the coloring matter of quercitron and rosewood. By applying his process to the decoction of woad, M. Preisser obtains a clear yellow liquor, which, on cooling, throws down a large quantity of yellow. ish white scales; large yellow scales are obtained on boiling with some drops of chromic acid; they are similar to iodide of lead. The yellow matter is the luteoline; it is presented in the shape of white scales, which are soluble in water.

## Gutta Percha Capsules.

A useful purpose to which benzole may be put as a solvent is in dissolving the little scraps and odd pieces of gut ta percha tissue, which in the ordinary course of business will accumulate, and which are too frequently thrown aside as waste and useless. If these be dissolved by the aid of a gentle heat, so as to form a moderately thick fluid, and then vermilion or other pigment added, both for the purpose of coloring the solution and giving it a greater body, a preparation is obtained capable of producing a uniform and a very


Fig. 2.-HARRISON'S NEW STANDARD GRINDING MILLS.

NEW IMPROVED band-SAWING MACHINE.
Band-sawing machines are in such universal use that the demand for them induces manufacturers to make changes to meet some newly developed want which may be discovered, and obtain prominence amongst operators of band saws. The varying changes in the form of machines, methods of producing flexibility in the motion of the upper saw wheel sufficient to prevent breakage of saws by any sudden varia-

tion in the tension of the saw, or leaving off some device used for a special purpose and not desired generally, thereby lessening the cost of construction, are, we think, worthy of notice.
We illustrate herewith a new band-sawing machine, the object of which is to meet the requirements of the demand for a machine of small cost with the adaptability to general classes of work.
The column of the machine is cast in one solid piece, form ing a support to the wheels and table, of such proportions s to resist all inclination to vibration or flexure. The bear ings of the wheels are long and arranged to avoid the wea ncident to the revolution of their shafts.
The upper wheel bearing is supported upon a turned center, movable vertically in the column to compensate for differences in the lengths of the saws from breakage or other causes. It is raised and lowered by a screw and hand wheel. The upper wheel has a device at tached to its support to direct the saw in its line of travel on the wheels, by a revolution of the upper wheel on a horizontal plane through the center of the axis of the wheel, thus placing the upper wheel at an angle to the lower wheel to give the saw sufficient lead to retain a constant pressure of its back against the guide rollers. The wheels are covered with an elastic covering to protect the teeth of the saw from abrasion, and to assist in compensating for variations in the tension of the saw blade.
The saw guides upon this machine are of the same pattern as those placed upon all band-saw ing machines built by this house. They consist of a hardened steel roller which revolves as the back of the saw passes over it, relieving the saw from the friction caused by the back thrust, from the friction caused by the back thrust thereby obviating the most prominent cause of
the fracture of band-saw blades. The saw is held in position by adjustable side guides, which can be regulated to accommodate different thicknesses and widths of blades. The upper guide is at tached to a vertical bar which is adjustable to the thickness of the work sawing; the lower guide is attached to the column. Patented Au. gust 14th, 1877 . For further information, address J. A. Fay \& Co., Cincinnati, 0.

The flame of a mixture of two volumes of coal gas with three of carbonic acid gave a maximum heat of $1,000^{\circ}$. On volume of coal gas with two of carbonic acid gave $860^{\circ}$, while the maximum temperature reached with the flame of one volume of coal gas and three of carbon ic acid was $780^{\circ}$ Mixtures of coal gas and atmospheric air decrease in hea if the proportion of the latter exceeds what is necessary fo combustion.-FI. Rossetti.

THE STEAMSHIP "MASSACHUSETTS" ON AND OFF THE
The Massachusetts, a new steamer plying on Long Island Sound between New York and Providence, recently ran upon a rocky beach, and was rescued from her perilous position by the exercise of good judgment and considerable engineering skill. The casualty referred to occurred near Rocky Point, L. I., at midnight on October 5th, when, owing to a strong current in shore during a heavy rain storm, the Massachusetts drifted broadside on the beach, which was strewn with large boulders, and became fixed in a position parallel with her course, her starboard side being towards the shore. The passengers were at once landed without accident. Captain Jones of the steamer and Captain Babcock, the President of the Providence and Stonington Steamship Company, Mr. Henry Steers, the shipbuilder, and Captain Merritt with his crew, of the Coast Wrecking Company, removed the cargo, and by the aid of divers located the leaks. The most serious injury was on the bottom, 48 feet from the stern post, a little towards the starboard side, where the planking, main keelson, and frames were injured and a hole averaging four feet in diameter was made. The stern was also damaged. Two or three leaks were stopped with mattresses and blankets, but the larger aperture required other expedients in order to expel the water and close the opening. Fig. 1 shows the position and nature of this opening, and also of the scratches and indentations on the planking. Mattresses were forced into the hole, and a wooden cofferdam was built around it in the following manner: By means of adjustable templates, divers took the angles of the hull and keelsons, and the ends of boards $1 \frac{1}{2}$ inch thick were shaped to correspond with the angles obtained. It was then comparatively easy work to build the coffer dam, which is represented at Fig. 2.

As the ends of the different boards were properly shaped they were placed in position and secured to the keelsons, until the cofferdam assumed much the shape represented. At the top it was of a trapezoi dal figure; 11 feet high, 8 feet wide aft, and 10 feet forward. A flooring was then put in at the bottom of this cofferdam over the in serted mattresses, and held down by shores. The coffer dam consisted of boards $1 \frac{1}{2}$ inch thick, covered with canvas and another course of boards placed outside, so as to break joints, the whole held together by upper and lowe framework. This completed, and the smaller leaks stopped, a gang of men started the wrecking pumps. Holes were made on the main deck opposite the passenger gangway and cargo hatchways, and the suction pipes inserted. There were nine steam pumps in all; five pumps placed forward and four aft. The ship was relieved in three hours and floated at high water.
Two pontoons, about 15 feet long and 10 feet wide, were placed on the port side abaft the paddlewheel and under the guard, in order to straighten her up and ease the list. Two steamers then hauled her off. While the ship was being cleared of water, steam was got up in two boilers, which enabled the Massachusetts to leave her rocky bed and to proceed to the New York floating dry dock under her own steam, where, at the time of writing, she is, and where the damage done has been fully ascertained and examined, and the necessary repairs are being made. The illustration represents the Massachusetts in this dry dock, and ship-carpenters repairing the extensive break already described. As a
matter of course the copper has all been removed from her bottom, and she is receiving a thorough overhauling. The scratched and indented planking has been cut out, new planking and extra pinning put in, new frames of the trongest description have been added, and she will be re caulked and recoppered from stem to stern.


THE COFFER DAM.-Fig. 2.
The injuries to the ship are not so serious as was at first supposed and stated. With the exception of the rent at the stern, the damage was confined to the planking and the rubbing away of some of the forward frames. These will be thoroughly renovated. Four of the six boilers were shifted from their settings, and the main copper steam pipe was cracked for a length of 24 inches on both sides, but the engine itself is in excellent condition. The repairs to the hull


## THE STEAMER MASSACHUSETTS ${ }_{6}$-Fig. 3.

will probably not exceed $\$ 30,000$. The Massachusetts is undoubtedly a very strong and substantial vessel, otherwise her position on the beach, where she rested and chafed for two weeks, would have strained if not broken her.
The dimensions of the vessel are as follows: Length, water line, 325 feet; beam, 46 feet; beam, over all, 76 feet depth of hold, 16 feet 4 inches.

Progress of the East River Bridge.
Twenty strands of the main cables are now finished and in position. Work on the approaches is going forward rapidly. On the Brooklyn side the second pier has been ompleted, and in a few days the men will have finished to them.
pier No. 4. On the New York side, one block of buildings on Pearl street between Cliff street and the Harper building, has been demolished, while the interior of the buildings on the opposite side have met with the same fate. As the outer walls of these buildings will not be in the way for some time, they have been left standing.

## The Danger of old Tobacco Pipes.

A case of so-called "nicotine" poisoning has recently happened in England which is attracting considerable attention. A child of about seven years of age amused him self by blowing soap bubbles in an old wooden pipe which had become foul by long usage. Shortly after, vomiting and convulsions ensued and the child died. The circum stance was put down as a case of " nicotine poisoning," but the Chemist and Druggist very cogently points out the im possibility of such being true, inasmuch as nicotine only exists in the unburnt leaf or juice, and the heat of combus tion splits it up into other componnds. The cause of the death is therefore rather to be sought for in these com pounds.
At the last meeting of the British Medical Association Professor McKendrick of Glasgow read a paper " on the physiological action of the Chrysoline and Pyridine Series of Compounds," detailing very extended researches and especially stating that these alkaloids seem to destroy life either by exhaustive convulsions, or by gradual paralysis of the respiratory nerves, thus causing asphyxia. According to the researches of Vohl and Eulenberg, alkaloids of the pyri dine series are all then mobile and coloriess liquids with a peculiar odor, and the same authorities consider that the stupefying effects of opium when smoked in a pipe are due not so much to the opium alkaloids "as to certain member of the pyridine series which are formed during its combustion." The physiological effects noted by Vohl and Eulenberg are contraction of the pupil, difficulty of breathing, general convulsions and congestion of the lungs death taking place from asphyxia. These ef fects accord with those noted by McKen drick and likewise those observed in the cas of the child previously referred to. Hence it is probable that death resulted from poisoning, not by nicotine but by the pyridine, pico line, etc., produced by dry distillation and existing in the old pipe.
Rank pipes it appears therefore are almost as dangerous as loaded pistols to leave about a house where there are young children. At the same time, they seem to offer not only the most disagreeable but the most delete rious method of smoking, as the user is sure to swallow some proportion of the poisonous alkaloids with which they are charged, and consequently to risk serious injury to the health, especially of those who have not become habituated

Effects of Poison on, Animals.
A French doctor has recently called attention to the fact that hemlock seed is eaten by mice without apparently producing fatal effects on them. He has recently succeeded in supporting two mice for eight days on hemlock seed. They ate it at first with repugnance, and even appeared to suffer from this diet. At the end of the eight days one of the mice seemed very ill, and next day he found the sick mouse half eaten by the other. The animals had eaten hemlock seed in quantities which would have been fatal to a man.


THE MASSACHUSETTS IN THE DRY DOCK.-Fig. 1.

## bASE BALL SCIENCE.

We are in receipt of several communications relative to the question of whether a projectile can be thrown so as to describe a horizontal curve during flight. Some of our cor respondents favor us with newspaper clippings wherein we are quoted as deciding this problem in the negative. As the only reference to the matter which has appeared in these columns consists in letters from correspondents wherein the writers set forth their individual views-and our reply to a question which gave insufficient data, to the effect that w had never witnessed the conditions specified-it is scarcely necessary to add that we have never expressed the formal opinion imputed to us, especially as the views we do hold are diametrically the reverse.
Several learned professors in various Ohio educational institutions having recently embarked in a newspaper con troversy as to whether a skillful base ball pitcher could or could not throw a ball in a horizontal curve-the question Fig. 1.

was set at rest by actual experiment. A chalk line was drawn parallel to the plane of the home plate and first base, Fig 1. Two sections, $A B$, of picket fence were placed on op posite sides of the line with their posts upon it. A flat board was placed at C , so that the edge of the board and the inner fence posts were in the same line. The ballwas de livered from D with a right hand twist. It passed to the right of $A$ and left of $B$, and struck the ground at $E$. When the pitcher stood on the opposite side of C , and threw with his left hand (the position of the barriers being relatively changed), the ball described a curve in the opposite direc tion.
The mode in which a ball is "pitched," in base ball playing, is shown in Figs. 2 and 3. Fig. 2 is the right hand of the pitcher drawn back. Fig. 3 the same purposely thrown forward more than usual to show the hand -the wrist being turned as the arm is swung, and the ball thus given a rotation from right to left. When thus projected the velocity of translation decreases more rapidly than the rotative ve locity, which remains nearly constant. This is true of rifle cannon balls, the rotative ve locity of which, at the end of their few seconds' flight, is found to be little impaired, although it is not nearly so rapid, the relative velocities of translation being considered, as is that of a base ball. The curve described by the The curve described by the ball, wh without twist, is of course in a vertical
plane, and in its path it enplane, and in its path it en-
counters resistance from the counters resistance from the air, first, to its forward progression; and, second. to its upward movement during the first part of its flight; while, during the second part of its journey, and while falling the second resistance of the air is of course opposite to the attraction of gravity. In either case the resultants of these combined resistances act upon the forward portion of either hemisphere, A B, B C, of the projectile approach-
ing Afor C, Fig. 4, as the direction of motion more nearly approaches the vertical; or moving toward B as the path of the projectile, traveling in the general direction indicated by the arrow more nearly flattens. It will be evident, however, that over the entire trajectory there will be a vertical component of air resistance, opposing in one case the rising, in the other the fallng, of the ball.


Now suppose the ball to be thrown with a twist, as indi cated* by the arrow in Fig. 5. During the first part of its journey the ball is rising, or moving in direction A B. But the resistance encountered by the side, $\mathbf{A}^{\prime}$, is equal to the the rotation of the ball, while that on the side, $\mathrm{A}^{\prime \prime}$, is due to
their difference. Hence the ball will be thrown to the right or in the direction A C, and its path, after being impelled in the directions AB, AC, will clearly be somewhere between


Fig. 6.

the two, or, for instance, on AD. (In the diagrams the ball is supposed to be traveling from the reader). This continues
 so long as the ball rises, but as soon as it begins
to fall, Fig. 6, then, the resistance of the air being, from down, up along the vertical A G, the side, $A^{\prime \prime}$, of the ball meets the greatest opposition, and hence the projectile is thrown in the direction E , in the direction A E, and diate path, as A F ; consequently the ball during the first part of its flight drifts to the right, and du ring the second part to the left. The curve described, instead of being in a vertical plane, as X Y Z, in Fig. 7, is in an inclined plane, as X T Z
pensation, and hence the estimate of the pitcher should be found untrue, the ball falling, instead of at the point, C, at some point to the right thereof. The converse result is is obtained by pitching down hill.
A good instance of a body being propelled in a curved line is afforded by the well known "perpendicular force shot" in billiards, wherehy a ball can be made to travel around a hat or other object placed in the center of the table. This is illustrated in the annexed diagrams, Figs. 9 and 10. The ball is struck, as shown in Fig. 9, with the cue elevated at an angle of at least $45^{\circ}$. To cause it to curve to the right it is struck on the left with a quick impulsive thrust. it thus receives a backward or rather angular twist in the direction of the arrows, and at the same time is given a forard motion or transla ion toward the right and ahead, as indicated by ar row, B. The composition of these two motions, and the friction of the ball against the table, deter mine its movement in the urves shown in Fig. 10
 The movement of trans lation to the right is at first the stronger, but eventual ly the rotating movement, tending leftward, prevails, and the ball at the end of its course inclines towards the latter direction.

## American Products in English Colonies.

We have frequently called the attention of our reader to the magnificent market for products of American inven tion and industry which is open in Australia. Progress on that continent only finds its parallel in our own past his tory, and its movement was never so rapid as now. How our manufacturers and in ventors are taking advanta of the opportunity offered is shown by the following from he British Mercantzle Gazette. Beef, cotton cloth, and hardware have hitherto been chief among the productions where with England has uniformly distanced competition; but what with importation of what with importation of American beef, the sale of American cottons in Man chester itself, and now our arge exports of hardware and machinery to English colonies, it would seem that the condition of affairs, so far as our English rivals are concerned, is very truly, as the Gazette states, one of se rious importance. "We allude," says our contemporary, "to the ever lengthening list of American-made goods which not only in foreign markets, but in our own co onies, and even in this country, are gradually displacing and superseding English ma nufactures of the same description. In Australia and
the projection of which is on a horizontal plane, becomes a urved line, X M Z
It may be added that Commander A. P. Cooke, U.S.N. in his "Ordnance and Naval Gunnery," states that in rifle

firing it is well known that projectiles "deviate in a curved line either to the right or left, the curve rapidly increasing toward the end of the range. This probably occurs from the velocity of rotation decreasing but slightly compared with the velocity of translation, and the trajectory is therefore a curve of double curvature, its projection on either a horizontal or vertical plane being a curved line."
A simple experiment in proof of the correctness of the above theory may be made as follows: Let a skillful pitcher, accustomed to allow for the twist he gives the ball when throwing it to a given distance, X Y, on level ground, throw with the same allowance to a point, C, at about the same
distance off on a hillside, A B, Fig. 8. Now P being the distance off on a hillside, A B, Fig. 8. Now $P$ being the highest point on the trajectory, the ball, for the reason al-
ready given, will deviate to the right from $X$ to $P$. It would ready given, will deviate to the right from X to P . It would
then deviate to the left in traveling from P to Y , on level ground, to compensate for this; but in traversing the distance, P C, less than P Y, there will not be sufficient com-

New Zealand, which are now almost the only shipping mar kets that exhibit any real vitality, the successful growth of this competition is especially alarming. Every month, we are told, on the authority of some of the oldest and largest firms in the trade, adds to the list of American and dimin ishes the list of English made goods. Sydney, it is stated, swarms with the representatives of American hardware houses, who spare no exertions 'to wrest the orders from English firms, and in too many cases with success, and the

Fig 10 .

reports from Sydney are echoed from Melbourne, and from the principal towns of New Zealand, Canada, the Cape, and many of the leading States of South America. In Australia and New Zealand the United States houses, we are as of progress it will evidently nem, and at the present the
splendid and expanding markets are entirely lost to the manufacturers and merchants of the old country.
" The competition is not confined, as formerly, to those articles for the production of which the Americans enjoy natural advantages, such as wood work, but extend to leather goods, tinware, machinery, every description of implement and edge tool, carriage axles, force pumps, spades, shovels, axes, forks, files, locks, scales, tacks, rivets, pulleys, sewing machines, stove grates, guns, pistols, and other products too
numerous to mention. In all these branches of manufacture numerous to mention. In all these branches of manufacture
the Americans are rapidly increasing their Australian business, whilst the English makers are losing ground. Australian commerce, as a whole, is certainly expanding, yet the returns of many well known English firms who supply the markets of Sydney and Melbourne are not now one tenth of what they were a few years ago. If we ask for an explana what they were a few years ago. If we ask for an explana
tion of this extraordinary falling off, from those who are in a position to answer us, we are told that it is due to the suc cessful competition of the Americans, who beat our manufacturers sometimes in price, always in quality, and not unfrequently in both. English manufacturers are slow to adopt new patterns or to accommodate themselves to the wants of
their customers, but their American competitors spare themselves no pains or expense in this way. They are constantly on the look-out for novelty and improvement, and by good trade organization and close intercommunication they are always kept well posted up in what is being done by their rivals in other parts of the world. Their illustrated pattern books, which are distributed with lavish hand among their
customers, are marvels of engraving and typography, and no amount of canvassing or advertising is spared to bring the merits of their productions before the world. Above all, the Americans take care that their goods shall correspond to sample, and be turned out in a finished and workmanlike manner, unlike those of many English makers, who ne
trouble themselves to inspect the work they send away."

## Are Ants Civilized?

The October number of the Quarterly Journal of Science contains an article on "Our Six-footed Rivals," the ants, which may well cause us to believe that we are not the only rational and civilized beings on this globe.
Let us suppose that we were suddenly informed, on good authority, that there existed a race of beings who lived in domed habitations, aggregated together so as to form vast
and populous cities, that they exercised jurisdiction over the adjoining territory, laid out regular roads, executed tunnels underneath the beds of river, stationed guards at the entrance of their towns, carefully removed any offensive mat ter, maintained a rural police, organized extensive hunting expeditions, at times even waged war upon neighboring communities, took prisoners and reduced them to a state of slavery; that they not merely stored up provisions with due care, but that they kept cattle and even cultivated the soil and gathered in the harvest. We should unquestionably regard these creatures as human beings who had made no small progress in civilization, and should ascribe their actions to reason.

Among the hymenoptera the lead is undoubtedly taken by the ants, which, like man, have a brain much more highly developed than that of the neighboring inferior groups. Perhaps the most elevated of the formicide family is the agricultural ant of western Texas. This species is, save man, the only creature which does not depend for its sustenance on the products of the chase or the spontaneous fruits of the earth. A colony of these ants will clear a tract of ground, some four feet in width, around their city, and remove all plants, stone, and rubbish. A species of minute grain, re ed, kept free from weeds, and guarded against marauding insects. When mature, the crop is reaped and the seeds dried and carried into the nest. If this is done near a larger city the latter regard it as an intrusion, and a fierce warfare results, which ends in the total destruction of one or the other side. The queens are treated with great attention and installed in royal apartments.
The ant government is communistic. In a formicary there is no trace of private property; the territory, the buildings, the stores, the booty, exist equally for the benefit of all. The family among them scarcely exists. Rarely is the union of the male and female extended beyond the actual intercourse, all provision for the future young devolving upon the latter alone, the former being speedily killed, as h is no longer of any use. The females are the larger, stronger, and more long lived. The workers and fighters are sexless to them belongs the real government of the ant-hill, and they provide for its enlargement, well being. and defence.
Ants are sometimes very stupid in regard to small things, but in many instances they display remarkable sagacity Mr. Belt, in his " Naturalist in Nicaragua," tells of a column of ants who were crossing a watercourse by a small branch not thicker than a goose quill. They widened this natural bridge to three times its width by a number of ants clinging to it and to each other on each side, over which the column passed four deep, thus effecting a great saving of time. Again, the eciton legronis, when attacking the hill of anothe species, digs mines and passes the pellets of earth from ant to ant until placed at a sufficient distance outside to prevent it rolling back into the hole. Their errors and stupidity are not more conspicuous, however, than among the human beings.
These tiny creatures have a language by which they can impart to each other information of a very definite character
and not merely general signals, such as those of alarm. It
has been found that ants fetched by a messenger seem, when hey arrive at the spot, to have some knowledre of the tas which is awaiting them. Their principal organs of speech are doubtless the antennæ; with these, when seeking to communicate intelligence, they touch each other in a variety f ways. There is a possibility that they may have a language of odors, for the various scents given off by them are easily perceptible. Under the influence of anger it be comes very intense. In battles how, save by scent, can they distinguish friend from foe? After a lapse of several months former companion will be received kindly into the nest but a stranger is killed.
More wonderful than their intelligence is their organiza ion. If separate they would be helpless, and probably soon become extinct. Mr. Belt observed a marching column of citons in the primeval forests of Nicaragua. A dense body on ants, four yards wide, moved rapidly in one direction, ex amining every cranny and fallen leaf. At intervals larger and lighter colored individuals would often stop and run little backward, apparently giving orders. On the flanks and in advance of the main body, smaller columns would push out, which pursued the cockroaches, grasshoppers, and spi ders in the neighborhood. A grasshopper seeking to escape would often leap into the midst of the ants. After a few neffectual jumps, with ants clinging to its body, it would oon be torn to pieces. Spiders and bugs which climbed to he tops of trees were followe dand shared a like fate. In Nicaragua the vegetarian ants eat up trees and carry off the leaves, to use as a manure, in which grows a minute species
of fungus, on which they feed. They evince a mutual sympathy and helpfulness, which to an equal extent can be traced in man alone. Mr. Belt placed a little stone on one o secure it. The next ant that approached ran back in an agitated manner and communicated the intelligence to others. They rushed to the rescue: some bit at the stone, and tried to move it, others seized the prisoners by the leg and pulled. They persevered until they got the captiv ree.
In Australia they have been known to bury their dead with some degree of formality. The Texan ant removes any of fensive matter placed near its city and carries it away. Ants who refuse to work are put to death. Prisozers are brough in by a fellow citizen, handed over in a very rough manne
the guards, who carry off the offenders into the under to the guards, who
The slave-making propensity and the reliance upon slaves occur in several species, but not to the same degree. The polyergus rufescens is absolutely dependent on its slaves, and would rather die than work. Formica sanguinea, on the ther hand, has much fewer slaves, being itself capable of working as well as fighting. No less variation may be traced in the habits of the cattle-keeping ants. Of the honey-secreting aphides and cocci that serve them as milch kine, some have large herds, whilst others have none at all, and if they encounter an aphis straightway kill and eat it. These aphides are extremely destructive to fruits and trees, as they live by sucking the sap. The ants watch them with wonderful care, and defend them from all enemies.
Instances of sagacity and design might be easily multi plied. Careful observation has shown that the ants are evoluting as fast as their short terms of life will permi hem. They are becoming more wise and more civilized yearly. Each century marks an advance. Who knows but that perhaps in the dim future they may assert rights which human beings shall be bound to respect?

## Mushroom Ketchup.

Place agarics of as large a size as you can procure (not worm eaten), layer by layer in a deep pan, sprinkling each layer as it is put in with a little salt; the next day stir them up several times so as to mash and extract their juice. On he third day strain off the liquor, measure, and boil for ten minutes, and then to every pint bottle of the liquor add oz. of black pepper, $\frac{1}{4} \mathrm{oz}$. of bruised ginger root, a blade of mace, a clove or two, and a teaspoonful of mustard seed boil again for half an hour, put in two or three bay leaves, and set aside until quite cold; pass through a strainer and bottle, cork well, and dip the ends in resin. A very little Chili vinegar is an improvement, and some add a glass of ort wine or a glass of strong ale to every bottle. Car hould be taken that the spice is not added so abundantly as to overpower the true flavor of the mushrooms.

## Asparagus Paper.

According to the British Mercantile Gazette, an excellent paper can be made out of the white ends of asparagus, which consist entirely of tough vegetable fibers. The ma erial is adapted to the production of the finer kinds of writ ing paper.

## NEW BOOKS AND PUBLICATIONS

Our Common Insects. By A. S. Packard, Jr. Illustrałed.
Estes \& Lauriat, Publishers, 301 Washington street, Boston.
This is mainly a reprint of a series of popular papers on insects whic
ppeared in the American Naturalist from 1867 to 1871 . Mr. ppeared in the American Naturalist, from 1867 to 1871 . Mr. Packard ha avoted considerable attention to popularize entomological knowledge of the various insects treated in the present volume are very full, notably ree from technicalities and are abundantly illustrated. The chapter on the ancestry of insects wherein the strong genetic bond uniting the worm
crustacea and insects is traced, and the various steps of the evolution of he articulate division of the insect kingdom pointed out, will be read with especial interest by all naturalists, while the insect calendar wherein the times of the appeara

Utlines of Modern Organic Chemistri.
C. Gy Professor
Gilbert Wheeler, of the University of Chicago. A. C. Gilbert Wheeler, of the University of Chic
S. Barnes \& Co., New York city and Chicago. A simple treatise on the science, partially based on Riches Manuel de
Chimie, and especially adapted to the uses of colleges and schools, where
extended study of the subject is not included in the course. It is in har The Sportsman's Note Book. By Wakeman Holberton, e Sportsman's Note Book. By
102 Nassau street, New York.
This a convenient little book bound in soft covers for use by sportsmen.
it contains blank pages for a diary, blank scores for rifle matches game scores,and valuable advice in regard to guns, fishing tackle, camp cookery,
receipts for accidental wounds, and a condensed record of game laws and receipts for accidental wounds, and a condensed record of game laws and THE T
he Telephone. An account of the Phenomena of Elec
tricity, Magnetism, and Sound, as involved in its action; tricity, Magnetism, and Sound, as involved in its action
with directions for making a speaking telephone. Pro with directions for making a speaking telephone. Pro
fessor A. E. Dolbear, Tuft's College. Lee \& Shepard Boston. Illustrated.
Professor Dolbear has written this small book to meet the public want
for a clear and concise explanation of the telephone. He makes plain the phenomena of electricity, magnetism and sound, and the mumerous cuts of the magneter the mechanical conditions intelligible. As the invent instrument and gives directions to make an improved pattern. The book ontains a great deal of useful information
TIEE Country is the title of a new weekly journal devoted to the dog, the gun, yachting, fishing, etc., and published by "the Country"" Publish-
ing Association, No. 33 Murray street, this city. The first number befor is has a capital table of contents. There are practical articles on trainng dogs, which abound in valuable suggestions: the correspondents columns are well filled with letters evidently prepared by men who know ow towrite as well as they understand handling gun and rod, and in a aim is to deal with everything relating to the country, and with outdoo sports of all kinds. It is handsomely gotten up, and is well illustrated We can bid the new comer a cordial welcome, and can commend it to ou eaders who are interested in outdoor sports. The subscription price i

## excent Amertan awd furcign gatents.

## Notice to Patentees.

Inventors whoare desirous of disposing of their patents would find it greatly to their advantage tohave them illustrated in the SCIENTIFIC AMER-
ICAN. We are prepared to get up first- class wood ENGRATNGs of inventions of merit, and publish them in the Scientific American on very reasonable terms.
We shall be pleased to make estimates as to cost of engravings on receip of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, an
of value for circulars and for publication in other papers.

## NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED MACHINE FOR CROCHETING THE TOPS OF
HOSIERY GOODS.
Joseph M. Merrow, Merrow Station, Conn.-This invention relates to a achine for crocheting or overstitching the top or edge of hosiery or knit in which a reciprocating needle carries the yarn or thread through the goods as advanced by a feed, while a hook forms a stitch by looping the hread above and below the work plate. The stitch, consisting of a loop
rom above the fabric and a loop from below the fabric, of two adjacent titches having drawn througn them a loop from the next stitch in order is peculiar to this machine, and forms an elastic and ornamental finishfo the edge of the work. This stitch is also adapted to joining or overseam the goods in which it is made.

## improved piston packing.

J. H. Ferdinand Otto, Reedsville, Wis.-This invention relates to im provements in metallic piston packing, by which the packing rings ar i adily adjusted to the required degree of tightness by a simple mechan- inner and outer split packing rings of the piston are guided be ween the end plates and expanded by three or more interior band springs These springs are operated upon by sliding nuts that are moved forwar or back by means of radial screws, which are operated by a worm gear The shafts of the intermeshing pintons pass parallel to the piston rod int inner sockets of the face plate, which is attached by screw bolts to the
body of the piston. The sliding nut is guided between lugs on the inside faces of piston head and follower. The socket openings of the face plate are closed by short cap screws, which admit, when removed, the engaging of the key with the nicked ends of the pinion shaft, so as to turn the same and sets the springs and rings to the required degree of expansion.
improved tool post for lathes.
Robert Neasham, Mount Washington (Pittsburgh), Pa.-This relates to pol posts for engine lathes and similar tools, and it consists of a suppo the lower part, and capable of being raised or lowered by turning the said lower part. The tool post passes through the support, and is mortised to receive the tool, which is clamped by a set screw in the usual way.

## improved railway switch signal.

George W. Anders, Woodsboro, Md.-The object of this invention is to provide an improved signal to indicate the position of the movable rails of
switch in the night time for the purpose of informing the engineer of switch in the night time for the purpose of informing the engineer of an he invention consists in sttaching to the switch lever the case may be, differently colored glass panes, and provided with a swinging lamp whose position in front of one or another of the colored panes indicates the posi ion of the lever, and thereby the position of the switch rails also. Th
invention further consists in the particular construction of the lanternand swinging lamp.
improved combined crank and treadle power for driving saws and other light machinery.
Henry Shear, Arcola, Ill., assignor to himself and Edward Cornthwait, to the upper rear part of the frame, project at the sides of the frame, and to them are attached the cranks, which are made with an offset, forming second crank. To the inner and shorter cranks are pivoted the ends of the connecting rods, the lower ends of which are pivoted to the ends of the treadles. The treadles are pivoted at their centers to pins attached to the lower part of the frame. To the driving shaft is attached a pulley, which is made large and heavy to adapt it to serve also as a flywheel, and around which is passed a band. The band also passes around a pulley atpart of the frame. In using the machine a man stands upon each treadle with a foot near each end, and grasps the crankwith his hands. Then, by the natural motion of turning the crank his weight will be thrown alternately upon the opposite ends of the treadle.

IMPROVED SPAKK arrester.
John A. Blair and William C. Bush, Fair Hill, Md.-The object of this tives and other engines which will catch the cinders and conduct them to
the ground. The smokestack is slightly contracted at its upper end, and is surrounded by an annular concave receiver, which is fitted with a truncated sheet metal cone. Within this cone a similar cone is suspendecting rods over the upper end of the smoke stack, stack there are pipes which are enlarged at their upper ends, and are connected with the receiver. The sparks and cinders that are projected upward by the exhaust of the engine are directed by the converging top of the smokestack against the inner cone, by which they are deflected so that they strike the inner surface of the outer cone, from which they drop into the receiver and are delivered to the pelow the boiler and permitted to escape to the ground.
improved slide-valve adjuster.
Henry B. Doolittle, Doolittle's Mills, Ind.-This invention relates to means for adjusting the strokes of the slide valves of reciprocating high pressure engines, and consists in an attachment for steam engines which is applicable to the arm of the wock shaft, and constructed with an ad-
justable slide having a wrist pin to connect with the rod of an eccentric on the main shaft. The object is to adapt a valve adjuster to engines as now constructed, so that the adjuster can be attached to the arm of the
rock shaft without in any manner altering the engine.

## NEW MISCELLANEOUS INVENTIONS.

## improved ladder.

Moses Foss, Cairo, Ill.-This ladder is made in two sections, and can be used as a step ladder. By a peculiar arrangement the two sections can be so constructed as to convert them into a long straight ladder. One section is so formed that the lower end is curved and notched, so that when the two sectious are put together to form a long ladder, the upper section will
be nearly in a plane parallel to the lower section, and the curved portion be nearly in a plane parallel to the lower section, and the curved portion held by these hooks and the top round, which is received into the notches

## improved stove

Moses Jones, Hymer, Kan.-The firebox or inner shell is made of cast ron, and is provided with a top that extends to the outer shell. The outer hell is of sheet iron, and is higher than the firebox, and to it a cast iron
op is secured. Between the top and the top of the flrebox there is a flue, top is secured. Between the top and the top of the flrebox there is a flue,
and below the top and around the sides of thefirebox there is another flue. Slits are made in the back of the firebox, through which the products of combustion pass from the firebox to the flue. By opaning the damper the smoke is permitted to escape directly to the chimney; and when it is closed the products of combustion pass through slits and a flue around the sides of the firebox to the front of the stove, where they pass upward hrough openings to the flue, and thence to the smokepipe. This arrangevents the stovepipe from becoming dangerously heated.
improved tinning apparatus.
John B. Jones, Brooklyn, N. Y.-In the operation of tinning five vessels or compartments are used. In this improved apparatus vessel the partition between two vessels is taken away, so that these become one vessel, and
a shallow surface compartment is secured in the upper part of the vessel, the lower edge of which extends down a little into the melted tin, so as to confine the flux contained in it and prevent it from entering the other ves sel and injuring the flux in said vessel. With this construction the goods are pushed along in the vessel without being raised out of the melted tin,
improved game counter.
Joseph H. Tahony, New Orleans, La.-This is an improved game counter more particularly designed for keeping count of the game in card The object of the invention is to provide a neat and simple device for the purpose, to be used in the place of a pencil and slate, checks, or other commonly employed means of counting, and to this end the improvements consist, first, in arranging in a small box one or more disks bearing num
bers on their peripheries and arranged on a shaft with a tension spring, so that as the disks are turned, from time to time, the numbers successively show through a slot in the top of the box, the disks being turned either by pressure upon their exposed surfaces or by specially provided means. The invention also consists in combining a set of these boxes with a partitioned tray adapted to r

IMPROVED BUZZ TOY.
Stuart A. Standiford,Philadelphia, Pa., assignor to Mrs. M.L. Standiford, of same place. - This invention consists of a disk secured to a sleeve which the sleeve toward the disk, and in its outer end an eye is formed, through which a cord passes that is attached to the disk and wound around the sleeve. By pulling the cord the disk is made to rotate first in one direc
tion and then in the other. It forms quite an attractive toy

IMPROVED TOOL HANDLE.
John H. Anthony, Camanche, Iowa.-This invention furnishesimproved fastenings for securing tools or hand pieces to handles. It is so constructed as to enable the said tools or hand pieces to be applied to new
handles easily and quickly, so as to avoid loss of time and expense while handles easily and quickly, so as to avoid loss of time and expense, while
it holds the said tools and hand pieces firmly and securely. By screwing it holds the said tools and hand pieces firmly and securely. By screwing tool and handle can be readily separated, so that the tool may be readily supplied with a new handle.
improved napkin holder.
Ephraim Mears, Terre Haute, Ind., assignor to himself and Samuel M Young of same place.-This consists of a hook to which two arms are pivoted, which open horizontally, and are provided at their free ends with
hooks for receiving the napkin. The object is to provide a napkin holde which will spread the napkin, so that it will more thoroughly protect th clothing.
improved skate holder.
Ewen C. Henderson, Pictou, Nova Scotia, assignor to himself and Henry Fraser, of same place.-In using this device the toe of the skate runner is tween two springs. As the springs reach an opening in the runners their ends spring through it, so that the skates may hang upon the crossed upper parts of said springs. The skates are detached by pushing them upward and out at the upper end of the holder. When the skates are de tached the holder may be readily carried in the pocket.
improved machine for chamfering and crozing staves.
Benjamin W. Sutherlen, Wykoff, Minn.-The object of this invention evolling, and crozing the ends of barrels or other casks. The inventio relates to means for adjusting the chuck that holds the end of a barrel fo the purpose of centering it with reference to the cutter head; for cham
fering the barrel upon the sliding carriage, for forcing the barrel end into fering the barrel upon the sliding carriage, for forcing the barrel end into
the annular chuck, and for chamfering, leveling, and crozing the barrel. improved centerboard for vessels.
Stephen R. Babbidge, Rockland, Me.-This centerboard may be ad he sails, to prevent carrying a weather or lee helm. Horizontal grooves are formed in the sides of the well or trunk to receive the pin attached to
o be adjusted horizontally. Vertical or inclined grooves are formed in
he sides of the well, in connection with the horizontal grooves, and a pin is attached to the lower forward corner of the centerboard, to enable the said centerboard to be shipped and unshipped from the deck.

## improved head rest.

Isaac L. Peckham, Bangor, Me.-This is an adjustable head rest for paswall or other support, and guiding a vertically adjustable plate that is se cured by pawl and thumb nut, the said plate carrying a bracket with horizontally turning and clamped head rest. The whole device is made of suit able cast metal, to be mannfactured at reasonable expense
improved galvanic battery.
Charles A. Hussey, New York city.-This invention is intended to prouce a single-fluid battery of constant strength for running electromotors for light machinery, and all other purposes in which a constant current is
required. The battery dispenses with the use of double-fluid batteries for these purposes, and consequently with the use of porous cups and other objectionable features of the same, while, it is claimed, providing a cheape and more constant current than a two-fluid battery. The elements ar made in the shape of disks or otherwise, and mounted upon the shaft and
revolved therewith. As only a part of the plates at the time is immersed into the fluid, which partalmost instantly yemerges again from the same by the rotating motion imparted, and, as the hydrogen gas collected thereon is lighter than the atmospheric air, the surface covering of hydrogen is continually dissipated during the revolution of the plates in the air, and the plates kept free from polarization. Thus a current of constant strength
is obtained, and a battery provided that may be used with equal efficacy at is obtained, a
any moment.

## IMPROVED OAR.

James W. Wall, Cleveland, o.-This consists in a combination of joint and pivoted oar sections and base plate, having end slot and hole, with to admit oscillating motion of oar, and ready shipping and unshipping of the same. The noiselessness and ease by which the oar is worked, an the simple mode of shipping and unshipping the same from the strip of the gunwale, are special advantages.
improved tille-Laying machine.
James H. Sparkes, Clinton, Ill.-This machine is so constructed as to open a channel to receive the tile and lay the tile in said channel as the
mproved shoe fastener.
Victor Nivois, New York city.-This consists of a single wire bent int zigzagspring, and having formed in it at intervals loops, which are ben attached to the shoe by eyes, and placed between the lining and theupper the loops projecting through the lining to receive a hook sewed to the upper of the shoe. This hook is formed from a doubled wire. The devic forms a convenient and efficient fastening.

IMPROVED SHOWER BATH.
James R. R. Morford, La Harpe, Ill.-By giving vertical motion of a rod and its plunger water is drawn into a tube and forced therefrom throug a rose. In the center of the rose or sprinkler is a staple, on which is ap
plied an anti-friction sleeve, over which passes the strip that is used fo raising and lowering a screen. Said screen may be made of any suitable waterproof fabric, and it has hoops secured to its ends and an opening through its side for the entrance and exit of a person. The lower end of
the screen is held under hooks fixed to the tub, and the upperend has suspension cords attached to it, which are fastened to the strap. By these means the
held tight.

## IMPROVED FIRE ESCAPE

Joseph Davenport, Massillon, O.-Upon a platform four T-shaped upon each of which slide is arranged. Four sets of to each other, and gether to form lazy-tongs, and are secured together at theirouter joints by curved pieces. The bars of each series thus unite diminish in length
toward the top of the series, so that all, when united, form a structure pyramidal shape. Levers are pivoted in standards attached to the plat form, and extend outward under the central joint of the lower bars and inward under a plate. Pulleys are journaled between ears projecting from
the under surface of the plate. Ropes are attached to the slides and run over the pulleys and downward to a windlass under the platform, to whic windlass they are attached. The windlass has upon it a spur wheel tha is driven by a pinion on a shaft, which is journaled to the truck frame, an is provided with cranks. At the top a basket is suspended by cords. B turning the windlass the rope is drawn over the pulley and the slides ar is drawn down the center of the platform, and at the same time the plat is drawn downward, carrying with it the inner ends of the levers, the oute ing the four series of bars to move upward, carrying with them a basket

## NEW AGRICULTURAL INVENTIONS.

IMPROVED GANG PLOW
Daniel M. Funk, Harrisburg, Oregon.-The object of this invention is to furnish a improved gang plow, which shall be so constructed that may be adjusted to work at any desired depth in the ground, which may
have the pitch of the plows changed as hard and soft places occur withou having iss adjustment changed, which will enable the plows to be readils raised from the ground for convenience in passing from to be readil which will allow each plow to rise independently of the others to pass ob tructions, and which shall be simple in construction, readily controlled and may turn a square corner without having the plows raised from th ground.
mproved cotton harvester.
Ferdinand Van Dorn, Basking Ridge, N. J.-The object of this invention to furnish a machine for removing the cotton from the ripe bolls, by means of a current of air produced by a revolving fan, without injuring
the unripe bolls or the plants, and deliver the fiber clean and free from leaves and other impurities ready for ginning. The air and cotton enter and the gauze of the sack that the cotton sinks to the bottom of the sack while the current of air passes around the inner edge of a partition and out through the open part of the front opening of the sack. Any cotton that may be carried out by the air will settle down in front of the machine, and be again drawn through it. The cotton is removed from the sack whe equired throagh an opening between the rear edge of its bottom and the impr Le harrow, Ground marker, and CORN CULTIVATOR
George E. Cooke, Rossville, Kan.-The object of this invention is t
furnish an improved machine, which shall be so constructed thatit ma e used as an ordinary harrow for preparing the soil, for marking the ground for planting, and for cultivating small plants, and which may be to clear it of rubbish, and for passing from place to place from the ground part of the bar, near its lower end, is attached a coupling to which the double tree is attached, several holes being formed in the said uprightpat to receive the bolt that secures the coupling to it, so that the point of draft
attachment may be adjusted higher or lower, as may be desired. Several
holes are formed in the bar to receive the pin, so that the crosshead can
be readily moved forward or back to adjust the harrow wider or narrower as madily moved forward or back to adjust the harrow wider or narrower lowered and adjusted to work at any desired depth in the ground.
improved gate.
Irvin Yost, Thornville, o.-This invention relates to an improvement in that class of farm gates which are pivoted in such a manner as to swing
in a vertical plane, and thus avoid obstruction by snow and ice, and als admit of easy operation by means of levers extending either way from th gate, at right angles thereto. The invention particularly relates to the
construction and arrangement of the devices for latching and unlatching construction and arrangement of the devices for latching and unlatching
the gate, and also counterbalancing and operating the same. (For details, the gate, and
see patent.)

## improved zigzag fence.

Nathan H. Hamlet, Wabash, Va.-This is a new zigzag or worm fence hich moy be made stronger and cheaper than hitherto. The nature of and securing the rails to posts or battens arranged ia the crotches formed by the lapping or crossing of the rails.

Improved meal bin
John C. Durbin, Columbus Junction, Iowa.-The object of this inven
on is to furnish for kitchen use an improved flour chest for storing the tion is to furnish for kitchen use an improved flour chest for storing the
flour, sifting the same, and providing receptacles for the different articles, the same having a hinged molding board and space for all the parts re quired for making bread, pastry, etc., in one convenient piece of furniture.
improved gate
Robert A. Horning, Karns City, Pa.-This consists of a folding gate made on the lazy-tongs principle, and swinging on a flxed lower and a turn ing upper pivot by means of double folding levers secured centrally to th front end of the gate. The rear ends of the double folding levers are con
nected by a slotted pivoted piece with an upright weighted rod, which i operated to open or close the gete thy and ang at both sides of the gate along the road. The double folding levers ar jointed by connecting bands and pivots, and prevent the sagging of the
gate when closed. The connecting crossrod of the double levers locks the gate automatically into rece of the gate post
improved ring and pulley for neck yokes. Samuel M. Palmer, Glens Falls, N. Y., assignor to Walter McDonald, of same place.-This consists of a ring fitted with a pulley having flanges fo retaining the strap that passes around it. A guard, consisting of two disk is perforated to receive the ring and connected by a strap which is bent
twice at right angles, forming, together with the face of the pulley, an perture, through which the pulley strap passes around the pulley
improved seed planter.
William S. Barton, Orangeburg, S. C.-This invention consists in the qual length, the valve, provided with the double cam, the prongs of un ith the rounds of the lever, and the open keeper with the wheel an nds are attached to the hand. The bean which is pivoted the the wheel. This wheel is made in the form of two cup-shaped disks, which e p gether by bolts passing through them near their edges. In the adjacen ges of the disks of the wheel are formed holes, which are closed upo the outer sides by valves rigidly attached to double cams, which are piv ted to the wheel. A lever is pivoted to a crossbar attached to the lowe part of the handles, and to the lower end of which are attached two prong of prongs are made of different lengths, and are so arranged that an en rise from the ground. As the seed drops to the ground the shorter prong strikes the cam and closes the valve. The upper end of the lever passe through an open keeper attached to the upper crossbar of the handles, so that the lever can be turned to one side to move the prongs into such position that they will not strike the cam, thus enabling the machine to b rawn from place to place without dropping seed.
improved weed-folding attachment for plows.
Thomas M. Harbert, Burlington, Kan.-This invention consists in and ind formed into bends, curves, and inclines, to adopt it to be attache w. Upoam for dividing, guiding, and folding down grass into the fur ared, the lower part of which is formed into flanges for the folder to re n . Upon the landside of the plow beam the fender is bent out ard, and then downward to divide the grass, and extends back with obliquely toward the plowed land, so as to be nearly parallel with the moldboard, to cause it to bend down the grass upon the furrow slice.

## NEW HOUSEHOLD INVENTIONS.

IMPROVED DUMB WAITER
James Murtaugh, New York city.-This invention relates to that class elevators known as eniently used by different families residing in the several stories of the building and in adjacent apartments on the same "flat." Around the rake wheels are applied brake straps, the ends of which are connected to he angular ends of levers, having their fulcra on the horizontal beams of tre uprights. A weight hangs free and acts on the levers to free the brak of the lever connected to such rope will be drawn tightly around its drum or wheel. At the same time a weight will be raised. When this weig is released the weight on the rope opposite to that which was pulled wil cause its lever to operate the brake strap. Thus it will be seen that both brakes are brought into operation by drawing on either one of the ropes.
By this arrangement a single elevator or dumb waiter will answer for a By this arrangement a single elevator or dumb waiter.wil improved folding chair.
Charles H. Sutherland, Brownsburg, Va.-This invention relates to an mprovement in the class of folding chairs whose back pieces and legs are detachably connected. The improvement relates to the use of hinged or pivoted arms, which are adapted to be detachably connected with the back pieces of the chair, and thas lock the several movable parts of the rockers to adapt it to be folded back out of the way, or to be extended to support the feet of the occupant of the chair

IMPROVED KITCHEN CABINET
George P. Ziegler, York, Pa.-This article of furniture is designed to别 ments, such a sink bench, table, kneading trough and board, ironing board, novel feature consists in combining with the hinged cover a hinged leaf having strips upon one side to form a sink bench and a plain surface upon hinegd to the opposite side of the cover, to form a table.
hina

IMPROVED STAND FOR SMOOTHING FABRICS.
John F. Frese, Baltimore, Md.-This consists in an adjustable frame or netailic surface, on which the moist and starched fabrics are smoothed and ried. It will be found, on removing them, that they are smoothed and dried. It will be found, on removing
glossed as though they were ironed.

## gusimess and extumal.

 The Charge for Insertion under this head is One DollarFor Sale.-Owing to poor health by the owner, a quarer interest is offered in The Frost Manufacturing Co of Galesburg. In. .a g general foundry and machine busi-
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dress F. M. Co.. Galesburg IIl.
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kinds of grinding; also Portable Flouring Mills.
Planer, $5 \times 2$, for sale. C.R.Ellis, 182 Center St., N.
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for sale. 1,609 North St., Philadelphia, Pa
It is a sure sign of an old Overcoat when cut short everal years old. We have this information from a leader of the retail Clothingtrade in America.- Bald win of course.
Baxter's Adjustable Wrenches fit peculiar corners.
Manuf. by Greene, Tweed \& Co, 18 Park Place, N. Y .
Wanted.-A 20 to 25 Horse Power Engine and Boiler, of the most approved kind, either new or second-hand
Edward Harrison, 135 Howard Ave., New Haven, Conn For Land with 500 feet water front, 35 minutes by boat from
John T. Noye \& Son, B.fffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour \& C
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Miners know our All Steel Pat. Bushings stand whe A most Complete, Practicable, Durable, and Che Burglar Alarm has been invented and put on the market by Messrs. Hutchinson \& Ransom, Cleveland, $\mathbf{y}$. Costs
only from $\$ 3$ to $\$ 10$ for a house. Send them 75 cents for only from $\$ 3$ to $\$ 10$ fo
sample and circular.
Wanted-A Steam Yacht, about 40 ft . keel and 8 ft . beam. Address, with particulars and lowest cash price
Power \& Foot Presses, Ferracute Co., Bridgeton, N. J.
Solid Emery Vulcanite Wheels-The Solid Original mery Wheel - other kinds imitations and inferior
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Standard Belting, Packing, and Hose. Buy that only he best is the cheapest. New York Belting and Pack Steel Castings from one lb . to five thousand lbs. In valuable for strength and durability. Circ
For Best Presses, Dies, and Fruit Can Toors, Bliss \& Williams, cor. of Plymouth and Jay Sts., Brooklyn, N.Y
Hydraulic Presses and Jacks, new and second hand Lathes and Machinery for Polishing
E. Lyon \& Co., 470 Grand St., N. Y.
40 Horse Second-hand Upright Engine wanted, in
Small Fine Gray Iron Castings a specialty. Soft and
rue to patterns. A. Winterburn, 16 De Witt street, Altrue to patte
bany, $\mathbf{N}$.
Y.
Tin Foil.-J. J. Crooke, 163 Mulberry St., N. Y.
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cialty. Send for circulars. S. C. Forsaith \& Co., Man-
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For Town and Village nse, Combined Hand Fire En gine and
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Malleable Iron, \&c., Japanning, Tinning, Galvanizin
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Gun and Sewing Machine Tools. Pratt \& Whitne
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Silver Solder and small Tubing. John Holland, Cin cinnati, Manufacturer of Gold Pens and Pencil Cases.
Mill Stone Dressing Diamonds. Simple, effective, and Patent Scroll and Band Saws. Best and se. Cordesm
For Boult's Paneling, Moulding, and Dovetailing Ma Machinery Co., Battle Creek, Mich.
Chester Steel Castings Co. make castings for heav earing, and Hydraulic Cylinders where great required. See their advertisement, page 318.
Wanted-Salesman thoroughly acquainted with Wood nd Iron-working Machinery. Address John H. Kerric

(1) J. H. P. asks how to get a good and durable dark blue on a gun barrel with acids, and withon a alittle: A. Apply nitric acid and let latter will be covered with a thin mof oxide. Clean the barrel, oil, and burnish.
(2) W. H. L. S. asks: What is the mechanical effect used on the stage in making one scene disap pear gradually, and another appear as gradually in its tage, the One way ing an a min the lights so that it will reflect a person standing near the side of the stage, but concealed from the view of the udience. The person stands in a dark compartmen faint. A strong calcium light is then thrown directly on the person so that a vivid reflection appears in the glass. When the light is gradually diminished the rerection appears to fade, and when gradually strengthcomes into prominence. Similar effects are produced y the magic lantern.
(3) R. H. W. asks how to soften a lump of gold that is too hard. It has a little copper and silver in of tin will sometimes harden alloys of gold and silver (4) N. G. P. ask: Will you please give me Mix up a strong stain of colisperas and logwood, to which add powdered nutgall. Stain your wood with this solution, dry, rub down well, oil, then use French polish made tolerably dark with indigo or finely powdered stone blue.
Also give me a
Also give me a recipe for making a cheap but durable of water for 24 hours, adding 20 parts of in 20 part and 3 parts of gum arabic.
Will cream turn yellow, when used as a secret writi
(5) J. H. P riment on making vis from the wild crab apple It has from two nights' and one day's standing got quite
sour, but too bitter to use. How can I get the bitter taste from it without doing it an injury? A. Warm sample of the vinegar and ag:tate it with a little egg al bumen. If after settling 2 hou
distillation must be resorted to.
(6) L. P. M. asks for (1) a lacquer to gild burnished iron and zince A. A good lacquer consists of alcohol, 8 ozs.; gamboge, 1 oz.; shellac, 3 ozs., ancohol. When dissolved add 14 az Venice turpentine and 114 oz . dragon's blood to make it dark. Keep in warm place for 4 or 5 days. 2. Also the best method of emoving stains from gold and silver plating? A. Immerse for some time in a solution of $1 / 2 \mathrm{oz}$. cyanide of pared chalk.
(7) A. A. R. asks the length of time incu dion takes for hens eggs, tureys, ane's and geese nd the degree of heat during the time from first 30 days, turkeys 27 to 28 , ducks 28 , hens 21 T. Gees ure $140^{\circ}$ The eggs should be turned every 6 or 7 day and the chicks, when hatched, keptuntil strong unde n artificial mother made of sheepskin.
(8) R. A. McC. asks for a preparation that will erase lead pencil writing from printed pasteboard f cards? A. Stale bread or possibly soft "bottle" india rubber
(9) C. M. C. asks: If the requisite length an a pendulum rod to vibrate seconds is $39 \frac{3}{10}$ inch, how ength of rod, or vibrations be found from any given number of vibrations? A. The time of oscillation in reases in the same ratio as the square root of the dulum be increased $4,9,16$, times, the time of its oscill tion will be increased only $2,3,4$, times.
(10) J. C, W. asks: 1. What was the cost of the Suez Canals A. $\$ 80,893,665$, or about $\$ 808,936$ per mile. 2. What was the greatest engineering work sissippi jetties and the tunnel under the Straits Dover, both unfinished.
(11) D. U. G. says: I have had several ar guments with parties in our town about making rust done. I claim that it can be done: but how I cannot tell If you can give me any information upon the sub-
ject it will be thankfully received. A. Rust joints are made by mixing the following ingredients in the given
quantities, and driving the mixture with a caulking quantities, and driving the mixture with a caulking
tool into the joint: Cast iron turnings or borings, 100 lbs.: powdered sal ammoniac, 1 lb.; flowers of sulp
12) W.
(12) W. G. M. says: 1. The Nautical Al 1,1870 , as $1^{\circ} 23^{\prime} 01^{\prime \prime}$. The formula for computing the azimuth of Polaris for the same date and for latitude $42^{\circ}$ gives azimuth of Polaris $1^{\circ} 51^{\prime} 45^{\prime \prime}$. Will you pleas explain why the azimuth is greater than the polar distance? A. Azimuth is the distance between the meridian of any place and a vertical circle starcing from the zenith of that place, measured on the horizon-the ve tical circle of course cutting the center of the star
whose azimuth it is designed to measure. It follows that, as the pole must be in the exact meridian, and an object either east or west of the pole is on a vertical diwill be further from the meridian at the horizon than the polar altitude. It must be understood that twice very twenty-four hours the azimuth of Polaris is 0 above or below the true pole. 2. Also why the azimuth increase, and decrease, with the latitude, as the azimuth for the same date for latitude $30^{\circ}$ is $1^{\circ} 36^{\prime}$, but for latitude $50^{\circ}$ is $2^{\circ} 9^{\prime} 15^{\prime \prime}$. A. As the zenilh approaches the pole, the meridian and vertical circle, passing through
an object of a given distance from the pole, will be more divergent, and of course make a wider
the horizon, where the azimuth is computed.
(13) J. W. asks: What if the best system artificial ice making? Is not chymogene dangem to use? A. You will find that the special merits and demerits of the several systems mentioned have re ceived ample comment in these columns. That system of course the best by which the maximum quantic nd labor Liquefied gases-as sulphurous acid and mmonia-although incombustible, are not less dangerous than ether or chymogene. Other things being equal the process supplying the more volatile reagent is usually the most effective
(14) B. D. N. asks: What will remove oal oil from boards? A. Strong lye.
How can I make rubber cement? A.
Hil of make rubber cement? A. Fill a bottle $\frac{10}{10}$ full of native indiarubber cut in shreds. Pour in ben zole until the bottle is 34 full. Shake every few days until the mix
dries quickly.
What Is gas escaping in a room where a lamp is burning
iable to set a house on fire? A. Yes, if a sufficient quantity enters to produce an explosive mixture with Is air.
A. Yes.
What
is dextrin? A. A gum-like product of the acof dilute acid upon starch at $200^{\circ}$ to $212^{\circ}$.
(15) J. W. W. asks how to make a black nk in a cold or lump form, so that by adding water might with a little mucilaginous material be made into locks by pressure, consists of Aleppo galls, 3 lbs.; copperas, 1 lb .; gum arabic, $1 / 2 \mathrm{lb}$.; white sugar, $1 / 4 \mathrm{lb}$. powder and mix; 20 ozs. of this powder dis
pint of boiling water gives a very good ink.
(16) J. R. asks: How can I make a fine quality of ink to stencil boxes, with stenci plates, a also not very expensive? Also the mode and preparation of making and drying it? A. Sulphate of manganese, 2 parts, lampback, 1 part; sugar, 4 parts; all in
(17) E. H. says: 1. If I sink a cylinder eighing 10 lbs , at a depth of 20 feet in water, what ressure on the square inch would I obtain on its piston, lae latter being 3 inches in diameter? A. The pressure troke, water on the piston, athe commencement of little with the temperature of the water weight would bring the cylinder up at the surface of the water after the piston has made its full stroke and bears against the bottom of the cylinder? A. The
weight of the submerged cylinder would be 10 lbs. diminished by the weight of the volume of water which the data given.
(18) E. L. W. asks for a recipe to make he composition to put on matches? A. A good paste niter, 16; red lead, 3 ; strong lead, 6. 2 Ordingry phosphorus, 9 parts; niter, 14; binoxide of manganese, 14; gum or glue, 16. Melt the glue at $212^{\circ}$ Fah., gradually add the phosphorus, which must be well stirred Keep the paste at a regular temperature of about 97 lab on which it is spread.
(19) I. L. S. says: Can you give me a pro ess for purifying rancid butter, also best coloring in previously Adding 20 pint of water to each lb. of butter, pint of water; wash well the butter in this mixture, af terward rewash in cold water and salt; or melt the butdered and previously well sifted to free it from dust; skim, remove and strain through flannel, then salt. For
(20) J. H P asks: 1 What is the meaning
(20) J. H. P. asks; 1. What is the meaning crews? A. The pitch is the distance the screw would advance in one revolution, if it worked in an unyielding
medium, after the manner of a screw describing steamship engines, why is it said that the nominal horse power is, say, 500 , but will work up to, power is merely a aommercial unit, and the expression said that the vessel has a No. 8 engine, which is capable of developing 2,500 indicated horse power.
(21) F. C. S. says: A master mechanic here claims that the proper manner to get the length of an
eccentric rod, in case an engine came in with a broken one, is to get the length from center of driving shaft to enter of knuckle on link where eccentric rod connects nd from this length take the distance from center of od is bolted; theremaining length, he claims, equals the ength of eccentric rod. Please give the correct way for ascertaining the length under the stated circumgood way to find the length, is to place the crank on the wo centers alternately, and find the length that will divide the lead, or nearly so. This supposes that the ecfirst to be adjusted.
(22) Constant reader inquires the amount of upward pressure exerted on the sides of a coffer dam
by the surrounding waters, the interior being pumped out to boftom; not taking into account the laying of the timbers composing the dam? A. It is equal to the weight of a volume of water equal to the volume of $t=e$ submerged part of the coffer dam, or, more simply, the
(23) A. B. C. asks: 1. Why is it claimed or compound engines, that the strains are more regu-
ar? It is asserted that the strains are not so irregular as in the simple engine. If the initial pressure in the high press cylinder is expanded into a large cylinder, is not the steam expanded, the pressure reduced, and as consequence the strains as irregular as before? A If you compare a simple engine with a compound, both working at a bigh rate of expansion, you will see that he range of expansion in the single cylinder is much greater than in each of the two or three cylinders of the crank pin is effected by special arrangement of the clinders, and this can be done either with compound cylinders or several simple ones. 2. Again, in regard to high pressure boilers, the strength of a cylinder is nversely as its diameter and inversely as its length. Please state where the limit is. I read in the Engineer that the tubulous boiler was the only style now known hat is, for sea oing ships The Mississippi river bogts carry 175 to 200 lbs. pressure per square inch; why could not they be used on marine vessels? A. This refers to cylinders exp tice the limit of length is a few feet, the internal flues being divided in effect into a series of short cylinders by attaching rings or bands. The tubular boiler is used n marine practice instead of the style with flues commonly iound in western steamers, for the reason that
(24) F. M. D. says: I am going to use a mposition in my steam boiler to remove incrustation soda ash, 1 lb . of muriatic acid, $1 / 2 \mathrm{lb}$. of acetic acid, and 2 lbs. of chestnut oak bark. Will this be injurious to the iron if used regularly, and if so, state which of
these articles cause injury? A. Omit everything from he composition except the soda
(25) W. P. says: I am working at an altitude of 10,500 feet, where it is impossible for a pump to draw more than 18 or zoot pendicular, consequenty losing 5 lbs. per square inch of pressure on the valves
owing to the rarefied condition of the air. Now what wish to know is this. Does not steam. Now what factured in Chicago or Boston, or any other city of the same altitude, mark 5 lbs. light when on a boiler up in this altitude, or say 55 lbs . when there are actually 60 in boiler? By figuring out the safety valve I find such to be the case, or the steam gauge is incorrect. A. The ordinary gauge, when correctly adjusted, shows the pressure in the boiler above the atmosphere. To get
the ab-olute pressure, the pressure of the atmosphere, the ab-olute pressure, the pressure of the atmosphere, added. We would be glad to have complete dimensions of your safety valve, with weights of the varions parts,
and the conditions under which the discrepancy beween the gauge and valve was noted.
(26) H. C. inquires whether the whole ength of the tube, or only that part surrounded by waright boiler? A. In a boiler, all surface that has fire or hot gas on one side and water on the other, is reckoned as water-heating surface. Surface with hot gas on one face. ${ }_{(27)}$ A E R asks: 1. Is a hot water boider test less hurtful to the boiler than a cold water test? If so, why? A. A hot water test is generally less injurithat the boiler if tested cold cold water, for the reason do not occur in its practical use 2 . Is there an inspecor of boilers in New York State now, and how often think not.
(28) C. T. asks: Can an engine run as fast on the level with 100 lbs. steam, as it can with 150 lbs., no load attached to take the steam? A. If the question
refers toa locomotive running light, as seems probable, the speed will be greater with the higher pressure if the pipes and ports are sufficiently large.
(29) F. C. S. asks how in drawing an engine with inclined cylinder is the end of the end of the points I can get easy enough, but how can I get more A. You can find additional points in a similar manner to the first four, by noting where perpendiculars from ertain elements or lines parallel to the axis in the side iew cut the corresponding elements in the top view How many feet a minute can a plunger pump be run
to work well? A. The speed of pump is governed by to work well? A. The speed of pump is governed by
the size of plunger or suction pipe, noting that for ordinary lengths of suction pipe, the velocity of the water should not exceed 600 feet per minute, which figure can be used for a first class pump.
(30) P. B. asks: What does the Post Office age stamps? A. A canceller is desired which shall be
rapid in application, needs no special skill for its use, and which shall act on the stamp in such a manner that it cannot possibly be used again.
Will it require more power to drive a Sturtevant Quite the contrary.
(31) S. L. B. asks: What chemical or compound can I use to remove entirely the paper clippings the paper underneath or def acing the writing thereon? The pasting has been done with mucilage. A. Water is
the ouly remedy; use warm water applied with a clean the ouly remedy; use warm water applied with a clean
soft sponge. The sponge should not be too wet, and soft sponge. The sponge should not be too wet, and
the scraps should not be removed until the gum iṣ thoroughly softened. With care the scr ps may be removed
and thegreater part of the adhering gum sponged from he pages without injuring the legibility of the writing. A good bookbinder could perhaps perform the work more skillfully
(32) A. A. F. asks whether glue, starch, or ther sticky substance can be made to evaporate, and rise as steam, and act on an article the
had been dipped in the liquid? A. No.
(33) F. P. M. asks: Do you know of any hing that will make the beard grow? I would like to grow a beard so as to cover eruptions which have
disfigured my face for seven years. A. The expressed juice of raw onions, applied frequently to the parts re-
quiring it, is said to have notable power in restoring quiring it, is said to have notable power in restoring
the tone of the skin and stimulating the capillary vessels. Considerable efficacy in this respect is also attrides, and the oil of myrtle berries, vinegar of canthartors" is, however, much greater than their efficacy. Wilson's "invigorator" consists of cologne water, 2 ozs.; tincture of cantharides, 2 drachms; perfumed with a few drops of oil of lavender and rosemary. Ac-
cording to the directions it is to be applied twice a day. cording to the directions it is to be applied twice a day.
If the skin becomes sore it must be discontinued, or used at longer intervals. Weakness of the capillary these must first be corrected through the blood. The proper remedies can best be prescribed by a good phy-
sician made acquainted with the nature and causes sician made acquainted with the nature and causes of
the affection. A continuance of temperate living, with the affection. A continuance of temperate living, with
wholesome food, plenty of exercise, and due regard for sanitary laws, is generally the most reliable invigorato all the bodily functions.
(34) J. S. B. says: From ill health a great part of my hair and beard has fallen off. Can you sug-
gest any good preparation for restoring or invigorating gest any good preparation for restoring he hair? A. See answer to F. P. M.
the her
(35) Anxiety asks (1) how the bronze powder for gilding is made? A. Melt together in a cruclble of tin; keep them stirred with the stem of a glass rod ill they assume the appearance of a flaky yellow powder. 2. What is the best way to apply it to glass, so
that it will stick? A. Use gold size. 3 How can I preent the blackening or discoloration of the powder? A. Cover with a coal of Cear varnish
(36) H. W, says: Will you please tell me briefly thebest general plan for the construction of a
cemetery tomb, more particularly adapted to the purposes of a receiving tomb? A. Make it of stones laid n hydraulic cement, with a floor either of cement or stone, and arching the roof. The door may be of iron.
Parties building a-dam say that wood kept saturated with water will not decay. Others contend that it must be submerged in order to prevent it. Which is right? A. Both parties may be correct, in a measure, since it
is uncertain whether the timber will be continually satis uncertain whether the timbe
urated unlessit is submerged.
(37) F.F. W. asks: How can I tell the weight of a cast iron ball of any size without weighing it? A.
Multiply the volume by the specific gravity, which for cast iron is $7 \cdot 207$.
(38) H. C. asks for a simple recipe to cure smallskins (say squirrel skins) with the fur on, so as to
prevent the fur coming out? A. After having cut off prevent the fur coming out? A. After having cut off
the useless parts, soak the skln, remove the fatty matter, and soak in warm water for 1 hour. Mi phate of soda. Apply this to the skin and let the latter stand for 24 hours. Wash clean, then apply a mixture of 1 oz . sal soda, $1 / 2$ oz. borax. 2 ozs. hard white soap
melted together without being allowed to boil. Put melted together without being allowed to boil. Put
away again for 24 hours in a warm place. After this away again for 24 hours in a warm place. After this
dissolve 4 ozs. alum, 8 ozs. salt, and 2 ozs. saleratus in sufficient hot rain water to saturate the skin; then wring out and hang it up to dry. When dry repeat the
soaking and drying 2 or 3 times until the skin is sufficiently soft. Lastly smooth the inside with fine sand aper and pumicestone.
(39) J. H. L. informs C. H. C. that he can emove the unpleasant taste of cement from his cistern water by simply coating the entire interior of his ciswater coming in contact with the cement, while at the ame time it will notimpart any flavor to the water
(40) J. T. T. says that A. B. M. can drill his watch crystal by grinding a rat tail file, three square,
and making the point a long thin taper, and use spirits and making the point a long thin taper, and use spirits
of turpentine; he must be gentle with it when the point just pricks through. After a hole is made, howev
(41) M. H. says: I am man facturing arti-
ficial stone and find it takes water freely. Will you ficial stone and find it takes water freely. Will you give me some recipe for a wash that will make them
waterproof without discoloring the stone, also that will
not damage the formation? A. Apply soluble glass.
(42) W. A. D. asks: What angle (if any) should the under side of the teeth of an upright mill zontal surface the teeth are cutting? A. It depends zontal surface the teeth are cutting? A.
upon the hardness or softness of the wood.
(43) F. B. S. W. asks for a recipe for making plug tobacco? A. Strip the tobacco, sprinkle the leaves with a liquor of white sugar, black licorice; and
water; make into rolls, and while moist press flat in water; m
(44) J. H. F. asks: How can I repair small holes in rubber boots? A. By rubber cement composed
of india rubber dissolved in benzole, or by attaching thin pieces of gutta pe
sion in boiling water.
How can I prevent brown linen from shrinking? A. He know of no process.
mets, which exterminate those microscopic pests, emA. Sprigs of wormwood or wintergreen strewed around he house are said to be efficacious.
(45) S. B. G. asks: Why are the upper regions of the air colder than the lower? A. Because the
heat radiated from the earth warms the atmosphere
(46) C. A. R. asks: How is a dispatch reeived from the Atlantic cable? A. Either by reflecting galvanometer or siphon recorder. In the first a
delicate magnet carries a small mirror from which a beam of light is reflected, and caused by its motion to make signals indicating letters. Thompson's siphon The current from the cable passes into a coil of wire suspended between the poles of magnets. The coil turns round in a direction depending upon the direction of
the current. The motion of the coil is communicated the current. The motion of the coil is communicated
to a glass siphon which feeds itself with ink from a to a glass siphon which feeds itself with ink from a
basin. The ink is electrified and spurts out against a basin. The ink is electrified and spurts out against a
strip of paper and draws an undulating curve, which strip of paper and draws an undula
ndicates the letters of the message.
(47) I. H. asks: 1. How is a staff fastened so as to turn a pivot on it in a common Swiss bow lathe A. One end is put on the live center of the lathe, the the centers, and does there not come a chuck with the
same? A. The centers are to hold ordinary work. A huck is necessary to drive the work and usually come
(48) R. K. says: In overhauling locomotives of different kinds, I find trouble sometimes in telling iron from steel in casehardened work, such as
link 3 , pins, etc. Can you tell me how to tell the one rom the other? A. You will find in casehardened iron (49)
(49) O. A. says: 1. I am making castings hat weigh about 6 lbs., and they have to be finished all
over. I cannot get the cope sound. A. Prick the mould all over with a fine wire, which will let off the air and if necessary dry the mould. 2. Does the quality of pig and scrap iron make any difference, providing it makes soft castings? A. No.
(50) M. A. B. says: 1. I wish to make a flywheel for a lathe by taking a light iron wheel and casting on a heavy rim of cement. What kind of a
composition would you recommend? A. Use lead. 2 . Could I use a mould made of wood well painted on in-
(51) C. L. A. asks: What is meant by car bon points used for electric light? What are they com posed of? A. They are long rods, cylindrical or square asually about $3 / 8$ of an inch thick, made of carbon ob tained from incrustations formed on the hottest parts
of the interior surfaces of gas retorts, or from the dust of coke mized with gas tar, forced into moulds and
carbonized in a muffle. The former material is the best, as it burns with great difficulty and is very compact and hard.
(52) J. Valiant asks: How can I prevent blackness when plating gold chains with a solution of
chloride gold and hyposulphite soda? A. The blacken ing is due to the presence of sulphides in solution. The only remedy is to give the work a slight covering of
copper (electro deposit) or to use a different bath. The ouble cyanide gives the best results.
(53) J. H. asks: How is it that gas after it becomes inflamed in safety or Davy lamps cannot escape to inflame the gas outside of the lamp? And also why does the lamp burst after the wire is red hot, ot
what causes the expansion? A. It is because the metal conducts away the heat so rapidly that the temperature of the gas in contact with it is reduced below the point of ignition. If the gauze becomes sufficiently heated the flame will pass. Depress a piece of fine wire gauze
over a clean flame and the same phenomenon will be oriced.
(54) E. S. asks: How is the crystalline surface produced on tin plate? A. Make a mixture of 3 parts hydrochloric and 1 part of nitric acid, and dilute with an equal volume of water. It is merely necessary ceeding ten seconds, the plate afterwards to be thoroughly washed with water and dried in sawdust.
(55) A. S. M. asks: Can you give me a recipe for making imitation shellac varnish? A. The dealers: Gum sandarac, $11 / 2$ lbs.; pale rosin, $11 / 2 \mathrm{lbs}$;
benzine, 2 gallons. Dissolve by gentle heat. The varnish is quick drying.
(56) R. P. M. asks: What is the solution how can I prepare it? A. We do not know of solution by this name. The usual fluids for this battery are, for the porous cup, a strong solution of bichromate of potash mixed with about $1 / 2$ part of strong sulphuric acid; for the outer solution, water acidulated with $\frac{1}{20}$ part oil

Minerals, etc.-Specimens have been re ceived from the following correspondents, and examined, with the results stated:
J. W. H.-No. 1 is traprock and felspar. No. 2 is a 3 is hor nblende. No. 4 is hornblende schist. Nos. 6 and 8 are limestone and serpentine. No. 10 is felspar and willemite. No. 12 is serpentine. No. 13 is sandstone and chlorite. No. 14 is impure hematite. No. 15 is albite-lime orthoclase. The missing numbers were
not in the box.-J. J. P.-It is flint containing small not in the box.-J.J. P.-It is flint containing small
specks of iron pyrites-of no value.-E. P.-The sam-
ple of lime appears to be of good quality. It will an-
swer for the light, but must be kept away from the arr.
A preserve jar will answer.-J. J. E. -It is nodular iron pyrites-sulphide of iron. You will find an article on
the subject on p. 7 , vol. 36.-J. G. P.-No. 1 is a trap rock containing calcite-lime carbonate, gypsum-lime rock containing calcite-lime carbonate, gypsum-lime
sulphate, and ferruginous earths. No. 2 contains hornblende, lime carbonate, iron oxide, and pyrites-iron sulphide. No. 3 is an impure talcose schist.

## COMMUNICATIONS RECEIVED.

The Editor of the Scientific American acknowledges, with much pleasure, the receipt of original papers and
contributions upon the following subjects: On the Effect of Wind on Unfinished Buildings. By On a Curiously Marked Stone. By H. L. C On t
M. D.
On the Relative Cost of Coal and Coaldust Fuels. By W. F. S.

## HINTS TO CORRESPONDENTS

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to
name the date of the paper and the page, or the number of the quastion.
Correspondents whose inquiries fail to appear snould repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The Inquis of the writer
Inquiries relating to patents, or to the patentability here. All such questions, when initials only are given,
are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleas ure in answering briefly by mail, if the writer's address is given.
Hundreds
Hundreds of inquiries analogous to the following are sent: "Who makes small tubular boilers for steam
launches? Where can I purchase aluminum?" All such personal inquiries are printed, as will be observed, 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 of the United States were Granted in the Week Ending October 9 1877,
AND EACH BEARING THAT DATE.
[Those marked (r) are reissued patents.]
A complete copy of any patent in the annexed list including both the specifcations and drawings, will be
furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn \& Co., 37 Park Row, New York city.

## Alum, manufacture of, G.P. Rockwell

 Ammonia salts, treating gas liquor for. Bee hive, J. C. Train Beer measure gage,Boat knee, D. True Boots and shoes, protector for, C. Nobs... Bottle stopper and fastening, H. B. Anderson Box wood and coal, A. Stau
Brake, car, J. H. Lakin.
Brake, car, J. H. Lakin...
Brake, car, Seevers \& Jelfs
Brick kiln
Brick kiln, J. H. Kelley....
Brick machine, w. E. Gard
Broiler, O. Edwards.......
Broiler, O. Edwards. ......
Bung,
Burg. Wobertshaw
Burglar alarm, W. H. Kno
Burglar alarm, F. Krupp
Burglar alarm, F. Krupp ...
Burglar alarm, W. N. Pattes
Butter package. J. F. Bly.
Butter package, G. Kator
Button fastening, J. J. Mervesp....
Button, sleeve, A. . Frankenthal
Can, milk, G. H. Lester....
Can, shipping, J. C. Moore
Cane, walking, J. Pool.....
Car, ballast distributing, A. B, Dockstader
Car coupling, C. W. Stimpson, Jr.
Car, locomotive street, H. C. Bull.
Car mover, A. Lebus . ............
Car, railway ferry, P. P. Sheby
Car starter, Crocker \& Lytle
Cars, distributing grain in loading, J. Jackson.. Carding engines, stopping rolls of, C. H. Chapman
 hair bottoms, cutting ven
Chair, opera, , W. Nolan
Chair seats, Provenzano \& De Gaetano. Churn, W. F. Long......
Cigar lighter, H. R. Whiteman.
Clamp, M. L. Edwards.
Clamp, M. L. Edwards............
Comb, semicircular, E. W. Smith
Corset, W. S. \& C. F. Hunt......
Corset, skirt-supporting, C. A, Griswol
Cotton and hay press, B. J. Methvin.
Cotton and hatting prosess, B. B. J. Methvin machine, R. C. .......
fiber from, W. Adamso
Cow fetter, A. R. G. Gillis.
Crayon, o. Swasey...
Crucibles, compound for, R. W. Wallace
Curtain roller and bracket, H. C. Steinhoff
Dish, pressed wooden, G. Gardner..... ..
Ditches, forming and lin
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Drafting apparatus for dr
Drawing board, T. Bergne
Drill chuck, C. Elterich..
Drills, machine for clearing twist, G. ....................... Drilling machine metal, M. L. Edwards

Feather renovator, J. J. Van Alstine ...........
Feed water heater and feeder, G. H. Burrough Feed water heater, etc., Hermans
Fence, portable, A. S . Chaney..
Fence, Fence, post, J. W. Frey ....... ....
Fence stretcher, wire, H. Schulgen Fence stretcher, wire, H. Schulgc
Fertilizer distributer, J. G. Sims Fire extinguisher, C. W. 'ralcott Fire extinguisher, car, Hotchkiss \& Pegram Fire kindler, J. A. Conover ...................
Floor for buildings, fireproof, Egan \& Hill.
Fruit dryer w. Gras cock, automatic, C. H. Scofield Gas cock, automati,
Gate, L. ©. Beckford.
Grain separator, J. M. F. Shepler.
Grate bar, o. J. Hodge

Grinding machine, H. Wickham, Jr.... ........
Ground, holder for articles being, J. Jowitt..
Gun barreis, machine for boring, H. C. Bull . Harness, J. H. Nichols..
Harness loop, W. Coul
Harness loop, W. Courtenay ...
Harow and corn marker, L.
Harow and corn marker, L. Davis
Hides and skins, treating, J. Fish
Hides and skins, treating, J. Fishback
Hose reel and carriage, C. L. Fitch.
Hydrant and hose plug G. W.
Hydrant and hose plug,
Hydrant, fire, J. Flower.
Key boards, smoothing ivory, M. Prat
Knitting machine take-up, J. S. Crane
Knitting machine take-up, G. Jackson
Knitting machine take-up, G. J
Knob for doors, etc, S. Hiler..
Lamp, night, M. S. Chase.
Lenses, measurement of, Lomb \& Scharpf
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Letting off mechanism, J. P. Buzzell.
Lifting jacl, R. Hermance.
Lifting jaclk, R. Hermance........
Lubricating compound, B. French
Lubricating compound, B. French .......
Mail bag catch, G. F. Shaver.........
Mantel, iron, T., J.M.\& T.E. Scantlin.
Marble, etc., artificial, W. Dwight
Match safe, Hubbell \& Ochs
Mill spindles, attachment to, C. F. Walters
Moulding metal, core for, R. . Totten.............
Mill spindies, attachment to, C. F. Waters ....
Moulding metal, core for, R. .Ctoten........
Monument and tomb, combined, G.D.Schuyler
Mower, R. D. Thomson ..
Mucilage bottle, F. Sholes

Muzzle, acalf, G. Tilton..
Necktie, W.H. Hart. J
Necktle, J. J. Winsor...............................
Oakum, machine for making, D. S. Tibbals.
Oakum, machne for makng, D. S.
Oreroasting furnace, W. J. Talor
Ore stamp feeder, J. Tullock (r)...
Ore stamp feeder, J. Tullock (r)...
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Overalls, S. Kauffmann...
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Paper, foxd, A. D. Schaeffer....
Peper bountain, J. W. Stanton
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Pencil, copying, C. Walpuski (r)........................
Piant,
Piano keys, dressing, Wilder $\&$ McNeil

Pictures, stereoscopic, H. A. Reynolds (r)..
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Planter, corn, w . Galley...
Planter, corn, G. D. Hawo
Plow, W. S. Lawrenc:
Plow, F. E. Sessions.

Printing press, J. O. Kurtzman
Pulverizing mill, I. M. Phelps
Pump bucket, W. D. Mayfiel
Pump, force, W. S. Laney
Pump, force, W. S. Laney
Punch, ticket, J. B. Aiken
Ranch, ticket, J. B. Aiken ..........................
Railroads signal, pneumatitic, Kettell \& Howland
Rivers; deepening bars of, H. F. Knapp
Rockets, J. H. S. Hooper
Rod coupling, T. D. Culter


Safety pins, making, Butler \& Wellge
Sash holder, V. Freeman.........
Sewing machine, T. A. Macaulay. Sewing machine feeding mechanism, T.............
Sewing machine shuttle, T. J. Holton. Sewing machine shuttle, T. J. Holton
Sewing machine shuttle, H. J. Nott.. Shep to be sheared, securing, w....G............. Shirt, A. L. Edwards..
Shoes, exhibiting, J. S. Palmer ...
Shutter fastening, Booth \& Wyatt Sink trap, H. Miller
Spinning frane, ring, G. Draper
Spinning machinery, J. M. Ston
Spinning machinery, J. M. Ston
Sprinkler, street, J. Hoffman
Sprinkler, street, J. Hoffman
Square, dressmaker's, C
Steam ejector, F. Steele
Steam trap, W. Conner
Steam trap, w. Conner
Steam trap, T. Kieley.
Steel
Steel, manufacture of, M. J.
Stove, coal oil, W. S. Pot win
Stove grate, H. Cribben ....
Stove grate, H. Cribben ....
Stove heating, T. Gemmell.
Stoves,
Stoves, conductor for cooking, ©. ©. H. Phelps.
Surgeons' bandages, fabric for, H. P. Plante
Surgeons' bandages. fabric for, H. .
Surgical apparatus, B. G. McCabe.....
Syringe bottre, uypodermic, E. Parare
Syringe bottle, hypodermic, E. Pfarre
Telegraph, quadruplex, B. Thompson
Thill coupling Spencer
Thill coupling, Spencer \& Ba
Trace carrier, L. E Walker.
Trace carrier, L. D. Martin.......
Trunk fastener,
Tobacco, treating leaf, C. F. Bji
Toilet case, W. A. Nichols....
Toy, automatic, J. Sch wippl
Toy, automatic, J. Sch wippl.
Toy money box, J. Hall (r).
Toy money box, J. Han (r).
Umbrella runner, C. Hariso
Umbrella tip cup, B. J. Riley
Umbrella tip cup, B. J. Riley
Vault cover and railing, C. H.
Vere
Vegetable cutter, M. Roos....
Vehicle spring seat, R. Dudley
Vehicle spring seat, R. Dudley
Wagon, side bar, J. H. Robinso
Washing machine, L Rivers. ..................
Whifletree, etc., connecting link
Window cleaner, W. C. Gayton..
Wool, treating artificiar, A. D. Elbers.
Yoke, neck, H. H. Hartzell...........
DESIGNS PATENTED.
10,270.-Burial Caskets.-Augustus Clark, Amster-
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10,272 and 10,273 --Orl. Clotis.-C. T. Meyer and V $V$.
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