

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFAC"TURES.


THE OBELISK PRESENTED BY THE KHEDIVE OF EGYPT TO THE UNITED

1. Obelisk at Luxor.-2. Obelisk at Alexandria.-3. Disembarking the Obelisk.-4. Crossing the Hudson River Railroad.-5. On West 96th Street.-6. Ready for Placing.-7. The Obelisk in Central Park.

# Srientific eqmerican. 

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## STREET ILLUMINATION.

Almost the first thing that strikes the scientific economist, when gazing upward in admiration at one or other of the numerous electric lights now being :troduced in our streets, is the extremely small percentage of the light really utilized for achieving the purpose intended, viz., the effective light ing of the streets and thoroughfares. Somewhat more than one-half of the light emitted is totally lost, a fact scarcely requisite to be pointed out to any one acquainted with the rudiments of optical science, seeing that all light that passes upward into space rather than in the direction into which it is required must, for that requirement, be assumed to have no existence. The fifty per cent passing upward and outward is not more metaphorically than literally in nubibus.
The value of reflectors for projecting light in any required path is well recognized by all, but the proper application of the principles of reflection and diffusion appears in a large measure to be lost sight of. Divested of the reflectors or refractors to which they owe their efficiency, of what value would be the lamp in the lighthouse, at the pier-head, or ffixed to that of the railway locomotive?
A parabolic reflector is that which utilizes to the greatest extent the light emanating from any lamp; but owing to the very perfection of this form it is quite unserviceable in aiding street illumination, the conditions of which demand something entirely different from those subserved ly that perfect reflector. What is wanted is radiation rather than reflection in the optical sense of the term. A reflector is a polished surface, any one part of which reflects light from a radiant according to the law of the angle of incidence being equal to that of reflection; a radiator, on the contrary possesses a surface from which is emitted in every direction the light that falls upon it. A silvered glass or polished metallic surface represents the former; a type of the latter being a sheet of white cardboard, a surface of porcelain, or of silver deposited upon ground glass. Unsilvered ground giass, translucent porcelain, or even a sheet of tissue paper placed in front of a light, also act as radiators.
What is required to render perfect our system of street illumination by electric lamps is that all the light which is now lost by passing upward shall, by means of a bright radiating surface of a tolerably large area, be arrested and projected downward in the direction where it is really required. Di mension in the radiator is of importance, inasmuch as this forms a condition of softness and diffusiveness of the light. From several experiments which have been tried on a small scale, it is believed that a valuable means for utilizing in the most efficient manner the light from the electric lamp is to have erected over and at no great distancefrom it a nearly flat circular plate of coarsely ground glass coated with silver, according to the manner recently described in the Scientific American. The ground surface should be farthest from the light, and the deposit of silver protected first by a coating of varnish and atterward by a casing of thin metal This insures the reflecting surface against becoming im-
paired by atmospheric or other deleterious influences. But it is also an essential part of this radiating "reflector" that it be surrounded by a deep edge, also of silvered glass, beveled outward in such a degree as to prevent any rays from passing out in a horizontal direction (that is, if the electric lamp be erected high overhead), but so as to arrest and diffuse them downward, which, by a proper selection of the angle at which the bevel is given to the edge, can be done so as to cause the greatest benefit to be received by those parts at a distance a way from the lamp.
In such cases where il is desirable to hide the light itself from the eye this may be done in the best manner by the interposition of a plate of ground glass, which, of all other diffusers or radiators, is found to absorb less of the light than any other diaphanous body. Some kinds of porcelain shades are known to absorb sixty per cent of the light; to ground glass such an objection cannot apply.

## aUNRECOGNIZED QUALITIES IN CHARCOAL.

mong the numerous and varied properties possessed by charcoal there is one-one, too, of the most wonderfulwhich does not seem to be adequately recognized, probably from its being imperfectly known except to physicists. It is that of being able to condense and store away in its pores many times its own bulk of certain gaseous bodies, which it retains, thus compressed in an otherwise unaltered condition, and from which
from a reservoir.
That eminent scientist, M. Saussure, undertook the task of a systematic examination of this subject, with a result which will prove surprising to the general reader. Operating with blocks of fine boxwood charcoal, freshly burnt, he found that by simply placing such blocks in contact with certain gases they absorbed them in the following proportions:


It is this enormous absorptive power that renders of so much value a comparatively slight sprinkling of charcoal over dead animal matter as a preventive of the escape of the odors arising from decomposition. A dead dog having been placed in a bux in the warm laboratory of an eminent
two and three inches, could not be discovered to have emitted any smell during several months, after which time an exam ination showed that nothing of the animal remained but the bones and a small portion of the skin. To the large excess of oxygen over the nitrogen in the atmosphere, which, ac cording to the above table, was absorbed by the charcoal and which thus rendered harmless the noxious vapors given off by the carcass as they were being absorbed, is doubtless owing the fact above stated and the further fact of the charcoal never becoming saturated.
A reader of the Scientific American who has been trying certain experiments on the value of charcoal as a con venient means of storing oxygen, reports favorably as to the results. In a box or case containing one cubic foot of charcoal, may be stored, without mechanical compression, a little over nine cubic feet of oxygen, representing a mechanical pressure of a hundred and twenty-six pounds on the square inch. From the store thus preserved the oxygen can be drawn by a small hand pump.
From the fact of the charcoal absorbing oxygen in so much greater proportion than nitrogen, we have here a means of utilizing its discriminative powers of selection in obtaining unlimited supplies of oxygen from the atmosphere, which contains nitrogen five times in excess of its oxygen, or twenty per cent; whereas by the separating or selective powers of the charcoal the mixed gases capable of being extracted from it contain over sixty per cent of oxygen. It only suffices to withdraw this now highly oxygenized air into auother vessel of charcoal, by the further exposure to which the proportion of oxygen will be increased to a still greater extent. This indicates a most feasible means by which atmospheric air can be decomposed in such a way as to provide a cheap supply of oxygen.
One cannot readily recognize the fact, which is neverthe. less true, that the condensing power of charcoal as applied to ammonia is equal to what would be obtained by subjecting this gas to a pressure of nearly one thousand two hundred and sixty pounds on the square inch.

## electric signals for the new york elevated RAILWAYs.

A series of utterly inexcusable accidents have occurred on he elevated railways of this city, for which reasonable men will, we think, hold the companies responsible. It is easy to make a show of shifting this responsibility upon employes; but, so long as the companies persist in running these roads without providing electric signals, and all the other safety appliances used on our railroads, the recurrence of collisions, derailment at misplaced switches, etc., may certainly be expected.
The neglect to provide electric signals is all the more culpable when the comparatively small outlay required to sup. ply them is considered.
The theory that accidents can he avoided on a doubletrack road when trains on the same track run all in one direction, has been over and again disproved by facts, and though the list of accidents has, as yet, resulted in little loss of life and small personal injury, this has been due rather to fortunate concurrence of circumstances than to anything ste.
Steps should be taken to compel the companies to provide every known means for securing the satety of the many thousands of people who daily trust their lives upon the elevated railways. The holders of these monopolies should be made to feel the full weight of public opinion till they ield to all reasonable demands for the public safety.
Suitable legislation, which we do not believe they could successfully obstruct or defeat, sbould be at once begun to compel what they do not seem disposed to voluntarily perform.

## GAS IN STEEL AND GLASS MARING.

A few years ago every maker of crucible steel in the city of Pittsburg surrounded his frail pots of clay and plumbago with coke, the direct heat from this fuel melting the metal. To-day finds every one of these furnaces discarded, and the regenerative Siemens gas furnace has supplanted the coke burning ones. As a consequence, instead of two heats, five or even six heats are obtained from each crucible, while the saving in fuel is a notable item. The gas producing furnace is fed with a grade of bituminous coal which in many cases can be had for the hauling. Such in brief is an outline of the results attained in the use of gas in steel making.
Very recently a glass manufacturer of Pittsburg has, with remarkable success, adopted gas as a fuel in the converting of a "batch" of ingredients into molten glass, and his little furnace is an object of the deepest interest to the glass makers of Pittsburg and elsewhere. The glass melting furnace of the present is in principle that of the furnace of a century ago, a towering mass of refractory brick, holding at its base a collection of costly and fragile " pots," containing usually 2,000 pounds of molten glass each, these pots being exposed to the direct heat of burning coal beneath. The extreme tenderness of these pots, their liability to deposit their costly contents into the ash pit, their first cost, about $\$ 50$, and the care necessary in preserving them from sudden lowering of temperature are a few only of the objections that have always existed in the orthodox form of furnace. In the best of these a pound of melted glass produced for a pound of coal burned is considered extremely good results and the first cost of such a furnace is $\$ 6,000$. On the other hand, the new gas burning furnace costs $\$ 500$, and in it every day there is melted a 6,000 pound batch with 1,000 pounds of "nut"
coal in 12 hours.after lighting the fires, against 24 to 36 hours in the old furnace.
The new or "open tank" glass furnace is built of firebrick, and is of the subjoined modest proportions. The "tank," holding 6,000 pounds of glass, is 7 by 5 by 2 feet. Across one end of this space, and separated from it by a fire wall, is the furnace or fire box. This is simply a fireplace, 30 inches square, furnished wth grate bars, and not differing in appearance from the ordinary furnace under a steam boiler. To this fire box is led air from a rotary blower. This finds its way to the grate bars and through flues in the surrounding wall. In the latter instance this air becomes intensely hot before escaping through suitable openings and mingling with the products of the burning coal. So mingled, air, smoke, and gases blend in a flame of intense heat, and following the draught pour over the fire wall and down upon the tank, converting the "batch" into molten glass in the time stated. It should be added that the old style furnace, with its great mass of brickwork, requires two weeks of continuous firing to make ready for melting, and that skilled labor, "teasing," is necessary to properly preserve the pots from undue heat or cold.
The new furnace is the invention of Mr. Thomas Atterbury, of Pittsburg, and an inspection of the operation of the gas furnace warrants the supposition that the days of the old style and time honored furnace are numbered.

## trees in cities.

An interesting paper has been recently read by Dr. Phené at Edinburgh on the benefits to be derived from planting trees in cities. Among the beneficial results to be attained are, he stated, the relief to the optic nerve through the eye resting on objects of a green color. Just that which is effected by the use of green or blue glasses in strengthening and sustaining the power of sight, is attained, or, at any rate, much aided, by the presence of green in nature; and in streets the only method to procure this result is by planting trees. It was pointed out by the author that wherever opportunitý exists nature provides green and blue (the latter being the same color minus the presence of yellow), and that as the absence of color produces snow blindness, and in tropical calms, where the ocean presents only a white reflected light from a uniform glassy surface, reduced optical power soon follows a long continuance of the absence of blue color, which becomes immediately apparent on motion of the waves.
So in the streets, to the occupants of houses having a northern aspect, the glare of the reflected light is injurious; but the effect would be much modified by the coolness to
the eye produced by the green of trees. In ancient surgery, the eye produced by the green of trees. In ancient surgery, persons having weak or declining sight were advised to look
at the emerald. In the old style of building, the streets being narrow, were both cooler, from the sun not being able to penetrate them with direct rays, and less subject to noxious exhalations from the scouring and purifying effects of the searching air to which the narrow streets were subject, so that while there was no space for trees there was also less necessity. Wide streets, on the contrary, are hotter, and require the shade of trees to cool them; and, as in the case of London, which had so far done without trees in its streets, it was pointed out that not only are modern streets compulsorily wide, but that the enormous increase in me tropolitan buildings render every sanitary question one of importance; and the chemical properties of trees as shown by experiment give them an important standing, irrespective of ornament or the pleasure they produce. Some of Dr. Phene's experiments on this subject have extended over a period of thirty years, and he it was who first tried the planting of trees in the streets of London. Since the reading of a former paper by him at Manchester, wherein the importance of the subject was pointed out, a number of street n wealthy localities have been planted, and even Trafalgar Square, in the heart of the metropolis.

## SINGULAR DISCOVERY IN CONNECTION WITH PHOSPHORESCENCE

The property possessed by certain metallic sulphides and other phosphorescent bodies of absorbing light when exposed to its influence, and giving out the same when brough into a darkened room, has long been known to scientists, but it is only quite lately that efforts have been made to utilize such properties. Of these, the most striking con sisted in spreading a sulphide of this nature upon a flat tablet and exposing it to strong light for a few seconds under an ordinary photographic negative. Upon remov ing the tablet thus impressed into a dark room, the pic ture on it will be found to be glowing in quite a myste rious and wonderful manner, and it will continue for some minutes to radiate the light which it absorbed.
It has occurred to an ingenious physicist, A. L. Henderson, to mix one of the most sensitive of these phos phorescent metallic sulphides with the bromide of silver, now so generally employed in the preparation of photo graphic dry plates, and, after emulsifying this mixture with gelatine, spreading it upon the surface of glass plates, and treating the same as ordinary ones except in so far as regards the exposure, which must be momentary. He appears to have reasoned in this way: With even the briefest exposure capable of being given, a certain modicum of change will be produced on the sensitive bromide of silver, although manifestly such as will be incapable of yielding a properly developed image. But the light also
rated in the films: and as these in turn radiate such light, it follows that they will complete the imperfect exp
set up in the bromide by the direct action of the light.
This reasoning has been found correct, and the result a present stands that plates have been prepared having such exceeding sensitiveness as to be well impressed by what Mr. Henderson designates "the flash of a match."
Phosphorescent sulphides may easily be prepared by heat ing the carbonate of lime, of barytes, of strontia, or other carbonate found most suitable, in a covered crucible with half its weight of sulphur. After an hour's exposure to heat the preparation is complete and phosphori are obtained which, upon being briefly exposed to light and then withdrawn into a dark room, will be seen to glow brightly, the color of the light emitted depending upon the nature of the carbonate originally selected.
This application of a well recognized fact in phosphorescence is so novel, and calculated to be of so much use, that we have no doubt its progress toward development will be rapid.

## A DESCRIPTION OF CAUCASIAN PETROLEUM

It has been known for years, if not for centuries, that combustible gases escaped from the earth at Baku, in the Caucasus, yet no one seems to have suspected that Baku was destined to become as famous for its oil springs as our own Pennsylvania. Recently, however, the production of Caucasian petroleum has been such as to interfere with the sale of American petroleum in Russia. Two of the foremost chemists of St. Petersburg, Messrs. Beilstein and Kurbatow, have subjected this oil to a critical examination, which is given in full in the Berichte of the German Chemical Society.
The peculiarity of this petroleum from Baku consists of ts high specific gravity as compared with $\Lambda$ merican petroleum of the same boiling point. For a long time this fact caused the consumers to be mistrustful of their own oil. Wilm and Biel, however, proved that the Russian oil gave ten per cent more light than the American, and Biel also found that the illuminating oil even of this high gravity was drawn up the wick to the flame more easily than the American oil. Since that time the public prejudice has disappeared, and the importation of American oil into Russia bas as good as ceased entirely. The high gravity of Caucasian oils is taken advantage of by the manufacturers of lubricat ing oil, and at present a lubricator with a gravity of 0.940 is made without adding any solid substance, which has already found extensive use in Europe.
The oils examined by Beilstein and Kurbatow was the first distillate obtained by a careful distillation of crude oil. Although they submitted it to fractional distillation nine times with the aid of Glinsky's dephlegmator, they did not succeed in obtaining any products with constant boiling points. That which boiled below $176^{\circ}$ Fah. bad a specific gravity of 0.717 , while American petroleum of like boiling point had a specific gravity of only 0.669 . The portion dis tilling over between $200^{\circ}$ and $212^{\circ}$ had a density of 0.748 , the American of 0.699 . At first they were inclined to attribute this to the admixture of hydrocarbons of the aromatic series like benzol, $\mathrm{C}_{6} \mathrm{H}_{6}$; toluol, $\mathrm{C}_{7} \mathrm{H}_{8}$, etc. On shak ing it with fuming sulphuric acid they were unable to detect a trace of any aromatic hydrocarbon. An ultimate analysis of that boiling about $185^{\circ}$ corresponded nearly with the formula $\mathrm{C}_{7} \mathrm{H}_{14}$, while the American oil of $205^{\circ}$ to $212^{\circ}$ is nearly $\mathrm{C}_{7} \mathrm{H}_{16}$, showing that the Caucasian petroleum is poorer in hydrogen than the American. Yet it does not consist of homologues of ethylen $\left(\mathrm{C}_{2} \mathrm{H}_{4}\right)$, because bromine did not act upon it until heated, when hydrobromic acid was copiousl volved, showing that substitution had not taken place. A farther study of these products convinced these investigator that they were dealing with the hydrogen addition products of aromatic hydrocarbons, such as hexahydrobenzol $\mathrm{C}_{6} \mathrm{H}_{12}$ hexahydrotoluol $\mathrm{C}_{7} \mathrm{H}_{14}$. The graphic formula of the forme is given below:


A very unusual circumstance for a petroleum was the action of nitric acid (sp. gr. 138). When boiled until red fumes ceased the acid liquid contained acetic and succinic acids; the oily portion contained a liquid boiling at $410^{\circ}$ to 420 Fah., and having the formula, $\mathrm{C}_{6} \mathrm{H}_{11} \mathrm{NO}_{2}$. This may be either a nitrous ether, or a true nitro-compound, a very sur prising fact in petroleums.
The different petroleum wells of the Caucasus yield oil of varying composition, according to their situations. Those examined came from the wells of Messrs. Von Benkendorff Others will soon b
October $8,1880$.
B. B.

## Chemical Research by Means of Photography.

tus the use of the electrical spark and a photographic appa stances in certain liquids may be readily detected. The
liquid to be examined is placed in a vessel, the sides of which are composed of quartz, which is one of the few purely
transparent substances. If one part, by weight, of the coltransparent substances. If one part, by weight, of the col-
oring matter known as anthracene is mixed with fifty million times its weight of alcohol the presence of the color may be detected by a gelatine plate photograph taken as aoove, which will show the characteristic bands of the absorbed rays pertaining to anthracene.

## ELECTRO-METALLURGY. <br> silver deposits.

For electro-silver plating the double salt of silver and poassium cyanide is almost universally employed. The baths are used either hot or cold. The latter method is generally adopted for articles which require great solidity. The hot process is used for small articles, and is preferable for steel, iron, zinc, lead, and tin, which have been previously electrocoppered. The hot baths are generally kept in enameled cast iron kettles ${ }_{\downarrow}$ and the articles are either suspended or moved constantly about in them. A somewhat energetic current is needed, especially when the articles are moved about in order to operate rapidly. A gray or black deposit indicates too strong a current, and when the surface becomes covered with bubbles of gas the same thing is indicated. The anodes are plates of silver or heavy silver foil. The wooden tanks for the cold baths are similar to those used in plating with copper and nickel, but should be very thoroughly coated on the inside with gutta-percha.
the bath.
Water (soft). $\qquad$ ...........
Cyanide of potassi
Nitrate of silver..
Dissolve the nitrate of silver in a sufficient quantity of pure water (soft), and add to it gradually, with constant stirring, hydrocyanic (prussic) acid until all the silver has been precipitated as cyanide, which may be known by the formation of no cloud in a portion of the clear liquid when a drop of the acid is added to it-avoid adding an excess of the acid. Throw the precipitate upon a fine cotton cloth filter, and as the liquid runs through wash the precipitate on the cloth several times with pure water. Dissolve the cyanide of potassium in the water, and stir in the cyanide of silver carefully removed from the cloth. If it does not dissolve in the liquid entirely, add more cyanide of potassium until it does, stirring continuaiiy. Let the impurities settle, and the bath is ready for use. Many electroplaters use a preliminary or silver "whitening" bath, which is the same composition, but contains less silver, more cyanide, and is worked with a somewhat stronger current.
The cleaned article in some cases is first dipped for a few moments in a solution of nitrate of mercury, one ounce in one gallon of water, and then in the whitening bath for a few minutes, and after brushing is transferred to the silver bath proper
The vessels containing the cold bath are sufficiently high to allow about four inches of liquid above the immersed objacts, whose distance from the bottom and sides should be nearly the same to give a regular deposit of metal at both ends of the object.
The upper ledge of the trough carries two brass rods all around, which do not touch one another, one above the other, so that other metallic rods placed transversely will rest upon the higher or lower series of rods only. The upper rods are connected with the zinc, the lower with the carbon or copper end of the battery, or with the corresponding poles of the dynamo-electric machine. The transverse rods resting upon the lower set support the silver anodes; those resting on the upper set, the work. The work suspended from an upper transverse is placed so as to face two anodes sus. pended from two lower transverse rods.
As the lower layers of the bath are apt to become denser (richer) than the upper, it is often necessary to reverse the articles during the operation to obtain a perfectly uniform articles during the operation to obtain a perfectly uniform
thickness of deposit. For the same purpose small articles thickness of deposit. For the same purpose
should be kept in motion as much as possible.
The deposit is finer and denser if obtained with a weak battery and long exposure than if a strong current is em ployed. A sufficient quantity of silver may be deposited in three or four hours, but it will be of much finer quality and more easily burnished if the work is left in the bath for twelve or fifteen hours with a few cells of battery.
When the articles, especially coppered iron, etc., have acquired a coherent film of silver, they are sometimes removed from the bath and thoroughly scratch-brushed, cleansed in alcohol, or preferably in a hot silvering bath, thence again passed through the mercurial solution and finished in the cold plating bath.
The first scratch-brushing, which is not always necessary, obviates the tendency of certain alloys to assume a crystal line appearance and corrects the imperfections of the cleansing in process.
Should the anodes become black during the passage of the current the solution contains too little cyanide. In this the deposit is adherent, but too slow; and the bath loses more silver than it can gain from the anodes.
If the anodes remain white during the passage of the current the bath contains an excess of cyanide, and the deposit does not properly adhere; correct by adding cyanide of silver until it dissolves with difficulty.
When in good working order the anodes present a gray when circuit is broken.

The specific gravity of the bath may vary from $5^{\circ}$ to $15^{\circ}$ Baumés hvdrometer and still furnish good results.
Electro-silvering baths do not generally work so well when freshly prepared. If properly used and cared for they improve by age. At first the deposit is often granulated, bluish or yellowish
It is customary to mix portions of an old bath with a freshly prepared one. Some platers introduce small quantities of ammonia instead to age the liquid.
Bisulphide of carbon in small quantities imparts a bright luster to plated articles. An ounce of the bisulphide is put into a pint bottle filled with a strong solution of the cyanide of potassium aud silver, briskly shaken, and a few drops of this liquid poured into the bath occasionally until the work appears sufficiently bright. An excess of bisulphide must, how ever, be avoided, as it will spoil the bath.
What has been said about the arrangement of battery in articles of nickel and brass plating will also apply here. (See p. 153, vol. xliii., and 4, current volume.)

## Electric Light Experiment.

The recent experiment of lighting the Hoosac (Mass.) Tunnel with electricity was with an apparatus placed on a platform car which was pushed slowly along by a locomotive. The generator of 4,000 candle-power was operated by an engine of 20 borse power, and each of the burners was of 2,000 candle-power. In the parts of the tunnel free from smoke the light was thrown strong enough to do track work over 500 feet away, and driving spikes and shoveling 1,000 feet off. Between the central shaft and the east portal, where the smoke was so dense that an ordinary locomotive light would not be visible 10 feet away, the electric light could be seen for over 100 feet. In some parts of the tunnel one could read by the electric light 250 feet from the car. The State authorities are soon to witness an experiment, and it is probable that the improvement will be adopted. If the electric lights are adopted power can be supplied from a turbine water wheel now lying idle in a shop at the east end. It is thought that twelve lanterns will light the tunnel, except when the smoke is unusually dense.

## IMPROVED LOCK FOR MUSEUM CASES.

The difficulty of properly fastening the doors of museum, cabinet, and library cases in institutions where such cases are employed in large numbers, is only too well appreciated by those baving such matters directly in charge. The usual method of bolting one of a pair of doors and locking the other, or of locking both doors simultaneously where cases are numerous, entails a great deal of labor, beside incumbering the person doing it with a weight of keys that is really burdensome.
We give herewith engravings of an improved system of locking mechanism for museum doors, by means of which an almost unlimited number of doors and drawers may be securely fastened by a single operation. This invention has been practically tested in the Museum of the University of Michigan, where its application to the newly-built cases effected a saving of $\$ 800$, beside furnishing a complete fastening, which not only holds the doors securely, but draws them into place should they be left slightly ajar before locking. The inventor has shown is letters from several of the professors in the Michigan University undorsing the lock in the highest terms.
The bolt consists of a steel rod extending along the top and another at the bottom of the series of doors, and carrying beveled hooks capable of engaging sockets or eyes attached to the doors. The rods are supported at suitable intervals by guides attached to the casing of the doors. In like manner a rod extends over a series of drawers and carries hooks which engage sockets at tached to the sides of the drawers. The upper and lower continuous bolts are each connected to a bellcrank lever, and the two levers are connected by a ver ical rod, so that the bolts will move simult the bolts will move simult in the same direction. The ver tical rod is connected with a lever whose pintle extends through an opening in the front of the case, and is capable of being turned by a key adapted to it. The opening in the front of the case is closed by a small door, which lol by means of a fin is locked by means of a fin lock and key of approved make.
The bolt which locks the drawers is connected with the lower door bolt by a lever, so that when the key is turned, the bolts at the top and bottom of the doors and at the top of the drawers are all moved at once, permitting of opening any of the doors or drawers in the case. The bolt may be applied to cases con taining any number of doors,
and in fact to any number of cases if desired, so that one din fact to any number of cases if desired, so that one are closed and bolted the key is removed, and the small door which covers the pintle of the unlocking lever is locked by a single key, rendering all secure by the use of a single key weighing but the fraction of an ounce, and capable of being carried without the slightest inconvenience. These bolts are very cheaply made, and yet strong and durable, and capable of accomplishing all that is required of them.
This useful invention was recently patented by Mr. Andrew Climie, of Ann Arbor, Mich.

## BUTTER COOLER AND WATER HOLDER.

The engraving shows a novel device for holding water and cooling butter. It consists of a water bottle, having a deeply-recessed bottom, and a butter plate of sufficient size


## COMBINED BUTTER COOLER AND WATER HOLDER

receive the base of the bottle. The cavity in the bottle is sufficiently large to inclose the butter without touching it, and the bottle, when in use, is filled with water and ice small pieces
This invention was recently patented by Mr. P. Dorlon f Brooklyn, N. Y.

## Mr. Oliver Byrne.

We record with regret the death of Mr. Oliver Byrne C.E., who died at Grecian street, Maidstone, England, on December 9, 1880, aged 70 years. For some time past he had been in failing health, and lived a retired and secluded ife. About two months ago, when in London, he caught a iolent cold, which terminated in inflammation of the lungs, involving the smaller bronchial tubes, from which he gradu
ally sank. Mr. Byrne was the author of several engineering works, and notably editor of, and a large contributor to, "Spons' Dictionary of Engineering." He was the inventor of the dual system of arithmetic, for which he claimed many peculiar advantages.

## MISCELLANEOUS INVENTIONS.

A reel for measuring bagging, patented by Mr. Charles J. Le Roy, of Palestine, Texas, may be used for handling, measuring, and cutting bagging, matting, carpet, etc. It consists of a spool or roller from which the stock is taken, a reel upon which it is wound from the roller, a cutting board or table, and a measuring wheel, by which the operations named are simply, accurately, and easily performed. In a button hole attachment for sewing machines, patent d by Mr. John K. Harris, of Springfield, Ohio, an automatically octing and adjustable feeding device gives the cloth an intermittent lateral movement combined with a forward movement by improved devices, whereby an extra pressure of the presser piece upon the cloth is obtained, the locks of the stitches are caused to terminate in a straight line either above or below the surface of the material or at the edge, according to the regulation of the tension, and all upword or downward motion of the goods around the needle is prevented.
A feather renovator, patented by Messrs. Jefferson Hatch and Leonard Fortune, of Felt's Mills, is intended for cleansing feathers before using them for beds, both when new and after they have been used. The feathers are placed in a ro tating cylinder, in which the feathers are subjected to the action of a strong blast which issues from openings in the hollow shaft of the cylinder, through which air is blown by a fan blower, the air finding outlet through a perforated or reticulated door in the side of the cylinder, through which the feathers are put in and taken out.
Mr. William A. Jennings, of Dyersburg, Tenn., has paMr. William A. Jennings, of Dyersburg, Tenn., has pa-
tented a clevis that may be adjusted to draw-beams of different dimensions. Two bars are hinged to the ends of a link. A screw bolt is pivoted to the free extremity of one of the bars, and its threaded end passes through an eye in the free end of the other bar, where it may be secured by a nut. The pivoted bolt is passed through a hole in the beam to which it is desired to attach the clevis.
A skirt ironing board, patented by Mary H. Baldwin, of Hamlin, Texas, has hinged detachable leaves, with devices for holding the leaves open, the board being hinged to a frame, the lower part of which forms a box for receiving that part of the article which hangs down, to protect the same from dust and dirt and to keep it moist.
A jack screw, patented by Mr. William H. Williams, of Key West, Florida, appears a very effective device for raising heavy weights. A peculiarly constructed detachable pawl, combined with a bifurcated lever for actuating the screw, is the main feature of the invention. The construction of the pawl permits the screw to be worked in either direction according as the pawl is adjusted; its detachability affords means for preventing any tampering with the screw by unauthorized persons.
Mr. Karl Kreurzer, of New York city, has patented a game bat of that class having oval-shaped heads fitted with netting. He bends a piece of wood to the shape required, the strip having wire rods embedded into it at opposite sides throughout its length for strengthening the bat, and gore pieces fitted into the crotch in a peculiar manner to resist strain and prevent disconnection at that point.
Mr. Robert Watkinson, of Salford, England, has invented an improved coupling for hose and other pipes. The joints are formed by interlocking ander pists. The joints packing, which not only maintains the locking of the parts after they are joined, but acts to tighten the joint through the action of interiur pressure upon the packing.
An improved pile for the manufacture of composite metal plates, patented by Mr. Dolphus Torrey, of New York city, protects the metal forming the interior of the pile from the action of oxidizing flames and gases while in the heating furnace and immediately subsequent thereto. The pieces of metal forming the pile are so shaped that no bands, ties, bolts, or rivets are required to keep them in position. The pile is made of two plates and intermediate band and steel scrap, which fills the space inclosed by the plates and band.
Mr. Otis D. Thompson, of Elkhart, Ind., has patented an improvement in wind wheels, which consists in a novel construction, arrangement, and operation of the wheel and vane relatively to each other, whereby provision is made for throwing
the wheel out of wind when the current is too strong, and
also for adjusting the sails to accommodate the wheel to the force of the wind.

## MANY-COLOR PRINTING PRESS

We present herewith a tigure of a new press, which, with a single form and at a single impression, prints in several colors. This result is obtained by a special arrangement of the inking table, a full view of which is seen in the figure. This table, instead of being in a single piece, is composed of a certain number of narrow cast iron plates held in a frame. These plates are formed of four distinct parts, and are wide in the center and taper conically toward the extremity. This mode of construction allows them to move easily on each side at every revolution of the table, and has nearly the effect of an articulated joint. The end piece near the ink trough is stationary. The various colored inks are placed in the ink trough, which is divided into cells by metallic partitions. Directly over the trough is an iron frame carrying a set of screws and nuts. By tightening these screws, which are placed over the metallic partitions, the inks as they flow beneath are prevented from mixing. The inking rollers, instead of being fixed at a certain angle relative to the table, are arranged so as to run perfectly straight, the distibution being effected by the plates above described.
The different inks are spread on the multiple table in the usual way. As a consequence of the motion of the articulated joint, the inking table is caused to move slightly in one direction and the other at every revolution of the table, and the ink is thus as well distributed as if several rollers were used. The movable plates which constitute the inking table are of different widths, so that the uppermost or the lowest line in a prospectus can be printed in a color selected beforehand. Motion is communicated to the movable plates by a small lever which hangs under the table, and which rests on a small vertical iron plate affixed to a cross-stay of the machine.
The removal of an ordinary inking table and its substitution by the multicolorous one can be effected while the form is being prepared. There is, however, no reasou why the articulated table should not be used for work in black; it is only necessary to have a sufficient number of plates to cover the whole breadth, and then the rollers may be allowed to run obliqueallowed to run oblique. y as usual. With this vo prospectus may be readily printed in eight colors at a single im pression, each color being brilliant and per fectly distinct from the others. As the rollers move in a perfectly traight line the ink not mix, luk o not mix, aluhough the plates which carry
them may be placed as close together as neces sary.
This same system of multicolorous tables may be applied to various printing presses. The impression can be made in just as many colors as may be desired, and with such ad vantages it is certain that the use of such method must become widespread for printing prospectuses, cir culars, bills of fare and other work of this ature The apparatu will effect a complete volution in mplet work, since the difference in price between printing in black and printing in colors by the Bacon system is veryslight, being merey the difference be the the nd cor inks. We and colored inks. We hould remark, in con lusion, that two colors cannot be printed on the same line-neither in initials nor in bor ders-since the colors are arranged in straight line; but it will be readily und will be readily under stood that, by super-
posing the colors and
taking several successive impressions, the most varied effects may be obtained.
This machine attracted considerable attention at the late fair of the American Institute.
T. Sarony-Lambert, Room 5, Bennett Building, New York City, is agent.

## NEW MICROPHONE. <br> <br> by m. boudet, of paris.

 <br> <br> by m. boudet, of paris.}This microphone, with multiple contacts, as shown in the accompanying figure, is composed of a mouthpiece, $\mathbf{E}$,

affixed to the end of a glass tube, $T$, one centimeter in dianeter, itself fixed on a jointed stand, thus enabling the whole apparatus to be moved at any inclination.
The mouthpiece contains an ebony plate one millimeter thick, on which is fixed a piece of copper, $\mathrm{M}^{1}$, penetrating the glass tube a slight distance. In this tube there are six
carbon balls slightly smaller in diameter, so that they can easily be moved.
The microphone is completed by a second piece of copper, $\mathrm{M}^{2}$, supported on the end of a hollow breach, K , by means of a little spiral spring, not shown in the figure. The screw, V , fixed in the cup, $\mathbf{Q}$, serves to regulate the pressure of the piece, $\mathbf{M}^{2}$, against the balls. The variations in the resistance of the microphone are reproduced equally through all the coutacts of the balls, because, when talking at the mouth-
piece, the vibrations are transmitted almost instantaneously, as in the well known case of billiard balls.
The apparatus acts like an ordinary middle-sized Gaiffe microphone, with six elements (peroxide of manganese and chloride of zinc) set up with a resistance of 800 ohms, with a Bell telephone for receiver.
By employing inductive currents and a fine wire telephone receiver-a necessity with inductive currents-the distance may be largely increased, and extended, with artificial resistances, to 250,000 ohms.
We have been present at experiments made with this microphone, and we have found that it transmits the voice very clearly, without altering the tone and without any scratching sounds.-Electrician.

## RECENT INVENTIONS

A suspension clothes line pulley has been patented by Messrs. David H. Payne and Jerome H. Payne, of Troy, N. Y. The pulley is formed of a central disk, projecting arms, and rings, joined to the arms, the line running in the groove or throat formed by the arms and rings. The pulley turns horizontally on a vertical axis, and the lower ring has rollers placed on it, which prevent the entanglement of the clothes with the pulley when the line passes over it.
Mr. August Berghaus, of Brugge, Prussia, Germany, has patented a bandle attachment for agricultural implements, which is simple and effective. A spring socket attached to the implement is arranged to receive the end of the handle, which is held therein by a conical ring or sleeve drawn over he ends of the spring socket. The handle is by this means quickly and firmly clamped in the socket.
Mr.James E.Tyler, of Orange Court House, Va., has patented Mr. James E. Tyler,of Orange Court House, Va., , has patented
a machine for edging sheet metal, which forms either a single or double lock upon the edges of the plates that may be hooked or pressed together to form a secure joint either for sheet metal articles or for roofing. A pair of griping jaws, one of which is provided with a lip, seize the edge of the metal and bring it under a presser bar to form a single fold or lock, and the machine is further supplied with a pivoted bending jaw that may be forced around the griping jaws to form a double fold.
Mr. Willianu G. Lindsay, of Winneconne, Wis., has invented a stovepipe damper of that variety made in two circular parts separated by a narrow space and secured to the same turning rod. The pieces are made with lugs having square holes, and the turning rod is square to fit these holes. One plate is of greater diameter than the other, and has an openiug in its center. By this construction the passage of the smoke or gases of combustion is obstructed, but never wholly prevented.
Mr. John Herrmann, of Columbus, O., has patented a window cornice which may be adjusted to windows of different widths. The adjustment is made under the center piece, and is therefore concealed. It is accomplished by a tongue and groove device with suitable means for fastening the adjustable pieces in adjustment.
Mr. Ila M. Moore, of Battle Creek, Mich.
has patented an improvement in knitting machines whereby a double web, with two threads, is formed in such manne that, if the threads be of different colors, the finished fabric will be striped lengthwise.
Mr. Patrick Deevy, of Melrose, Iowa, has patented an improved guard finger and sickle bar. The sickle bar is sectional, each section carrying a cutter as a part of it. These parts are made interchangeaole, and by tongue and groove devices may be put together and fastened by screws parts, mortised ward tenoed together at one end and in two parts, mortised and tenoned together at one end, and in the
under part or section is a mortise in which is fixed a cutting under part or section is a mortise in which is fixed a cutting
blade that can readily be removed for sharpening and blade that can readily be removed for sharpen
replaced securely without the aid of screw or bolt.

## decisions relating to patents.

United States Circuit Court-Northern District of Illinois.
resweating of tobacco.-Robiryon et al. vs. sutter et al. Blodgett, J.
This is a suit for infringement of letters patent granted by he United States to complainant, Abraham Robinson, on the 10th day of June, 1879, for an improved apparatus for resweating tobacco.
The defense set up is, first, that defendauts do not infringe void for want of novelty.
It seems from the proof that in the manipulation of to bacco it is deemed very desirable to obtain a dark uniform color in the leaf, especially of that to be used for cigar wrappers; that in the natural sweating which the leaf under goes in the ordinary process of curing it is left spotted, or some leaves will be darker than others, and the process of resweating is intended to bring the tobacco to a dark and uniform color.
Robinson claims to have discovered that tobacco can be successfully resweated by packing the leaves closely in a mass in a wooden box or tub made substantially tight, except so far as the pores of the wood will admit vapor or moisture to slowly percolate through the wood and diffuse itself with tine mass of leaf from a body of warm water and expanded steam contained in an outer tank or chamber sur rounding the tobacco holder, the process to continue from three to eight days according to the mass of tobacco to be operated upon. The apparatus which he devised for this purpose, and which is covered by his patent, consists: First of a tank or cbamber adapted to hold a body of water and sufficiently tight to hold expanded steam, or steam generated or let into the chamber at a very low pressure. The model resented here consists of a tank which is water-tight at th bottom and substantially water or steam tight above, with the tobacco holder let into it and suspended by a rim upon the edge, the holder being made tight, as described; but the patentee does not restrict himself to this precise form of construction. Second, a tobacco holder in which this mass of leaf tobacco is placed, which tobacco holder is placed or suspended inside of the tank or chamber. Third, a steam generator for producing steam, by which the water in the chamber is to be warmed and steam generated, whereby a warm humid atmosphere is kept constantly about the to bacco holder, and the warm moisture gradually diffused hrough the tobacco in the holder.
The device used by defendants operates upon precisely the same principle as that of complainants-that is, it has tank or chamber within which the tobacco holder is placed. The bottom of the tank is supplied with water which is heated by an outside steam generator or heater; and the only difference between the two devices of the complainants and the defendants is that the defendants' tobacco holder is not made tight, so as to exclude moisture except through the pores of the wood, the defendants, in practice, using the ordinary tobacco cases in which leaf tobacco comes packed to hold the tobacco during their process of resweating. In other words, the defendants open the doors in their tank and slide the ordinary tobacco case full of tobacco into this steam box, and allow it to remain there until the tobacco has become resweated, which is in no respect different from the process of Robinson, except as hereafter noted; but it is claimed that this is a substantial difference, because it is insisted that complainants' claim requires their tobacco holder to be tight, while the defendants' tobacco holders are not tight. I think, however, the word "tight," as used in his claim, is to be construed, in the light of his specifications, as meaning sufficiently tight to subserve the purposes to be ac complished. The term as used here must be held, I think, to mean comparatively or approximately tight-close enough to exclude an excess of steam or moisture, and open or porous enough to allow the warm moisture to sweat or percolate into the tobacco holder, so as to warm and moisten its contents; and it would seem that slight crevices or openings arising from defective mechanical construction, if not large enough to admit steam in such quantity or volume as to wet the tobacco, would not violate this patentee's rule of con struction.

1. The word "tight," used in the claim to qualify the wooden tobacco holding vessel, Held to mean sufficiently tight to subserve the purposes to be accomplished by the invention.
2. Crevices or openings in the wooden tobacco holder arising from defective mechanical construction, if not large enough to defeat the operation of the device, will not relieve the apparatus from the charge of infringement.
3. The patent shows an organized apparatus consisting of
steam and water containing chamber and a wooden to bacco holder specially constructed for that purpose sus pended in said chamber. The defendants employ the steam and water containing chamber, but, instead of using a wooden tobacco holder specially made for that purpose, use for containing the tobacco in the chamber the ordinar wooden tobacco case in which leaf tobacco comes packed Held to be an infringement

United States Circuit Court.-District of New Jersey harvester patent.-Tyler et al. vs. CRANE.
Nixon, J.

1. In a suit for infringement of reissued letters patent $\mathrm{N}_{\mathrm{o}}$ 6,609, granted August 24, 1875, to Samuel W. Tyler, for an improvement in harvesters, two defenses were set up; first want of novelty; second, the defendant's machine did not nfringe.
2. Held that the patentee's device of placing the gearing and shafts that impart the motion to the cutters upon a rigid common support or frame formed in one piece, to correc the practical defects of twisting and warping in existing wo-wheel machines, is sustainable
3. That defendant's machine, having two wheels with connecting axle, and containing the solid piece or frame made of a single casting for the support of the intermediate draught and gearing sustained by the axle, differing only from the mechanism of the patentee's in having the solid piece directly and not mediately attached to the axle of the wheels, is an infringement.

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## Captain Eads' Ship Railway over the Isthmus.

To the Editor of the Scientific American
Referring to your issue of November 13, 1880, I suggest an improvement which I think might be made in the car of Capt. Eads for his projected ship railway, which you illus trate.
As illustrated the principal weight of the ship is on the keel, which rests rigidly on the car, while the bilge is sup ported by solid and unyielding blocks.
Now, to accomplish this without severe strain to the ship while in transit, the car or cradle must be perfectly rigid while all elasticity must be in springs over the wheels. It would seem that in order to construct a car four or five hundred feet long, which would be rigid enough not to bend and thus cause the ship to be unevenly supported while pass ing over any curve in grade or uneven place in the roadbed from whatever cause, would require a very great additional weight of metal, more than would be required were the kee rests and bilge blocks made to rest on air cylinders, all of which should be connected by hose or some other flexible connection by which compressed air could pass from one to another. Thus, regardless of the bending or twisting of the ar, either longitudinally or otherwise, the"ship would at all imes have a perfectly even and elastic support, which would ot in any case bring an unequal bearing or strain on the essel in transit or wheels of the car, as when any bearings would be relieved by curve in grade or depression in track the compressed air from others would be forced through the connections, thus making every bearing do its exact portion of duty and allowing none to be overloaded or any unequa train to the ship. Tbis would avoid the necessity of any ilting tables, as the grade could be changed by a gentle curve.
The body of a cradle or car of this kind should be as light and flexible as strength and perfect safety would permit. Another advantage of this system would be that in handling a large ship, instead of requiring another and longer car than for a smaller one, it would only be necessar to attach a section to make it the required length, and con nect the air tubes as is done with air brakes on ordinary rail roads. This in order to secure equal pressure in the cylin ders of both sections.
My method of constructing such compressed air springs would be to build in the center of the cradle cylinders large and numerous enough to support the proper proportion of a ship's weight.
To support the balance of the burden, each bilge block should contain an air cylinder, and all cylinders should be connected as above stated. By arranging in this way with air-tight pistons to support the plates on which the ship would rest, a lighter car could be used with better result, and the bilge blocks might be moved into place as easily as if solid. Some such principle applied to the cradle would allow a more cheaply construeted roadbed than would be possible with a rigid car, and the ship would be relieved of any injurious strain in transit
New York, January, 1881
[Note.-Capt. Eads appears to be fully alive to the value of the points above mentioned. One of the patents take by Capt. Eads is for a hydraulic cradle to carry the ship, in which the vessel is supported on hydraulic jacks, all con nected, as our correspondent suggests.-EDs. S. A.]

## The Flywheel Explosion

To the Editor fol the Scientific American:
Please allow me to make a few comments upon Mr. Rose articie on "A Mysterious Explosion," on page 38 of your paper. He says: "If the flywheel broke first, it should
is true, if all the fragments separated simultaneously: butconsidering that every ounce of the rim of a 30 -inch wheel at 2,000 revolutions per minute has a centrifugal force of about 100 pounds-suppose any considerable portion of one side to have gone first, would not the remaining unbalanced part have wrenched the spindle from its bearings in a

Of the holes drilled in the rim of the wheel, Mr. Ros ays "their number and size (as shown in Fig. 10) preclude the idea that they could have been made to balance the wheel, especially as it appears a well shaped casting," etc. There may be a difference of opinion on that point. Wha is the alternative? As near as I can judge by measuremen of the figure, the weight removed by boring these hole would be not far from three-quarters of a pourd. If, then being a "good casting," the wheel was in balance withou the holes, it would with them be out about 12 ounces on radius of 14 inches. Is it at all probable, I may say, even possible, that it was used in that condition, at he velocity named? O. A. Benton.

## Amenia, N. Y., January 18, 1881.

## Soldering Cast Iron.

To the Editor of the Scientific American
A few weeks ago, being in a manufactory whe e hard ware of all sorts is made for harness, I was told that piece of cast iron could not be soldered together; and that if any inventor could devise a process by which cast iron could be soldered, he could not fail to disclose a process that would be of untold value, especially to manufacturers of harnes hard ware. As I have been accustomed, for many years past, to solder together pieces of cast iron, always with most satisfactory results, it occurred to me that perhaps the little experience which I have had may help some mechanics ou of a little difficulty.
Many years ago the cistern pump of a neighbor was allowed o freeze up when partially filled with water, the result of which was the cylinder was bursted for about six inches in length. The part of the cylinder at the crack was placed on the grindstone, and ground away until the iron was clean and bright for an inch or more on both sides of the crack. The he cylinder was put in a vise and screwed up tightly, and held in the vise while solder was applied along the crack. The first process was to "tin" the surface of the cast iron o that the solder would take a strong hold of the iron Muriatic acid was applied with a swab to the bright iron after which a little of the best kind of sorder was laid on and rubbed rapidly over the surface, with the soldering iron as hot as it could be without burning the tin off the copper sol dering iron. After the cast iron had been well tinned solde was applicd, and piled on over the crack until it was at leas one-eighth of an inch thick all over the crack. That solder ing never failed so long as the pump was in use.
Last year a cast iron wheel on our portable forge was broken, by an accident, into so many pieces that it wa judged to be impracticable to mend it. As no one could determine where such forges were manufactured we could not procure a new wheel. To make a new pattern fo another wheel like the broken one, pay for casting and fit ting up, would cost several dollars; so I concluded to older the parts together. Several machinists laughed me in the face for suggesting such a manner of repairing that wheel But I took all the parts, and went where I could have the use of an emery wheel, and the surface of the iron on both sides of the cracks or breaks was neatly polished for at least half an inch to an inch from the break. Some of the arms wer broken in two pieces. There were eight arms. Some o the arms tore away a piece of the rim. In some pieces it was not practicable to touch the surface with an emer wheel or file. The only way of removing the hard scale and rust from such places was with a sharp cold chisel. All the polished surfaces were first tinned in a thorough manner, after which the arms were put in their respective places, and the parts neatly and thoroughly soldered all over the breaks The job cost about fifty cents' worth of time, and ten cent for the solder. The wheel runs as true as it did before it was broken, and to all appearance every part is as strong as ever. Indeed, we all judge that the parts would break in the solid iron sooner than where the arms and rim are sol dered. There will be no difficulty in soldering cast iron the surface is first polished and then well tinned with a hot soldering iron.
I always keep several small bottles containing muriatic acid of different degrees of strength. One bottle has in it pure acid. Another contains about three parts of acid and one part water. Another bottle contains about three parts acid and one part water, in which we have dropped nume rous small pieces of sheet zinc. The acid will dissolve the zinc in a few hours. The acid in this last bottle is employed when soldering tin. The acid will corrode and clean the surface so that melted solder will unite with the clean and rough particles of iron, taking such a firm hold that one can scarcely perceive where the iron ends or where the solder begins. Wrought iron and steel also may be soldered with less difficulty than cast iron, if the surface is first polished and afterward tinned with good solder. If the surface is not tinned thoroughly the solder will not adhere with satisfactory tenacity to the iron. The reason why it is so easy for any cne to solder tin consists in the fact that a sheet of tin is simply thin iron well covered with tin. After the surface of any piece of metal has been tinned any tinker can make melted solder adhere to the surface
S. E. T.

Orange, N. J.

## the obelisk in central park

The venerable monument, late of Alexandria, Egypt, and popularly miscalled Cleopatra's Needle, has been successfully transplanted to Central Park.
From time to time, from the first inception of the enterprise which has brought to our shores one of the most famous legacies of ancient civilization, down to the landing of the obelisk at the foot of West 96th street, last fall, the successive stages of the great undertaking have been described in this paper. With the completion of the work a brief review of the chief facts in the history of the obelisk and its voyage hither may properly be given before taking up the final chapter.
The material of the monolith, a reddish granite (syenite), shows that the stone must have come, as Egyptologists declare, from the ancient quarries of Syene, now Assouan, near the northern boundary of Nubia. From this point it was probably loated, as Pliny says all the obelisks were, on huge rafts or flat-bottomed boats to the sacred city of On, known to the later Greeks as the City of the Sun, or Heliopolis, a distance of about 450 miles. At Heliopolis, which was situated about eight miles from the site of the modern city of Cairo, our obelisk with its companion shaft now :n London was set up before the entrance of the Temple of the Sun. Doubtless its position there was substantially like that of the remaining obelisk before the ruined Temple of Luxor, as shown in Fig. 1. The fallen mate of the Luxor obelisk was removed, it will be renembered to the Place de la Concorde, in Yaris, where it now stands.
The first erection of our obelisk at Heliopolis took place not less than 3,500 years ago, the precise date being fixed by some students of Egyptian history at B.C. 1640. Others give an earlier date as probable. It is certain, from the central columns of inscriptions on the stone, that the obelisk dates from the reign of Tothmes III., who ruled over Egypt when the Empire was at the height of its power and glory, and covered not only Northern Africa as far as A byssinia, but Western Asia as far as Kurdistan and Armenia, sinia, but estern Asia as far as Kurdistan
south of the Caspian Sea, and all of Arabia.
For more than 1,600 years our obelisk stood at Heliopolis, and saw the glory depart from upper Egypt. It was then transferred to the newer seat of power and commerce, ancient Alexandria, 120 miles down the Nile, to adorn a majestic temple, probably begun by the great queen Cleopatra, but not completed until some years after her death. The fragmentary inscriptions on the copper crabs on which the obelisk rested at Alexandria make it certain that its erection there occurred during the eighth year of the reign of Augustus Cæsar, or B.C. 22.
While standing at Heliopolis, says Consul-General Farman, in one of his communications to the State Department, "it had passed the whole of the golden period of ancient Egyptian history. It had in all probability looked down upon the boy Moses as with the noble youths of the land he daily went to receive instruction from the priests of the Temple of the Sun, and also beheld on his part with admiration the then golden hieroglyphs that so long puzzled the wise men of modern times, but which he read as a student reads his Latin. It had beheld the chosen people of God in the days of their oppression and witnessed their exodus and the excitement that resulted therefrom, the hurrying to and fro of the priests of the temple, and the groups of people in the public places of the city discussing the great event. It had afterward watched the passing generations during the reigns of the Pharaohs for eight centuries, and had not only actually looked down upon those monarcis, but also upon all the long line of scholars who came to seek knowledge in this famous city of learning. It had then witnessed the conquests of the Persians, and mutely seen the City of On and its temples and many of its companion obelisks destroyed by the sacrilegious soldiers of Cambyses; and aily
wards in a period of tranquillity it had seen Plato in his daily wards in a period of tranquillity it suad seen Plating in that city pursuing the study of whilosophy and astronomy. Still later, amid the surroundphilosophy and astronomy. Still later, amid the surround-
ing ruin and desolation, but ever looking further out upon ing ruin and desolation, but ever looking further out upon
the green fields of the valley of the Nite, it had seen the coming of Alexander the Great and his warm reception by the people as their deliverer from the yoke of the Persians, and afterward witnessed the three hundred years' reign of the Ptolemies, and finally, at the coming of the Cæsars, it had left the decay and ruin of its inland town and been transferred to the busy seaport of Alexandria. Here it has stood upon the seashore, a beacon for the mariners, for nineteen hundred years, and watched the rolling waves and the coming and going of the ships on the one side and the kaleidoscope of human events on the other.
Rebellions and insurrections, invasions and conquests, the struggles between Paganism and Christianity, between Christianity and Mohammedanism, between the different dynasties of the Arabs and the Turks, the successive rules
of Sultans, Caliphs, and Mamelukes, and finally the conquest of Napoleon and the battles between the English and French on the waters and sorl of Egypt, have all since its removal been witnessed by this sole surviving monument of the ancient City of Alexandria.
During the later ages of its sojourn in the modern city of Alexandria, the obelisk stood, as shown in Fig. 2, in a neglected quarter, its foundation, its unsuspected pedestal, and nine feet of its shaft buried in sand and rubbish, at last bereft even of its fallen companion, which had long lain half buried in sand.
The history of the removal of the obelisk from Alexandria to New York will doubtless be told at length by Lieu-
tenant-Commander H. H. Gorringe, U. S. N., under whose
direction its last migration has been brought to successful direction its last migration has been brought to successful
conclusion. The more salient facts of the history can be conclusion. The more sa
summed up in few words.
A little more than three years ago Mr. John Dixoa, the engineer employed to convey the original and fallen companion of our obelisk to London, informed the World through Mr. Louis Sterne, an American engineer, that Ismail Pasha, then Khedive of Egypt, desired to present the remaining obelisk to the United States. The cooperation of Mr. Henry G. Stebbins, then a member of the Park Commission of New York, was enlisted by the editor of the World, and the possibility of securing the obelisk for our city was publicly announced. Within a few days a wealthy citizen of the city (understood to be Mr. Wm. H. Vanderbilt) agreed to defray the estimated expense of taking down the obelisk and bringing it to New York. The matter was thereupon laid before the State Department at Washington, and Mr. Farman, United States Consul-General in Egypt, was directed to take the necessary steps for the official transference of the obelisk from Egyptian to American ownership. French and English influence, then dominant in Alexandria, were strongly arrayed against the fulfillment of the Khedive's offer. About this time the Khedive was compelled to abdicate. Consul-General Farman at once obtained a written confirmation of the gift at the hands of Mohammed Tewfik Pasha, the son and successor of Ismail Pasha, the writing bearing date May 18, 1879.
Meantime Mr. Dixon's unfortunate experience in the ransportation of the London obelisk led him to decline the more serious undertaking of lowering and transporting across the Atlantic the companion of the stone he had had such bad luck with. At this juncture Lieutenant-Commander Gorringe returned from a surveying cruise in the Mediterranean in command of the U. S. steamer Gettysburgh. He had made a study of the standing obelisk at Alexandria with reference to the conditions of its possible removal, and now submitted to the Secretary of Stat, a proposition to undertake the task. His plans were approved; and having seen to the construction (at the Phœenix Iron Works, at Trenton N. J.) of the machinery he had devised for taking down and shipping the monolith, he sailed for Alexandria by way of Liverpool, August 24. The completed machinery followed some weeks after. The ensuing winter and spring were spent
by Commander Gorringe in the double task of overcoming the material difficulties and the more annoying political dif ficulties attending the lowering of the óbelisk, its removal to the water, and its stowage in a vessel, the steamer Dessoug, which he had purchased for its conveyance to New York. The magnitude of the task will be appreciated when account is taken of the enormous size and weight of the stove. The belisk proper is 69 ft . 2 in . long, 7 feet 7 inches by 8 feet 2 inches at the base, tapering to about 5 feet square at the foo of the pyramidion. The weight of the stone is $1961 / 2$ tons. The pedestal is 9 feet square, 7 feet high, and weighs 43 ons. The weight of the other stones of the foundation is given at 87 tons. The summit of the obelisk was something ver 81 feet above the lower step of the marble platform which formed the base of the monument.
A description of the engineering operations at Alexandria, as given by Lieutenant-Commander Gorringe before a recent meeting of the New York branch of the United States Naval Institute, was printed two weeks ago in the Scientific American of January 22.
The Dessoug sailed with her preciouscargo June 12, 1880, and arrived at Gibraltar ten days later. The voyage from Gibraltar to New York occupied nearly a month, owing to a delay caused by a broken crank shaft. After her arrival, July 20, the Dessoug lay at anchor in North River for some weeks while the final disposition of the obelisk was under discussion. She was then taken to Clifton, Staten Island, bauled out of the water on the marine railway there, and opened at the bow for the discharge of the stone, which was run out on a massive platform supported by two rows of piles in such a way that the stone could be floated off on pontoons at high tide. A proper conjunction of weather and tide did not occur until September 22, when the stone was floated to the pier provided for it at the foot of West 96th street.
The method of disembarking the obelisk is shown in Fig. . Owing to the necessary narrowness of the opening in the ow of the Dessoug, the means by which the stone was to bulk or handling such heavy bodies would require at least four times that space. Accordingly, Commander Gorringe adopted a sort of railway formed of 6 -inch channel iron and $51 / 4$ inch cannon balls, one set of channel irons forming a trough for the cannon balls, the other set (inverted) riding above and carrying the stone. This device, Commander Gorringe is careful to state, was not original with himself, as has been reported. It was first employed, so far as he can discover, in the handling of the gigantic bowlder on which tands the statue of Peter the Great in St. Petersburg.
The same machinery was utilized in moving the obelisk
across the tracks of the Hudson River Railroad at 96th across the tracks of the Hudson River Railroad at 96th street, as represented in Fig. 4. After that the plan of the ordinary marine railway was employed, as shown in Fig. 5, the movable track being carried forward as fast as the was up 96th street to the Boulevard; thence to 86th street, through the transverse road to 5th avenue, and down to 81st street, from which point an incline of massive trestle work,

920 feet long and rising three-quarters of an inch to the foot, led to the site of the final resting place of the obelisk. The power required in hauliug the stone up the stiff grade of 96 th street was equal to a dead pull of 36 tons; on the incline the power required was 24 tons.
Meantime the foundation stones and the pedestal had been put in place and the towers or gallows frame erected for sustaining the obelisk during the last critical stage of the work. The towers were the same as were used in taking down the obelisk at Alexandria. The steel work of each tower was of six 12 -inch heavy I -beams, spreading out at the base to a distance of 21 feet, and converging at the top to less than 5 feet. At their base the beams rested on four heavy I-beams, and were securely riveted to the platform by means of plates and kuees. On top of the towers were caps 5 feet long and 30 inches wide, secured by plates and knees. The towers were braced from top to bottom by angles and channel irons, making them perfectly rigid. Placed on top of the caps and securely bolted to the towers were pillow-blocks weighing 3,700 pounds, and forming the bearings for the trunnions to turn in. The trunnions on which the obelisk turned while being swung into upright position were each 33 inches long and 18 inches in diameter, and were cast of the best quality of cannon metal. The trunnion plates, each 4 inches thick, 9 feet wide, and 6 feet high, were securely held in position, just above the center of gravity of the shaft, by strong connecting bolts. The two trunnions with their plates weighed 6 tons. The entire weight of metal employed in handling the stone was something like 60 tons. As the monolith stood at Alexandria it was supported by copper crabs at the base, which left room for passing under it heel straps to be connected with the trunnion plates o prevent their slipping when the obelisk was lifted. In Central Park the stone rests squarely upon its base, the heel of the shaft, which was originally rounded, having been cut square off. This made it necessary to provide a substitute for the heel straps. For this purpose two massive friction plates of gun metal were cast at the Brooklyn Navy Yard to snugly fit the base of the stone, the hold being secured by pressure, by the penetration of the metal into the hieroglyphic incisions, aud by overlapping the corners which had been cut away for the crabs. These base plates were strongly bolted together and connected with the trunnion plates with steel rods tightened by means of turn-buckles.
The copper crabs alluded to were originally four in number, but two of them had been stolen at some time, pro-
bably for their metal. The place of one had been supplied by a block of stone wedged in with iron; the other corner was vacant. The bodies of the remaining crabs, which were genuinely crab-like in form, were about 8 inches thick, 12 inches long, and 16 inches broad, and weighed about 150 pounds each. They were much broken in lifting and turning the obelisk, and were replaced by other crabs of bronze made at the Brooklyn Navy Yard. Unlike the original, these do not bear the weight of the obelisk, which rests directly on the stone of the pedestal, but simply iil up and ornament the cut-way corners.
With the trunnions in exact line with their bearings as in Fig. 7, the ponderous stone was lifted by means of six powerful hydraulic jacks; the cradle was removed, and then he obelisk was slowly lowered by the jacks until its weight rested on the trunnions. Here, poised ou its center of gravity between the towers, it a waited the final turn at noon Saturday January 22.
Not the least remarkable feature in the history of this unprecedented transportation of a great historical monument over a hundred degrees of longitude and across a great ocean, is the uniform success, celerity, and good fortune which attended every stage of the undertaking, a good fortune mainly due, all must admit, to the scientific and diplomatic skill of Lieut. Commander Gorringe. The practical wisdom of his prearranged plan of conducting the enterprise was justified by the fact that it was carried out without a single material alteration of mechanical or engineering detail, save that made necessary by the unexpected popular opposition stirred up by foreign influence in Alexandria against the carriage of the obelisk the nearest way to the ship through the streets of the city.
For our views of the several stages of the progress of the obelisk we are indebted chiefly to Messrs. Harroun and Bierstadt's admirable series of artotype views of the obelisk.

## Erratun.

In article on "Expansion of Steam," by Prof. Thurston, January 8, 1881, for $\frac{P \times 37}{22}$ (Emery's formula) read $\frac{P+37}{22}$

WE are informed that many of our leading manufacturers who have heretofore been troubled with the formation of scale in boilers are now using the Eureka vegetable hoiler scale eradicator with very satisfactory results. G. E. Brinckerhoff, 107 Liberty street, New York, is agent for this article.

## A Large Gold Brick.

Recently there was cast in San Francisco a brick of gold measuring $123 / 4$ inches in length, 7 inches in breadth, and $41 / 2$ inches in thickness. It was 950 fine, weighed $3,785 \cdot 17$ ounces troy, and was valued at $\$ 76,000$. It represented one month's product of the Spring Valley Hydraulic Mine, and month's product of the Spring Valley Hydraulic Mine, and

## IMPROVED BENCH CLAMP

The bench clamp shown in the annexed engraving is de signed for the use of carpenters, sash, door, and cabine makers, and is to be attached to the ordinary bench by means of a downwardly projecting foot which enters one of the several sockets formed in the bench top. The upper surface of the foot is inclined and serrated, as shown in Fig. 2. The general arrangement of the clamp 2. The general arrangement of the clamp
is shown in the perspective view, Fig is shown in the perspective view, Fig.

1. The nut formed on the base plate 1. The nut formed on the base plate
receives a screw having at one end a fol receives a screw having at one end a fol
lower which presses the work, and at the other end a ratchet wheel whose teeth are engaged by a projection formed on the ratchet lever, which swings on the head of the screw and has sufficient longitudinal motion to permit of bringing it into engagement with the teeth of the wheel or f inserting it into the deeper notches formed in diametrically opposite sides.
The clamp may be placed in any desired position on the bench, and may be brough to bear upon the side or end of work whose opposite side or end is supported by the ordinary bench pin.
This device can be applied to great ad vantage in both wood working and iron work, and it will be found useful in mar ble and stone cutting. It replaces the cumbersome clamps in common use, and may be applied to a number of purposes which we need not enumerate. This in vention was recently patented by Mr. James Murphy, of San Antonio, Tex.

## IMPROVED EXTENSION TABLE.

We give herewith an engraving of an improved extension table, in which the extending sections are contained in the table and are automatically placed when the table is pulled out or extended.
Fig. 1 is a perspective view of the table showing one half closed while the other half is being extended. Fi is a perspective view of the under side showing the mechanism which sustain and operates the extension sections. Lazy ongs connect the legs at the ends of the able with the legs in the middle, and the extension sections, which drop and are covered by the other sections as the table is closed, are raised into their places by the lazytongs at the instant the table top s drawn out sufficiently to admit of it. The lower terminals of the lazytongs slide in slotted plates,D, attached to the legs, and when near the upper portion of the slot they strike brackets which support the movable end sections of each half of the table top. The permanent sections of the table top, that is, the sections which always lie in the same horizontal plane, alternate with the vertically movable sec tions, and are attached to and supported by alternate sections or links of the tongs The extending sections are mounted on uprights, B , which extend downward and are slotted to receive the pivot of the upper joint of the lazytongs sections these uprights are also connected by a sliding connection with the lower joint of the section. The parts are arranged so that the movable sections always maintain a central position in relation to the permanent ones; and when the permanent sections are sufficiently separated, the rising of the lower joint then carries the intermediate movable sections upward into place and sustains them in that position.
The table is locked in an extended or closed position by pressing a button. A lady or child may readily open and close the table, so small is the force required, as the pivoted russes, C, are balanced and the table works almost as easily as a door turns on its hinges. The table top, whether drawn out or closed, is always supported by truss es, which give it grea strength and rigidity, and here is no doubt of the su periority of the table in point of durability. It is a most desirable improvement.
The advantages of a table of this construction will be apparent to any one having had even a slight experience with extension tables of the common form. The extra leaves are always in place and properly stored, and all that is required to lengthen the table is to release the retain ng rod and draw it out, and to shorten it when length ened is simply the reverse of
jacking wheel for vehicles, which can be applied in case a


## BRASSINGTON'S EXTENSION TABLE.

 ton, 256 West 28th street, New York city.
The patentee will be pleased to correspond with parties wishing to purchase the patent, or to obtain license to work the invention in the United States, Great Britain, or Canada


MURPHY'S BENCH CLAMP.

## NEW INVENTIONS

An improvement in tool handles, patented by Mr. John Gearon, of Beloit, Iowa, provides a new method of attaching handles to axes, adzes, hammers, etc. Instead of the usual eye for receiving the handle the tool has dovetail recesses on opposite sides, into which metal bars are inserted, which are concave on their interior surfaces below the tool for the reception of the handle, and are also provided with means of clamps and braces this wheel, which is small, can be readily applied, and by a screw the vehicle can be jacked up for immediate removal. The devic is portable
Mr. Edward N. Oualline, of Hockley, Texas, has patented an improved wheel hub, which permits the taking out of a broken spoke and the insertion of a new one without the removal of the wheel tire. The lub is sectional, and provided with spoke sockets having open sides, which are closed by a plate held by bolts which pass between the spokes.
An improved copybook, patented by Mr. Elmer P. Newton, of Dimondale, Mich., is claimed to be more convenient in use and less expensive than those heretofore used. The copies are printed in rows on a few pages of the book, the rows being easily separated by perforated lines. Each copy may be torn off, and by means of a copy holder attached to any o the pages where required. A saving in the cost of printing is thus effected.
Mr. George Blair, of Prescott, Ontario, Canada, has patented an improvement in stovepipe collars. It is formed by curving laterally a ribbon of metal into a circular form, at the same time forming therein radial corrugations or flutes which are deepest near the interior border of the coldeepest near the interior border of the col-
lar. This collar will fit stovepipes of dif! exterior of the lower part of the bars is screw threaded for $\mid$ and of course will allow expansion or contrac tion. The whole is made integral by joining the ends of the Mr .
. Sanders, of Lons Oak, Texas, has patented open link for connecting trace chains to whiffletrees and other purposes, so constructed that it can readily be attached or detached without the use of tools, is fastened automati cally when closed, and is not liable to become accidentally

Mr. Laurids J. M. Mortenson has patented a wagon hound brace holder or post, by which the hounds and circle are firmly held together, and by use of which the brace, instead of being weakened, as it is by some forms of brace holders, is strengthened.
A bottle filler, patented by Mr. Emile Kleiber, of New Orleans, La., supplies a machine for filling bottles with viscid oils and other viscid liquids, by which the oil or other liquid is forced out by air pressure, and the cocks are opened by the rise of the bottles to be filled. The arrangement is very ingenious, and will greatly facilitate the bottling of this class of liquids.
Mr. Alexander C. Bell, of New Alexandria, Pa ., has patented an improved cider mill and wine press. The fruit is first placed in a hopper and ground. It is then passed between compression rollers to extract the juice, and the pomace is then dropped on an endless belt, which carries it out of the mill. The compression rollers are covered with rubber. These rollers compact together so closely as to prevent the passage of the juice between
secure attachment.
Mr. Aaron M. Sidwell, of Girard, Kansas, has patented ransplanter so constructed that plants can be readily removed from the ground without disturbing the soil around their roots, and holes made in the ground of exactly the shape and size of the soil raised with the plants. A very onvenient implement.
Mr. Emil Schuhardt, of New York city, has patented them, while their elastic quality permits he pomace to pass. The juice flows from their upper surfaces as from a trough, and is received into a conductor, through which it flows out of the mill.
Mr. Charles W. Millspaugh, of Rowaton, Conn., has Mr. Charles W. Milspaugh, of Rowaton, Conn., has provided with two sliding blocks, carrying clamping springs which press upon the leaves on each side of a music book. An indicator, designed more especially for attachment to


BRASSINGTON'S EXTENSION TABLE,
may be employed for othe purposes, has been patented by M.r. C. Friedrich A. Bultmann, of Sumter, S. C. It not only indicates the kind of merchandise contained in the drawer or box, but also the number of articles.
A band cutter for thrashing machines, patented by Messrs. John Alexander and William Alexander, of Hazelrigg, Ind., is so constructed as to cut the bands as the bundles are fed to the band table, and to present the grain to the feeder in better condition than when the bands are cut by hand, economizing labor, and preventing all danger of the feeder's hands being cut by the band cutter. The construction of the device is simple, and its action effective.

## the sea cat.

"Sea cat" is the popular name bestowed on certain cartilaginous fishes of the order Holocephala because of a peculi arity of their eyes, which have a greenish pupil, surrounded by $a$ white iris, and which have the property of shining, especially at night, like the eyes of the cat. These fishes seem to form a group intermediate between sturgeons and sharks.
Nothing is stranger and more ugly in appearance than one of these fishes, especially the species represented in the engraving, and which is well deserving of its scientific name, Chimara monstrosa. It is from three to four feet long, and its body, from the base of its ensrmous head, gradually diminishes in size and ends in a loug slender tail like that of some reptile. Its skin is smooth, elastic, and flabby, of a silvery white, and covered with scales that are so minute that they are scarcely perceptible to the touch. It is thrown into folds and sinuous wrinkles all along the body and on the top of the head, so bat it appears to be too large for the body that it envelops. Under be mouth and on the lateral faes the mouth, and on the lateral faces
of the snout, it is perforated with numerous holes, from which issues a glutinous mucus. The pectoral fins are supported on a sort of thick fleshy arm. Before and behind the ventrals hang two appendages resembling small paws. Between the eyes there is a large fleshy clubshaped process, with serrated edge, and ending in a spine, which somewhat resembles a crown, and bas given rise to one of the popular names of the fish-" king of the herrings." What makes the sea cat still more hideous is its quick and odd movements, bending and twist ing. as it does, in all possible directions. Besides this, the different parts of its snout are constantly in notion, so that it has the appearance of making grimaces, which have inle of this fish the northern encrang) which is found in the North Sea and Northe a flock, and when one was missing it was pretty safe to con Atlantic, and the southern sea cat (Callorhyncus australis), , shepherd really kept count of his flock by counting his inhabiting the southern seas. The first of these pursues speckled sheep. As fences were erected the flocks were shoals of herrings and other migratory fish, and also feeds on jelly fishes and crustaceans. Its flesh is tough, but the Norwegians use the eggs (which, as in the sharks, are inclosed in a leathery capsule) as food, and employ the oil of the liver in diseases of the eyes and for wounds.
In the southern sea cat the snout ends in a gristly appen-都 dage, bent back ward at the end anterior dorsal is very far
forwa:d over the pectorals; forwayd over the pectorals;
the second over the ventrals the second over the ventrals
and reaching to the caudal, and the tail does not end in a filament. The singular shape of its snout, which is not unlike that of the tapir, has gained for it the familiar name of "elephant fish." It is about the same size as the northern animal, and is silvery, tinged with yellowish brown.

## Jersey bull diavolo

This bull was the first prize in the yearling class at the New York State Fair in 1880 It is the property of Hon. Erastus Corning, of Albany.
The engraving, from a pho ograph taken for the Rural Neo Yorker, at the time of the Fair, and reproduced with great faithfulness, is a very correct portrait of this spirited and beautiful animal. That he is "good enough" goes without saying, for he won the highest honor in a large class. The photograph, as usual, slightly exaggerates the legs, perhaps, but the life-like play of light on the hide, the shadows, the spirited pose of the animal, are excellent, and so well preserved tha the picture is a source of pleasure simply as a work of art Diavolo was sired by Stockwell 3d, the noble bull which won the first prize at the same show in "aged" class, and was imported by Mr. Corning. His dam, Tranquillity, is by the same sire, her dam being Daisy Morton, also imported.


THE SEA CAT
much diminished, the above experience would appear to be general."

## Filtration and Decolorization,

by o. g. pfander, london.
It consists of dried or baked granulated clay mixed with blond to the proportion of about three of clay to four of blood; sometimes a proportion of vegetable charcoal is
added. This mixture is moulded into lumps of convenient form, dried, broken into small pieces, mixed with an equal bulk of granulated clay, and then carbonized in a retort. This material, when screened, constitutes the new filtering material especially adapted for treating sugar, etc. The dust screenings will remove color from solutions of sugar and form a new product.

## NATURAL HISTORY NOTES.

The Colors of Floweers.-Hitherto it has been supposed that the colors of flowers were due to so many different materials, each color"being a chemical combination having no relation witb the others. But now, however, Prof. Schuetzler, in a communication to the Vaudois Society of Natural Sciences, shows that, when the color of a flower is extracted by placing the latter in alcohol, the addition of an acid or alkali will give all the colors that plants exhibit. Flowers of pæony, for example, give when put into alcohol a violet-red liquid. If to this solution binoxalate of potassa (" salt of sorrel") be added the color becomes pure red. Soda causes it to change, according to quantity used, to violet, blue, or green. In the latter case the green liquid appears red by transmitted light, just as a solution of chlorophyl (the green coloring matter of leaves) does. The sepals of pæony, which are green bordered with red, become entirely red when put into a solution of binoxalate of potassa. These changes of color which These changes of color, which be produced in plants by the same causes, since in all plants there are always acid or alkaline matters. Moreover, it is quite certain that the change from green to red ob served in leaves in autumn is due to the action of the tannin which they contain on the chlorophyl. Consequently, without wishing to ffirm it absolutely, Prof. Schuetzler believes that a priori there is in all plants but one coloring matter-chlorophylwhich, becoming modified by certain agents, gives all the tints that flowers and leaves exhibit. As for white flowers, it is well known that their want of color is due to the fact that their cells are filled with a colorless fluid, and that their opacity proceeds from the air contained in the interspaces.
When such flowers are placed under the receiver of an airpump they are seen to lose their opacity and become trans parent in measure as the air is exhausted.
Relation of Fish to the Lime in Wuter.-In a recent paper by Herr Weith, entitled "Chemical Investiration of Swis by Herr Weith, entitled "Chemical Investigation of Swiss Waters with Reference to their Fauna," he gives a large
number of quantitative analyses of the water of Swiss lakes, rivers, and streams, with regard to the proportion of lime and earthy substances generally contained in them. In this rescarch a very interesting relation appeared between the quantity of fish and the amount of lime con tained in the water sult arrived at was that, in general, of the various bodies of water under otherwise similar conditions, those which contain the most dissolved carbonate of lime also contain the most fish. The explanation of this fact is also given by the author. The simple carbonate of lime is found largely distributed on the largely distributed on the
bottom and banks of lakes, etc., but it is insoluble, and therefore cannot be taken up by the water. If, however, the water contains carbonic acid in abundance (which of course is produced by the respiration of animals) this transforms the carbonate into the bicarbonate, which is
fishes increase the proportion of lime in water, but that conversely, an abundance of lime in water might have a stimulating effect on fishes. The latter, for their part, produce this carbonic acid which, with lime present in the water, does not escape into the atmosphere, but remains dissolved in water, and so stimulates plant life. Water plants, however, serve aquatic animals as food, and render possible their existence; and thus vegetable and animal life, whose mutual dependence is well known, is maintained by the mediating action of lime in continuous and intimate connection. Experiments on a large scale would decide whether it is possi ble to transform a body of water on ground which is without lime, and therefore poor in organic life, by suitable addition of carbonate of lime into such as would afford proper condition of life for animals and plants.

## Effect of Strong Drink on the Liver.

The Family Physician tells us that when alcohol is introduced into the stomach in the ordinary way, it nearly all passes through the liver. Undiluted spirits are much more injurious than when mixed with water, and produce greater irritation. Alcohol consumed as wine or beer is far less destructive to the liver than when taken in the form of ardent spirits. A hot climate intensifies all the vicious effects of alcohol. The symptoms of cirrhosis of the liver are in the early stages often obscure, but later they are sufficiently well marked. At first the livergetsslightly enlarged, and the patient suffersfrom pain in the right side, indigestion, wind, and costive bowels. He is occasionally feverish, his skin is hot and dry, and he has a peculiar, unhealthy, sallow look, which he probably fails to notice, but which is sufficiently obvious to his friends. The necessity for making a change in his habits is forced upon his attention, and for a week or two he is under the doctor's orders, and not feeling able to drink any more, he consents to follow a restricted diet, and to take a course of purgatives.
Soon the most prominent symptoms are relieved, he fancies himself well again, and quickly returns to his old habits. Gradually, however, he notices that he is getting thinner and weaker, and occasionally he has a good deal of pain in the side. He is nervous and out of sorts. He has no longer the pluck he used to have; first his friends notice it, and then he gradually becomes aware of it himself. He finds that he is not "fit for business," and he is afraid to see people. The patient has occasional attacks of diarrhea, his appetite fails, and the emaciation and debility increase. He tries all kinds of treatment, but never sticks to one for long at a tirne. He consults every one of any note in London, but derives little if any benefit from their advice. He would give up the drink if he could, but he can't. His self-reliance is gone, the alcohol has stolen away his will, and he is utterly incapable of giving up the dangerous fascination. He will take an oath to-day that he will never touch another drop of spirit, and will probably break it to-morrow. Sometimes he wishes that some one would lock him up in an asylum, or that by some chance or other he could have six months' imprisonment, but he never feels able to put himself under restraint. After a time the liver gets smaller, and this, instead of being a good sign, is a bad one, for it is contracting. He would willingly enough consent to knock off drink now, but it is too late; the mischief is done, the liver is in a state of cirrhosis, and no medicine can restore it to its natural condition. Is there any remedy for this horrible complaint? Yes, one, teetotal-ism-absolute abstinence from alcoholic liquors of all kinds. This remedy must be applied early. If he waits till his liver has undergone serious organic change, it is too late. No half measures will suffice; he must give up drink of all kinds. If he does this he will recover; but if he goes on in his old plan an early and painful death is the inevitable con sequence.

## Exercise and Temperature

These have been made the subject of a series of observa tions (about 150 in number, extending over four years) by M. Bonnal. He finds that all muscular exercise raises the rectal temperature. The rise is not, however, in direct rela tion either to the duration of the exercise or the apparent fatigue. For a given exercise, performed under like conditions, the rise of temperature may vary in different inds viduals, and even in the same individual. The altitude, the state of the atmosphere, the energy of the movement, the nature and amount of clothing, have a very manifest influ ence, especially on the rapidity of the rise. Absence or abundance of perspiration has no appreciable influence. The rectal temperature is rarely elevated beyond $38.6^{\circ} \mathrm{C}$. but in one case, that of a runner who, on the 14th of No vember, ran about 18 kilometers in an hour and a half without'stopping, M. Bonnal found it $39 \cdot 5^{\circ}$. (This man showed no accelerated respiration, but merely an increase of pulse to 145 beats.) In rest after exercise the rectal temperature falls, and the more rapidly the shorter the exes the has been It is noted that all rapid exercise diminishes the peripheric temperature (in the mouth, armpit, or groin), which, on the
other hand, rises again directly rest is taken, and after some other hand, rises again directly rest is taken, and after some
time the peripheric and rectal temperatures come to their normal difference, $0.2^{\circ}$ or $0.3^{\circ}$. If the rectal temperature be over $37^{\circ}$, a moderate exercise (such as walking 20 minutes on level ground) only raises it $0 \cdot 2^{\circ}$ to $0 \cdot 4^{\circ}$.; but if under $37^{\circ}$, the rise may be more. In rapid ascent it is always after the first half bour that the rectal temperature is most raised; it tenths of a degree. Gymnastic exercise in the horizontai position, and limited to the upper limbs, does not alter the
initial temperature. If limited to the lower limbs, it may, in 30 minutes, raise the rectal temperature $0.3^{\circ}$ to $0.7^{\circ}$. In
general, a rigorous application of the laws of mechanics to general, a rigorous application of the
the human organism is not justified.

## Accumulation of Foreign Bodies in the Stomach.

The following case is reported by Charles L. Dayton, M.D. in the Buffalo Medical and Surgical Journal. It demonstrates that in gastric diseases there is great difficulty in forming a conect diagnosis, and also in reaching a reliable prognosis, the problem only yielding a satisfactory solution through a Mr. St examination
Mr. S., aged 45, residing at Black Rock, for a period of six months had complained of gastric pain with nausea, and other symptoms of indigestion. He presented the appearance of one suffering from scirrhus of the stomach or aggra vated dyspepsia. Failing to secure relief after consulting several physicians, he consented to accompany me, with a view to consult Prof. Austin Flint, Sr., at that time residing in Buffalo. Prof. Flint examined the patient thoroughly, and expressed the opinion that he would ultimately recover. Two days afterward the patient suddenly died. At the autopsy, in the presence of Drs. L. P. Dayton, Tobie, and Beaman, the stomach was removed. It contained a tumblerful of prune pits; the pyloric oritice was so far occluded by the induration of the surrounding tissues that it admitted only the passage of a small catheter. About three inches from the pyloric orifice the stomach was perforated, probably through the influence of the prunes. His wife stated hat he had not eaten prunes in five or six months, and could offer no explanation for his swallowing the pits.
The case is interesting on account of the presence of so arge a quantity of foreign substances in the stomach, of the similarity of symptoms to those usually occurring in ulceration and scirrhus, and of the obscurity often attending gastric and intestinal disease, which is cleared up only through the post-mortem examination.

## Neuralgia as a ${ }^{6}$ Warning."

The great prevalence of " neuralgia"-or what commonly goes by that name-should be regarded as a warning indica tive of a low condition of health, which must necessarily render those who are affected with this painful malady es pecially susceptible to the invasion of diseases of an aggres sive type. This is the season at which it is particularl desirable to be strong and well furnished with the sort of strength that affords a natural protection against disease There will presently be need of all the internal heat which the organism can command, and a good store of fat for use as fuel is not to be despised. It is no less essential that the vital forces should be vigorous, and the nerve power, especially, in full development. Neuralgiaindicates a low or de pressed state of vitality, and nothing so rapidly exhausts the system as pain that prevents sleep and agonizes both body and mind. It is, therefore, of the first moment that attack of this affection, incidental to and indicative of a poor and weak state, should be promptly placed under treatment, and as rapidly as may be controlled. It is worth while to note this fact, because, while the spirit of manliness incites the "strong-minded" to patient endurance of suffering, it is no wise to suffer the distress caused by this malady, as many are now suffering it, witbout seeking relief, forgetful of the condition it bespeaks, and the constitutional danger of which it is a warning sign.一Lancet.

## Suggestions Concerning Long Life

If any one could furnish the world with a medicine which would insure a long life, there is no end to the demand he would have for his drug. The Herald of Health thinks he would need many factories to make it, and many banks to hold the money he would receive. Fortunately there is no such medicine, and so the world will have to get along in some other way.
Some time ago the French Government sent a circular let er to all the districts of that country to collect information as to those conditions of life which seemed to favor longev ity. The replies were very interesting, but on the whole rather monotonous; and the general result was that longevity is promoted by great sobriety, regular labor, especially in the open air, short of excessive fatigue, easy hours, a well-off condition, a philosophical mind in meeting troubles, not too much intellect, and a domestic life. The value of marriage was universally admitted, and long-lived parents were also found an important factor. A healthy climate and good water were mentioned. All this agrees with common sense, unless the idea that the intellect is a hinderance to longevity be considered unreasonable, and we know that some of the most intellectual men have lived to great age.

## Soda for Burns.

All kinds of burns, including scalds and sunburns, are almost immediately relieved by the application of a solution of soda to the burnt surface. It must be remembered $t$ at $d r y$ soda will not do unless it is surrounded with a cloth moist enough to dissolve it. This method of sprinkling it on and covering it with a wet cloth is often the very best But it is sufficient to wash the wound repeatedly with a strong solution. It would be well to keep a bottle of it always on hand, made so strong that more or less settles on the bottom. This is what is called a saturated solution, and really such a solution as this is formed when the dry soda is sprinkled on and covered with a moistened cloth. It is thought by some that the pain of a burn is caused by the hardening of the
albumen of the flesh which presses on the nerves, and that the soda dissolves the albumen and relieves the pressure.
Others think that the burn generates an acrid acid, which the soda neutralizes.

## Sewage, and Rules for Public Buildings.

The following rules, to be observed in the construction of all buildings erected under her Majesty's Office of Works, have been prepared and issued by the Secretary to the Office of Works:

1. All water closets and urinals shall be constructed so that one wall at least of such closets and urinals shall be an outer wall of the building.
2. All soil pipes shall be carried outside the building, and ventilated by means of pipes leading the foul gases above the highest point of the building. Such pipes to be carried to points removed from chimney stacks
3. Separate cisterns shall be constructed for the water closets and for the general purposes of the building. No tap or "draw-off" shall be affixed to any pipe communicating with a cistern supplying a water closet or urinal.
4. All waste pipes and overflow pipes of cisterns shall ter minate in the open air, and be cut off from all direct com munication with drains.
5. Great attention shall be paid to insuring thorough ventilation in all rooms. Rooms s.) hign that their ceilings shall be more than two feet above the top of the widodows, corridors, staircases, and other oven spaces, shall be specially ventilated so as to prevent the accumulation of stagant air.
6. All main drains should, where practicable, be formed outside the building. In the event of its being necessary to carry a main drain underneath a building, it must be trapped mmediately outside the main wal, and a ventilating-pipe must be carried from that point to the highest part of the roof, as under Rule 2.-Journal of the Society of Arts.

## Pllocarpin in Diphthersa.

Last week fifty-two children dicd in Brooklyn of diph theria. Sad reports of similar m.rrtality come from othe quarters. I is our duty to call he especial attention of American physicians to the extrao dinary success which is now reported in Germany, in this disease, from the muriate of pilocarpin. It is given in ordint ry doses, internally, and a large number of cases have ber $n$ reported by different physicians wherein the results were astonishingly good. As soon as the pilocarpin exercises its specific effect on the salivary glands, the false membraute detaches, the inflamsalivary glands, the false membraice detaches, the infla
matury phenomena disappear, and improvement begins.
matory phenomena disappear, and improvement begins.
We particularly request our readers to try this treatme We particularly request our readers to try this treatment
and report their results, whether good or bad.-Medical and Surgical Reporter

## Raspberry Culture ILade Easy.

It is a source of constant regret ; with farmers that small fruits require so much care and att intion, and that, too, in the season when they are hardest at work at something else. Field work must be done at all eveats, and so the " berry patch" struggles on single-handed with weeds and grass ill it submits to the inevitable sward. Some years ago, coming into possession of a patch of black-cap raspberries hat had received the usual shiftles: culture, I treated them in the following way: After carefully plowing and boeing hem, I covered the ground with a heavy layer of strawy manure, and the work was done, no only for that year, but for the two years following, only renewing the mulch each spring. Only a few straggling Conada thistles will ever grow through such a mulch; the soil is always rich and moist, and the berries can ask no better treatment. Since that time I have tried the same plan without removing the sod, and find that the result is quite as satisfactory. Late as it is in the season now, any raspberry plot can be re claimed by a liberal application from the horse manure pile Farmers, try it, and you will not need to complain that ber ries cost more than they are worth.- J. C. in N. Y. Tribune.

## Sewer Ventilation.

At a recent meeting of the Leith 'l'own Council, Provost Henderson, a propos a memorial from certain inhabitants n nuisance said to be caused by the :sewer ventilation in the treets, took occasion to address the Youncil on the princi ples and practice of sewer ventilation. He described the arious means which bad been resorted to in different town to secure ventilation of the sewers, ly in draughts, by out draughts, by furnaces, by screws, but thought experience had proved that the simpler the mcans adopted the more effectual the result. In fact, the mor» numerous and more direct the openings made in the sewers the better the venti lation and the less the nuisance (if any) from sewer air. He, as Mrs. Lirriper with the chimney-cowls and smoke, pre ferred the ventilation, and the means thereof, plain, and this was the general conclusion of competent observers on the subject. If the street ventilators of Leith stink, the evil must be sought not in the ventilators, but in the sewer themselves.

Paste for Paper.-To ten parts by weight of gum arabic add three parts of sugar in order to prevent the gum from cracking; then add water until the desired consistency is obtained. If a very strong paste is equired add a quan tity of flour equal in weight to the gum, without bciling the mixture. The paste improves in strength when it begins to ferment.-Chron. Industr.

| Prelininary report upon the specific cotton manufacture of the United States, exhibiting the number of looms, spindles, the number of bales of cotton consumed, and the number of operatives employed, as reported by Edward Atkinson, of Boston, Mass., Special Agent of the Tenth Census on Cotton Manufacture. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| sra |  |  |  |  |
| The United States. | 230,223 | 10,921,147 | 1,588,481 | 181, |
| Alabama | 1,060 | 55,072 | 14,888 | 1,600 |
| ${ }_{\text {Arkansas }}^{\text {Connecticut }}$. | ${ }_{18,036}{ }^{28}$ | 93, ${ }^{2,1535}$ | ${ }^{1078787}$ | 15,497 |
| Delaware.. | 823 | ${ }_{48,8858}$ | 7,512 | ${ }_{63} 69$ |
| Georria | $\stackrel{4,713}{ }$ | 200.974 | ${ }^{67,874}$ | 6,678 |
| ${ }_{\text {Indiana }}$ Iliniol | ${ }_{776}$ | \% ${ }^{\text {4.3.396 }}$ | ciliss | ${ }_{720}$ |
| Kentucky | + ${ }_{1}^{78}$ | ${ }_{6.096}^{9,022}$ | ${ }_{1}^{4,354}$ | (108 |
| Maine.. | 15.978 | ${ }_{\text {che }}^{6966865}$ | ${ }_{\text {112, }}^{12,31}$ | 11,318 |
| Massaachuset | 94,788 | 4,465,290 | 578.590 | 62,794 |
|  | ${ }_{704}^{131}$ |  | ${ }_{6}^{600}$ | ${ }_{7}^{78}$ |
|  | ${ }^{3454} \times 187$ | 1,088.521 | (172.739 | 161565 |
| New jerse | $\substack{3,344 \\ 1,382 \\ 1}$ |  | 20569 | 年, 4.658 |
| Neorth Carkilia. |  | (102.67 | 70, <br> 27,508 | (0,410 |
|  |  | 14,388 | ${ }_{8}^{10,597}$ | ${ }^{663}$ |
| Pennsylyania. | ${ }_{\text {c }}^{10,541}$ | 1,669,295 |  | cer 21.878 |
| Touth Caroina |  | ${ }^{9} 9$ | -33,099 | ${ }_{1}^{2}, 312$ |
| Texas.... | ${ }_{14}^{71}$ | ${ }_{2,648}$ | ${ }^{246}$ | ${ }_{29}^{71}$ |
|  | ${ }_{1}^{1,180}$ |  |  | ${ }_{17}^{735}$ |
| ${ }_{\text {Wisconsin }}^{\text {irgin }}$............. | (1,324 | $4,3,36$ 10,240 | ${ }_{\text {c }}^{1,7,783}$ | ${ }^{1,1128}$ |

The Health of Cities.
Statistics compiled by the National Board of Health show that for the year ending October 31; 1880, the more important cities of the world rank as follows in comparative healthfulness. The death rate shows the number of deaths o each 1,000 persons during the year:

| City. | Population. | Death Rate. |
| :---: | :---: | :---: |
| Cticago. | 503.298... | $17 \cdot 9$ |
| Philadelphia | 850,000 | 183 |
| St. Louis | 333,577. | .. $18 \cdot 8$ |
| Boston. | 375,000 | ... 20 |
| Baltimore | 393,796 | .. .. $20 \cdot 9$ |
| London. | 3,254,260. | 21 |
| Leeds | 318,291. | 21.8 |
| Glasgow. | 589,598. | 21 |
| New York | .. 1,203,223. | ... 23 |
| Paris | .. 1,988,806 | 24 |
| Brooklyn. | 556,889. | ... $25 \cdot 8$ |
| New Orleans. | 216 359.. | .... $27 \cdot 7$ |
| Lyons. | 342,815. | 27.7 |
| Berlin | 1,096,644 | $29 \cdot 3$ |
| Dublin. | 314,666. | $32 \cdot 9$ |

## Luminous Paint.

According to the London Building News, luminous paint is getting into quite extensive use in England. Mention is made of offices coated with the paint which give great satisfaction to the occupants. The effect is that of a subdued light, every object in the room being clearly visible, so that in a room so treated one could enter without a light, and find any desired article. The luminous paint is excited by the ordinary daylight, and its effect is said to continue for about thirteen hours, so that it is well adapted for painting bedroom ceilings, passages that are dark at night, and other places where lamps are objectionable or considered neces. sary. For staircases and passages a mere band of the paint will serve as a guide, and costs but a trifle. For outdoor purposes the oil paint is.used, but for ceilings and walls the uminous paint, mixed with water and special size, can be used the same as ordinary whitewash, and presents a similar appearance in the daylight. By the recent discovery that it can be applied as ordinary whitewash considerably expands the field of its usefulness. Sheets of glass coated with the paint are in use in some of the vessels of the navy, at the Waltham Powder Factory, at Young's paraffine works, and in the spirit vaults of several London docks; and now that, by increased production and the use of water as the medium its cost is reduced by one half, it will probably be exten sively used for painting walls and ceilings. The ordinary form of oil paint has already been applied in many ways, to statues and busts, to toys, to clock faces, to name plate and numbers on house doors, and to notice boards, such a " mind the step," " to let," etc. The paint emits light with out combustion, and therefore does not vitiate the atmo sphere. Several experimental carriages are now running on different railways, the paint being used instead of lamps, which are necessary all day on account of the line passing through occasional tunnels.

## Light Road Locomotive Wanted

A correspondent suggests that this is one of the great needs of the times, and wants us to keep the subject before our readers. He says: "Your suggestions in years past hav brought out many valuable inventions. Having been a patron of the Scientific American for thirty years I know its value. It has been a schoolhouse, workshop, and laborator to thousands of men who are now in mature life."

| Population of 10,000 and Over.Census of 1880. |  |  |  | staff of officers appointed by the super- |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | Pop. | intendent of the census to collect statistics relating to the |
| , |  | n, Mass | 12,017 | industries and manufactures of New York city is, says the |
| F, | 90,903 |  |  | Evening Post, now approaching completion, and will show, |
| Alexandria, | 13,658 | Marlorough, M | 10,126 | Hill, the gentleman in |
| Allegheny, Pa | 78,681 | Memphis, Tenn. | 18 | charge of it, a very satisfactory growth since $1 \times 70$. |
|  |  | Mertaen, Conn |  | In the course of the investigation by Mr. Hill's deputies |
| Amsterdam, N | ${ }_{\substack{\text { 12,712 } \\ 19,716}}$ | ${ }_{\text {Milw }}$ | ${ }_{\text {115,588 }}^{11,731}$ | some singular industries were brought to light. It was |
| Atcbison, Kan | 15,100 | Minneapolis, Minn | 46,887 | found, for instance, that some use was made of old shoes, |
|  |  |  |  | hat use was hard to find out. Large numbers |
| Attleborough, | 11,111 | Montg |  |  |
| Auburn, N. | ${ }^{21,924}$ | ${ }_{\text {Muskegon, Mich }}$ | ${ }^{11,262}$ | its |
| Augusta, Ga Aurora, Ill |  | Nashua, N. H <br> Nashville, Ten | $13,39$ | of old leather make the commercial article known as Prus- |
| Austin, Texa | 10,960 | Newark, N | 136, |  |
| Baltimore, ${ }^{\text {a }}$ | ${ }^{332,190}$ | New Albany, Ind |  | call for old shoes was evidently for some other purpose. In |
| Bangor, Me |  | New Bedford, Mas |  | New York city and Brooklyn about three million pairs of |
| Bay City, Mid |  | New Britain, Conn |  | old shoes are thrown a way every year. Formerly old shoes |
|  | 12,652 | Newburg, X. Y | 18 | were plentiful in the gutters of certain neighborhoods; now |
| ${ }^{\text {Bin }}$ |  | New |  | it appears that they are sought after as choice prizes in the |
| Bloomington, |  |  |  |  |
| Boston, Mass | ${ }^{362,535}$ | New London, Co |  |  |
| Bridgeport, conn |  | New Lots, N. Y |  |  |
|  |  |  |  | oes |
| Brooshaven, |  | Neewport, Ky |  | and after being otherwise regenerated, sold to men who deal |
| Buffalo, N . | ${ }^{565}$ | Ne |  | in such wares. Some persons wear one shoe much more |
| Burlington, Io |  | New York, N |  | than the other; these dealers find mates for shoes whose |
| ington, |  |  |  | original mates are past hope. Secondly, the shoes not worth |
| ${ }^{\text {Cambridge, }} \mathrm{M}$ | 52,740 | Norri | 13, | patching up are cut into pieces; the good bits are used for |
|  |  | North Adanis, M |  | patching other shoes, and the worthless bits, the soles and |
|  |  | Northampton, M |  | cracked "uppers," are converted into Jamaica rum by a |
| tieton, |  | Norwalk, Conn |  |  |
| Cedar Rapids, | 10,104 | Nor | 21,141 | process known only to the manufacturers. It is said that |
| Cha |  |  |  | they are boiled in pure spirits and allowed to stand for a |
| Ch |  |  |  | few weeks, the product far surpassing the Jamaica rum |
| Chelsea, Mass | 14.996 | ${ }_{\text {Oma }}^{\text {Oma }}$ |  | made with essences, burnt sugar, and spirits. A gentleman |
|  |  | Orar |  | who doubted the truth of this story stopped recently at a |
| Chicopee, M |  | Osw | 21,117 | low grog shop in the neighborbood of the factory spoken of |
|  |  |  |  | and inquired if they had any rum from old shoes. "No," |
| Cincinnati, o | 255,788 | Paterson, N. J. |  | said the barkeeper, "we don't keep it much now; the drug. |
| ${ }^{\text {Cle }}$ |  | Pawtucket, R. |  | gists, who want a pure article, all sell it, and the price has |
| Cohoes, N. Y. <br> Columbia, S. | $\begin{aligned} & 19,417 \\ & 10,040 \end{aligned}$ | Peoria |  | gone up. But we have had it, and we can get you some if |
|  | 51,665 | Philade | ${ }^{846}$ | you want it." How many old shoes go to a gallon of rum |
| ${ }^{\text {co }}$ |  | Pittsburg, Pa |  | could not be ascertained. |
| Cortlandt, N. Council Bluffs |  | Pittsfield, Ma Portland, Me |  | It has been noticed by some deputies that while manu- |
| Covington, | 29,720 | Portsmouth, | 11,3 | facturers are quite willing to put a valuation upon their |
| Dallas, T |  | Portsmouth, V |  | - |
|  |  |  |  | material and even return the schedules with the |
| Davenport, |  | Poughkeepsie, N |  | or the value of raw material left bla |
|  | 33,677 | Providence, R | 104, |  |
|  |  | Quincy, III |  | stance a manufacturer of tomato catsup returned a report |
|  | 11,649 |  |  | giving the value of his manufactured product at \$18,000 |
|  |  |  |  |  |
| Detroit, Mich | ${ }^{116,342}$ | ${ }^{\text {Reading, }} \mathrm{Pa}$ | 43,2 | tion was as follows: Every year in the coming season he |
| ver, N. H |  | Richmond, Ind |  |  |
| $\begin{aligned} & \text { Dubuque, Io } \\ & \text { Easton, Pa.. } \end{aligned}$ |  | Richmond, V |  | $n$ tubs, with the understanding that |
| East Saginaw, M | 1,9016 | Rockford, III. | 13,136 | d |
|  |  | Rock Island, | 11,660 |  |
| Ell |  | Rome, N. Y. |  |  |
| Elizabeth, N . |  |  |  |  |
| ${ }_{\text {Erie }}$ Era. | 27,730 <br> 2980 <br> 280 | Sacr Sagi | 21,420 | tomato catsup to the extent of $\$ 18,000$. |
| Evansville, <br> Fall River, |  | Sagina Salem, |  | Another singular and decidedly pernicious business is |
| Fishkill, |  | Salt Lake City |  | ufacture on a large scale of cheap candies from |
|  |  | San Antonio, T |  |  |
|  |  | Sandusky |  | glucose. The deputy who investigated the confectionery |
| Fo | 13,091 | san Francisc | 233 | business reports that seventy-five per centum of some can- |
| For |  |  |  |  |
| Galesburg, | - $\begin{aligned} & 11,464 \\ & 2,2,25 \\ & \end{aligned}$ | Saratoga Springs Saugerties, $\mathrm{N} . \mathrm{Y}$ | 10,822 10,375 | ably "gum drops," contain still less sugar. The effect of |
| Ge |  | $\left.\right\|_{\text {Saug }} ^{\text {Sava }}$ |  | white earth upon the stomachs of the unfortunate children |
|  |  | Sche | 13,6 | andies is yet to be determined by future |
| ${ }^{\text {Gr }}$ |  |  | 45,8 | autopsies. What is called a fine brand of castile soap has |
| Ha |  | $\begin{array}{\|l\|l\|} \hline \text { She } \\ \text { Shr } \end{array}$ |  | been found to be composed chiefly of this white earth and |
| Ha |  | Shreveport, |  | grease, but the evil effects of such an imposture are trifling |
|  |  | South B | 18,2 | compared to the results of turning children's stomachs into |
| Haverhill, |  | Springteld, |  | miniature $p$ |
|  |  | Star | 11,2 | uring the last few years is the system of finishing in |
| Houston, Texas |  |  |  | this city foreign goods imported in an unfinished condition. |
|  |  | Stocl | 10,887 | Foreign articles composed of several parts are now largely |
| In | 75, | St. J |  | in this city, the parts calling for hand labor being |
| Jackson, Mich <br> Jacksonville, I | 16,10, 1092 | $\begin{array}{\|l\|l\|} \text { St. L } \\ \text { St. P } \end{array}$ | 350,5 | imported while those calling for machine work are made |
|  |  |  | 51, | here. In this way beavy duties are saved, although the ar- |
| Jeffersonville, I |  | Taunton, Mass | ${ }^{21,213}$ |  |
|  | 120, | Terre Eaute, II | ${ }^{26,1}$ |  |
| Johnstown, |  | Toledo, O.. |  |  |
|  |  |  |  |  |
| Kalamazoo |  |  |  | The Photop |
| Kansas |  | Tro, N. Y |  | The opinion is gaining ground, especially among French |
| Keokuk, lowa | -12 | Utica |  | savants, that the musical sounds produced by Professor Eell |
|  |  |  |  | in disks of various substances, such as mica, India-rubber, |
| La |  | Wallkill, L |  | metal, and wood, by holding them in the path of a rapidly |
| Lak | 18,396 | Walham, Mass | ${ }^{11,7}$ | interrupted beam of light, are really due to heat and not to |
| Lancaster, P | ${ }^{25,769}$ | Warwick, R. I | 12,12 | light. Radiophonic notes, such is the new term, have been |
|  |  | Washington, D. Waterbury, |  | obtained by M. Mercadier from ordinary gas lamps without |
| Leavenworth, Kan |  | Wa |  | employing lenses to concentrate the interrupted beam, by |
| Lenox, N . Y | 10,249 | W | 22,220 | simply bringing the receiving disk near the source. Even a |
|  |  |  |  | plate of copper heated to a bright red heat produced very |
| Lexington, K , | 16,556 | Wheeling, W. Va Wikesbarre Pa |  | distinct musical tones, which gradually died away as the |
| Lincoln, Neb | ${ }_{\substack{13,004 \\ 13,65}}^{13}$ | ${ }_{\text {Wilke }}$ |  | plate cooled to a dull red followed by obscurity. The fact |
| Littl | 13, | Wilmington, Del | 42, | that when the receiving disks were coated with silver on the |
|  | ${ }_{13,522}$ | Wilmingt | 17,3 | next the light the effects were feeble, and that when |
| ansport, Ind | 11,198 1,117 | Wi |  | ated with absorbent lampblack they were strong, would |
|  |  |  |  | seem to tell against Professor Bell's conclusion that the sounds |
|  | 123,645 |  |  | were due to light. |
| Lowell, |  |  |  | ious |
|  |  |  |  |  |
|  |  |  |  | tion was due to |

The work of the staff of officers appointed by the super. intendent of the census to collect statistics relating to the Evening Post, now approaching completion, and will show, in the opinion of Mr. Charles E. Hill, the gentleman in harge of it, a very satisfactory growth since $1 \times 70$.
In the course of the investigation by Mr. Hill's deputies ome singular industries were brought to light. It was but exactly what use was hard to find out. Large numbers f old shoes were sold by rag pickers to certain men who disposed of them at a good price. It is well known that bits of old leather make the commercial article known as Pruscall for old shoes was evidently for some other purpose. In New York city and Brooklyn about three million pairs of old shoes are thrown away every year. Formerly old shoes were plentiful in the gutters of certain neighborhoods; now appears that they are sought after as choice prizes in the ag picker's line. By dint of persevering inquiry it was dis all shoes not completely worn out are patched, greased, and after being otherwise regenerated, sold to men who deal han the other; these dealers find mates for shoes whose original mates are past hope. Secondly, the shoes not worth patching up are cut into pieces; the good bits are used for ane process known only to the manufacturers. It is said that hey are boiled in pure spirits and allowed to stand for a made with essences, burnt sugar, and spirits. A gentleman who doubted the truth of this story stopped recently at a nd inquired if they had any rum from old shoes. "No," said the barkeeper, "we don't keep it much now; the drugists, who want a pure article, all sell it, and the price has gone up. But we have had it, and we can get you some if could not be ascertained.
It has been noticed by some deputies that while manumanufactured product they hesitate about stating the value of the raw material and even return the schedules with the space for the value of raw material left blank. In one instance a manufacturer of tomato catsup returned a report and the value of his raw material as nothing. His explanaion was as follows: Every year in the coming season he sends to all the wholesale houses which make a business of
canning tomatoes clean tubs, with the understanding that the women who trim and peel shall throw the skins and stuff in them ground up, fermented, flavored, and sold as ato catsup to the extent of $\$ 18,000$.
he manufacture on a large white earth or terra alba mixed with a littie sugar and glucose. The deputy who investigated the confectionery business reports that seventy-five per centum of some can
dies is composed of these substances, and such candy, notably " gum drops," contain still less sugar. The effect of white earth upon the stomachs of the unfortunate children
who buy these candies is yet to be determined by future autopsies. What is called a fine brand of castile soap has been found to be composed chiefly of this white earth and grease, but the evil effects of such an imposture are trifing miniature pottery works.
Among the new industries which have sprung into exist this city foreign goods imported in an unfinished condition. Foreign articles composed of several parts are now largely imported while those calling for machine work are made here. In this way heavy duties are saved, although the articles are sold as imported goods.

## The Photophone

The opinion is gaining ground, especially among French avants, that the musical sounds produced by Professor Bell metal, and wood, by holding them in the path of a rapidly interrupted beam of light, are really due to heat and not to obtained by M. Mercadier from ordinary gas lamps without employing lenses to concentrate the interrupted beam, by imply bringing the receiving disk near the source. Even a late of copper heated to a bright red heat pas as plate cooled to a dull red followed by obscurity. The fact that when the receiving disks were coated with silver on the side next the light the effects were feeble, and that when
coated with absorbent lamplack they were strong, would seem to tell against Professor Bell's conclusion that the sounds It is a curious
brought out by Dr. Crookes he intimated his belief that its now known to be the cause of the motion.

## 象usiness amd extumat.

## The Charge for Insertion under this head is One Dollar

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tiful and acceptable gift of the season. Order one from the manufacturers or their agents.
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tion when competent. Send for pamphlet.
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etc. Condit. Hanson $\mathbb{E}$ Van Winntle, Newark, N. J., and 32 and 94 Liberty st, New York.
Clark Rubbe: Wheels adv. See page 29.
Peck's Patent Drop Press. See adro, page 45. For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie'sad. p. 60. Blake "Lion and Eagle " Imp'd Crusher. See p. 45 . Mineral Lands Prospected, Artesian Wells Bored, by
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Horizontal Steam Engines and Boilers of best con-
struction. Atlantic steam Engine Works, Brooklyn N. $\mathbf{Y}$ Apply to J. H. Blaisdell for all kinds of Iron IVorking Machinery. 107 Liberty St., New York. Send for illustrated catalogue.
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10.000 Gear wheels, now in use, the superiority of their Castings over all others. Circular and price list free. Brass \& Copper in sheets, wire \& blanks. See ad. p. 76 . Diamond Saws. J. Dickinson, 64 Nassau St., N. Y. The I. B. Davis Patent Feed Pump. See adv., p. 76. For Superior Steam Heat. Appar., see adv., page 77 . Eagle Anvils, 10 cents per pound. Fully warranted Steam Cylinders bored from 3 to 110 inches. L. B. anders Machine Works, Philadelphia, Pa.
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ings. The most accurate, complete. and easily under stood book on the Locomomotive. Price 82.50 . Send for a catalogue of railroad books. The Railroad Gazette, 73
Broadway, New York. Moulding Machines for Foundry Use. 33 per cent
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keot at 79 tiberty Wm. Sellers \& Coo., Phila., have introduced a new by alde motion of a lever.
Saw Mill Machinery. Stearns Mfg. Co. See p. 77. Skinner \& Wood, Erie, Pa.. Portable and Stationary Engines, are full of orders and witharaw their illustrated advertisement. send for their new circulurs.
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movable Covering for Hot or Cold Surfaces; 'Toope's Pat. movable Covering for Hot or Cold Surfaces; 'Toope's Pat.
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nan's Parallel Vise, Taylor. Stiles \& Co.,Riegelsville,N.J. Green River Drilling Machines. See ad. p. 60 .

## Hathestinneris

hints 'to correspondents
No attention will be paid to communications unless
accompanied with the full name and address of the accompa
writer.
Name

## given to inquirers.

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 question.
Correspondents whose inquiries do not appear after
a reasonable time should rqeat them. If not a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the
Editor declines them. Persons desiring special information which is purely a personalchara $\$ 1$ t $\$ 5$, cor of general interest as we cannot be expected to spend time and labor to obtain such information without remuneration. Any numbers of the Scientific American Supple ment referred to in these columns may be had at this Brawemem
(1) J. R. asks how to mix aniline colors so
that they will hold on glass buttons without rubbing off by touching. A. Mix them with a thin colorless varnish (alcoholic), such as bleached shellac or spirit copal (2) C. E. N. asiks how to soften rattan so as to make neat basket work. A. Coil and steep in boiling (3) C. H. A. asks: Are kerosene heaters unhealthy? A. As commonly used, without means of
(4) J. B. asks how to make soap hard and firm. A. Heat the paste nearly to boiling, add plenty of soap, skim off the curds soap which separates, press
and let stand to cool, Then cut up and stack in a dry place to harden
(5) W. B. H. asks if the same cutter is
(5) W. B. H. asks if the same cutter is
used to cut all the wheels in a set of change wheels for a lathe. I have a lathe, and wish to cut some more wheels, have an index plate and gear cutter, but don
know whether a cutter made from one of the wheels a pattern would answer for others having more or less teeth. A. Yes, if you shape your cutter to
the teeth of a wheel not differing much from the the teeth of a wheel not differing much from the tameter of that you wish to cut. 2. Please give me some work where I can get some information relative to gear cutting, etc. A. "Shelly's Workshop Appli
(6) H. S. asks the cause of the noise in the pipe connecting the range and boiler. The noise is some thing like that of a steam pump. The pipe connecting my range and boiler has burst twice in as many months,
and the therefore, cannot remedy it The boiler is about 40 gal lons size, and is supplied from a tank. The burst has oc curred just where the noise is, and the noise does not
commence until the water becomes heated. A. The pipe when it leaves the water back mustr rise gradually and have no place for steam to gather in. Anything which retards the free circulation of the water will cause nuise, whether there is a partial stoppage in the pipe or whether the pipes are not properly set. It is excessive heat, with
alternate heating and cooling at that part of the pipe, asalternate heating und cooling at that part of the pipe, as-
sisted by the ordinary pressure, which causes it to burst.
(7) A. W. asks: 1. Is there a common way of melting German silver? A. Use a black lead
crucible, cover with charcoal, and give a good crucible, cover with charcoal, and give a good
white heat in a small crucible or melting furnace. white heat in a small crucible or melting furnace.
2. How can I harden small gouges ? A. Heat to right redness under charcoal and quench in clean way by which I can clean files, such as used by manufacturers of metal show cases; they get filled with soft
solder? A. Use a piece of sheet brass or soft hoop iron to detach the metal between the teeth by striking (8) C. G. R. asks: 1. At what speed is the boat described in Scientific Ambrican SUPPlement No. 166, supposed to run with a load. A. Probably eight to eight and a hatf miles. 2. What wood is bes A. White oak; best bent 3. What wood is test for the hull and how thick \& A. Cedar or cypress, flye eighths inch or three-fourths inch thick. 4. Would a four horse power engine answer for this boat ?
Probably it would if the stroke is not too great.
(9) M. J. H. asks cess for removing the color from calico prints and colored cotton cloth and bleaching it white. A. Boil in a strong solution of caustic soda, rinse thoroughly in clean
water; steep for half an hour in a strong clear soluwater; steep for half an hour in a strong clear solu-
tion of chloride of lime (calcium hypochlorite) in water; tion of chloride of lime calacium hypochlorite) in water;
ring out and pass throngh water containing about 3 per traces of the blic acid, rinse in running woved; dry
(10) W. C. K. asks: What will remove tattoomarks from the skin ? A. It is said that milk oricinally applied will change the blue color to red and
ond ultimately cause it to disappear
(11) J. B. D. asks how to make a solution can will take thick grease from steel wire so that it can be immediately dried, without causing it to rust
A. Use a boiling hot solution of potash in water. Bi sulphide of carbon and naphtha also readily dissolve (12) R. E. N. writes: We have two valu able sleigh robes, which are not used very often; how
can I keep them free from moths when not in use ? A. Alcohol, 1 pint; camphor, half an ounce; dissolve.
(13) W. T. B. asks (1) how oil of neroli is made. A. The freshly gathered flowers (sweet orange)
distiled with an equal quantity of soft water in a retort distilled with an equal quantity of soft water in a retort
provided with a condenser. The oil separates from the provided with a condenser. The oil separates from the
distilled water, which is returned to the still with fresh distilled water, which is returned to the still with fresh
leaves. Rectify by redistillation. About 600 pounds of the flowers produce 1 ounce of the oil. 2. How are orango fowers gathered and preserve
(14) C. asks: Can you give me test for grease in glue? A. Macerate the glue with a little pure bisulphide of carbon, draw oft the latter, filter quickly, and let it evaporate, in a clean porcelain vessel. The
oil or grease (if any) in the glue tested will remain as a esidue.
(15) J. S. B. asks why it is that the salts in a storm glass rise to the top of the hermetically sealed
glass tube in damp weather and sink to the bottom in glass tube in damp weather, and sink to the bottom in
dry weather. A. These glasses are usually not herdry weather. A. These glasses are usually not her-
metically sealed - the change is chiefly due to the effects of the varying temperature
(1b). F. M. W. asks: What is the method of preparing and using soluble glass in the place of resin, in the manufacture of hard and soft soaps?
Pure quartz sand, 1 lb; reduce by grind ing to Pure quartz sand, 1 lb; reduce by grinding to a fine
powder, and $i$ timately mix with $13 / \mathrm{lb}$. carbonate of soda deprived of water by calcination. Place the mixture in a retort, capabele of holding four times
the quantity, and expose to a white heat until the mixture is in a state of calm fusion. Pour out on an
and iron plate to cool. When powdered it dissolves to a
sirupy liquid in boiling water. Consult Feuchtwanger's "Soluble Glass" and
the Manufacture of Soap."
(17) L. G. G. asks: 1. What gas is the lightest? A. Hydrogen. An equal volume of atmospheric air under
like conditions of temperature and pressure weigh like conditions of temperature and pressure weigh
about fourteen and a half times as much. 2. How much lifting power has it per 1,000 cubic feet? A. If large scale usually by decomposing dilute oil of vitriol with scrap iron, or by decomposing superheated steam by passing it over red hot iron. See Giffard's proceess
(illustrated), p. 104, Vol. 38 Sciestricic Amentican. 4. If kept in an air-tight vessel will it always remain the If f kept in an air-tight vessel will it always remain the
eameunder all conditions of weather P A. If pure, yes.
(18) J. S. asks whether there is any pro sss besides painting, of transferring a photograph o A. The process of obtaining photocraphic lantern trans. parencies is briefly as follows: clean the glass, coat it with a thin ammoniacal solution of albumen, dry, flow with photographer's sensitized collodion, dip for a few tilled water a 1 dath of nitrate of silver, 5 drachms; dis thed water, 10 fluid ounces (in a dark room). Adjust focus. Then put the sensitized glass plate in the dark box, transfer to the camera, expose a minute or two (ac cording to light), then cover, immediately remove to the dark closet and wash the plate in a strong solution of sulphate of iron to develop the picture. Tone in a little warm water containing a few drops of gold chloride wash and fix by immersion in a strong aqueous solu
tion of hyposulphite of soda or cyanide of potassium rinse thoroughy dry ond fow with photomsanher, varnish. Place this in the outer aperture of a dark tube, the other end of which joins the front of the camera, so that the light passing through it enters the lenses of the camera and the image may be focused on the glass plate at the back. Then prepare another sensitized glass plate as before, expose in the camera,
develop tone, and fix as before. This plate will bear develop, tone, and fix as before. This plate will bear
a positive image, and may be used directly in the lan tern. Consult any good photographer.
(19) J. M. R. asks: By what means can I restore to its original whiteness a plaster vase that has
become yellow? It appears to be a mixture of plaster of Paris and oil or wax of some kind, the ontside bei: coated with spermaceti or. parafifne. A. While chlorine or peroxide of hydrogen might be tried, we believe that there is no known method of restoring the original purity of a plaster article prepared as indicated. The with a white paint possessing good body, such as Dutch with a white
white lead.
(20) E. B. F. asks: Can you give a description of the blue photographic process of copying tracings, etc., nsed by architects and others? The process
is that by which white lines on a dark blue or purple ground are obtained. A. To compress a full descrip tion in the small space at disposal in this column would be impossible, but we give hints from which you can work. Brush the paper over with a solution of ferricoxalate, ten grains to the ounce. This paper will remain good for years, but must be kept carefully in the
dark. Expose to light under the drawing that is to be copied, and then brush it over with or immerse it in copied, and then brush it over with or immerse it in
a solution of ferridycyanide of potassium (red prussiate of potash), by which the picture will be immediately de-
veloped, white lines upon a bue ground. The strength veloped, white elines upon a bue e ground. The strength
of the of the developing solution is immaterial. The blue
color becomes intensified by subsequent washing with a solution of bisulphate of potash. The best sensitizing preparations are those in which ammonia as well as oxalic acid forms a part. Such ammonio-ferric ozalate be prepared by mixing together oxalate of ammonia, 437 grains; oxalic acid, 386 grains; water, 6
ounces; heating onces; heating the misture to the boiling point and
 pared by adding peroxide of iron to a hot solution of yadd in water to saturation.
(21) S. A. C. asks how the iron moulds for cast steel ingots are made. Do they separate at the cor-
ners or in the middel of the mould to allow the ingot to be got out? A. The moulds are in a single piece. The tapering to admit of lifting the mould from the ingot.
(22) G. K. writes: I have a lot of keys that have got badly rusted through lying by for some time.
Will you please inform me how to clean the rust off? A. Scour with a little fine emery and oil, if iron, if brass boiil in strong washing soda solution, rinse in
water, then dip momentarily in strong nitric acid, rinse Water, then dip momentarily in strong nitric acid, rinse
quickly rub witin a cloth or sawdust and slightly oil
(2?) J. P. B. asks for a recipe for making a cheap black paint for coating canvas. The paint must not crack, and thave a good gloss. A. Try the
following: Gumamber, 16 oz: melt in boiling oil linseed), half a pint; add genuine asphaltum and resin, each 3 oz. Mix thoroughly over the fire, remove to the open air, and grad
pentine, slightly warm
(24) E. T. W. asks: What is used and how preparea and applied for a dressing for carriage tops
when they become worn ? 1 have seen one that had been dressed over and it looked as well as new had

## See answer to J. . B., this page.

(25) J. N. S. asks: How many pounds of iron turning, of vitriol, and of water will it require to make eight thousand cubic feet of hydrogen gas? Can I make it in one vessel or tank, and what size, or will it operate better by using two or more smaller vessels, and
of what size ? A. About 1,776 lb. iron turnings 374 gallons strong oil of vitriol, and 45 barrels of water
git galions strong oin of vitriol, and 45 barrels of water.
Better use a number of large, tight hogsheads. Make connection by means of varnished canvas hose, with
short piece of iron pipe driven in a hole in the bead o the vessel; 71 lb . iron require at least $121 / 1 \mathrm{lb}$. acid mixixed with about 6 gallons of water. See Giffard's apparatus and process for making hydrogen for inflating balloons, p . 104, Vol. 38, ScIENTIFIc American.
(26) J. F. writes: I have in my possession a graduated tube with a bulb on the end loaded with
shot; it is marked " Baume for coal oil," temperature shot, in is marked " "aume .tor coal oill", temperature
$60^{\circ}$ Fah. I wish to know how to use 1 tso as to tell the best oil and which is the least explosive. It is marked from 110 up to 75 . Y have never seen these instruments
desicribed by you. A. In Baume's hydrometer for light liquids zero ( $0^{\circ}$ ) indicates a specific gravity of ${ }^{1} 0.075: 10^{\circ}$ corresponds to sp. gr. $1 \cdot 000 ; 25^{\circ}$ to sp. gr $0906 ; 50^{\circ}$ to sp . gr. 0.782 , and so on. Suspend the inard; those in which the instrument sinks deeper are of poorer quality. Almost any dealer in optical and philo-
sophical apparatus can provide you with printed tables sophical apparatus can provide you
and explanations of the instrument.
(27) D. V. C. asks if there is any ingredients which would mix with our sizing, composed princi-
pally of glue and soap dissolved in water, to prevent
window shades from curling on the sides when exposed
to the heat of the sun. A. Try the addition of a trace
of glycerine to the size.
(28) C. E. R. asks: 1. Is the pressure the same on the bottom of steam boiler as on the top? A.
The pressure is as much greater at the bottom, than the pressure of steam, as is due to the head of water. 2 . What is the largest size steam engine cylinder ever made? A. We suppose the largest cylinder is that of drainage engine at Harlem lake, 144 inches diamete
(29) J. M. M. asks: 1. With what color are parafine matches colored! A. Usually the colors are pigmental and not dyes, such as red and yellow lakes, ochers, Prussian blue, and green, etc. 2 . If it in aniline
how is it applied and mixed? A. The aniline dyes may be introduced by first dissolving them in alcohol. The merest trace of the dyestuff is sufficient. 3. Is there any liquid color for dyeing matches in the market?
We know of no color sold especially for this purpose.
(30) F. T. R. asks: How is brass made and melted? My experiments have resulted in a blue flame
and ashes. A. Yellow brass-zinc, 36 ; couper, 70 ; for and ashes. A. Yellow brass-zinc, $36 ;$ copper, 70 ; for
turning (common) copper, 20 lb ; zinc, 10 lb . lead, 1 to 5 turning (common) copper, 20 lb ; zinc, 10 lb ; lead, 1 to 5
oz. Red brass for turning copper, 24 lb ; zinc, 5 lb ;
lead, 8 oz Red brass, free for turning copper, 160 lb ; lead, 8 oz . Red brass free, for turning copper, 160 lb .;
zinc, 50 lb . 1 lead, 10 lb .; antimony, 41 oz. Anotherzinc, 50 lb. ; lead, 10 lb. ; antimony, 44 oz . Another-
copper, 32 lb .; zinc, 10 lb . : lead, 1 lb . Best red brass for copper, $32 \mathrm{lb} . ;$ zinc, 10 lb : lead, 1 lb . Best red brass for
castings
copper, $24 \mathrm{lb} . ;$ zinc, 5 lb .; bismuth, 1 oz; put castings...copper, $24 \mathrm{lb} . ;$ zinc, $5 \mathrm{lb} . ;$ bismuth, 1 oz; put
in bismuth last. In melting use a black lead crucible, put in the copper and heat in a crucible until melted (requires a very bright red, or white heat). When the oopper is barely hot enough to remain liquid, add the zinc , with a little borax and charcoal powder. The zine
must be dry. Where lead, antimony, or bismuth is one must be dry. Where lead, antimony, or bismuth is one
of the constituents, stir in these just before taking from of the constituents, stir in these just before taking from
the fire to pour. Stir with a stick of green wood, skim the fire to pour. Stir with a stick of green wood, skim
and pour. In remelting brass use a quick fire and add a little zinc to make up for that invariably lost in the operation.
(31) W. M. C. asks how to put a black bronze on gun barrels. When the guns or carbines are first issued to us they have a lustrous black bronze, which
lasts about six months and wears off, leaving the barrel smooth and bright. I think that it is applied with a brush or by a dip, as muriatic acid takes it off clean leaving the barrel bright. What I need is a recipe such
as a soldier can use. I think that a liquid preparation as a soldier can use. I think that a liquid preparation
would be the thing, if possible. A. The blue color is would be the thing, if possible. A. The blue color is
dne to a thin film of oxide formed in tempering. We due to a thin film of oxide formed in tempering.
know of no way of reproducing the film without reheatknow of no way of reproducing the film of spirit copal e, may be used to imitate the color and appearance, but it is not very durable.
(32) T. W. asks if a glass ball placed on top of a flag staff on a house is any protection against lightning. A. No, the . The proper protection would be a three-quarter inch iron rod, made if possible in
one continuous piece, or in sections with soldered and one continuous piece, or in sections with \&oldered and
riveted joints, extending from the staff or highest riveted joints, extending from the staff or highest
point on the house to the ground, and connected underpoint on the house to the ground, and connected
ground with the iron water main pipe or iron gas pipe; the connection between rod and pipe being by soldered material under ground in direct connection with the rod. No rod is a protection unless it is thoroughly
(33) J. P. asks for formula for electro-plat ing ironon othermetals. A. Neutral ammonio sulphate water, 1 gallon; dissolve and filter. Use a clean iron anode, clean the work thoroughly. (See Nickel Plating, p. 153. Vol. 43, Scientific American.) Use a moder-
ately strong battery. The success of the operation deately strong battery. 'The success of the operation de-
pends very much upon the preparation (thorough cleanspends very much upon the preparation (thorough cleans-
ing) of the work. 2. Is the formula given in No. 1, new olume, for electro-plating brass, patented
(34) J. H. M. writes: Some makers of boilers, to be used in connection with pipes for heating dwellings and greenhouses by the hot water system,
have, in this country and in England, used pipes for grate bars, intending that the water in the boiler should greater efficiency from the exposure of more surface to the action of the fire. In what respect is an apparently good theory practically defective, for it seems to have been adopted by but few, and to have been abandoned by some who have experimented with it? A. Such "water grates," as they are called, are not used for economy of fue, but because they are more durable
than the ordinary grate. Coal burning locomotives are frequently fitted with them
Minerals, etc.-Specimens have been re ceived from the following correspondents, and examined, with the results stated
R. P. W.-It is a fine silicious sand, useful for polishing purposes and for glass making; might also find a narke
makers.

COMMUNICATIONS RECEIVED
A Plan for the Reformation of the Orthography of the
English Language. By H. A. s. English Language. By H. A. S.
On Solar Phenomenon. By J.

## NEW BOOKS AND PUBLICATIONS

Extracts from Chordal's Letters. New
York: American Machinist Publishing York: American Machinist Publishing Company.
These selections from the contributions of "Chordal"
to the American Machinist make an interesting enterto the American Machinist make an interesting, entertaining, and usefully suggestive addition to the literature of the machine shop. The author discusses shop work and shop management with much practical
shrewdness, and in a manner that mechanics, artisans, and wide-awake working men generally cannot help butenjoy.

Yellow Fever: Its Ship Origin and PrePENTION. By Robert B. S. Hargis, M.D.
Hargis is an 0
Dr. Hargis is an enthusiastic disciple of Professor
Gamgee as to the nautical origin of yellowfever, though he professes to have developed the same theory long the subject published in several medical journals during the past year.
Studies in Song. By Algernon Cbarles Swinburne. New York: R. Worthingwinburne's command of singing English is marvel ous. His verses are unequaled in sweep and melody. If he could only freight them with thought and feeling The Scientific Basis of Spiritualism. By Epes Sargent. Boston: Colby \& Rich. 12mo, pp. 372. \$1.50.
Of the two classes of men-those who believe in spiritualism and those who reject the spiritual hypoth-esis-one must be grievously in error: perhaps both are. on the main point) errs as much in denying real phenomena because they are not readily explainable under a too limited theory of what is natural, as the other does over haste to accept phenomena which are misunderstood or fraudulent, hecause they tell in favor of that Mr. Sargent's bolv is not likely to change raicaly Mr. Sargent's book is not likely to change radically the
belief of eitherclass. The natural material out of which men have created and peopied the supernatural, the "invisible universe," the "spirit world," or whatever
it may be called, will have to be much more broadly and minutely understood, both as regards its origin and its character, before the question of fact and fancy involved in spiritualism can be brought to any real scien
Spons' Encyclopedia of the Industrial
Arts, Mandfactures, and Commercial
Products. Edited by G. G. Andre. 30
parts. Fach 75 cents. New York: E. F. N. Spon.

Parts 15, 16, and 17 of this encyclopedia complete substances, floor cloth, food preservation, fruit, fur coal gas, gems, glass, and graphite.
[OFFICIAL.]
INDEX OF INVENTIONS

## Letters Patent of the United States

 Granted in the Week Ending January 4, 1881,
## AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]
A printed copy of the speciffcation and drawing of any patent in the annexed list, also of any patent issued
since 1866 , will be furnished from this office for lar. In ordering please state the thumber and for one dolpatent desired and remit to Munn \& Co., 37 Park Row,
New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the spe fications not being printed, must be copied by hand.
Addressing machine, J. M. Bolton.
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