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NEW YORK, AUGUST 24, 1872.
$\left[\begin{array}{c}\text { \$3 per Annum. } \\ \text { IN ANVANCK }]\end{array}\right.$

## IMPROVED SUGAR EVAPORATING APPARATUS.

The sugar evaporating apparatus illustrated in our engrav ings was patented through the Scientific American Patent Agency, July 2, 1872, for Jobé Guardiola, of Chocolá, Guate mala. We have slready placed before our readers other inventions emanating from the same source, and expect ere long to present them with still further evidence of Mr. Guardiola's skill in devising means for the development of Central American and other productions.
The present invention relates to a novel form of evapora tor and an impreved means of rapidly and effectually defecating sugar juice. Its essential features are shown in Fig cating sugar juice 1, which represent one form of the ap paratus. In this
form two evaporat form two evaporat
inghelices are ustd in combination with a receiver of defecator and two evaporating pans all of which are heated by the fur nace shown in the figure, part of the ground in which is broken a way under the first pan in order to show the flue which con nects the furnace with the chimney The peculiar con. struction of the
evaporating helis evaporating helix
will be better un derstood on refer enca to Fig. 2, which is a top view of the same, and to Fig. 3 where it is shown in vertical central section. The material is metal, and it is made so as to form a spiral channel, which descends gradually as it increases its distance from the center. The center, which is of course the highest part, consists of a vertical tube into which the juice is received and which is shown in detail in Fig. 5. It will be seen that the open side of the tube is provided with a gate, which is raised or lowered by a rack and pinion. By the adjustment of this gate the flow of juice into the spiral channel is regulated. The outer rim of the channel, throughout its entire length, is made so as to form a vertical wall with an outwardly projecting horizontal flange, which latter is terminated by an upwardly projecting lip; the construction is fully shown in the sectional view, Fig. 4, where A is the bed of the channel, and B is the outer rim.


The horizontal flange is perforatad, as represented, and acts as a skimmer; for when the juice, in its downward pass age through the channel, boils over the vertical wall, it is thrown upon the flange, $u_{f}$ on the surface of which the im purities are retained, while the purified juice falls through the holes into a lower part of the channel. Alorg the lowest convolation the flange is not perforated, thereby preventing the lateral discharge of the juice for obvious reasons.

The operation is as follows: The cane, beet, or sorghum juice passes from the mill in which it was made into steam defecators of ordinary construction, and is then elevated to
and passed through suitable filters, whence it fi, ws into a and passed through suitable filters, whence it fi, ws into a vat. From this vat, by proper connections, it is drawn into the central tubes of the two helix evaporators and skimmers seen in Fig. 1. It passes from them into the receiver or $\mathrm{d}_{\theta}$ fecator, which is placed between them and the first pan. By means of a faucet in the roceiver and a trough, both of which are shown in the engraving, it is thence conducied into either of the two evaporating pans, where it is brought to a densi. ty of from $25^{\circ}$ to $30^{\circ}$ Baum $\xi^{\prime}$, and rendered fit for the vacuum pan or other process. By means of the crane and dipper, a
[Toronto Monetary Times.]
The building of railroads in the United States is one of those marvels of the sprightlier phase of civilization developed on this continent which it estounde one to contem plate. There are now in that country 60,000 miles of lines built at a total estimated cost of $\$ 3,000,000,000$, being on the average $\$ 50,000$ a mile. To this immense aggregate, new lines are being added at the rate of eight or nine thousand miles annually. The new constructions last year are estima ted by Mr. Poor-the author of a series of valuable statisti cal volumes on this subject-to have cost $\$ 275.000,000$. though we shall never know-ho far these woul have contributed to promote the se tlement of the Uni ted States, and to cause the increase of 25 to 35 pe cent, each decade in the total popu lation of that coun try.

Instead of being compelled to seek a charter from Le gislature, as is th case in this coun try, nearly all of the States permit the formation of railroad companie under a senera ct, so that an body of men, of the requisite number upon filing article of association with

## GUARDIOLA'S SUGAR EVAPORATING APPARATUS.

delineated, the sirup is removed from the pans and de posited A
furnace may be placed under each helix, with e used under bor under the defecator, or a single furnace can ces, as one alone would answer, though in that case the spira channel of the one would have to be proportionately elonated. Various modifications of the helices, etc., are em braced by Mr. Guardiola's patent which also includes the in roduction of a box into the bridge of the furnace for the production of hot air, should it be required for any purpose A large quantity of the water contained in the juice is eva porated while it is passing through the helix, and the sirup which comes out is comparatively pure. It takes but a few minutes for its passage and proper evaporation, and it is stated that the yield is greater and the quality better than in any other apparatus used for the same purpose. A boy with a rag or brush keeps the skimmer clean, and that is all the attention that part of the process requires.
Further information may be obtained by addressing Mr. Guardiola, care of Ribon and Muñoz, 63 Pine street, New York, or care of J. C. Merrill \& Co., 204 California street, San Francisco, Cal.

## The Drive Well.

The Hutchinson (Kansas) News says that a novel but highly successful ex pedient has been adopted by Mr. Criley superintendent of construction of the Atchison, Topeka, an Santa Fé Railroad Company, for supplying his boarding trains and track layers with pure cold water. Providing himself with three drive wells, he placed one at the end o the track and the others alnng the line in advance, one mile apart. An experienced well driver was obtained in Hutchin son, and he contracted to take up, carry forward, and drive again two pumps per day, removing one after the morning' supply was obtained at the boarding train and carrying i forward one mile beyond the farthest pump. After dinner pump, this pump is carried forward again to the front; and thus the men are constantly and cheaply supplied with fresh water. Excepting a few miles of the line beyond Cow Creek, one hundred miles west of Hutchinson, where the road leaves the valley and cuts off a bend in the Arkansas, striking it at Fort Dodge again, the pumps can be driven all the way to the State line, a distance of 280 miles. What other railroad line in the world can boast of a similar advan tage, and where else is there so long a row of pumps?
the proper State officers, become a corporation, and are in vested with full authority to construct a railroad upon any oute they may select. This is giving full effect to the law competition; and loose as such a statute appears, it seem tates, ope after the other, have adopted it. It is claimed on behalf of this plan that the fear of competition is al ways before the eyes of railroad owners, who, therefore, are the more careful not to use their position so as too flagrantly to damage the interests of the public.
In any light that it is possible to view the subject, it will be seen that the American railroads have been a most profit ble investment. This might be abundantly established by citing the incidental advantages arising from them; the give an immense demand for labor-the uneducated labo

which usually emigrates in the greatest quantities; supply n immense carrying trade in materials and supplies; open a the wilderness for settlement, and thus attract population and all the concomitants of civilization; increase the value of property, and so by spreading taxation over a wider field lessen greatly its pressure upon individuals. By all these and many more considerations, it might be demonstrated be yond a doubt that these works give a handsome aggregate
though indirect return on their outlay. But it is not neces sary to prove by this class of arguments how profitable is the investment of three bundred millions in American rail ways. In 1871 , the 60,000 miles of lines earned $\$ 455,000,000$, or at the rate of $\$ 7,500$ per mile. Taking the estimated cost at $\$ 50,000$, we find that the lines earned a sum equal to 15 per cent per annum on their cost. If we assume the workpaid expenses to be 50 per ceat, num. But the financial prospect is even better than these figures indicate. Every year the traffic is rapidly increasing; in the decade from 1861 to 1871 the tunnage carried increased at no less a rate than 33 per cent per annum. And it is from tunnage that two thirds of the entire receipts are derived. After the figures that we have given above, it will scarcely be necessary to ask: What is the matter with the iron mar ket? Every car shop, rolling mill, and forge in the States is calling out for supplies which reach them too slowly to keep up with the demand. Russia is adding largely to her lines every year; France is replacing those lost by the war and building new ones. Canada's annual bill for railroad iron is beginning to assume considerable proportions; some other countries swell largely the demand, so that the question, "What is the matter with iron?" is pretty satisfactorily answered.

Recent Decisions by the Commissioner of Patents. Important decision in relation to the renewal of APPLICATIONS UNDER THE ACT OF JULY 8, 1870.-REJECTvived.

## Gordon.-Telegraph Wire.-Appeal.

Leggett, Commissioner:
This invention consists in inclosing a telegraph wire in a non-conducting covering formed of strands of fibrous material, saturated, if desired, with non-conducting substance,
the strands being "laid up," as in rope making, and the whole coated with gatta-percha, the objects being to strengthen and insulate the wire, and at the same time leave it flexible. The claims are first, the described method of insulating; second, the employment of fibrous strands "laid up"
to give longitudinal strength; and, third, in such a cable the give of gutta percha as an insulating substance.
the use of gutta percha as an insulating substance. Gordon, May 13, 1848, and was once rejected the same year In 1863, his administrator, the present applicant, filed an amended specification and claim, which was rejected by al the tribunals of the Office and finally, on appeal to Judge June 1,1866, for want of novelty. Under the act of July 8, 1870, the present application was filed, which has been twice rejected by the Principal Examiner upon references, and ap pealed to the board
A majority of the board take the ground that, so far as the Office is concerned, the question raised by the present appli cation is res adjudicata, and they affirm the decision of th
Primary Examiner pro forma, in order that, if the case is to be reconsidered at all, it may be by the tribunal which ren be reconsidered at all, it may be by the tribunal which ren
dered the final decision against it. The minority opinion is that the question presented on appead is a proper one for the board under the act of 1870, and it proceeds to consider the references and decides them insufficient. The majority of the board assume that the present claims are substantially those of the application of 1863 , rejected by
The argument of applicant denies that this case is res adjudicata, and asserts that it is a new case, and must stand upon its merits; that the strict rules of courts should not b
followed by the Office; but even if the followed by the Office; but even if they are, a subordinate tribunal may send a question a second time before an appel
late tribunal when an error has been committed, as in thi case. On the supposition that the present claims are subcase. Ontially those rejected on appeal, the references are reviewed to show that they are impertinent, and a brief review of the old law is submitted showing that the practice has been to rehear applications after rejection. The question for the Commissioner seems to be simply whether an application
filed and rejected in 1848 , renewed in 1863, and rejected fo want of novelty on appeal to the court in 1866 , can be re want of novelty on appeal to the court in 1866, can be reof 1870 ; and if not, then whether it should be rejected pro forma and allowed to go to the court. The Examiner as sumes the former, and the board, the latter.
The language of the act of 1870 is, that-

This language is broad. It places no limitation upon the signification ot the word "rejected, which makes it neces
sary or proper for the Commissioner to inquire when or at what stage of proceedings a rejection occurred, whether in or out of the Office.
All renewed applications are, in one sense, res adjudicata, and it was to reach adjudicated cases and provide a remedy the board in rejecting this application pro forma It is properly before the Office for action upon its merits, and should be so considered by the board.
The case is ordered to be returned to
The case is ordered to be returned to the board for such
examination.
coupling-Appeal from the decision of th principal examiner, who held that every element that enter into the construction of a device must be mentioned in the claim.
Overruled by the Acting Commissioner, Thatcher.
Hammond.-Sioaging Drop.-The applicant, in his appeal from the Primary Examiner to the Examiners.in Chief, introduces several important amendments to his claims. Held by the Acting Commissioner that rule 43 precludes al cept as provided by rule 31 .
McDougal थs. Eames and Seely.-Carbolic Compounds.-In terference.-Decision of the board of Examiners-in-Chief re versed and priority of invention awarded to Eames and See ly. In this case, Commissioner Leggett says: "McDougal's patent of 1867 , so far as it describes a soap, ought never to Eames and Seely, which was issued on the very day that

McDougal's application was filed. A little more care, upon the part of the Examiner at that time, would have saved the Office from a great amount of vexatious labor, and the parties from thousands of dollars of needless expense.
Butterfield.-Imitation button
Butterfield.-Imitation button and button hole for leather work.-Decision of the Primary Examiner overruled. Held by the Commissioner:-"A device which is cheaper and more durable, although its novel feature is for ornamentation, is substitute for an article both useful and ornamental."
McClellan.-Fare-box for cars.-Appeal from the Primary Examiner, who held that the words " or their equivalents" must be erased from the claim. Decision of the Examiner overruled by the Acting Commissioner, Thatcher.
Allen.-Tube Joint.-Extension.-Held by the Acting Com Allen.- Tube Joint.- Extension.-Held by the Acting Com-
missioner that any new matter found in the reissued speciimissioner that any new matter found in the reissued specif.
cation was improperly allowed, and must be stricken out becation was improperly allowed, a
fore an extension can be granted.
Corban.-Spring for watch cases.-Appeal.-The Board of Examiners-in-Chief being unable to perceive the novel and useful points in this case, Commissioner Leggett, on appeal comes to the rescue, points out the patentable features, re erses the decision of the Board, and orders a patent to issue Packer.-Hand Drill.-Extension.-Held by the Acting commissioner, Thatcher, that where a patent has been reis sued by the patentee, the application for extension must be made
tent.

## A New Steam Street Car

The Utica Herald gives the following accou
ial of a new steam street car at Hion, N. Y.
This car appeared at the first glance to differ not at al from the ordinary street car. Closer inspection revealed the fact that one platform was a trifle longer than the other, and
could not be gained from the inside of the car. In the space could not be gained from the inside of the car. In the space ordinarily used as a doorway stood the compact boiler and engine. All the machinery does not occupy more space than an ordinary, modern base-burning parlor stove of the larger size, and does not use one foot of passenger room. The en gineer stands upon the platform, occupying the place of the driver.
The engine, perfected by William Baxter and now in use at Ilion, is made on the principle of the English compound engine, in use an ocean steamers. It has two cylinders, and drives the car by direct crank connection without any inter mediate mechanism. The steam is admitted from the boiler the first cylinder, which is smaller than the other and which is, in fact, a " high pressure" cylinder. It escapes from his to a chamber formed by a jacket around the boiler, where is superheated, and then it is used in the larger cylinder As it finally escapes, it is reduced to about atmospheric pres-
sure. By this means the entire force of the heat is used, and ure. By this means the entire force of the heat is used, and
conomy of fuel as well as of space for the boiler is obtained The engine is arranged to consume its smoke, and with the low pressure of the exhaust both soot and noise are avoided. The engine, as ordinarily run, is a five horse power engine and will take a load of thirty or more passengers over a rea sonably level track at the rate of fifteen miles an hour, a east. The engineer can instantly and at pleasure throw the steam from the boiler directly into both cylinders, and give his engine, for the time, twenty-five horse power. It thus takes its load easily, and not without retarding its speed p grades of four hundred feet to the mile. It is, in fact, ve horse power engine, with power to increase its power ve times, without stop and without loss of speed. Having o gearing, cogs, or intermediate mechanism between the en ine and the crank of the drive wheel, there is comparative y no danger from disarrangement in that quarter. The
outer jacket of the boiler is shut in from the body of the car by a waoden screen through which no heat passes at any ime. The exhaust in the summer goes under the car. In the winter it is taken through the car by pipes, which give give moderate but equal temperature to the atmosphere Mr. Baxter has embodied in this engine another feature, by done away objections to reversing the engine are entrel stops the loaded car in eight feet. Going at the rate of twelve miles an hour, he stops in thirty-two feet. The great conomy in steam gives equal economy in fuel, so that coa consumed at the low rate of one tun to the thousand miles without trouble fres the car, all the windows can be opene othout to from dust. Smoke, there is none, there i raisss is under the car and left behind. When the car is in motion, the front windows can be opened, and a refreshing breeze is felt, with none of the ordinary discomforts.
About twenty persons started from Ilion on Saturday but before the ride was over, the number was more than doubled. The party rode first to Frankfort, dashing out of Hion at a lively rate; but slowing just as the car seemed in imminent danger of running into a horse car which it overtook. The engineer seemed to have perfect cuntrol of could have been done by horseflesh. The road from Frank fort to Ilion needs some leveling, and the curves especially eed attention, the outer and inner rails being often on evel; in some few places the inner rail was apparently the bowest. The real test came in going over the canal bridg by a grade of about eight feet in one hundred, and the im mediate approach to the bridge, each side, is by a very sharp bad curve.
It will be seen that the combined curve and grade made this a bad place, but we rode safely up the grade, around th
curves, and down again, and gaily away to Frankfort
return from Frankfort to Ilion was made at the rate of fif een miles an hour, in spite of rough roads, curves and grades. After reaching Ilion, the car was run over a track still rougher than the first, but without grades, to Mohawk and eturn.
During the afternoon, the car met or overtook in the road, at no place very wide, from fifty to one hundredhorses, with out an accident, so far as we learn.

## Refrigerator Cars.

The heat of the summer months does not prevent the shipment of Western produce to Eastern cities. The Blue Line ment of Western produce to Eastern cities. The Blue Line
Freight of the Michigan Central and Great Western Roads make a specialty of this class of traffic during the warm season, and guarantoe to deliver butter and fresh meat at East ern markets in as good condition as when received for ship ment here. They use refrigerator cars both of the Suther land and Davis patent. These are, without doubt, the best of the kind. The outside does not differ in appearance from other freight cars, with the exception of not having end windows and grated doors, and they are a little heavier. The Davis cars, which we examined, had been running about five years, almost exclusively in the beef trade. The floor is double, with heavy matched flooring; the sides are made airtight with a lining of zinc, which stands off six inches from them, this space being filled with ice and salt, the ice broken in pieces about the size of an egg; the doors are of the same thickness, are double, and open into the car; the space with in the doors is filled with charcoal and sawdust; an addition al door of plank is outside of this, and when the car is loaded al door of plank is outside of this, and when the car is loaded
the space between the two doors is filled with sawdust. Fastthe space between the two doors is filled with sawdust. Fast-
ened to the ceiling of the car with staples are iron rods, ened to the ceiling of the car with staples are iron rods,
about three quarters of an inch in diameter, placed about one about three quarters of an inch in diameter, placed aboutone by means of hooks. A car will carry about 120 beef quar ers, weighing in the aggregate from 16,000 to $20,000 \mathrm{lbs}$. A wooden rack extending about the sides of the car prevents the meat from swinging or resting against the zinc. The Davis car requires about four tuns of ice to render it a per fect ice box, and this is replenished at Detroit, Suspension Bridge, and Albany, and meat shipped in this manner brings the highest price in the Eastern markets.

The Sutherland car is built with packed sides of charcoal and other ingredients, to render it impervious to atmospheric influences. The casing is about six inches thick, and the in terior lining is of zinc, the same as the Davis car; the ice is placed in a rack at each end of the car, and above the racks are openings in the roof to replenish the ice; a door dreps rom the roof of the car to the edge of the rack, which serve to retain the ice in its place; a conduit pipe carries off the water, none of which is allowed to stand on the floor. A rack will hold one tun and a half of ice, or three tuns to the carone tun less than is required by the Davis method, and with out the extra trouble of breaking it into small pieces. The Sutherland car shown to us was used for shipping butter The kegs and firkins are piled up two thirds the hight of the car, between the racks; the doors are closed in the same man ner as in the Davis cars, and the ice is replenished at the same points.
Judging from the quantity shipped East, we are justified in supposing that "Western grease"-which the Eastern dames are pleased sometimes to call our butter, as they peer at it over their specs and punch it with a parasol-is far mor palatable than was supposed, and it now finds an apprecia ive market. In the freight depol, foot of Lake street, a long room is partitioned off; the space, four feet wide, between he outer brick wall and the interior board lining, is filled with ice; inside the room the butter kegs and firkins are piled up, and as soon as a car load has accumulated it is at nce loaded and started eastward. The additional expense of unning a refrigərator car from Chicago to Buston is abou $\$ 30$, and rates are the same as with ordinary freight cars the shipper runs no risk; if his goods are in perfect condition when loaded, he can rely on finding them so when unoaded. And in regard to beef, he pays rates on that which is clear profit to him, without the extra freight on horns hide, and hoofs, when live cattle are shipped.-Chicago Rail, way Reviero.

THE great globe which we inherit is itself a magnet. On he one side of the magnetic equator, the north end of the needle dips; on the other side, the south end dips, the dip varging from nothing to ninety degrees. If we go to the quatorial regions of the earth with a suitably suspended needle, we shall find there the position of the needle to be horizontal. If we sail north, one end of the needle dips; if we sail south, the opposite end dips; and over the north o south terrestrial magnetic pole the needle sets vertical. The south magnetic pole has not yet been found, but Sir James Ross discovered the north magnetic pole on the 1st of June 1831.-FFaraday.

The Nassau Gas Light Company is the title of a new cor poration in Brooklyn, N. Y., for the supply of street gas. Its works are quite extensive. The gasometer is located at the corner of Keap street and Myrtle avenue. It will have a ca pacity of 385,000 cubic feet, adequate in all respects to receive and discharge the one million of cubic feet to be daily manufactured. The dimensions are: elevation 50 feet and diameter 104 feet. The retort and purifying house will be equal to the production of $2,000,000$ cubic feet per day.

Writing Ink.-Adding a solution of yellow prussiate of potash, to any ordinary black ink, renders it incapable of being removed or altered. Oxalic and other acids convert it into Prussian blue.

## How felt hats are made

There is a legend among the hatters that felt was invented by no less a personage than Saint Clement, the patron saint of their trade. Wishing to make a pilgrimage to the holy sepulcher, and at the same time to do penanco for sundry unexpiated peccadilloes, the pious monk started on his journey afoot. As to whether he was afflicted with corns or kindred miseries, the ancient chronicle from which this information is derived is silent; but, at all events, a few days successive tramping soon began to blister his feet. In order to obtain relief, it occurred to him to line his shoes with the fur of a rabbit. This he did, and, on arriving at his destination, was surprised to find that the warmth and moisture of his feet had worked the soft hair into a cloch-like mass. The idea thus suggested he elaborated in the solitude of his cell, and finally, there being no patent laws in existence in those days, he gratuitously presented to his fell
his genius in the shape of a felt hat
The fur principally used at present in the manufacture of felt hats is that of the Russia hare or "coney." Hunting this animal is a favorite winter sport among the Russians, who pursue their game on horseback, killing it with a single blow of their long whips. Three kinds of the fur are known in commerce, termed back, belly, and side Russia, the latter be ing the finest.
The first process the fur undergoes is "carroting," which consists in applying to it a solution of mercury and arua for tis, the object being to render its felting easier. The skins are then hung in a hot room until dry, when the fur is removed, sorted into the qualities before mentioned, and finally made up in bundles and sold by the pound, the price varying from about $\$ 1.50$ to $\$ 5.00$.
The fur, as it is taken from the bundles, is mixed, and fine carded cotton added in the proportion of $\frac{1}{\frac{3}{2}} \mathrm{oz}$. to $\frac{1}{2}$ oz. of cot ton to 4 or 5 oz. of fur, that being the usual quantity required for a single hat. This-mixing is done by a picking machine into which the material is fed. It is then immediately seized
by a toothed picker which revolves with great velocity, creaby a toothed picker which revolves with great velocity, crea-
ting a strong current of air, thus agitating the fur and cotton in the top of the box above the machine. This process is re peated by the misture falling on an endless belt which con ducts it to another picker.
The "stock," as it is now termed, is next passed through a machine which contains a number of rollers on which are short metal teeth. There is an opening of about an inch in width before each roller, and one at each end. The fur being carried to the rollers, on a broad belt, is subjected to their action, by which the coarse material and impurities are made to fall through openings in the bottom into boxes underneath, while the finer portions are forced to the top of the machine and out at its further extremity. The stock, which in technical parlance is now said to be "blown," is next weighed into quantities sufficient to form the desired number of hats of similar weight. It is then spread upon a broad
belt and passed into the forming machine, an apparatus made belt and passed into the forming machine, an apparat
of boiler iron and resembling a snow plow in shape.
of boiler iron and resembling a snow plow in shape.
A quantity just sufficient for one hat body is placed on the feeding apron of this machine. It is drawn in, between two horizontal feeding rollers covered with felt, and immediately seized by a cylinder which revolves about 3,000 times in a minute, and which is furnished with several longitudinal
lines of stiff brushes. This generates a current of air which lines of stiff brushes. This generates a current of air which scatters the stock and blows it out of a vertical slot in the
apex of the machine. The thin stream thus ejected strikes against a revolving copper cone which is thickly perforated with holes. A current of air, caused by an exhausting fan revolving with immense velocity under the cone, creates a saction which draws the fur closely to its surface. When the stock in the machine is exhausted, a wet cloth is placed over the cone, a metallic cover slipped over that, and the whole plunged in a tank of hot water. The mat is now re-
moved from the cone, as the felting has begun to take place. This, as our readers are probably aware, is due to the fact that all fur is barbed, from root to point. As the hairs are thrown on the cone in every possible direction, they become interlaced, so that by warmth, proper moisture, and manipu lation, they may be made into a firm close fabric.
Each body is first inspected in order to detect thin spots, which are strengthened by causing small portions of stock to adhere by the aid of hot water; then it is gently worked and rolled in a piece of blanket, and finally packed in the bale twenty-four dozen at a time. It is in this condition that the body reaches the hatter, who sends it to the sizers. The sizingkettle or "battery" is constructed of copper, and, in large establishments, heated by steam. Around its edge are ar ranged eight planks, one for each workman. These planks are some ten feet long and eighteen inches wide, and are
sloped at an angle to the kettle, to the edge of which they are fastened. The principal tool of the operator is a rolling pin some eighteen inches long, pointed at both ends and marked with rings for measuring. His hands are protected by "gloves" or thick pieces of sole leather covering the palms. Taking two or three bodies at a time, he plunges them into the boiling water, and then kneads them until a aufficient shrinkage in their dimensions takes place. Then he takes a single body and rolls it with his pin until it assumes the proper size, form, and consistency, and then, af ter allowing it to dry, pares off all its inequalities with a large sharp knife, made especially for the purpose.
Stiffening is the next process. The material is gum shel lac, dissolved in boiling water by the aid of alkalies. Across the top of the tub in which it is contained are two rollers turned by a crank and pressed by the action of a weight closely together. The body, after being dipped to the depth of the brim, is passed quickly through the rollers; then it is
refolded, the brim again dipped, again passed through, and this process is repeated several times. The crown of the hat is not dipped, as it gathers sufficient stiffening from that adhering to the rollers. When dry, the body has little readhering to the rollers. When dry, the body has little re-
semblance to a hat. In fact, it t 'is simply a wide mouthed semblance to a hat. In fact, it' is simply a wide mouthed
bag, with a small rounded end and stiff edges. It is necesbag, with a small rounded end and stiff edges. It is neces-
sary, therefore, to begin to moli it into shape. A workman, termed a " blocker," is furnished with hat blocks and a trencher or small copper plate, four inches long and three inches wide, pierced with a hole in the center large enough to admit the thumb. After soaking the body in boiling water until it is soft and pliable, the operator places it upon a block and shapes it with his trencher, continually pouring hot water over it to keep it in proper condition.
The hat thus roughly modeled is now ready for coloring If it is to be black, it is soaked in a dye of logwood, verdi gris and copperas. It is not left permanently in the kettle but is removed from time to time and suspended in the air the effect being to deepen the color. This process occupies about twelve hours. The fancy colored dyes are prepared with mordants. Washing follows, and then the hat is re blocked and its size determined and indicated by notches made in the edge of the brim. Pounding or rubbing the sur face smooth with fine pumice is generally done by hand then the hat is ready for the finisher.
Each hat bsing placed upon its proper block and kept in position by a fine though strong cord, its surface is wetted and a hot iron drawn around it in the direction in which the nap is to be. Then the brim is trimmed to proper shape and curled according to the fashion. The lining is put in by girls, and finally the hat is ironed, packed in a nest of half a dózen in paper bandboses, and thus supplied t.J the retail trade.

## adUlteration of chemicals.

Acetic acid is frequently weakened with water and adul terated with sulphuric ether. Six samples tested with chlo ride of barium gave a precipitate of sulphate of barium in varying proportions.
Muriatic acid and sulphuric acid, sold as chemically pure, have both been found contaminated; the former with arsenious and sulphurous acids, the latter with a large proportion of sulphate of lead.
Tartaric acid has been met with containing 50 per cent of sulphate of magnesia. Alum is also said to be used as an dulterant, but the reporter had not met with a specimen.
Alum frequently contains iron, probably arising from care lessness in the manufacture. The presence of free acid has also been noticed, especially in the Eaglish article.
Carbonate of ammonia is sometimes substituted by a compound made from solution of ammonia, glue, and bicarbon ate of soda, which forms when dry a hard translucent mass, esembling genuine carbonate.
Muriate of ammonia is sometimes met with of very poo quality; iron is often visible on the surface and becomes stil more so when dissolved. The report recommends that the purified granular salt should be the only one sold at the disensing counter.
Black sulphuret of antimony has been met with contain ing sulphite of lead (galena), quartz (30 to 40 per cent), clay etc. A good article, however, is procurable.
Powdered arsenic is sometimes adulterated with sulphate of lime or sulphate of baryta; the pharmacist is, therefore, rommended to purchase the lump arsenious acid.
Bismuth (metal) generally contains arsenic. An instance is mentioned in the report where 400 lbs of antimony wer ld by artan for the latter, he detected the error before the transaction was completed.
Subnitrate of bismuth has been reported as adulterated with 20 per cent of phosphate of lime; but it is believed that the salt made in the United States by the principal man facturers is free from adulteration.
Citrate of iron and quinine is seldom found made strictly coording to the United States formula, which does not pro duce a sufficiently soluble salt. Some manufacturers,therefore add citrate of ammonia to make it soluble, and others leave out a considerable portion of the quinine to accomplish the same end. There is also a probability that in some cases cincho nine is substituted for the quinine.
Chloral hydrate has been met with containing the alcohol. ate. The tests pointed out are the difference in boiling point, sulphuric acid, which leaves pure hydrate colorless but sulphuric acia, which leaves pure hydrate coloress but
urns alcoholate brown, and nitric acid, which gives little or no reaction with hydrate, but reacts violently with alcohol te, giving off nitrous oxide gas.
Chloride of calcium has been noticed at Chicago with a arge excess of caustic lime, and it is known to have been sold in crystals without any allowance made.
Chloroform is sometimes met with diluted with alcohol and sometimes not sufficiently purified, and, therefore, unfit for inhalation. There is also reason to believe that partially decomposed chloroform has been sold through ignorance on ectirt of the spenser. Nitrate of silver is useful in de ecting this decomposition, by giving a precipitate of chloride of silver with the liberated chlorine.
Cream of tartar is grossly adulterated, and the distinctive erms are said to be well known to mean varying proportions f terra alba and cream of tartar
Epsom salt has been substituted in the Western market by inely crystallized Glauber's salt. As the prices, however Ether is sometimes sold contat likely to recur.
Ether is sometimes sold containing a large proportion of alcohol. This may probably arise from the druggist dispensing photographic concentrated ether, made to contain al
cohol in order to dissolve the gun cotton. cohol in order to dissolve the gun cotton.

Iodoform has been noticed of a light canary color, a con iodoform has been noticed of a light canary color, a con of lime.

Acctate of lead has been in the market containing a large percentage of crystaliz: d nitrate of lead; one lot was of fered to a maker of preparations for the hair as "damaged, hich proved to be damaged sulphate of zinc, in lumps
Precipitated carbonate of lime has been offered containing ufficient iron to give it a light fawn color; supposed to ba rdinary chalk, dressed.
Sulphate of morphia is frequently open to suspicion. In ne case the sample did not contain any morphia: placed on a red hot plate, it did not seem to lose any weight, and it was insolubte in water. A fraud in which sulphate of quinine was put into sulphate of morphia bottles las been lately de ected in New York.
Phosphorus, according to Dr. Rademaker, sometimes con ains arsenic.
Bromide of potassium has been observed to contain a con siderable quantity of water of hydration.
Iodide of potassium is often adulterated with the bromide some made in New York was found to contain carbonates in considerable quantity.
Sulphate of quinine has many adulterants, among them sulphate of lime; cinchonine, sold as "sweet quinise" or a " cinchoquinine;", muriate of cinchonine, sold as " light sul hate of quinine" and as "French quinine," salicine, tte. Rochelle salt has been offered for salt containing at least percent of sulphate of soda.
Santonine was seen last year, in the New York market contaminated with small particles of mica. This fraud may easily be detected by placing the suspected sample on a hot plate ; the santonine will disappear and leave the mica.
Nitrate of silver (made for the Government), which con tained five per cent of coprer, was sold in Chicago. Pieces could be picked out emerald green in color; it appeared to could be picked out emerald green in color; other alloy of have been made by simply dissolving coin or other alloy of
silver in nitric acid, and crystallizing without any aitempt at silver in nitr
purification.
Precipitated sulphur is reported as usually free from sul phate of lime, and the United States pharmacist is congratuated on this superiority to the English article, but a propor tion of 50 per cent of gypsum in flowers of sulphur is re ported as having been noticed, and sometimes ground sul phur is sold for the sublimed.
Tartar emetic has been met with containing 11 per cent of cream of tartar.
Spices, on account of their widely extendead use, are large ly adulterated, and some startling revelations might be wade if a spice miller could be persuaded to disgorge his ill-goten knowledge. The only safe way to get pure powdered drugs is to pay a good price, and buy from conscientious percens who are above suspicion.
Cochineal is adulterated with sulphate of barytes, a heavy hite powder, which, when shaken with the insects, lodge in the wrinkles and crevices on the surface of the body. Th weight is thus increased sometimes from 15 to 25 per cent. Balsam of copaiba is often mixed, and sometimes found entirely fictitious, being composed of a mixture of castor oil rasin, and oil of copaiba. Powdered ipecacuanha is some imes so adulterated and weakened that tartar emetic is nec essary to strengthen it. Oil of lemon mixed with 30 per cent of fixed oil has been met with.
Powdered opium is often mised with powdered extract of iquorice. In fact, some dealers uniformly send to the grind ers a certain proportion of liquorice with the opium, so that they might be ground together. Powdered rhubarb is fre quently adulterated with curcuma. Sometimes seniega root is mixed with cypripedium.
Castile soap frequently contains an undue proportion of water. It has been met with containing as much as 30 per per cent. Acetic acid is also mixed with water, acidulated with dilute sulphuric acid.
Subnitrate of bismuth has been found mised with phos phate of lime to the extent of 20 per cent; and citrate of iron and quinine is adulterated with citrate of ammonia, and contains less quinine than called for, 10 or 15 per cent intead of 25 per cent. Quinine itself is frequently met with mised with cinctiona, muriate of cinchona, and saliciee.
Santonine has been found adulterated with small particles of mica, and cream of tartar frequently mised with tartar metic. Cream of tartar is grossly adulterated; the terms "strictly pure, pure No. 1 and No. 2,' being used to indicate arying proportions of cream of tartar and terra alba, the atter material being largely imported from Europe for the express purpose of adulterating, the importations amount ng to many tuns annually.
Chloroform is sometimes diluted with alcohol, and iodide of potash in crystals mixed with bromide, and occasionally with bicarbonate of potash. Solid estracts are also much adulterated.
In the manufacture of sirup, a considerable portion of the sugar is replaced by glucose, especially in making fruit sirups.-Proceedings of the American Pharmaceutical Asso ciation.

Whether we see rightly or wrogly, whether cur intellection be real or imaginary, it is of the utmost importance in science to aim at perfect clearness in the description of all that comes, or seems to come, within the range of the intellect. For, if we are right, clearness of utterance forwards he cause of right; while, if we are wrong, it ensures the speedy correction of error.-Tyndall.

Never use a hard word when an easy one will answer as

## direct-acting steam engine

The invention which forms the subject of this article is applicable to that class of steam engines known as directacting, and the improvements consist in a peculiar form of steam valve and piston, which is packed tight enough by steam pressure to prevent leakage, and is yet sufficiently relieved from the same to insure ease in running and certainty in action. It is, at the same time, of simple construction, is easily accessible for repairs, and admits of accurate adjust ment.
Fig. 1 is a central longitudinal section, and Fig. 2 is an end view, with the end of the valve chest removed. The steam valve is shown at $a$. Its bottom sides operate the poris of the cylinder by conneeting each, alternately, with the steam in the chest and with the exhaust passage, the latter being effected by means of the vertical passage through the valve, as shown, and their connections. In the center of the valve, $a$, is a chamber, the two ends of which are shown at $b$ and $c$. In this chamber is placed the ex haust port, $d$, the passage up the center of which forms a communication between the main exhaust and the exhaust passage in the plate, $e$. The exhaust port, $d$, fits the sides of the the chamber, $b c$, and is the same hight as valve $a$, so that when the plate, $e$, is in place, the $t$ wo parts of the chamber, $b$ and $c$, may be alter nately filled wi hand exhausted of steam by means of the supplemental valve, $f$. The valve $a$, and the exhaust port, $d$, are ground to fit the top of the cylinder and the plate, $e$, and all the parts are then accurately adjusted by means of the screws which may be seen pass ing through the ends of the valve chest in Fig. 1. The ends of the plate are beveled and the screws have their bearings in the center of the bevele, thus allowing the plate to
move sufficiently to make the acjustment, notwithstanding ordinary imperfections in the construction of the parts. The ports of the supplemental valve, $f$, pass through the plate. The various passages for steam and exhaust cannot be shown in full detail in the engravings, but their course will be readily understood from the following description of the operation of the engine, taken in connection therewith.
In Fig. 1, the piston is supposed to have finished its stroke to the left, and to have carried the valve $f$, into the position shown; under which conditions steam is admitted through a port in the plate, $e$, into the end of the chamber, $c$, and at the same time steam from the other end of the chamber, $b$, is permitted to escape, by means of passages through the plates and the cavity, shown in the valve, $f$, to the main exhaust port. The effect of the foregoing is to force the chambered valve, $a$, to the right, and thereby to connect the right hand cylinder port (through the passages in the valve and plate) with the exhaust port, $d$; at the same time and by the same "motion of the valve, $a$, the left hand cylinder port is opened to the steam chest, and a reversal of the engine is effected.
The improvements were patented June 4, 1872, and fur ther information may be obtained of the inventors, H. A Benson and William Avery, of Warren, Mass.

## Cutaneous Absorption of Poisons

In a recent note to the Paris Academy, M. Bernard describes a series of experiments for the purpose of testivg the degree of cutaneous absorption which took place in a bath impreg nated with the substances to be tested. Every precaution was taken to prevent the possibility of the substances enter ing the ssstem of the patient by any avenue except the skin He was then submitted for a short time to steam vapo charged with iodide of potassium, and two or three hours af terwards the urine gave unmistakable evidence that the iodide had been ab.orbed and was passing through the system.
In these experiments the medicinal agent reached the skin in hot aqueous vapor, and therefore acted more readily than an ordinary cold solution; but the fact of cutaneous absorp. tion was very definitely illustrated. M. Bernard adds:
" M. Colin has dercribed an experiment in which he al lowed water charged with cyanide of potassium to fall for five hours on a hore's back. This caused the death of the animal; the sebacius (fatty) matter baving been destroyed through percussion, and cataneous absorption taking place

The Scudy of Nature as a Means of Intellectual Development
Some affirm that the study of natural science is fatal to the development of our higher emotions, and teads towards gross utilitarianism. But who can stuty the harmony exist ing in the works of Nature, the manifest order and de..1ga displayed in enaless chauges and variety, and the immutable laws which govera the physical world, without haviag bis thoushrs and a piraions lifted to Him who innabiterh eter nity, the Al sha and Onaga? "The heavens declare the glory of Gos! Diy uaco day uttereth speech, nisht unto nigho showeth knowled fe!"

Astronomy writes, in the motions of the stars, poetry more glowing than human pen ever produced. Botany leads us among the flowers, the most unpretending of which is arrayed in glory greater tilan that of Solomon and teaches Divine goodness and love to every thoughtful observer. Chemistry, unfolaing to us wonderful and mysterious changes, excites not only emotions of beauty but of sublimity. And what shall we kay of that marvellous agent, vital force, which
still eludes the analysis of the latest science? In autumn it withdraws its power and all Nature is clad in the habiliment of decay and death. In the spring time, with magic hand, $i$ robes the earth in living beauty.
Adding, to a thorough knowledge of any one science which night be chosen as a particular field for research and study, a knowledge of the most important principles of the others we have sufficient matter for the development of the mosi usceptible and retentive memory.
By constantly observing facts, drawing conclusions from them, and verifying these conclusions by observation or ex periment, we form the habit of correct reasoning, and thu gain the aame kind of discipline which geometry or any

Fig. 1

bat at present there are only two oil pits existing, and on of these is of very recent date. In fact the whole affair is in its infancy, but is most likely destined to undergo very grea extension, so as to become of considerable importance. The its are sunk in the ordinary way, and the seams of sand ar worked by means of galleries, in a manner similar to that of etting coal. As the workmen cut their way through the ompacted sand, the oil oozes out of it, running down th walls of the gallery on to the floor, where it accumulates in hallow wells dug for the purpose. From these wells th rude petroleum is conveyed to the surface to be properl reated. But this process of draining does not remove a the oil, and the sand itself is accordingly taken to the surfac to bedistilled in retorts. The crude oil which oozes from the sides of the gallery, and tha which is distilled from the sand, are subse quently rectified by a further distillatory pro cess, and the product is understood to be in no degree inferior to the best American petroleum. In working the existing pits, it is a singular fact that no water is met with Of the extent to which the petroliferou sand pravails, it would be premature at pres ent to judge, but there seems no reason to doubt its presence over a considerable range of ground. Now that attention has been drawn to the subject, we may expect furthe discoveries will be made. It is reported that Mr . Keates, the well known analytical chem ist, has recently visited the oil produting dis trict in Alsace, and examined the works. So far as we can learn, there is every prospec of the oil proving abundant. The cost of produciion, it would seem, is so moderat that the competition of American oil need not be feared, and the demand is such tha Alsaca will consume all she raises such that time to come, unless the produce is very largely increased.

## dnson \& avery's direct-acting steam engine.

other abstract science affords. Nor is discipline alone the re sult of the study of Nature as is often the case in absolute sciences. Nature rewards her students not only with discip line but with knowledge the most practical, pleasurable and profitable.-Rhode Island Schoo!master.

## BLACESMITH'S BUTTERIS.

We illustrate in the annexed cut John H. Rhamy's im roved butteris, patented June 11; 1872, which appears to b very good tool for the purpose intended.
It is constructed of three levers which are combined, in the manner shown in the engraving, so as to obtain considerable power in the jaws of the implement. The jaw on the left i provided at its end with a steel paring knife, and the right hand one forms an anvil block and projects considerably be yond the fronc of the knife.


In practice, the projecting por tion of the right hand jaw i made to restagainst th horse's hoof, and the paring knife ; put in operation by compress ing the handies of the levers. as the knife approaches th lock, it pares off the hoof and lso cuts off the nails therein thereby performing the doubl duty of butteris and pincers.
On the left of the tool is shown a thumb screw, whic passes through the arm of on ever and presses against the one immediately opposed to it By adjusting this thumb screw he distance between the jaws is regulated and the blade of the paring knife prevented
striking the face of the anvil striking the face of the anvil
block and thereby becoming dulled. The latter is prefera bly made of copper or othe soft metal.
The increased leverage obtained in the arrangement as to makeit in render in action of the tool so sure and easy factured by J. H. Rhamy and C. W. O'N $\quad$ al, at Findlay, Han cock county, Ohio, of whom further information may be ob tained.

## Pecroleum in Alsace.

The value of Alsace to $G$ romeny and the consequant ex tent of the loss to France, comm rcially considered, are alike enharced by the probable development of a large petroleum industry in that celebrated provinc $ヶ$. Od works on a sinall scale already extot in the vallny of th $\rightarrow$ Riacen artue vilag of Scnwatwiller, within and oa the b ord $\rightarrow$ rs of the foress of Higeaau. A thick alluvial depo it has tirst to be penetrated brneach which ars alteroating strata of indurated clay and micaceous sundstone, with seam; of compacted sund. These last named seams co atain the petroleum, and are found at a depth of seventy or eighty yards. Indications of the presence
of petroleum are observable in various parts of the forest. of petroleum are observable in various parts of the forest
and bitumen is found and worked in the adjacent country. Borings to test the presence of the petroliferous sand have been multiplied to some extent, and in all cases with satis factory results. The mode of working very much rasembles that of a colliery, only on a mach smaller scale. We believe

It has been said that petroleum, as found in different part of the world, is not confined to any particular stratum, and that consequently there is no such thing as a "petroleum rock," properly so called. Petroleum has been found in rock of all ages, from the lower silurian to the tertiary period in clusive. The oil wells of the United States are for the mos part sunk in the sandstones which form the summit of th Devonian series. The oil of Alsace, it will be observed, is limited to certain seams of compacted sand, and it would appear that in this region the oil is found solely in these seam It is a general theory, with regard to the origin of petroleum that it has been produced by the slow distillation, at low temperatures, of coal and other bituminous minerals. The theory would seem to accord with the fact, already named, that bitumen in various forms is found in the country bor dering on the oil region of Alsace. Further explorations in this territory may lead to still more important discoveries, and the commercial importance of the inquiry is one guaran tee that it will not be neglected-Engineer.

## American Bismuth

Bismuth is one of the rare metals, having many useful ap plications in the arts, which have been hitherto restricted to but few localities, principally in Saxony and Bohemia, in the Erzgebirge range of mountains. These mines have become o nearly exhausted that, even with no increase in the de mand, a growing scarcity has been felt. It is said that dis coveries of native bispmuth have been made in Utah, in the town of Beaver, about two hundred miles south of Salt Lake City; and if the accounts which have been given of the existence of the ore are reliable, they are destined to attract no mmall sbare of attention. The deposit is said to be very ex tensive, and a well defined lode seven feet in thickness is re ported to have been traced for a distance of more than twelve hundred feet. If thes : assertions be true, this discovery is a matter of great importance. The metallurgical treatment of the native bismuth is very simple. According to Makins, the ores are placed in tubular iron retorts arranged in a horizon ores are placed in tubular iron retorts arranged in a horizon-
tal row, slightly inclined from the upper to the lower end. tal row, slightly inclined from the upper to the lower end.
Heat is applied to the exterior of the retorts, when, in a few Heat is applied to the exterior of the retorts, when, in a few
minutes, the metal begins to flow. A small rake is thrust into the end of the retort, and the heated are stirred, which promotes a more rapid flow of the molten metal, which runs nto iron diehes, where it is protected from the oxid zing in fluence of the air by a covering of powd $\because$ red charcoal. In this manner a charge of a series of retorts, hold ng fiftys six pounds each, may be worked off in less than an hour. When no more metal runs off, the siliceous matrix is raked out of the upprr end and allowed to drop into water, when the re torts are recharged and the upera ion continued.

## Bolter Explosivias in Eetritam.

M. Ribert Viuçocte, a B flgian enyıauer. recancly read a pa par before the L èro Association of Elpine trs, iu waich he staces that there are in $B \rightarrow l$ gian ab hat $11,0 J j$ stoxm bollers ad that taere is an expl)siou ot 1 oat of every 1.274 boiltrs anauilly. In Eiglad thore is annatly 1 exiloston our of every 2,000 boilors. Ia B-lgiau five out ot every six explosions are du* to the fact that the boilers have bocome too woak to resist the regulation pressure, and the sisth is attributable to the excess, ove: the proper pressure caused by the negligance of those in charge or the inefficient state of the safety apparatus or the gages.

A LIVE turtle, lately found on Long Island, had inscribed uson its shell "S. H. Rogers, 1801." It is therefore sup posed to have lived more than three score gearsand ten.


NEW YORK CITY.-THE CONTEMPLATED IMPROVEMENTS ON THE RIVER FRONT-PERSPECTIVE VIEW SHOWING THE NEW SYSTEM OF PIERS AND BULKHEADS.


SKETCHES SHOWING THE FUTURE PIERS AND BULKHEADS.-[See next page].
the new water front, new yort city.

## [See Engravings on page 115.]

General McCleilian has submitted his report upon the pro posed new system of wharves and piers, and the Dock Commissioners iave fied a demand with the City Comptroller for $\$ 1,500.000$, wherewith to begin the work. With his own world wide experience, and with the efficient aid of General A. A. Humphreys and General Q. A. Gilmore, he has elabo rated a system of improvements which will place New York city very far in the lead of all other American ports, and on a par with the grandest and oldest port cities of Europe. General McClellan shows that our metropolis is unrivaled in its position as a great maritime and commercial mart, having far greater natural advantages thau either London or Liver pool as a seaport. These latier ports both suffer from a contracted river front and from the great daily variations of the tide, while New York has a total available water front of $24 \frac{3}{4}$ miles. With these facts in view, he comos $t$ ) the conclusion that the London system of eaclosed docks-necessary there on account of the rapid and great tide variations-is not only unnecessary here, but would be expensive and pernicious. He therefore discards that system, and proposes a solid river
wall, widening the river side avenu9 200 feet on the East wall, widening the river side avenua 200 feet on the East
river aud 250 on the Hudson, with piers of bêton (artificial stone) or masonry projecting therefrom at the requisite dis tances from each other. Outlets at the pier heads will be made sufincient for sewerage purposes. In brief, the general eystem proposed is thus summed up by General McClellan himself:
First. To construct a permanent river wall of béton and masoury, or of masonry alone, so far outside of the existing bulkhead as to give a river street 250 feet wide along the North river, 200 feet wide on the East river, from the Battery to Thirty.first street, and 175 feet wide north of that point.

Second. ${ }^{\text {Th }}$ To baild piers projecting from the river wall of ample dimensions, adequate construction, and, so far as possible, affording an unobstructed passage for the water.
Thitd. Whenever it is necessary, to cover these piers with substantial sheds suitable to the requirements of each case.
As regards the expense, the report says that dock facilities equal to those in Liverpool can be obtained, under the ar raxgement proposed, at a cost incomparably less than that of those superb constructions. The General's conception in cludes an elevated railway, forming an enceinte around the river front. The possibility of such a road has long been regarded at once as one of the greatest advantages which a reconstructed whariage system could offer, and one of the strongest reasons for undertaking it.
Commencing on both sides of the Battery, the first object is to increase the depth of water at the bulk heads. To effect this, as the work progresses, West street, fronting the North xiver, will be widened, by filling in and advancing the present line of bulk heads, until the street, from the warehouses to the shore line, has a width of 250 feet from the Battery to Eleventh sireet
From the foot of West Eleventh street, going northward, the position of the channel will not permit of increasing the widith of the river street until a short distance south of Twenty third street, where the widening will again begin and be continued to Fifty-ninth street, far enough, it is supposed, to provide for all the requirements of the commerce of the port for many years to come.
Along South street, fronting the East river, from the Bat tery to Gouverneur street, it will be 200 feet wide, thence, around Corlear's Hook to Grand street, 175 feet wide. Along this new shore line will be constructed a bulkhead of the general pattern shown in our artist's sketches. The soundings aud surveys made by the engineer corps develop the fact that overiying the bed of the river the depth of mud
varies from 8 feet near the Battery to 20 feet at pier 15, North river, and increases so rapidly that, in the vicinity of the gas houses, the depth is nearly 60 feet.
The engrasiogs represent, in perspective, in elevation and profile, the alteration in the wharfage of New York. Our principal perfpective view shows, in a telling manner, the extension of the piers into the water (represented at low tide in order to display as much as possible of the system) and the liberal boulevard gained to the city by the widening of the external avenue. The façade views of a pier and a bulkhead display the style of architecture contemplated. The profile of a pier exhibits the combined lightness and strength of the construction, and the free ingress and egress of the tide. A diag ram displays, with the utmost effect, the ground gained by pushing out the wharfage to a more distant limit.
The commencement of operations near the Battery will be Whe commencement of operations near the Battery will be
anxionsiy looked for, and the progress of the work will meet anxionsiy looked for, and the progress of the work will meet
with hearty coöperation from the mercantile community of New York, who see in this great plan of operations the one practical method of aiding to restore to this city its wander ing mercbant marine.
We are indebted to Frank Leslie's Illustrated Newspaper for the view and description of these important works.

Cabmen's Rests.-At Birmingham, England, the first of a series of movable waiting rooms for the use of cab drivers while waiting for hire has been presented by the Local Town Mission to the men on the rank near the Town Hall. Th structure, wbich is of oval shape and mounted upon small wheels, is of stained wood and glass, and contains sitting ac commodation for about a dozen men. It is furnished with a coke stove, at the door of which mat can be cooked in a Dutch oven, a bciler, and a locker for food. The current expenses of maintenance and cleaning will be defrayed by a small subscription among the men using the box.

## C゚arespundemte.

The Editors
spondenis.
The Influence of Forests and General Vegetation upon Rain Falls and climate.
To the Editor of the Scientific. American
Having for many years noticed in a dry season, in summer, where there was no dew on the open fields before sun rise that, in entering a wood or a grove, the leaves of the trees shrubs, and weeds were covered with moisture, and, also that the thermometer ranged higher on the open land than it did amongst the trees, etc., I was induced to try the follow ing experiments:

1. I took a small orange tree which was growing in a glazed flower pot-gave it two coats of shellac outside-sealed the hole at the bottom, and covered the earth on the top with a thin cake of putty, so as to prevent any moisture escaping therefrom.
2. I made a bell receiver with blotting paper, large enough to cover the tree without touching its leaves, and long enough to reach within two inches of the bottom of the pot on the outside, dried it by the fire and weighed it correctly.
3. I made another bell receiver larger than No. 2 and long enough to reach within half an inch of the bottom of the flower pot on the outside, and then placed it over the smalle one, No. 2. This one was well covered with shellac on both one,
sides.
4. B
5. Before I sealed the top of the pot with putty, I set it on a tin roof in the sun from $6 \mathrm{~A} . \mathrm{M}$. to $6 \mathrm{P} . \mathrm{M}$. so as to dry the earth in it
6. I now recorded the weight correctly and then added 8 ounces of well water to the earth in the pot, placed it on ounces of well water to the earth in the pot, placed it on
a plate of glass, and set it on a table in my workshop; the hygrometer then indicated but little moisture in the building, as the wind was north west. I then suspended over it the bell receiver of blotting paper; and, then over this one, I placed the shellac-covered receiver, and suspended both with
a silk cord from the ceiling, leaving a clear space of two a silk cord from the ceiling, leaving a clear space of two
inches between the two receivers. The inside receiver came within two inches and the outside within half an inch from the bottom of the flower pot on the outside. I suspended a thermometer in the center of the orange tree under the receivers, and one of the same make was suspended with silk cord from the ceiling of the room.
7. I kept them in this state 24 hours, then weighed the whole before I took off the receivers. The loss of weight was one dram avoirdupoise. I took off the receivers, and weighed the blotting paper one, which had increased in weight 6 drams avoirdupoise; there was no increased weigh was condensed on the leaves of the orange tree, but I had no means of ascertaining its correct weight
8. I dried the leaves of the tree, and weighed all again The loss of water by the condensation of the leaves was $3 \frac{1}{2}$
drams avoirdupoise. This was as near as I could ascertain, without special apparatus.
9. The tree, itself, then, had taken up $9 \frac{1}{2}$ drams of water
24 hours. None could have escaped from the soil in th in 24 hours. None could have escaped from the soil in the
pot, into the open air and the receivers, as it was hermetically sealed at both ends.
10. Those 9 drams of water, then, had passed from its roots through the tree, whose evaporation by heat had passed it into the atmosphere, to aid in forming rain falls, snows, etc economy of Nature, to supply the air with moisture? The thermometer when first removed from the orange tree was at $68^{\circ}$ Fah., the one suspended from the ceiling by a silk cord as at $711^{\circ}$ Fah., and the hygrometer indicated but little moisture in the room where the experiments were performed. the earth by means of their roots. And, if you investigate this subject strictly, you will find that in dry soils, the roots strike deeper in the earth than they do in swamps, so that and existan a sufficient supply of water for their growth magnolia, the currant bush, and the sugar maple, all of which proved the truth of the conclusions I have mentioned above I h pe some of my fellow citizens who are lovers of science all nations.
New York city.

## When does an Engineer's Duty Cease in Case o

 a Collision?To the Editor of the Scientific American:
In several of the late numbers of the Scientific Ameri an I have read articles upon the question "When does an ject, let moty cease in case of a collision? stopping of a train by reversing the motion. It is this: If two surfaces slide upon each other, the friction will increase as the motion decreases, and decrease as the mơtion increases. That is, if two surfaces move upon each other at a slow rate the friction will be much greater than if they move at a rapid rate. Apply this law to stopping of a train of car unning at a high speed: When an engineer sees a train ahead of him, into which he must inevitably dash unless he brings his own to a stop, there are three things he does as rapidly as physical nature will permit: He whistles " down brakes," reverses his valve motion and pulls wide open his throttle. What is the result? If he will look at bis drivers he will see that they make but few revolutions in the direction in which the train is moving, but will immediately commence to turn in an opposite direction, at a high speed. Now
it will take no great mathematician to calculate the speed which the driving wheels of his engine are, slipping over the track when the train is moving at the rate of 30 miles an track when the train is moving at the rate of 30 miles an
hour and the drive wheels spinning in the opposite direction at the rate of four or five hundred revolutions per minute. According to the above law in friction, the power of the According to the above law in friction, the power of the
engine is doing comparatively little to overcome the momenengine is doing comparatively little to overcome the momen-
tum of the train, even on a well sanded track. The point at which this power is in the greatest degree effectual is just as he wheels are about to slide or to reverse their motion, and if he partially closes the throttle and only gives his cylinders such an amount of steam as will exert the greatest reverse force on the driving wheels and not reverse their motion, he is doing the utmost in his power to stop his train.
I hold, then, that it is the duty of an engineer, if there are a few seconds of time left after whistling "down brakes" and throwing back his reverse lever, to remain on his fontboard, watching closely the action of his drive wheels; and by keeping his hand on the throttle, he should regulate the upply of steam, as the drivers are inclined to slip or revarse heir motion, until within two or three seconds of the crash when his duty to humanity and his employers is fairly and ravely done, and ends, and it becomes him then to look to his own safety by abandoning his engine or otherwise. If the time is short, as is often the case, between the moment of
first catching a glimpse of the coming danger and the final first catching a glimpse of the coming danger and the final
crasb, there will be little or no time to exercise judgment in crash, there will be little or no time to exercise judgment in ases, hrottle re times out of ten, it would be better to lt the while the engine was being propelled on its forward course, as the steam thus supplied would do far more to wards stop ping the train than if flowing through a full throttle.

Rochester, N. Y.
E. B. Whitmore,

## Rubber or Leather Belts

To the Editor of the Scientific American:
I notice, on page 48 of the present volume, an article on he relative merits of rubber and leather for belts. On would be led to suppose from this that the precise merits of both were to be fairly laid down, in which case it would be highly interesting to many of your readers; but on the contrary, it goes on to explain the many careless ways in which a rubber belt may be ruined in a short time, by running off into the gearing, by the lacing giving out, and in various ther ways; and the writer forgets to state whether a leather and would be damaged under similar circumstances. He winds up by saying that a well made leather band, if prop rly looked after, the width and pulley surface being propor ional to the amount of work done, will last 12,15 , or 20 years. Now, in comparing the two kinds of belts fairly, I
think it is perfectly safe to say that rubber belts are better think it is perfectly safe to say that rubber belts are better
balanced than leather, and run more smoothly; they will lso run in line after being used a long time, while a leathe band will run first to one side and then to the other side of the pulley, owing to the soft spongy spots stretching most. We have large rubber belts made to order (which are endless, no lacing being used) running on pulleys, the diameter and ace being proportional to the amount of work done, which do not require so much looking after as a leather band would in the same place, and costing much more money.

Chicago, Ill.
George B. Durkee.

## Clay and Fossils from Texas.

To the Editor of the Scientific American:
E. G. W. sends us from Texas some mineral specimens and fossils, and says: I send you a sample of clay from a bed we ave here. Seeing an article on the subject in the Scienti Fic American induces me to do so. The deposit is quite an xtensive one, cropping out from the side of the bank where took the sample from. It is subject to the wash of the tide; you will find in it a little salt, probably. I will also send you a sample of what I take to be the tusk or tooth of some monster. I dug it out of the bank near the clay. I measured the diameter; the large end was 10 inches, the small, 6 inches. It had been broken off at both ends, and was 8 feet long after I squared up the ends. Judging from the general appearance, it must have been upwards of 20 feet in length. I would like to know what the clay is, and what good for; and mhether sample No. 2 is bone, or what it is. good for; and whether sample No. 2 is bone, or what it is.
Answer. Answer.-The clay is from the tertiary formation, exten-
sively deposited along the Gulf and Atlantic borders. It is sively deposited along the Gulf and Atlantic borders. It is
of no particular economic value. The fragments of fossil bone are of greater importance. You have probably found either the jaw bone of a whale or the tusk of an elephant. You will do well to make diligent search for more fossils, and you will undoubtedly be rewarded by the discovery of harks teeth and other remains of great scientific interest. If you will send us minute descriptions with drawings lengthwise and sectional), we will aid you in identifying them. Look for a bed of lignite coal underneath the clay beds.-Eds.

## The Young Machinist Replies.

To the Editor of the Scientific American:
On page 52 of your present volume, I find two answers to my Young Machinist's Query." The first says that an engineer to become a member of the brotherhood of locomotive en gineers, " must be sober, truthful, moral, reliable, ever ready and have good judgment." Lst the man that has those quali fations serve from 3 to 7 years in any machine shop, in tead of on the top of a cab, a wood pile, or the soft side of a hemlock plank (as our friend would have us believe he did), and you have a thorough engineer, one capable of taking
care of the "thousands of dollars worth of property and the precious lives entrusted to his care."
No. 2 says that he knows first class machinists who can build and repair an engine but cannot take charge as engineer. I hold that a man is surely wooden-headed who can build and repair an engine but caynot learn to run it. If the machinist is, as he says, only a first class laborer, I would like to know in what class he would put the man that does the work he has evidently been accustomed to, namely, pitching coal or wood into the furnace. So I say: Give me a man that can make his own calculations, in regard to the engine and boiler, and the use of steam, and who is a practi cal machinist, rather than a man who has served 20 years at pitching wood or coal into the furnace.

Galveston, Texas.
a Young Machinist.

## Ignition by the Rays of the sun <br> To the Editor of the Scientific American:

A singular case of fire occurred in this village a short time ago, which has caused considerable inquiry and discussion as to its cause; and as there are diverse opinions on the subject, we would be pleased to hear your views. On the 20th of last June, there was a piece of bituminous coal, containing about one cubic foot, lying on some dry pine board, against the south side of a wooden building, and out of the influence of stirring air, but where the rays of the sun shone fair upon
it. At about 4 o'clock. P.M., the boards and side of the buildit. At about 4 o'clock. P.M., the boards and side of the build-
ing close to this piece of coal suddenly burst into flames, and had it not been seen by a person standing near by, the building would have been burnt up; but as it was, the fire was extinguished with a few pails of water. The day had been cloudless and intensely hot, the thermometer ranging from $100^{\circ}$ to $105^{\circ}$ in the shade. The piece of coal had lain in the same situation for the last six months, and when water was thrown upon it to extinguish the fire, there was a hissing
sound, as if just taken from a burning furnace. If this fire sound, as if just taken from a burning furnace. If this fire arose from the absorption of the rays of solid block of coal in like situations.
H. W. S. Millport, N. Y.

## The Emma Suit

The Emma Mining Company comes off conqueror in a suit instituted by it to restrain a rival company, whose workmen last April, broke into the Emma works. This was the Cin cinnati and Illinois Tunnel Company. When they made their appearance in the Emma, the workmen of the latter blocked up the opening, but shortly afterwards the "cave" in the Emma occurred, and cut the owners off from that part of their workings where their rivals had entered. When, after some delay, the fallen rock was penetrated, they found the Illinois men in possession of all that part of the Emma works, and the workmen of the latter mine were resisted in attempting to take possession of it.
The Illinois men claimed that the ground on which they stood did not belong to the Emma mine, but was separated from that vein by a clear space of about thirty feet, which was filled with barren rock. The present suit was then brought to decide the ownership of this part of the property The Illinois men produced affidavits from some gentlemen who professed to be experts, and also from a number of dis charged workmen, formerly in the employ of the Emma company. These gentlemen went into the mine and, peering around in places where the ore had been altogether removed, declared that they found no ore. Measuring the foot wall, they found it 30 feet wide at that spot, and assumed that for that distance there never had beenn any ore, and that the ground held by the Illinois people was accordingly separat and distinct from the real Emma vein.
On the other side, the owners of the Emma brought up men who had been constantly familiar with the mine during the time when that part of the ground was worked out, and who leclared that ore had been taken out at every foot of the istance said to be barren. Assayers also went into the mine nd, taking samples from spots at distances of two feet long the whole width of the so called barren space, found hat all that rock carried silver, the lowest assay being more ban $\$ 75$ per tun. On this evidence Chief Justice McKean eclared that the testimony failed to prove any disconnection etween the ground acknowledged to be the Emma mine nd that in dispute. He also gave expression to the opinion lat the Emma company had a right to follow their ore out de of their own surface limits into neighboring ground, in cordance with the law which says that the patentee may fllow the " vein or lode, with its dips, angles, and variaons, to any depth, although it may enter the lands adjoing , which shall be sold subject to this condition.
This tunnel business, as we have before said, ought to be sposed of, once for all, by Act of Congress. If any man ishes to run a tunnel and can point to a definite body of ore ich he expects to reach, he ought to have the right to that re for the length of time it takes him to reach it by reasonbl diligence. But how many of the tunnel claims in the Teitories have been prosecuted with what, by any stretch of te imagination, can be called "reasonable diligence?" Noone in a hundred. Whoever examines that country finds, in very district, tunnel "stakes," marking locations that hat never had a pick struck into them, or else have been seriusly neglected. This style of mining has not borne fruis sufficient to entitle it to the protection it enjoys. It is extrmely hazardous to the other, which we may call, in contradstinction, the straightforward style of work. We can but'eel pleasure at the victory of the Emma company in this poins, it at least deserves the credit of having worked its
property with fair diligence. This is the only return the
American people ask for the free gift of their mining prop American people ask for the free gift of their mining prop
erty, and to this they are certainly entitled.-Engineering and erty, and to this
Mining Journal.

## Gravitation, Light and Heat

The law of gravitation enunciated by Newton is that every particle of matter in the universe attracts every other particle with a force which diminishes as the square of the distance increases. Thus the sun and the earth mutually pull each other; thus the earth and the moon are kept in compa ny; the force which holds every respective pair of masses to gether being the integrated force of their component parts Under the operation of this force, a stone falls to the ground and is warmed by the shock; under its operation, meteors plunge into our atmosphere and rise to incandescence. Showers of such doubtless fall incessantly upon the sun. Acted on by this force, were it stopped in its orbit tomorrow, the earth would rush towards and finally combine with the sun Heat would also be developed by this collision, and Mayer Helmholtz, and Thomson have calculated its amount. It would equal that produced by the combustion of more than 5,000 worlds of solid coal, all this heat being generated a the instant of collision. In the attraction of gravity, there fore, acting upon non-luminous matter, we have a source of heat more powerful than could be derived from any terrestrial combustion. And were the raatter of the universe cast in cold detached fragments into space, and there abandoned
to the mutual gravitation of its own parts, the collision of to the mutual gravitation of its own parts, the collision of
the fragments would in the end produce the fires of the tars.

The action of gravity upon matter originally cold may in fact be the origin of all light and heat, and the proximate source of such other powers as are generated by light and heat. But we have now to inquire what is the light and what is the heat thus produced? This question has already been answered in a general way. Both light and heat ar modes of motion. Two planets clash and come to rest; their motion, considered as masses, is destroyed, but it is really continued as a motion of their ultimate particles. It is this motion, taken up by the ether, and propagated through it motion, taken up by the ether, and propagated through it
with a velocity of 185,000 miles a second, that comes to us as with a velocity of 185,000 miles a second, that comes to us as
the light and heat of suns and stars. The atoms of a hot the light and heat of suns and stars. The atoms of a hot
body swing with inconceivable rapidity, but this power of ribration necessarily implies the operation of forces between he atoms themselves. Itreveals to us that while they are held together by one force, they are kept asunder by another, heir position at any moment depending on the equilibrium of attraction and repulsion. The atoms are virtually connected by elastic springs which oppose at the same time their called of gravity strike each other, the intensity of the ultimate vi bration, or, in other words, the amount of heat generated, is proportionable to the vis viva destroyed by the collision. The molecular motion once set up is instantly shared with th ther, and diffused by it throughout space
We on the earth's surface live night and day in the midst of ethereal commotion. The medium is never still; the cloud canopy above us may be thick enough to shut out the light of the stars, but this canopy is itself a warm body, which ra diates motion through ether. The earth also is warm, and sends its heat pulses incessantly forth. It is the waste of its molecular motion in space that chills the earth upon a clear night; it is the return of its motion from the clouds which prevents the earth's temperature on a cloudy night from fal therefore, add the conception of its being in a state of inces sant tremor. The sources of vibration are the ponderable masses of the universe. Let us take a sample of these and examine it in detail. When we look to our planet we find it to be an aggregate of solids, liquids, and gases. When w look at any one of these, we generally find it composed of till more elementary parts. We learn, for example, tha the water of our rivers is formed by the union, in definite
proportions of two gases, oxygen and hydrogen. We know how to bring these constituents together, and to cause them to form water: we also know how to analyse the water, and the solid portions of the earth. Our chalk hills, for ex ample, are formed by a combination of carbon, oxygen and calcium. These are elements, the union of which, in definite proportions, has resulted in the formation of chalk. The fints within the chalk we know to be a compound of oxygen and sil cium, called silica; and our ordinary clay is, for the most part, formed by the union of silicium, oxygen, and the well known light metal, aluminium. By far the greater por tion of the earth's crust is compounded of the elementar substances mentioned in these few lines.-Tyndall.

## How to Kill Weeds.

By attending the following directions, weeds may be com letely extirpated :

1. Study their habits. Without this, you are working in he dark. You are shooting without taking aim, and are more likely to miss than to hit.
2. Have faith that weeds can be killed.
3. Should you, for the first year or two, see little benefit from your labor, do not relax your efforts. You will certainly triumph in the end. This is the experience of all gardeners; and a firm conviction of this truth is one of the strongest inres to perseverance.
4. Be forehanded with your work. This is exceedingly tilled . It is so not merely because weed plants can be that many just as they begin to grow, but it often happens enough to attract attention. Chickweed (stellaria) is quite
pest in many gardens. We have known much labor and ime spent, year after year, in efforts to keep this little plant in check, but all in vain, because the work was not com menced early enough in the spring and continued late enough in the autumn. The plant will flower in the snow, and tens of thousands of seeds were matured before the ground was cultivated in the spring. The garden was forked over and hood repeatedly during the summer, and every weed raked off (after they had gone to ssed), but during the wet weather, thousands of little plants would spring up, but were not thought to be injurious, and were suffered to remain to grow all winter and seed the land again early in the epring. The gardener declared it was impossible to get rid of chickweed. And soit is with many other weeds. We could get rid of them if our labor was directed by a little correct knowledge of the habits of the plants, and was applied at the right time. Many think it impossible to free the land of couch or quick Many think it impossible to free the land of couch or quick
grass (triticum repens), and their experience seems to them grass (triticum repens), and their experience seems to them
to justify the opinion. But it will be found that they are not forehanded in their work. They apply labor enough but it is too late. They let the plants grow until the ground is covered with the leaves of the couch, and then they hoe and rake and cultivate, and may be fork out as many roots as possible. But they cannot get out the whole. The roots are broken into small pieces, and each piece produces a new plant, which soon pushes out its roots in all directions in the oose and mellow soil Had the work been commenced before the couch plants pushed out their leaves, and been kept up so vigorously and continuously that the young shoots could not get to the surface, and the soil constantly cultivated during the hot dry summer months, every couch plant ted during the hot dry summer months, every couch plant
would be destroyed. We have tried the plan, and know that couch can be effectually got rid of in this way. But no half way measures will succeed with it.
5. Burn all the thistle heads and other weeds that are cleaned out of the garden. Many seem to think the best place to put these weeds is in the roads. The man that does should be indicted for a nuisance. He forgets that these weed seeds will stick to the feet of horses and other animals another plan is to feed these seeds to the fowls. All that re not digested will grow. If there is so much grain among the weed seeds that you do not like to burn them, boil before eeding.
6. Look to the manure. This is a fruitful source of weeds If the crops are foul, the manure will certainly be full of weed seeds. Fermenting the manure will not kill these seeds unless the seeds themselves are decomposed, which is seldom the case. The better plan is to pile the manure, turn t, and get it thoroughly rotted, and then apply as a top dress-ing.-London Farmer.
Glacial Phenomena in the vicinity of New York. The evidences of a glacier once moving over the island of New York are of three classes: 1st. The grooves, or striæ, and other results of the abrasion of the rocks of the island, wher ever they are visible. 2d. The mantle of drift which partial ly conceals the rocks. 3d. Facts observed over the hills of ly conceals the rocks. 3d. Facts observed over the hills of the neighboring island of Long Island. All the evidences of
the first class show that the movement and agencies causing the first class show that the movement and agencies causing Following this northwest direction from this island over the highland range of "Archæan" rocks at the Ramapo Gap, $\mathbf{N}$ Y., we find the same general evidence that we do elsewhere eastward. The same evidences can be seen in the Pompton Gap, Dover, and at Lake Hopatcong, N. J.
Some years ago I traversed the hights from this lake to West Point on the Hudson, and everywhere the evidence of some agent moving southeastward over them, rounding their summits, tossing them on their western slopes, was always present before me. The sum of all this evidence confirms Professor Dana's theory of a glacial plateau on the highland f Canada.
The second class of evidence-the material composing the mantle of drift-always shows it to have been transported from the northwest. Both on this island and Long Island the material is from rocks known to lie to the northwest ward. Thus on the island we find boulders and huge masses of the serpentine and trap rocks of New Jersey blended with the red sand rock of the same State. In Brooklyn, on Long sland, we find, in addition to the rocks of New Jersey, those rom New York island blended with the others. I have seen huge masses of anthophylite in Atlantic street, Brooklyn, which must have come from the parent bed of thts rock, on Tenth avenue and from West Fiftieth to West Sixtieth street, Now York. Careful measurement of the direction of the movement which must have transported these rock shows it to have been from N. $10^{\circ} \mathrm{W}$. to S. $10^{\circ} \mathrm{E}$. This course tallies with measurements made on the palisades by Professor Cooke. The agency which threw this mantle over the island had power to take up and transport immense masses of red sandstone from New Jersey to New York and Long Island. Many blocks in the city, as at East Steventythird, East Seventy fourth, East Seventy fifth, and East Seven-ty-sixth streets, Third avenue, New York, lying beneath the surface soil, are four, six, and eight feet thick, giving in the excavations an appearance of being independent red deposits in the drift.
The third class of evidence is the immense drift deposits to Fort Hamilion ridge a terminal moraine? Through this moraine the Hudson river breaks at the Narrows at almost right angles to the trend of the Hudson valley.-R. P. Stevens, M.D., Amer can Journal of Science and Arts.
The annual State exhibition of the Kansas Board of Agrio
culture will take place at Topeka Sept. 16th.

## FIRELESS LOCOMOTIVE

Dr. Emile Lamm, of New Orleans, whose invention of the ammonia engine was described and illustrated at page 290, Vol. XXV., of the Scientific American, has lately been giving his attention, with very successful results, to the economic and absolutely safe propulsion of street cars by steam power.
He was satisfied from the collected experiments of the past century that the efficiency of steam, togather with its intrinsic cheapness, could not be culled in question. The objections to its use lay, first, in the constant danger attending its generation in a boiler placed over an active fire; and, second, in the consequent expense in curred when such a boiler is used with a small engine doing but little work; for the ever present danger has to be guard ed against with a care equal to that required for a inach large apparatus, and a skilled attend ant must therefore be employe ant must at a very disproportionately high price. From this he con cluded that if the danger a tending the ordinary steam en gine could be avoided entirely a skillful attendant would not be needed to dive it, and the problem of working steam cheaply on a small scale would be near solution.

These conclusions led him to the invention of the " thermospecific" or fireless locomotive which form the subject of the which forme the subject of the illustrated in the annexed illustrated in the annesed en graving.
driving engine, shown at A , is a steam engine of ordina ry character, and does not require explanation. B is simply a reservoir large enough to con. tain about 300 gailons of water and leave steam room above it. It is made of steel, and is well covered with non-conducting
material so as to prevent the radiation of heat. Inside, from tained of The Ammonia and Thermo-specitic Propelling Comend to end, near its bottom, runs a pipe which is perforated pany of America, 175 Common street. New Orleans, or by with numerous small holes in its periphery, and which is addressing the inventor, $P 0$ Box 1,493, in tbat city connected with a universal coupling attached to the front of the reservoir. It is also provided with a water cock, etc steam drum, and proper steam connections with the engine The operation of the apparatus is as follows: By making suitable connections with a stationary st-am boiler, it is first heated throughout, and then a sufficient supply of water of the requisite temperature is forced into the reservoir. When properly charged, the water is flush with the water cock. and its temperature is about $380^{\circ}$ Fah., the pressure in the reservoir being about 170 lbs . to the square inch. The locomotive is then ready to be started on its trip, there being sufficient power stored up in the reservoir to enable it to run the attached car a distance of nine miles without expending the whole of it. Before beginning tha next trip, the charge is renewed by again coupling the reservoir with the stationary boiler, from which steam is forced in for about four minutes through the perforated pipe; by which operation the temperature and pressure are re stored, and the water which went off in the form of steam during the previous performance of the engine is replaced.
The rationale of the foregoing need not be dwelt upon. Suffice it to say that, in obedience to well known laws, as the pressure within the reservoir is relieved by the passage of the steam into the engine, a portion of the water in the former is converted into steam by the heat with which it is surcharged. This conversion would go on until the temperature in the remaining water had fallen to $212^{\circ}$. It is calculated that with the reservoirs as now used, about fifty gallons of Water is converted into steam before this point is reached. The steam given off develops sufficient power to make a nine mile trip easily, and leaves a pressure of 60 lbs . in the re servoir at its completion.
The absence of danger of explosion in using this apparatus is apparent, and it is real, also. The pressure in the re servoir can never rise above the point reached at the time it is charged; and after that, it is necessarily continually diminishing as the power is expended. It requires even less skill to dive this locomotive than it does to drive a horse or mule car, and the economy sought in this direction appears to be fully attained. Our space will not allow us to go into the details of the advantages and general economy claimed for this system of propuision over the regular horse railroad system, General G. T. Beauregard, who is president of the


## LAMM'S FIRELESS LOCOMOTIVE

New Orleans and Carrollton Ritroad Company, on whose road Dr. Lamm's fireless looomotive has been running, and who have just adopted his invention, has made a comparison btween the relative expenses of the two systems, and find difference of $33 \frac{1}{3}$ per cent in favor of the new over the old The calculations for the new system were based on fifteen locomotives supplied by one set of stationary boilers. One particular advantage claimed by the inventor, who has al eady made over a thousand trips of six miles each with his ocomotive, is the latitude allowable in its construction and plication by reason of the absence of the furnace.
Patented April 9, 1872. Further information may be ob-

The clamps by which the sides of the frame are nown at F , are mounted on ways in the head blocks and are operated by two pairs of twin right and left hand, screws which are fitted to them. Oae of the pairs of screws runs in bearings attached to the head block, A, and the other in bearings connected with the movable block, B , the latter pair being so distinctly shown in the engraving that no fur ther explanation is needed. Both pairs are geared to the crank shaft, $G$, so as to be actuated simultaneously by its ro tation, and the middle wheel of the gearing next $B$ is ar ranged so as to slide with the block along the shaft, $G$
When the clamps, E, are suitably adjusted, the machine is made to conform to any size nd shape of frame, within its wits, by simply working the and cranks, and the equaring and compressing of the frame is performed by it with ease and certainty.

In order to allow the frames to be bored and pinntd while yet clamped in the machine, the upper sides of the head blocks are made with longitudinal grooves, as represented, of sufficient depth and width to allow the boring tool to work clear through the frame to afford clearance for the chips and room for the pin to project when driven. In securing the joints of doors, which is commonly done by splitting the tenons and driving in wedges, ample access is given to them between the clamps, E. and the wedges can be driven wbile the door is clamped.

The machine has received practical trial, axd is claimed to be much superior to others hitherto used in sash finisking, saving both time avd labor; a boy may operate it effectively.
The inventor, who wishes to dirpose of a part or the whole of his rights, may be commuricated with at 116 Congress street, Troy, N. Y.

## Vibration of Glasses Cracked or Containing

 Effervescing Liquids.It is known that a glass containing effervescing liquid will ot give a clear note when struck, and that as the efferves not give a clear note when struck, and that as the efferves the liquid is perfectly tranquil, the glass will ring as usual but on re exciting the effervescence, the musical, tone agai disappears.
The phenomena presents itself to my mind as being du to a certain amount of vibration col muricated to the glass by the agit tion arising from the effervescenc This vibration-which can be easi heard by placing the ear close to $t$ glass-interferes with that caused striking the glass, and destroys mc or less the proper rhythmic moveme necessary to the production of a mu cal note, according as the intensity the agitation of effervescence is gre er or less.
The dead sound of a cracked gl is probably owing to a sixilar car For in that case, as soon as the vi tions traveling round the glass arr at the crack, the edges of which wholly or partially in contact, they transmitted from edge to edge; anc owing to the friction of the edges against the other, their vibrations not synchronize, a reflex wave ispinged upon each, having a less vety than the original wave. This res ty than the original wave. This res wave will correspond to the vibran
caused by effervescence. If the ck caused by effervescence. If the ck be cleanly cut out, so as to sepse the edge by a well defined inte; l, the glass will again emit a mual

## PHILLIPS' SASH COUPLING MACHINE

Upon a suitable frams, such for instancэ as depicted, are mounted two head blocks; one of which, A , is stationary, and the other, B , is movable to ward or from the first, on the grooved ways shown on the top of the frame. These movements are produced by operating the two screws, C, which are geared to the hand crank shaft, D. The head blocks are provided with adjustable metal clamping pieces, E, upon which is laid, in the manner indicated in our illustration, the sash or other frame which it is intended to square up and press together. The peculiar form of these clamping pieces will be understood by inspecting those seen on B; they conform to the rectangular figure of the head block on three sides, and on the fourth are turned up perpendicularly so as to clamp the frame perfectly square. By properly arranging the clamps, $E$, the terms of the side pieces of the sash frame are left room to project beyond the mortises in the end pieces through which they are driven, on being compressed by the machine.
note. In the latter case, the sonorous vibrations, on arring
at the cut portion, return by the way they came, synchriz ing with those which they meet.
The dead sound of the glass, when filled with honeor treacle, is probably owing to the circumstance of these fld b -ing not sufficiently mobile to vibrate in unison withthe glass; and thus they destroy its musical tone as eff ctuly as if they generated an independent and non-synchronor vi bration.-Allen Beazeley, in Nature.

The Sewage of Paris.--The question as to the treanent of the sewage of Paris has been settled, by its concessio for fifteen years to the London Ptat Eqgineering and Sevage Filtration Company. For a long time the sewage hasbeen dealt with by the Le Sage company in the most priritive manner-namely, by spreading the solid matter upo: the ground to dry, causing fearful annoyance for miles apund, and provoking general outcry against the barbarous prictice.

## Srientifir gmoritan.

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## TMIRMS

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT of science.

This body of the promin¢nt scientific men of the United States commences (as noticed elsewhere) this year's meetings on August 22d, at Dubuque, Iowa. It was at first intended to meet in San Francisco, if found practicable by the committee in charge of selecting the pla e of meeting: but such urgent was chostn. By the hospitality of the citizens, all the memwas chostn. By the hospitality of the citizens, all the mem
bers will be privately entertained, and arrangements have bers will be privattly entertained, and arrangements have
been made for free excursions to different places of scientific been made for free excursions to different places of scientific
interest in the neighborhood, so that this meeting promises to be as satisfactory to all concerned as any previously held elsewhere.
Perbaps no association is so little understood by the public and even by the press as this; and this is the reason that, after every meeting, most absurd criticiems are indulged in by the reporters. People complain that the subjects dis cussed are not popular enough to be understood by the visit ors who may drop in ; but it ought not to be lost sight of that this association was by no means founded for the popula diffusion of knowledge. The latter object would require per manent courses of elementary lectures, in place of the meet ing of some two bundred of the prominent scientists of this continent in a single city for only one week in a whole year It the people any where feal the want of popular and contin uous diffusion of knowledge, they ought to found, in the dif ferent cities and towns, local institutions, where, by means of lectures and experiments, given free to all by competent lecturers, the public may receive the needed scientific information. Such institutions would without doubt have the good wishes of all the members of the American Association for the Advancement of Science; but they would labor in an entirely different field, the diffusion of information obtained, while the said association labors, like the Smithsonian Insti tute in Washington, for the increase of our stock of scientific knowledge. This diffusion, or the instruction of the people, or teaching in general, is a field of labor entirely foreign to the purposes of the association, notwithstanding that most of its members are publicly or privately engaged therein, as their regular occupation.

That the meetings are held with open doors is not with the expectation that ignorant people, who happen to drop in, will learn anything or be pleasantly entertained, as many appear to expect; but simply because science has no secrets.
Uninstructed visitors have about as much right to expect to Uninstructed visitors have about as much right to expect to
obtain information or amusement when dropping in upon a obtain information or amusement when dropping in upon a
Congressional session in Washington. The members of the Congressional session in Washington. The members of the association can think as little about entertaining occasional
visitors as the members of Congress. In both sessions are duties to be performed, regardless of audience or visitors, namely, bringing facts and honest opinions before the body of the house, which in one case is political, in the other, sci entific.

Certain subjects treated are uninteresting not only for tbe public, they are so even to those members who have not made a study of them. Therefore the meetings are divided iato sections, so that, in section A, Mathematics, Astronomy Physics and Chemistry are discussed, in section B, Geology and Natural History, in section D, Microscopy. This is also done in order to save time, as otherwise the time occupied by the meeting would be protracted to four weeks in place of one. The objection, however, is that it frequently happens
that such interesting subjects are discussed in several section that of ten members regret their inability to attend more than section at the same time.
Upon the surface, however, the great benefits of these meetings do not appear. One is the profit, to men engaged in a common pursuit and who love that pursuit, of being brought together for private conversation, discussion, and interchange of opinions. The discussions arising after the reading of a paper are often the most important part of the proceedings, and it is to be lamented that no note is kept of these, except by newspaper reporters, from whom of course it cannot be expected that they will be able to distinguish matter of genuine value from the chaff which occasionall runs among it.
The wird m of keeping up the migratory character of these meetings has been doubted. There are two reasons: One is that no city should claim preëminence as a scientific center, as this would make the association less national by existing local jealousies, and science must try to bo eminently cosmopolitan. Another reason is that, in the city where the meet ing is held, the representatives of science in the Unite
States will stimulate a love for scientific research, and thi has been, thus far, actually the case in almost all place where the meetings have been held.
A very striking feature in the character of the discussions is the peace and harmony which pervades all from beginning to end. There may be different opinions in regard to the ex planations of observed facts, but there is constantly a tendenc to unification as the erroneous opinions are constantly being given up, when truth prevails and all agree in the end
Compare this with meetings where prominent men of differCompare this with meetings where prominent men of differ-
ent schools of politics or religion are brought together; ent schools of politics or religion are brought together;
would they discuss for a whole week the subjects of their would they discuss for a whole week the subjects of their
devotion, and separate with such perfect good feeling, and devotion, and separate with such perfect good feeling, and
leave behind them in the place where they met, so favorable an impression as is the case with the men of science?

## CANADIAN PATENTS.

We again remind our readers that the new patent law of Canada goes into effect on the 1st of September, on and after which date all citizens of the United States may take patents in the Dominion without let or hindrance.
Patents will be granted in Canada for periods of five, ten, and fifteen years. The two first periods may, before their expiration, be enlarged to fifteen years, on simply filing a petition for an extension and paying a small fee.
A model is also required, and on this subject the rule es tablished by the Canadian Commissioner of Patents is as fol ows:
Rule 7. Models must be neat and substantial ones, not to exceed eighteen inches on the longest side, unless otherwise allowed by special permission; such models must be so con structed as to show exactly every part of the invention and its mode of working. In cases where samples of ingredients are required by law, they must be contained in glass bottles properly arravged; but dangerous or explosive substances are not to be sent. Both models and bottles must bear the name of the inventor, the title of the invention, and the date of the application ; and must be furnished to the Patent Of fice free of charge and in good order.
It will be observed that the foregoing rule only requires that every part of the invention, and its mode of working hall be exhibited in the model. If the invention consists of an improvement upon some part of a known machine, it wil ot be necersary to make a model of the whole machine, bu nly those parts that are needed to show the intended work gh of the improvement. For example, if the invention re lates to vehicles, and consists in an improvement in the con-
struction of the wheel and axle, it will not be necessary for struction of the wheel and axle, it will not be necessary for
the inventor to furnish a complete model of a vehicle, bu the inventor to furnish a complete model of a vehicle, but
only a model of a wheel and axle, made according to the im provement. This is also the rule at our United States Pat nt Office.
For the information of those who contemplate taking ou Canadian patents, Messrs. Munn \& Co. have prepared a circu lar containing full directions, copies of which can be had free of charge by simply addressing them at the Scientific american Office. 'The Dominion of Canada is a splendid field for the introduction of new inventions. Her population is $5,000,000$, and rapidly increasing. Her people partake of the spirit of enterprise which governs here. The Canadians
are now building a railway from the Atlantic to the Pacific, are now building a railway from the Atlantic to the Pacting indicates a spirit of progressive activity.

## THE AURORA.

On the evening of the 3 d instant, occurred one of the most magnificent auroral displays that have ever been witnessed in these latitudes. Many of the principal phases of the phe nomenon, previously noticed by observers at the polar regions, were here brilliantly produced, the convoluted curtain clouds excepted.
The display began with the formation, at the northern horizon, of the bright arching bank or auroral bow, having a greenish yellow tint which illuminated the earth as if the full moon were shining. Pencils, brushes, columns and streamers of light, of various shades and fantastic forms, shot up wards with amazing rapidity to the zenith, where they con verged, forming a remarkable nucleus or crown of glory. The eastern portion of the columns and streamers now glowed with transparent crimson colors; and then began a general
upward undulating, waving, flickering and radiating movement of the luminosity, of indescribable beauty. The most remarkable part of the display lasted for about fifteen min utes, when its force appeared to have been somewhat spent;
but some two hours elapsed before the aurora had wholly disappeared.
The Utica (N. Y) Herald says: "The skies over Utica and other equally favored places presented a peculiar and most beautiful appearance. Directly overhead, a central whirl of fire, assuming different forms and tinted at times with red or purple, was surrounded by straight shoots and sheets of pale lame, constantly varying and shifting, which reached from he zenith to the horizon, except in the extreme south. At one time the form of an angel with outstretched arms and spread wings could be plainly traced in the flaming center of this grand display."
The precise origin of the aurora borealis, how and why it makes its appearance, is not fully understood, and still forms akes its appearance, is not fully understood, and still forms
an intéresting subject for investigation among the students an intéresting subject for investigation among the students
of science. Many theories have been put fo th, some of of science. Many theories have been put fo th, some
which we will briefly mention, together with a few facts.
A number of intelligent observers, stationed in polar regions such as Greenland and Iceland, aver that the aurora is sometimes accompanied by hissing and crackling sounds, the latter resembling electrical sparks. The Esquimaux natives also say that these sounds are very often heard in connection with the lights. But Kane, Richardson, Parry, and other arctic travellers were unable to detect any sounds, while Wentzel attributed the noise to the contraction of the snow from sudden increase of the cold.
The hight of the aurora is differently estimated by various observers, ranging from one mile to five hundred miles from the earth. Some of the best observations bring the light within the limits of the clouds, and indicate that the auroral eencils may even be swayed by the winds and currents of air. It is believed that the auroral light has a considerable thickness or body. It is visible at immease distancss. The ame aurora has been seen at the same timo in Europs. Asia, and North America, on a parallel as low as Cuba and Spain.
Professor Olmsted has attributed the aurora to the sudden piunging of the earth into what might be termed a cosmical atmosphere or vapor, composed of atoms of nebulous matter, the light being produced by the friction of this mater against the earth's atmosphere. This coincides with Biot's theory, who was of opinion that the atoms were coinposed of iron and served as conductors between various atmospheric beds, unequally charged with eiectricity: when the tendency of the electricity to get into equilibrium surpasses the resistance of the imperfect conductive pow - rs of the atoms, an electrical discharge ensues, and the nebulous molecules sparkle, thus producing the aurora. This curious theory is altogether surpassed by that of the editor of the New York Herald, who, in commenting upon the recent aurora ays: "The most satisfactory explanation of these splendors the northern skies seems to be that which connects them with the reflection of electric discharges from the microscopic ice crystals, which compose the delicate cirrus clouds in the upper atmosphere. These crystals of condensed vapor, so minute as to defy any but the most practiced observer, act as screen for the reflection of light; and the deporition of watery vapor from the lofty equatorial current produces the ightning discharge."
In a previous number of the same newspaper, the phenomenon is explained as follows:-"The origin of the aurora borealis is simply this, speaking sensibly:-It is caused by the refraction of the rays of the sun upon the vast fields of ice which line and fill up the shores of Labrador, Bebring Straits and the Hudson Bay Territory.'
Leaving these amusing, not to say absurd, theories, it may be remarked that magnetism and electricity are in some way conntected with the auroral development. The auror al lights, pencils, and streams may be artificially produced by means of a glass tube containing rareifie; atmosple eric air tbrough which electricity from a machine is passed, or in which tube it is excited by friction. A description of the tubes was recently published in the Scientific American.
Another device for the artificial production of lights which appear to be analogous to the aurora consists of an iron bar, enclosed within a rarefied air chamber. Luminosity, of different kinds, is here produced at will, either by the electrical machine, or by the contact of the iron bar with one of the poles of an electro-magnet.
Də la Rive says that luminous effects similar to those of he aurora may be obtained if a continuous current of or dinary electricity is made to arrive a t the pole of a powerful electro-m gnet in moist, rarefied air.
The magnetic needle is almost always deflected and agita ted during the continuance of the auroral display.

During the aurora, the telegraph wires often become charged with electricity winich in its nature appears to re semble galvanic electricity. Mr. Culley, the distinguished English telegraph engineer, stated that the aurora was a kind of lightning, differing from ordinary lightning in being a gentle and gradual flow, instead of a violent and sudden discharge. Telegraph wires that run east and west are said to be most aff ected during the aurora. Humboldt regarded the aurora as an electric activity which manifested itself by the fluctuation of the magnetic needle and by the appearance of the auroral light. Faraday suggested that the aurora was connected with currents of electricity induced by the earth's rotation and urged towards the poles, whence it is endtavor ing to return, by natural and appointed means, ab ve the arth to the equatorial regions. The results of experiments indicated by him confirm the correctness of this suggestion Dr. Nichol says: "It is vain to search at present for a theoyy of the aurora. What is known is this: The direction of the auroral jets or rays and the position of the crown have a connection with the magnetic meridian; and the aurora pro-

Professor Loomis gives the following particulars:-Auroral exhibitions take place in the upper regions of the atmosphere, since they partake of the earth's rotation. All the celestial bodies have an apparent motion from east to west, arising from the rotation of the earth; but bodies belonging to the earth, including the atmosphere and the clouds which float in it, partake of the earth's rotation, so that their relative position is not affected by it. The same is true of auroral exhibitions. Whenever an auroral corona is formed, i maintains sensibly the same position in the heavens during the whole period of its continuance, although the stars mean while revolve at the rate of $15^{\circ}$ per hour.
The grosser part of the earth's atmosphere is limited to moderate distance from the earth. At the hight of a little over four miles, the density of the air is only one half what it is at the earth's surface. At the hight of 50 miles the at mosphere is well-nigh inappreciable in its effect upon twilight
The phenomena of lunar eclipses indicate an appreciable atmosphere at the hight of 66 miles. The phenomena of shooting stars indicate an atmosphere at the hight of 200 or 300 miles, while the aurora indicates that the atmosphere does not entirely cease at the hight of 500 miles. Auroral exhibitions take place, therefore, in an atmosphere of extreme rarity ; so rare injeed that if, in experiments with an air pump, we could exhaust the air as completely, we should say that we had obtained a perfect vacuum
The auroral beams are simply spaces which are illumined by the flow of electricity through the upper regions of the atmosphere. During the auroras of 1859 , these beams were nearly 500 miles in length, and their lower extremities were elevated about 45 miles above the earth's surface. Their tops inclined toward the south, about $17^{\circ}$ in the neighborhood of New York, this being the position which the dipping needle there assumes.

## COUNTRY CHURCHYARDS.

An English jôurnal of recent date complains of the uniniting and desolate appearance so common in the plots, se apart in villages and towns, for the interment of the dead If the remarks made by our contemporary are applicable to the rural churchyards of England, where every hamlet, from its very age, supplies the elements of the picturesque, they are doubly true in reference to the barren and forbid ding enclosures found in the newly built villages which abound in our own country.
We do not of course refer to those magnificent cities of the dead which adjoin our great towns, for on these every re source of art and skill has been unsparingly lavished; but to the simple acre or two of land, which either surrounds, the rural church or else is fenced off, solitary and alone, on the outskirts of the populated quarter. Every one is familiar with its appearance; bleak, bare and desolate, totally devoid of ornamentation, the surface of the ground broken and irregular with heaped up mounds of earth, and covered with headstones and monuments standing stiff and white, like ghosts, over the graves. If trees there be, they are generally clumps of pines, lugubrious and solemn in
their dark shades. The grass is long, and coarse, rank weeds their dark shades. The grass is long, and coarse, rank weeds abound, while the few flowers that bloom here and there are wild and uncultivated. Perhaps a few plots within the closure, the family burial places of the magnates of the
village, are surrounded with cheap iron railings which, while vilding to the prim formality of the spot, convey the im. pression that its occupants maintain their exclusiveness even pression th
in the tomb

It is a beautiful idea, taught us by science that, our bodies after being buried in the ground are consumed and reappear in the shape of the fragrant flowers that bloom over our resting places. Even this consolation, if so it may be termed, is denied us in the modern burying ground, for the mind cannot but revolt at the thought of sleeping beneath rank weeds or moldering in the damp heavy shade, away from the clear bright sunshine. The practice of making mounds over graves is one which should long since have been abolished. They doubtless served in the beginning as marks of locality, but now they simply disorder the ground. We as under a surface of ridges and hollows, while the proper as under a surface of ridges and hollows, while the proper keeping of a flat gra

Niggardliness of space within the limits of a city may be a matter of necessity, but in the country, thus prescribing limits as to render the making of a few walks or the plant ing of a few ornamental trees an impossibility is without reason. In churchyards already in existence, this defect may not well be remedied; but where new ones are constant ly being laid out, it is a question worthy of consideration whether a sufficiency of space should not at once be obtained so as to admit of some pleasing effect being produced by the exercise of taste in its arrangement, instead of making calculations with a view of utilizing to the utmost, for burial purposes, every available inch of ground. In monuments and nificent memorials which mark the graves of the wealthy, nificent memorials which mark the graves of the wealthy,
there has been but little alteration in their general style there has been but little alteration in their general style
during the past century. The matter of designing inexduring the past century. The matter of designing inex-
pensive yet beautiful headstones is worthy of the attention pensive yet beautiful headstones is worthy of the attention
of our architects, if only to relieve us from the grotesque or painfully plain pieces of sculpture which emanate from the workshop of the rural stone catter.
In laying out a piece of ground for a burial lot, paths should bs at first formed, and then the planting of suitaable trees should follow. Among the latter, the weeping varieties, from 'he habit of growth they display, consort best with the character of the place. Flowering trees, especially, should be set out. Soft colors or whites should
be selected, but not yellow, as the laburnum, as that would be inappropriate. For foliage trees, the beech, horse chest nut, weeping ash, birch, elm and others of graceful outline hould be preferred, while a very few pines or dark toned hade trees may be interspersed for the sake of contrast Evergreens of low growth, such as the arbor vitae, togethe ith flowering shrubs, hollies, may bloom, syringas, lilacs or lders would form a pleasing variety, and at the same time urnish the bare sward without adding dullness or density Creeping vines, twined around monuments, make even th plainest of stones an object of beauty. The trumpet creeper weet honeysuckle, woodbine, climbing roses, German ivy and especially the hardy English ivy, are all graceful and ppropriate. If we dispense with mounds, the places of in erment might be covered with flower beds, of the shapes of he graves might be marked out on the green turf with flowery plants. Nothing could be prettier than a margin of snowdrops or lilies of the valley, inside of which might be a small cross of white crocuses. In spring time, exquisite designs may be worked out in purple and white hyacinths. The more delicate tinted flowers should.be selected or else hose of deep toned hue, neither brilliant nor gaudy. Pure white lilies, callas, purple violets, drooping white and pink uchsias, cape jessamine, moss roses or white pinks, with
These are all Nature's ornamenis, and they were given us o brighten those spots which to the mind carry the most ombre reflections. "God's Acre"should be pleasant and cheerful, and not a place to be avoided as only suggestive of gloom and death.

## INFLUENCE OF VARIOUSLY COLORED LIGHT ON <br> ANIMAL AND VEGETABLE GROWTH.

This subject is at present attracting a good deal of atten ion, and strange to say it is regarded by many as a new mat ter for investigation, a patent even having been recently granted for the use of blue glass in the cultivation of plants a years ago, a committee of the British Association fo e Advancement of Science investigated the whole questio very thoroughly, and at various times individual obs have devoted their attention to the subject. The general re sult seems to be that growing plants thrive best in white light, while seeds, during the process of germination, do best under blue rays. The well known seedman, Charles Lawson of Edinburgh, thus details the results of some experiments made by him in 1853: "I had a case made, the sides of which were formed of glass, colored blue or indigo, which case I attached to a small gas stove for engendering heat in the case shelves were fixed inside, on which were placed
small pots wherein the seeds to be tested were sown. The mall pots wherein the seeds to be tested were sown. The results were all that could be looked for; the seeds freely germinated in from two to five days only, instead of from eight to fourteen days as before. I have not carried our ex periments beyond the germination of seeds, so that I canno afford practical information as to the effect of other rays on the after culture of the plants.
I have, however, made some trials with the yellow ray in preventing the germination of seeds, which have been suc cessful; and I have always found the violet ray prejudicia to the growth of plants after germination."

## PLASTER CASTS

If the ordinary plaster of Paris of commerce, which is sold in the form of a dry white powder, be mixed with water to the consistency of a moderately thin batter, the compound will in a short time become solid and firmly set. By this means, accurate impressions or casts may be taken of almost any object. The first step in making a cast is to prepare the mold, and in order to render this process clear, we will sup pose that a simple object such as an apple or a plum is to be copied. A pint of plaster is placed in a bowl or similar ves sel, the interior of which has previously been oiled. Water is then added until a paste is obtained. Now oil the fruit and press it down into the mixture until its part of greatest breadth is even with the surface of the liquid. An apple, for instance, should be inserted, calyx end down, and allowed to sink about half way-the middle of the fruit in most va rieties being its largest portion. The plaster will soon set when the object may be lifted out. With a sharp knife pare off all inequalities, fill up air bubbles with fresh plaster, smooth off the top of the mold perfectly level and make three or four countersinks in its surface-carefully oiling the latter, as well as the matrix left by the object. Replace the original in its socket, oil its upper portion and lay on plaster with a case knife, as fast as it will solidify. Continue to add material until the mold is brought to the proper form, nearly square and flat on top. When the plaster is perfectly hard, lift off the upper portion of the mold and remove the object; then oil the entire interior surface with linseed oil and allow it to dry.
The mold being completed, the cast is easily obtained. Fasten the two parts of the former together and bore a small hole of about three quarters of an inch in diameter in the side. Through this opening pour in the liquid plaster, which, after being allowed sufficient time to dry, will harden into the shape of the mold
Those attempring the process for the first time should begin by making molds of simple objects until the necessary deftness of manipulation is obtained. Casts of heads, partic-
ularly of living subjects, should not be essayed ularly of living subjects, should not be essayed until after
considerable practice. A life size metallic bust may be used for the beginner's first efforts in figure molding; or, if he can obtain access to the dissecting room of any medical college, he may attain much greater akill by copying directly from the oadaver.

In making a mold of the head and face, the hair and whis sers should be mingled with potter's clay, brushed smoothly nd oiled. The back of the head is taken first. This is don by pouring a quantity of the mixed plaster into a shallow ray and laying the head back into the mixture, allowing it to remain there until the plaster sets. It is then removed he mold smoothed and oiled and countersinks made in its edge Then oil the face and apply the plaster, a little at a time being careful to see that it enters all wrinkles and indenta tions. In modelling from a living person, the breathing is done through the nostrils. When the material sets, lift the mold from the face and carefully smooth its interior surface If the eyes are to be represented as open, carve depres sions for the eyelids and'also for the brows. Now fill up al indentations with overhanging edges which would catch the cast and prevent its extraction. Brush the interior of th mold over with linseed oil, let it dry, and fit the two section ccurately together. The casting liquid is poured in throug he orifice left by the neck. Use but a little of the plasier a time and roll the mold around so that the mixture will be evenly deposited in all its indentations. Finally fill the mold and set it aside to dry. When the sections are removed, the ardened cast may be finished with a sharp pen knife.
For delicate and accurate castings, the best method is that roposed some time since by Mr. Boyd Dawkins, F. R. S. Th mold is made of artist's modeling wax, which, though sof and plastic when heated, becomes perfectly rigid when cold The object to be copied is first covered with a thin powder of teatite or French chalk, to prevent its adhesion to the mold. The wax, which has been hsated to a proper plasticity is then applied and carefully pressed into all the cavities of the original. When it is necessary, from the shape of the latter to make the mold in two or more sections, steatite powder should be placed between to render them easily taken apart The object should be removed from the mold before the latte becomes perfectly hard and rigid, as in that case it is very dif ficult to extract. After wetting the interior of the molds, to prevent bubbles of air lurking in the small interstices, pou n plaster of Paris. The casts, when dry, may be painted in water colors, which must be fainter than those of the origi al, because the next process adds to their intensity. After rying the cast, steep it in hard paraffin. The ordinary par ffit candles, which can be obtained from any grocer, wil serve the purpose. Finally cool and polish the cast by hand with steatite. By this process, casts of fossils or other ob ects in natural history may be made with such accuracy tha is with difficulty that they can be distinguished from the originals

The Corundum Region of North Carolina:
Professor Shepard, of Amherst College, Mass., in an arti le in the American Journal of Arts and Sciences, says that corundum has been recognized for above thirty years at sevral of the gold washings in the mountainous counties of North Carolina and Georgia, though rarely occurring in masses larger than would be called a coarse gravel. Within the last two or three years, however, under the stimulus of discovering an improved description of emery, many new lo alities of corundum have been brought to light.
The corundum localities are already known to occupy a stretch of country at least 170 miles long, with a breadth of about ten miles. As the region is little inbabited and very mountainous, it is probable that the corundum zone, as it ha been called, will hereafter be much extended. It is situated in a subalpine country, partly within the northeastern cor ner of Georgia, and extending thence, in the direction of the crest of the Blue Ridge, into several contiguous counties of North Carolina.

The principal exposure of the corundum has been effected at what is known as the Culsagee mine, situated in the town ship of Elegée (sometimes written Elijay) situate eight miles southeast from Franklin Court House, in Macon county This is the center of operations of the American Corundum Company, whose works are superintended by Colonel C. W Jenks. The chief excavations have been made on the north ern slope of a mountain, at an elevation of about 2,700 feet above tide water.

## To Detect Sulphuric Acid in Vinegar

An ounce of the vinegar to be examined is put into a mall porcelain capsule, over a water bath, and evaporated to about half a drachm, or to the consistence of a thin extract when cool, half a fluid ounce of stronger alcohol is to be added and thoroughly triturated. The free sulphuric acid if present, will be taken up by the alcobol to the exclusion of any sulphates. Allow the alcoholic solution to stand sev eral hours and filter; to the filtrate add one fluid ounce of dis tilled water, and evaporate the alcohol off by gentle hea over a sand bath; when free from alcobol, it is set aside for several hours and ther again filtered. To the filtrate, acidu lated with hydrochloric acid, add a few drops of a solution of chloride of barium, and a white precipitate of sulphate of barium will result, if the sample of vinegar has been Pharmacy.
We wish that some of our readers would suggest a more easy method of detecting the sulphuric cheat in vinegar. easy
Eds.

Scientific Garroters.-Dr. F. Kirkpatrick, Vice President of the Royal College of Surgeons, Ireland, while pro ceeding to visit a patient at ten oclock at night, recently was garroted in one of the most fashionable streets of Dublin and deprived of his watch and chain. One of a gang of three men quickly rendered Dr. Kirkpatrick insensible by pressing firmly on the carotid arteries on both sides.

# LETTER FROM PROFESSOR 1. H. THURSTON. 

Cincinnati, Ohio., July, 1872.
A pecilliar ferry boat at St. Louis. Visit to the wonderfu iron deposits. How the ore is mined and transported. Progress of the great bridge at St. Loui
The railroad between Cincinnati and St. Louis takes the traveler through a pleasant level and partly wooded country, which, however, presents so little variety in its scenery that it becomes monotonous long before the end of the route is reached. The terminus is in East St. Louis, and the passengers are taken across the river by an oddly designed ferry boat, having a double hall with the single wheel placed be$t$ ween the two parts. The craft is about as broad as it is long, and it is quite remarkable that it should allow of such skillful manouvering. The city of St.Louis is more of a commercial than a manufacturing city, and its levee is lined, nearly the whole length of the city front, with steamera which run to all the principal points upon the Mississippi which run to all the principal points upon the sississippi
and its tributaries. There is, however, in a city so large, and and its tributaries. There is, however, in a city so large, and
situated, as is St. Louis, at a point from which an extensive situated, as is St. Louis, at a point from which an extensive
market can be readily reached, necessarily a considerable market can be readily reached, necessarily a consideraboe
amount of manufacturing; and the proximity of those wonamount of manufacturing; an
derful deposits of iron ore at

IRON MOUNTAIN, SHEPHERD MOUNTAIN, AND PILOT KNOB has given rise to quite extensive iron works. The Laclede Iron Works at the north end of the city are quite large roll. ing mills and turn out excellent iron. The pig iron used is made from Iron Mountain ore. At Carondelet are to be found quite large and well managed blast furnaces which are supplied with ore from the Iron Mountain.
Having heard Pittsburgh manufacturers speak of this ore as fully equal, if not superior, to any ore found in the country, and havieg so frequently heard of its wonderful extent and remarkable location, a day was taken to visit the ore mountain. It is situated 85 miles from St. Louis, and a line of railroad leads directly past it. The ores mined at Iron Mountain and at the other almost equally noticeable deposits of Shepherd Mountain and Pilot Knob are thus readily brought to St. Louis, and are thence distributed, by rail and river, to all parts of the country west of the Alleghanies and south of the Lake Superior mines. The deposit is well named. It is a hill rising high above the general level of the country, and composed nearly entirely of an ore of iron that is almost absolutely pure. It is pure enough to make excellent Bessemer mstal, a test which very few ores can successfully pass. This great hill, for it is hardly high enough to be called a mountain, contains millions of tuns of ore that can be obtained by simple quarrying and without the expenditure of a dollar for drainage or hoisting. The miners have attacked it at three points, and have been, for some time past, getting out and shripping about 1,500 tuns a day. As may be readily imagined, they have made immense cavities in the great mass of ore, and yet they are insignificant when compared with what remains untouched. The process of mining here is the simplest possible. After "stripping" off a few feet of earth, a mixture of ore and disintegrated rock is reached from which is obtained a large quantity of ore, in masses of some considerable size occasion ally, but usually finely divided. This, Mr. Aubuchon, the superintendent, informs me is of as fine quality as the "bluff ore," and is preferred by some iron makers. After working through this deposit, which is usually of no great thickness, the hard solid "mountain" of ore is reached. Here the hammer, drill, and gunpowder are necessary, and the whole work is done by blasting. The scene presented here is strangely attractive and interesting. Six hundred men are employed at the mine, and they cluster among the loosened rocks and upon the unloosened crags like so many bees. The air is filled with the ringing sound of scores of hammers striking of the three chasms, the sound of hammering suddenly ceases, and, while a minute curl of smoke commences to rise from the fuse in some hole which has just been charged, the whole body of miners employed in the cut scatters in all diwhole body of miners employed in the cut scatters in all directions to find a safe retreat in which they cannot be reached
by flying "spalls." A few moments pass, moments of sus by flying "spalls." A few moments pass, moments of sus
pense, usually, to the spectator unaccustomed to such work, pense, usually, to the spectator unaccustomed to such work,
and the sound of the explosion is heard. Sometimes it is a and the sound of the explosion is heard. Sometimes it is a
dull, smothered, almost unheard sound, and the sudden cracking and slight displacement of great masses of the mineral are the principal evidences that the tremendous forces brought into action have done useful work; at other times, a loud crash accompanies the report, and great pieces of ore fly in all directions, and then the miners emerge from their hiding places as suddenly as they disappeared, and go on with their work at hammer and drill or transporting the "won" ore to the railroad. Sometimes, but very rarely, some poor fellow is struck by a falling mass and severely injured or even killed; but such accidents are much less frequent than would naturally be imagined, and when they do occur are, almos; invariably, the result of gross carelessness on the part of the sufferer. At the Iron Mountain such occurrences are almost unknown.
The ore, having been blasted out and broken up into pieces of proper size, is loaded into small cars or "buggies," as they are called, and these are 1 ushed out of the cut and let down the mountain side on a track which guides them to the loading docks where they are dumped, the ore falling into the waiting cars on the siding; and the latter, when full, are made up into trains and drawn away by lecomotives. Were the " buggies" allowed to run down the inclined plane without control, it would, of course, be quite impossible to pre-
vent their destruction at the bottom. A strong iron wire rope is therefore made fast to the loaded "buggy" and, passing around a drum which is controlled by a powerful brake, the other end is attached to an unloaded buggy at the foot of the incline, which is thus drawn up by the loaded one as the latter descends. A man stationed at the brake has their speed under perfect control. There is probably not another speed under perfect control. There is probably not another mining and for getting its ore to market as the one just demining and for getting its ore to market as the one just de-
scribed, and probably none in the world combines such ad scribed, and probably none in the world combines such adore. Shepherd Mountain and Pilot Knob, in the same range one or two locations as yet unworked in the Lake Superior range of iron ores, and a deposit in Rhode Island may at some future time compete, pretty closely perhaps, in some points.
There are two small charcoal blast furnaces at the mine, making iron from this ore mixed with a small proportion of a "leaner" ore obtained from a point distant about thirty miles from Iron Mountain. The iron is of excellent quality

## THE ST. LOUIS BRIDGE.

Returning to St. Louis, we visited the office of the Illinois and St. Louis Bridge Company, and were kindly allowed to inspect the plans of the great bridge which has already been referred to more than once. It promises to be a splendid work, and its completion will entitle Captain Eads and his ingenious and able assistants to a place by the side of the most celebrated engineers of our own or earlier times. They have so successfully surmounted every obstacle that has yet presented itself that it cannot be doubted that those which certainly still lie before them will also be as readily conquered. The substructure is so nearly completed that nothing really difficult remains to be done. The approach upon the St. Louis side is very nearly finished, the piers and abutments are all well up, and the approach upon the Illinois shore has made some progress. The really serious work re maining to be done is upon the superstructure and in its erection rather than in its construction. The bridge, when
completed, will be a splendid structure and one that will be completed, will be a splendid structure and one that will be
of great value to the whole country as well as to the city of St. Louis.

THE MISSISSIPPI STEAMBOATS AND THEIR ENGINES.
We were much interested in the engines and machinery of the steamboats on the Mississippi, but have no space in which to describe their peculiarities in detail. There is evidently frequent application of the " rule of thumb" in con struction, and, particularly on tow boats, some risks accepted in management. Steam is carried fully up to the point pre scribed as a limit by our faulty navigation laws; and, under the circumstances, it can hardly be expected that the most conscientious attention on the part of the inspectors can en tirely prevent accidents.
Some good work has been done, however, and among other noticeable facts is the introduction of the compound engine on one or two steamboats. Properly designed, well built and intelligently managed, compound engines and surface condensers should work well with the high steam and the muddy water of Missis sippi steamboat boilers.
R. T. H.

## Estimating Distance by Sound

To the Editor of the Scientific American:
In a communication published by you on page 84, from J W. Nystrom, he gave a table of speeds at which sound tra vels at different temperatures. It should not be forgotten that it was discovered more than ten years ago that, for very loud sounds, the velocity of propagation depends on its
strength; so thatwhile Mr. Nystrom's table is correct enough strength; so that while Mr. Nystrom's table is correct enough
for ordinary sounds, it is by no means correct for claps of for ordinary sounds, it is by no means correct for claps of
thunder, which are among the strongest sounds with which we are acquainted, and which therefore are propagated with much greater velocity than ordinary noises. Your correspondent is therefore as far wrong as the parties in Philadelphia whom he writes to correct. It was the Rev. E. S. Earnshaw, of Sheffield, England, who first published, in the London Edinburgh, and Dublin Philosophical Magazine (for June, July, and September, 1860,) a profound mathematical investigation of the laws of the propagation of sound, by which he proved that the accepted view of nearly 1,100 feet per second at $40^{\circ} \mathrm{Fah}$. is only correct for sounds of moderate intensity, whatever be their rapidity of vibration or wave length. He proved that the numerical value of a certain function in the theoretical consideration becomes much larger, in case of a
loud clap of thunder, than it is for ordinary sounds; and he then brought in practical evidence showing that the crash of a thunderclap, striking the earth at more than a mile distant, was heard almost at the instant that the flash of lightning was seen. And, probably, it is not an uncommon observation durfng a violent thunderstorm to hear the sound simultaneously with, or very shortly after, the flash of lightning; we are then accustomed to conclude that the lightning fell very near to us; hut if we take the trouble to investigate afterwards into the circumstances, we shall sometimes find that we have to deal with an identical case, as adduced by Mr . Earnshaw, in which the lightning atroke could not be less than a mite distant; so that the assertion of some that the sound of thunder travels a mile a second, as mentioned on page 84, may be true, and not only so, but this valocity may ven be surpacsed.
These theoretical and experimental considerations of Mr. Earnshaw were also practically confirmed by observations made during Captain Parry's arctic expedition. Daring artillery practice, it was found by persons stationed at a connon was heard before the command to fire from the officer,
which latter in this cold and dry climate could also be heard at very great distances. Recently, Mallet took the matter up and made a series of experiments on the velocity with which sound is propagated in rocks, by observing the times which elapsed before blastings, made at Holyhead, were heard at a distance. He found that the larger the charge of gunpowder, and therefore the loader the report, the more rapid was the transmission. For instance, with a charge of 2,000 pounds of gunpowder, the velocity was 967 feet in a second, while with a charge of 12,000 pounds, it was 1,210 feet in the same time.
In the air, the differences between the propagation of an ordinary and violent sound appear much more considerable than in rock. But the fact that thus far we have no numeri cal measure for the comparative intensity or loudness of dif ferent sounds makes it impossible to find a numerical esti. mate for the velocity at these different degrees of loudness. This part of the investigation, therefore, will have to be postponed till we have found a real measure for the intensity of sound in place of the mere impression on our ears. In the meantime, let us be satisfied to know so much as that there is, and must be, a difference in the velocity of propagation; this makes it probable that, near the gun with which we experiment, this velocity is somewhat greater, diminishing as the distance becomes longer or shorter in proportion to the greater or less loudness of the explosion.
I will close by expressing the hope that some experi menters may take up this subject again, in order to verify or annul the last suggestion. I regret to notice that the writers of nearly all of our text books on physics content themselves with copying one another, so that it takes twenty years or more for an important discovery to become incor porated in their publications. I refer here not only to this special subject but to scores of others. I ought, however, to add that Professor B. Silliman, of New Haven, is in this respect an honorable exception. See, for instance, the last edition of his " Physics."
P. H. Vander Weyde.

New York city.

## miscellantous items.

The Commercial Bulletin says: "The question of paying workmen on Monday instead of on Saturday, has attracted considerableattention at the West of late, and some of the manufacturers of Pittsburgh and elsewhere have adopted the plan. That such would be a reformatory measure, all think ing persons will at once acknowledge. With the present custom a workman is too often enticed into dissipation on the Saturday night because he has not to work on the following day, and he has also the financial ability to cater to his immoril and low tastes. This habit thus contracted is the worst enemy to the working man's prosperity and happiness that he has to encounter. In one night and the following day the hard toiling mechanic, who has labored faithfully and intelligently for six days, to earn a few dollars, dissipates away what really represents a portion of his life. Week after week he dives into the filth of dissipation, and each time his constitution and worth as a mechanic are impaired If he did not receive his earnings on Saturday evening he would not have them to spend on Sunday, and the day would be to him what it was designed to be-a day of rest. It is true there are obstacles in the way of this reform, but none that really prevent it from being placed in execution in our manufacturing towns and cities, and we shall therefore look to see it yet in force in many of them.'

The Winchester Arms Company, of New Haven, Conn. recently shipped their first instalment of 90,000 rifles to the Turkish government. Mr. Winchester is now in Europe ar ranging for another large contract.
The great building for the industrial exposition to be held in Louisville, Ky., commencing September 3, is finished, and pronounced sufficiently substantial for all the demands that may be made upon it. It covers a ground area of nearly two acres.
A portion of the nickel used at the United States Mint Philadelphia, comes from Mine-la-motte, Mo. An exploration of the Missouri mines show a deposit five feet deep of a mix ture of nickel and copper. It is estimated to be worth $\$ 600$ England.
In South St. Louis, Mo, blast furnaces are soon to be erect ed. With the great expenditure of money and all the most modern appliances, it is expected these furnaces will be equal to any in the world. The yield from each furnace will be The firm will It will occupy three acres of ground and cost $\$ 450,000$.
George Washington Hinckley, of San Francisco, has recent y obtained a patent for an ingenious oscillating combination of levers for the purpose of effecting, upon the stages of theaters, the rising, sinking, rolling and pitching motions of vessels at sea. So perfect is the imitation that, in connection with the sheet iron thunder, saltpeter lightning, and bellows wind, it makes the actors and actresses sea sick in a short time, and thus spoils the progress of the play. This, however, is not a serious objection, provided the sea sick scene be introduced for the finale.

Erratum.-In our illustration Fig. 3, on page 86, current volume, of the rotary pressure blower, the bases of the air chamber, D, should be represented of thickness sufficient to cover the apertures, C, while passing those points, thereby preventing escape of air from the chamber.

## Business and gexsmal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices
One Dollar and a Half per Line will be charged. Flouring Mill near St. Louis, Mo., for Sale. See back page. The paper that meets the eye of manufacturers throughout Manufacturers of Tacks who wish to sell Tacks in Bulk ca find a steady purchaser by addressing Wilitit \& Field, 27 West Lake street Chicago, Ill., with prices
2,000 a year and Horse and Wagon to agents to sell the "Domestic Steam Clothes Washer." J. C. Miller, Pittsburgh, Pa.
An American chemist, pupil of Hofmann and Bumsen, d sires a situation. Address Leclerc, Cleveland o .
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Power for Steam Yacht—Page 90—W. S. B. will please ad dress J. B. M.. Box 105 N. Y. P. O
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pound, 8 toot lengths. Pugsley, 6 Gold street, New York.
Gauge Lathes for $\$ 20$ at William Scott, Binghamton For Sale-A First Class microscope made by Smith \& Beck, London, with objectives $1 \frac{1}{2}, \%, 4-10,1-5$, and $1-10,3$ eye piecer; $A, B$, and
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1869. Also. Glazier's Diamonds
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field, Mass. Plans of Building, Room 22, Twenty One Park Row, N. $\mathbf{Y}$. Better than the Best-Davis' Patent Recording Steam Gauge For Solid Wrought-iron Beams, etc., see advertisement. ACdress Uwon Iron Mills, Pittsburgh. Pa., for lithograph, etc. Peck's Patent Drop Press. Milo Peck \& Co., New Haven, Ct. For 2, 4,6 \& 8 H.P. Engines,address Twiss Bro.,New Haven,Ct. For hand fire engines,address Rumsey \& Co.,S neca Falls,N.Y. To Ascertain where there will be a demand for new Machin. erg, mechanics, or manutactarers' sapplies see Manufacturing s
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of the best of the wire, the outside, is cut off and $\cdot$ wasted, the poorest part of of the best of the wire. the outside, is cut oft and $\cdot$ wasted, the poorest part of
the wire, the core, only being used; while the swaging process, by condensing the particles of metal, makes the part of the needle which is reauced far superior to the wire itself.
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hemming, cording, braiding, fine and coarse sewing of all kinds, with less machinery and complications than any other maces. Salesroom, ;o7 Broad wo-thirds the price of all other first-class machines. Salesroom, 702
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eautiful work, fine or coarse, as the Wheeler \& Wilson Lock Stitch, or is so readily changed from one kind to another; has sewed wif one that has
been in use 16 years, withouta cent for repairs, and has the same needles been in use 16 years, without a cent for repairs, and has the same needles
that came with the machine, with two others in use 10 years, each withour epairs. Ste has supported a family of three, sonetimes earning $\$ 4.00$ per day, or $\$ 1$ in an
Stitch Ripper.

## Tloteesequagries.

[ We present herevoith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are
orefer to elicit practical answers from our readers.
1.-Iron Rust Stains.-Will some one inform me of the best article for removing iron rust from white cotton and linen goods, an ve dir
2.-Flying Machines.-Has there ever been a successful flying machine invented? Has any book on aerial navigation ever been
pubitished? Has any reward for an aerial ship, to fulfl certain conditions er been offered ?-J. G.
3.- Root Beer.-Can ordinary herb beer be made to run thrnugh a soda draft apparatus, from under a counter or trom a cellar with-
4.-Milling Coins.-Will some of your correspondents are held whille their edges are milled ?-C. A.
5.-Spectroscope and Microscope.-Can any of your readers give me plain directions for constructing a spectroscope, giving
size of prism, and of the telescope required to use therewith in observing ordinary phenomena, soectra of chemicals, etc. I should hike, also, directions for constructing a compound microscope of power great enough detect the animalculce in water. -J. W. W.
6.-The River St. Lawrence.-Can any one inform m If the St. Lawrence discharges more water into the sea than the
or any other river on the North American continent $\%-\mathrm{J}$. $\mathbf{0}$. A.
7.-White Vinegar.-Can you tell me of a process for discoloring cider vinegar, to answer the purpose of pickling as the white
wine vinegar does? Where can I obtain a reliable treatise on pickling and anoing fruit?-L. C. M.
8.-AIr Pump.-In making an air pump, are the glass and the plate it sits on ground together so as to be arr tight, or is there leather
on the plate under the glass? How can I make a single barrel into a double n the plate under the
eting pump?-J. N .
9.-Spontaneous Ignition.-Can any one inform me of ny chemicals which, when combined, will produce an instantaneous fam or light, sufficient to illuminate a dial about 10 or 12 inches diameter?
10.-Linseed Oil for Waterproofing.-Can any one ell me how to prepare linseed oil so that, when put on muslin, it whll make
it waterproof and vill notcrack when bent? I intend to use the muslin io waterproof and ill not crack when bent? I intend to use the moslin in the const uction of a boat, and
the boat air tight.-B. B. B.
11.-Position of Eccentric on Crank Shaft.-I have had an argument with my foreman about the position of the eceentric on Il slide valve engines, be placed atright angles to the crank, while I hol that it should be in that position only with a valve without either lead or
lap, and should be removed from that positi , n according to the amount of lap and lead upon the valve. Will some one decide the case?-M.

## Gusurcts to Correspondents.

SEECIAL NOTE.-This column is designedfor the general interest and in
struction of our readers, not for gratuitous replies to questions of struction of our readers, not for gratuitous replies to questions of a
purely business or personal nature. We will publish such inquiries, purely business or personal nature. We will publish such inquiries
however, when paidfor as advertisements at $\$ 1.00$ a line, under the head of "Business and Personal."

Gilt Dip and Black Dip.-T. H., of Conn., sends an an Waterproofing Cotton Cloth.-A. B. C. should make a dough hy dissolving 1 pound india rubber in 1 1/2 pounds coal naphtha, and
spread this on the cloth as thinly and evenly as possible. Five coat shread be put on, and the cloth doubled together with the rubber coat ing inside, when it
Grinding Lenses.-If E. J. D. will go to a good optician and work with him a year or two, he will learn that turning and pollsh
ing the glass is only the alpha of knowing how to make a high powe

Red AnTs.-To J. C. W., page 30.-Mix a teaspoonful of
crystals of carbolic acid with an ounce of lavender water or any perfame crystals of carbolic acid with an ounce of lavender water or any perfame
and sprinkle well on your shelves, und the ants will undoubtedly skedad die. An occasional sprinkle will keep you free from 'he pests. The per.
fame is not necessary, but is used to cover the unpleasant smell of the fame is not necessary, b
acid. - E. H. H., of Mass
Hardening Soar.-To D. D., page 73.-Add hyposulphite of soda while the soap is hot. Twenty-four parts of this salt added to
112 of a softish soap will make a firm article on the addition of thirty 112 of a softish soap will make a firm artucle o
parts or even more of water. - E. H. H., of Mass.
Removing the Crust of Shells.-To R. I., page 73.-You may remove the outside crust of shells, by immersing in dilute muriatic acid until the layers are dissolved off. Protect the inside if you wish by
brushing over with a little wax and turpentine.-E. H. Permanent Marks in Electro-Chemical Telegraphy.To G. B_M., page 73.-I would suggest brushing, over the prepared pastarch, gum, or dextrin; or even wheaten flour might the solution of would act as a protecting coat from the action of ozone, and would proEably be no detriment in practical working, but possibly an advantage.. H. H., of Mas
Strength of Citric Acid.-To 'T. W. S.. page 90.-Aver age lemon juice contains six to seven per cent of citric acid. Lemons
vary in size; find out the quantity of juice and calculate.-E. H. H., of Mass.

Fly Paper.-To T. W. S., page 90.-Equal parts of molasses and Venic
H. H., of Mass.
Patent Leather.-To S. B. D., page 90.-This is produced by a double operation. First, several coats oflinseed oil and ochre, etc.,
are applied so as to fll up the pores of the leather, and the surface is are applied so as to flll up the pores of the leather, and the surface is
rubbed smooth. Four varnish are put on very thin, rabbed a mixture of boiled oil and copal Varnish are put on very thin, rabbed smooth, and dried at a moderately
high temperature. In tois way the flae gloss is obtained and the surface will not be liable. to crack. Care and experience in this, as in all manu-
fict factures, are required to produce a perfect aricicle.-E. H. H., of Mass. Wire for Sieves.-To A. C. S., page 90 .-Use No. 16 or larger copper wire, and you will find your sieves tolerably durable.-E.
H. H., of Mass. Aniline Inks.-To C. I., page 90.-Generally you will find them to fade on exposure to light, especially to the direct rays of the sun. -E. H. H., of Masa.
Anatomical Specimens.-T. G. H. I., page 90.-These are both dried and preserved in various menstrua. Some are injected in va-
rious ways, so as to show distinctly the arteries, veins, capillaries, etc. rious ways, so as to show distinctly the arteries, veins, capillaries, etc.
Imitations are made in leather, wax, etc.-E. H. H., of Mass. Compressibility of Water.-To L. E., page 90.-Practically, water is not compressible, and this peculiar property renders it of great service where an
less. - E. H. H., of Ma s.
impure Water.-To I. W. L., page 90.-Put into your pitchers a lump or two of fresi charcoal, and allow it to remain a while, or,
better, fllter the water th. ough a good charcoalfilter. There is a filter better, filter the water th. ough a good charcoalfilter. There is a filter
called the silicated carbon filter that $I$ know to be a first class instrucalled the silicated carbon filter that I know to be a first class instru-
ment for this purpose. It probably can be got in any large city. - E. H. ment for this
H., of Mass.
Drying Fruit.-To E. E. S., page 90.-Make a frame building with glass top, like a hot bed frame for raising early plants. Have place your fruit. The sides and bottom being made thick, of brick, etc.,
will retain the heat absorbed during the day will retain the heat absorbed during the day from the sun's rays, and
gradually give it off when he is out of sight. Near the bottom there gradually give it off when he is out of sight. Near the bottom, there
should be a few holes to admit air, and at the top should be a few holes to admit air, and at the top a few to le off the mois-
tureladen atmosphere; that is, a curreat will result turetaden atmosphere; that is, a currest will result, and can be regulated
by stoppiog up as required. I know two such frames used most successfully in this neighborhood for drying a wet paste, and have no doubt it will do for fruit. Take the flue pipe of your stove round such a bullding, and so utilize what now is so much waste heat.-E. H. H., of Mass Fetid Water.-To F. D. H., page 90.-Ynu do not say of What material your cistern is made, nor where the water comes from, what sort of paint about it, etc. Are the pipes from the pumps of iron?
Give more particulars, and I will try to help you -E H. H, of Mass.

## Gerent Smeriaw and forcign zatentr.

Under this heading we shall pubbish weekly notes of some of the more promi.
nent home and foreign patent.
Piston Packing.-Crawford Tibbets and DanielL. Weaver, of Riverton Ky.-This invention relates to new and useful improvements in packing the
pistons of steam engines, and consists in a hollow piston, which is formed istons of steam engines, and consists in a hollow piston, which 18 formed of a body and ends, between which is placed a perforated flanged ring.
Outside this ring are placed metallic packing rings which are turnghed with teel spring rings. Each end of the piston is provided with a passage and valve opening inward. The steam which enters one of the passages opens the corresponding valve and is disoharged into the interior of the piston, rom which it passes through the flanged ring and expands the steel and end of the piston. This occurs while also closes the valve in the opposite end of the piston. This occurs while the piston is travelng in one direc-
tion. At the end of the cylinder it changes its direction, and the action of the valves is reversed. When the steam is shut off from the cylinder the pressure inside the piston closes both the valves and keeps the packing rings et out to the cylinder
Washing Machine. - Moses Walker, of Keeseville, N. Y.-This invention elates to a new and useful improvement in machines for washing clothes, nd consists in an endless revolving washing board which is formed by con on a driving shaft or rolier within a box. A piece of fututed rubber to ar ranged above the washboard in such a manner that a vioratory motion is mparted to it by revolving the driving shait. The clothes are placed be tween the board and the rubber. By means of the endless washboard it
will be seen that anyparticular portion of the clothes may be retained on will be seen that anyparticular portion of
the board and rubbed as long as desired.
Culinary Pot.-John S. Kidd, and Mrs. Mary Melville, of Brooklyn, n --This invention consists of a cluster of two or more independent boiling The form of the sectional pots varies somewhat according to the number of sections in a cluster, but it is always such as to form a suitable figure with the projecting bottoms where they enter the stove hole. The stove cover made with a corresponding cluster of holes, and a cover for each. so tha
when all the pots are not used the u oused holes can be covered. To use th mproved pot on stoves with the ordinary round pot holes, a cover with ap propriate holes in it may be employed, but this is not essential when all the pots are used. These pots are very useful with parlor cook stoves having only one hole: also on ordinary cook stoves in summer, when it is preferre have a small are conctrat under onl
Railiroan SWITce.-John Shafer, of Tunnel Bill, Pa.-This improvemen
in switchesconsists of a novel arrangement whereby the ralls for the main ine maintain their complete form, and do not have the tongue or frog com mon to ordinary switches. One part of the switch consists of a widene and elevated piece on the outside of one of the main ralls, which is so tormed that, in connection with an opposite guard rail, the wheels are hereby torced over from the branch line on to the mainline. A siding is ased to adjust the opposing rail ends. In ranning from themain track on

Washiva Machine.-Francis M. Eliss, of Galva, Illnois.-This invention mprov's the construction of the washing machine for which letters patent
were granted to the present inventor Juae 13, 1871, and makes it more convenient in use and effective in operation.
Pocket Flask.-Rogers George, of New York city.-This invention
furnishes an improved pocket flask which is simple in construction and convenient in use; it is so constructed that the cup mas
flask by the same cork or stopper that closes the flask.
PLow.-Lewis B. White, of Norfolk, Va.-Thisinvention relates to a new plow, which is provided with an adjustable share, mold board, beam, and and manners of preparing the same. It consists, first, in providing the
share and mold board with backwardly projecting slotted ears, whereby
they are secured to the standard, and, owing to the slots, are made adjustthey are secured to the standard, and, owing to the slots, are made adjust-
able thereon. The invention also consists in providing the mold board with detachable extension piecees or wings; also in the use of reversible ap and down adjustable weeders, applied to a longitucinally adjustable and handle so asto regulate the width of furrow and the inclination of the plow share.
PaddLe.-Calvin C. Everson, of Palmyra, N. Y.-This invention furnishes animproved paddle or oar for propelling boats, which is so constructed as to encounter great resistance from the water when moving in the direction
to propel the boat and very little resistance when moving back for another stroke; it consists n making the blade of the oar of two swinging paddles, set in a frame. When pulling the paddles rest on the frame and resist the water. When the motion is reversed, the paddles are thrown outward aud the water passes through the frame
Sllverware Box.-Edmund Steinle, of New York city.-This invention consistsin making the bottom of a silverware or other show box adjusta-
ble and supporting it upon the cover, which is made to correspond in size ble and supporting it upon the cover, Which is made to correspond in size
and to be aetachalle for that purpose. The cover is not hinged to the sides, but is constructed so that it fits inside of them. The bed or bottom for the support of the ware is not attached to the sides, but is fitted so that it can rise up to their top, or nearly so, and it is connected with the side by straps
to prevent it rising too high. By this construction the cover can be taken to prevent it rising too high. By this construction the cover can be taken
entirely off so that it will not be in the way and obstruct the view of other entirely off so that it will
pleces in the show case
Polishing Powder.-Thomas R. Hubbard, of Brooklyn, N. Y.-This in States. Being found in a comparatie deposits of topaz found hat herdess, States. Beng found in a comparatively pure state and of great hardness,
it is admiranly adapted to the abrading and polishing of metals and other mineral and other substances, and its heat-resisting qualities makeit useru in fireproof structures of every kio. The invention consists in reducing
the topaz to a powder more or less fine, and in incorporating it with alumithe topaz to a pforder more or less fine, and
na and silex or clay as cementing materials.
Stair Rod.-Edward Schlichting, of New York city.-This invention relates to a new manner of coistructiog stair rods bymaking them extensible, so as to fit them to carpets of suitable width; and it consists in constructing them in sections which are made to slide one within another telescopically. Dado Plank.-Rufus H. Dorn, of Port Henry, N. Y.-This invention pro-
duces a grooving plane which can be adjusted, without change of knives, to cut narrower or wider grooves; and it consish in the appication, to th plane, of a pivoted cutting blade which can be swung more or less to one
side to enlarge the scope of its action. It also consists in several other details of mprovement, and in the combination with the swinging blade of a
1aterally adjustable spur or marking blade, which is set in accordance with laterally adjustable spur or markin
the position of the swinging blade.
TiLe.-George A. Davidson, of Malden, assignor to himself and Horace
T. Caswell, of Croy, N. Y.-This invention T. Caswell, of Troy, N. Y.-This invention consists in beveling the edges of stone tiles by the saw, so that they can be laid as they
sawing machine without any additional labor whatever.
Sewing Machine for boots AND Shors.- Nathan M. Rosinsky, of New Yors uppers of boots and shoes to the soles; and it consists in certain arrangements of a loop holder with the needle or aml, and in the apparatus tor op-
erating it also, in a novel construction of the feed ap paratus. It is more erating it; also, in a novel construction of the feed ap paratus. It is more
espec ally designed to perfect the machine patented by the present inventor espect tally de
May $16,1871$.
Mosquito Net Framr.-Seymour Hughes, of Jersey City, N. J.-This insteads and for contracting and expanding the same whenever desired. I consists pricinally in the arrangement of a rectangular frame about as large as the bedstead, and in the application to it of a sliding cross bar, to
which the side of the top of the mosquito net is secured. The remaining three sides of the top of the net are fastened to the rectangular frame and in such manner as to vibr ste easily to protect the net, in case it is steppe upon, and prevent it from being torn.
Combination Lock.-James Pigot, of Brooklyn, N. Y.-This invention letters can be used to guide the operator in actuating the lock, and as many different combinations of four may be had as twesty-sixare capable of.
Electromagnetic Motor.-José s. Camacho, of Habana. Island o Cuoa.-This invention relates to a new electromotor, which is appilicable to
the propuision of vehicles, such as railroad cars, small or large vessels, and to the operation of machinery, and other useful purposes. It consists prin cipally in such a combination of a wheel, containing a series of electro
magnets that have an unvarying direction of electric current, with a series of stationary electromagnets, in which the direction of the current is re versed at regularintervals, that, by the cbanged polarity of the stationary
electromaynets, their respective power of atcractionis so changed or rather transmitted from one to the other that the wheel magnets are caused to follow such transmission. whereby the wheel is turned. The invention also
consists in a new current-regulating mechanism; and also in a novel construccion of electromagnets for the purpose of obtaining a larger ratio of power from a given length of
of ordinary electromagnets.
Washing Machine.-Jonathan Hunsberger, of Shippack, Pa.-This in vention is an improvement on those washing machines using a fixed and
swinging board, and consists in so arranging the mechanism which oper ates the movable one that the ribs of one board are made to enter the space
Fruir Box.-William Nicklin, of Mariborough, N. Y.-This invention Purnishes, as an arricle of manufacture, a berry box made of pasteboard b Fish Ноок.-Edward Pitcher, of Brooklyn
Fiss Hook.-Edward Pitcher, of Brooklyn, N. T.-This invention fir
nishes an improved fish hook, which is s, conscructed as to prevent the fis getting off the hook and being lost; it consists in so arranging a doubl wire spear with the ii ie and nook that, upon the fish taking the latter, the sear is pullea duwn and pierces him
Dsaming Frame. - Samu 1 Brooks and John standish, of West Gorton
Eugland -This invention furnishes animprovement Eugland - This invention furnishes animprovement in machinery for pre paring corton and other fibrous substar ces, and consists principsly in
eonstruction und arrat gement of the d vices which constitute the sio, mo tiun of drawing frames, vy which their operation is made more perfect tha heretofore.
sash Holdrr.-Daniel J. La Due, of Carroll city, Iowa.-In this inven metal fitted into them. In one side of the frame is inserted a small metal box which contains a pivoted jaw and a spring. The spring connects with the lower part of the jaw, and tends to draw the roughened upper part of
the same off the sash. A screw, having a pointed end and itted through the side of the frame and box, enters with its point a hole in the jaw. When the screw is forced further in, so that the larger part of its conical point
gradually passes through the jaw, the latter is thereby swung against the sash to lock it at whatever hight it may be desirable to hold it. When the screw is withdrawn, the spring withdraw
the latter to be raised or lowered at will.

Orane.-Gasper Hunziker, of Summit, Miss.-This improvement consists
p pivoting a horizontal crane arm to a vertical shaft below its plane by crossed arms, which extend below the pivot and terminate in a toothed seg
ment, with which a crank shaft and pinion are connected. At each end o the horizontal arm is a grooved roller, and the hoisting rope hangs from one end for engaging the weight and passes over the other end down to the
drum. The loads are raised by the drum and cord, the crank shart being nearly so, by the extension of the horizontal arm across the top of the shaf
so that the side draft on the vertical shafc, common to ordinary cranes, is so that the side draft on the vertical shaff, common to ordinary cranes, is
mostly obviated. The arm is shifted forward and backward by the mostly obviated. The arm is shifted forward and backward by the
segment pinion and crank shaft to adjust it to the work in hand, and the end from which the weight is suspended is thus raised or lowered, as circum nces may require.
Begrsteak Chopper.-Elizabeth Atkins, of Monroe, Louisiana.-This cute angular flutes and arranged horizontally in the same plane for rolling together, one being turned by a crank; they are provicaed with a elearer or discharger below for preventing the meat being carried around with the rollers. One of the rollers is adjustable toward and from the other, and is
provided with an adjusting screw and a soring for allowing it to be self adjusting to some extent as the meat varies in thickness or resistance. Th guided along presented to the rollers by suspending it by the hand above and betwee them.
Water Closet Seat.-Charles Ledwich, of Fishkill Landiag, n. y.-Th object of this iuvention is to improve the mode now ia common use of s .t
ting the bowls of water closets. Theusual mode is to set the flange of the owl in putty, which is liabie to become loose and get displaced. and rende stant reparrs necessary. The difflcal y of getting at the source of the
rouble renders the services of the plumber expensive, while tue gases thus iberated are a constant sjurce of annoyance, as well as detrimental to aith. In this invention all this trouble is avoided by applying a dou cle rubber pack
tight joint.
Strainkr Pipe.-Amos Harris, of Minneapolis, Minn.-This invention re ates to a new manner of perforating pipes to be used in oll wells and other vention consists in grooving the pipe longitudinally on one side, and in atting a screw thread along its other side to such a depth that the spira
roooves are deeper than the material left under the longitudinal grooves This causes a perforation to appear at every crossing of a spiral and longitudtinal groove. A very fine and regular system of strainer is thus pro-
duced, which is cheap to produce, of great strength, and more convevient handle than

Barn Door hanger.-William W. Soden, of Unadilla, N. Y.-This in ention relates to an improvement in door and gate hangers, and consist a grooved rail in combination with a beveled or oval faced roller; the
side walls of the groove are cutor notched down to the bottom at suitable tervals along the rail, and, preferably, on the opposite sides alternately, ot to obstruct the rollers Greoved rails with oval or beveled head roll ers are used in preference to the oval rails with grooved wheels, to sav e expense of forming the grooves in the wheels, as the ralls can be cas with the grooves without any cost for the groove beyond the cost of the
simplest form of casting. Cloth Cotting Macine.-Fredrich Koch and Robert Brass, of Wilcloth of suitable thickness by means of a reciprocating blade, which ha its cutting edge parallel to its line of motion, It consists chiefly in the ar rangement, around the reciprocating cutter, of a circular table which
carries the feed mechanism, and which, when turned, causes also the rotation of the cutter in an equal degree, although it does not interiere with
the up and down motion of the same. The invention also consists in the arrangement of a yoke shaped swivel arm, which holds the upper part o the mechanism, and which is swiveied so that it can be swung to either side out of the way of the cloth which is being fed. This is an tupportant
item, as it permits the catting of large pieces on the machine and in suitatem, as it permits the cutting of large pieces on tue machine and in suita ble direction. It also comprises a new and peculiar manner of imparing
motion to the doubie feed, and to a néw combination of the concentric notion to the doubie feed, and to a new
ubes that embrace the reciprocating cutter
Low Water indicator for Steam Boiler.-Clement Brooks, Norfolk a.-The invention is an improvement in the class of low water indicato crease the reliability of the operation of the actuating devices withou correspondingly increased complication or number of parts.
Hydrant. -John w. Murphy, Baltimore, Md.-The invention consists in connect1 g with a water tight plunger a;central wat r -conveying pipe and
a valve so that the same movement which unseats the valve allows the Water to pass directly up. 2ally. In placing, between an adjustable cap and
its supporting cylinder, the packing that keeps the plunger watertight long time. 3rdy. In placing the end perforated flange by which the hy
drant is firmly held in its box diagonally across the bottom thereof, so as to

Plow.-Edward S. Cook, La ew modes of locking the landside, moldoboara, and share to a skeleto rame so tat they cannot be forced by any strain out of their desired relation mold board may mutually react and support each other against pressure and finally in a peculiarly construct d skeleton fra
Locomotive Smoke Stack. - Keytan J. Duggan, of Montgomery, Ala. In this invention the improved construction is calculated to economize the moval of thestack for cleaning and repairs. It consists principally in join ing the opposed cones of the stack by angle iron rings, by which is support gefor the smoke of about ten inches in widch in large stacks. A wir gauze spark arrester is arranged at the top of the stack.
Car Coupling.-Nathan Swigart, of West Richfield, Ohio.-The object o ailiroads; it consists in a device, for rendering the cars self separating in case of accidents, which operates ss follows: The coupling pin is provided with aluy pin, wnich sta ads at right angles with it, a short distance above
the end of the liok, and is so placed that if the other end of the link drops, or the car falls from a bridge, or by any means beo.,mes so depressed below the level of the tra:k as t , lower one end of the link, the otther end strikes
the lug pin and the link acts as a lever to pry the eouplng pin up, the uath of the drawhead bei $g$ the fulerum. As soon as the lower end of the pha is ralsed from tue 1 lo
he cars are separated.
Grain Metmr.-Archibald McB ide, of Favette, Pa.-This invention far parts: A tilcing h p per made in two parts and provided with a shifting Weight; automatic opening and closing gates through which the hoppers
are dis harged; spouts or hoppers lor holding bags; a shifting or moving ar for working a registering apparatus, and a regulator for controlling the movement of the weight.
HAND SERDER.-Barton W. Harris, of Williamsport, Ohio.-This inven in comprises 2 long lighttrough provided with a strap or cord by whio divided lengthwise into several short concave sections with a feed hole a the bottom of each which is covered by a curved oscillating gate with holes for the seed to fall through and with projections for pushing away any
objects too large to pass through the holes in the bottom of the trou叉h; the objects too large to pass through the holes in the bottom of the trounh; the
gates swing on pivots and have arms extending above the pivots to a rectp-

## Practical Fints to Inveniors.

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 ed themselves of their services in procuring patents, and many millions o
dollars have accrued to the patentees whose specifications and claims the ollars have accrued to the patentees whose specifications and claims they areprepared. No discrimine

## How Can I Obtain a Patent?

the elosing inquiry in nearly every letter, describing some invention comich comes to this office. A positive answer can only be had by presenting complete application for a patent to the Commissioner of Patents. A on. Various offlial rules and formalities must also be observed. Th fforts of the inventor to do all this business himself are generally without
uiceess. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done ove azain. The best plan is to solicit proper advice at the beginning. It the
parties consulted are honorable men, the inventor may setely confide his deas to them: they will advise whether the improvement is probably pat

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patent will be received, usually by return of mail. It is sometimes beet to ave a search made at the Patent Ofllce; such a measure often saves the co

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## [OFFICIAL.] <br> Index of Inventions

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Alarm, portable burglar, Webster and F
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Rake, horse hay, Lynd and Tonsley
Railroad crossing, trog for, S. L. Phelps
Railway rails, chair for street, W. Warne
Reel and swift, L. Weins
Refrigerator, H. D. Little...
Refrigerator, J. H. Munday
Reins, fastening for, R. L. Fraser
Roof freproof, Hodgson and Bro
Rope clamp, T. Pimer.
Ropes and cables, machine for making covered, H. Greenway.
Sash and fastener, window, S. W. Cox
Sash holder, Wright and Cooke
Sasit holder, T. McDonough
Saw frame, w. H ankin..
Saw jointer, W. R. Close
Sawing machine, J. C. Nelson.........
Screen for washstands,C. A. Johnso
Sewing machine, W. H. Hanna
Shoe, gatter, A. Baron.
Shutter worker, S. Duft
Signal, railway,
Sky light, ventilating, J. w. Wersham.
Sleigh runner, T. A. Whiting
Spark arrester, E. Rehling
Stand, lady's. J. N. Miller.
Steamer, agricultural, W. M. Gordo
Steel ingot molds, stopper for, S. T. Willman
Stereotyping and telegraphivg mathine, combined, M. Gally
Stone, manufacturer, of artificial, J. W. Snyder
Stone, machine for breaking and cubing, Brown and Hope
Stove, base burning, J. T. Durkee
Stove cover lifter, L. D. Lathrop
Stove, heating, H. Maranville....
Stove, parlor, E. Brown...
Sunstroke preventer, W. M. Pegram..........
Telegraph apparatus, printing, G. L. Andes
Telegraph receiver and transmitter, automatic, G. Littl
Telegraph transmitter, automatic, G. Litl
Telegraph wire, insulating, J. olmsted.
Telegraphic use insulator for M. G.
Telegraph paper, preparing, etc., G. Little..............................
Textile and other material, machine for cutting. A. Warth (reissue)
Tobacco manufacture
Tobacco, manufacture of, E. and C. F. Robinson and E. E. Andrew 129,73
Toy, N. D. Clark....
Toy, S. N. Trump....
Trap, fiy, F. Stengel
Trunk, D. J. Clark.
Tuck creaser, S. P. Babcock.
Valve, slide, Glasson and Gilfillan
Vehicle wheels, hub f
Vehicles, wheel for, H. Silvester
Wagon bed, v. Wasem.
Wagons, mode of attaching springs to, J. H. Cornwell
Wall, fireproof, s. M. Graff............................
Wall, ireproor, s. M. Graff.
Washing machine, c. H. Sawyer
Washing machine, J. C. Chase..
Water elevator, W. Burdo

Weather strip, S. J. Cilley
Wells, device for extracting broken
DESIGNS PATENTED
6,003.-CARPET.-W. Mallinson, Halifax, England.
6,004.-Carpet.-A. McCallum, Halifax. England
6,006 and 6,007.-CARPETs.-J. Patchett, Halifax, England.
6,008 and 6,009.-CARPRTs.-D. Paton, Halifax, England
6,010.-Corner Piece.-A. Soper, Whitestown, N. Y.
6,010.-Corner Piece.-A. Soper, Whitestown, n.
6,011.-CArpet.-G. C. Wright, New York city.
TRADE MARKS REGISTERED
922 and 922. -Writing Inks.-Adams \& Fay, Cleveland, 0
$923,-$ AxEs,-Bidele Hardware Co., Philadelphia, Pa .

WOAP.-J. Buchan \& Co., New York city
WHisky. - M. Crichton, Baltimore, Md. Liniment.-W. Crow. New York city.
Cigars.-Gaullieur \& André, Key West, Fla
o 930.-Plug Chewing Tobacco.-Harris, Beebe \& Co., Quincy, Ill.
932.-MoLassess, -A. Thomson \& Co., New Orleans, La.

DISCLAIMERS
20,959.-Raillway Switch.-M. Smith. Filed July 18, 1872.
20,927.-Joint For Condenser.-H. Allen. Filed July 20,287
2,0927.-Jolnt For Condenser.-H. Allen. Filed July 20,2872
20,649.-VAPOR LAMP.-A. M. Mace. Filed June 19, 1872.
sCHEDULE OF PATENT FEEB:


APPLICATIONS FOR EXTENSIONS.
Applications have been duly filed, and are now pending, for the extension
of the following Letters Patent. Hearings upon the respective application are appointed for the days hereinafter mentioned:
21,996.-Locomotive Truck.-Levi Bissell. Oct. 16,181
$21,952 .-$ Car Spring.-P. G. Gardiner. Oct. 16, 1872.

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