

## a WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE. MECHANICS, CHEMISTRY, AND MANUFACTURES. $\underset{\text { VNEW SERIES.1 }}{\text { Vol.XXV }}$. <br> NEW YORK, JUNE 15, 1872.

Improved Coffee and Grain Dryer.
We this week illustrate a new machine, invented by José Guardiola, of Chocolá, Guatemala, Central America, for artificially drying gram, coffee, malt, etc., so as to prepare it for preservation, transportation, or other purposes. It is more particularly intended to supersede the common method of drying such articles by exposure to the sun, by materially hastening the evaporation of the surplus moisture. It consists of a new arrangement of cylinders, hot air tubes, etc., for drying the grain, and a ing the grain, and a new construction of furnace for heating the air.
In Fig. 1, A shows the frame of the ma chine, which serves as
a support for two ina support for two inclined perforated cylinders, $B$ and C. The cylinder, B, is so placed that its lower end is above the upper end of the cylinder, $C$, and they are there connected by a fixed neck or conduit, as seen in the engraving. The cylinders are supported on ders are supported on small rollers having their supports in the frame, by which means they can be readily revolved around their axes. Rotary motion is imparted to them by a worm gear working in toothed wheels attached to them, one of which is shown at B. Each cylinder contains an inner perforated tube, which is shown in section in Fig. 2, where $D$ is the outer shell of the cylinder and $E$ the contained tube. It will be seen tube. It will be seen that, between the inner tube and outer shell, there are radial parti tions dividing the cyl inder into segmental compartments. From these partitions, transverse plates project into the compartments and çarry, at some of their ends, wings which are turned alternately inward and outward, as shown in the figure. The partitions and their appendages extend the whole length of the cylinders. The inner tubes of the two cylinders are coupled so that they remain free to revolve with the two hot air flues which project from the heater, F, as shown in Fig. 1. G is an elevator for raising the grain to be dried to the requisite hight; it has one spout extending from the upper part into the open end of the cylinder, B, and another leading downward to a suitable receptacle for the grain. A valve is arranged so as to open whichever spout is to be used, and to shut offthe other. From

the lower part of the cylinder, C , a spout leads into the lower part of the elevator. H is a hopper, from which the grain is

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fed into a vibrating shoe, which empties into a spout leading to the elevator. The heating apparatus, F, has a fire chamber, in which a tubular grate and additional vertical tubes connect the hof air chamber with a cold air supply chamber underneath. The fan, I, supplies the cold air to the supply chamber, whence it passes through the tubes and reaches the hot air chamber, thoroughly heated.
The operation of the machine is as follows: The grain to

The invention was patented through the Scientific American Patent Agency, May 7, 1872. For further information Mr. Guardiola may be addressed, care of Ribon \& Muñoz, 63 Pine street, New York, or care J. C. Merrill \& Co., 204 California street, San Francisco, Cal.

Solvent for Coralline.
The solubility of coralline in an alkaline liquid suggested the propriety of employ. ing soluble glass (basic silicate of soda) which has necessarily always an alkaline reaction, and by the use of which there might be expected to result a compound sparingly soluble in water. The experiment proved successful. Larger or smaller quantities of coralline were dissolved in a boiling solution of one part of soluble glass of a sirupy consistence, previously diluted with four parts of water. Thus were btainedsolutions whic btainedsolution which ave mans ranging from the most delicate rose to the most brilliant car mine. They are well suited for dyeing light colored woods containing but a small amount of tannin, such as Scotch fir, pine, lime, willow, etc. These, without injury to the color, may be subsequently varnished and polished. The same process may be applied to paper intended forthe manufacture of artificial lowers, and for a variety of ornamental purposes These solutions be preserved on or days in a state fit for use If allowed to stand longer, the silica separates itself out from the soluble glass, the solution

## GUARDIOLA'S COFFEE AND GRAIN DRYER

dried is conveyed from the hopper over the vibratory shoe the lower part of the elevator, nd of the cylinder, B. Within this and thence to the upper colors, known in commerce as poncean, soluble in cold water hrough the compartments and gradually conveyed to the like that yielded by coralline. These, even after long stand ower end, from which it passes through the stationary neck ing, do not deposit their silica, and can therefore serve to pre into the cylinder, C, where it is again agitated and moved pare a brilliant red ink. Aniline yellow and vesuvine, on the along, while within the cylinders the grain is constantly sub ected to the action of the heated air which passes from the perforations in the contained tubes into all the compartments hrough through the outer shells. If, after having passed it may be reconveyed the grain shoun passed again through the machine, and this may be repeated as often as is necessa When the ruired derre of drynes is obtained the rain is finally discharged through the proper spout into crain receptacle provided for it. The cylinders may be revolved five or more times in a minute, or slower, according to the requirements of the case. The temperature in the cylinders is ascertained by a thermometer, and regulated by the quantity of fuel supplied to, and the use of dampers in, the heating apparatus. The complicated motions, given to the grain by the partitions, plates, and wings, cause it to travel a distance of about three miles in an hour, and the evaporation goes on rapidly. Coffee, which contains fifty per cent of water, takes from eight to ten days to dry in the sun; it dries in less than twenty-four hours in this machine. Grain would dry in one or two passages through the cylinders.
Mr. Guardiola is an extensive coffee grower, and has invented other machines of great practical value in curing cof fee and like products of Central America. We have been favored with a generous sample of coffee from the Chocolá plantation, worked by Mr. Guardiola, and can personally testify to the plumpness of the berry and its fine flavor when cooked.
We notice elsewhere a coffee huller invented by this gentle man, and we shall present engravings and descriptions of other inventions pertaining to the same industry, from th same source, in future issues.


Our engraving shows a novel form of pestle to be used in hulling rice, coffee, etc., either by hand or machinery. It is
the invention of José Guardiola. of Chocolá, Guatemala, and was patented by him through the Scientific American Patent Agency, April 30, 1872.
The invention consists in making the pestle, which is conical in form, with projecting ribs of various lengths, thereby forming groover, in which the grains work their way upward by friction, and are thus divested of the external husks of pellicles it is no ired to remove.

The pestle is operated by moving it up and down in the mass of grains to be hulled. The grains are thus crowded into and through the grooves, which, it is claimed, acts effec
tively to speedily accomplish the hulling.

## FROM THE ATLANTIC TO THE PACIFIC.

A recent number of Harper's Magazine contains the following interesting description of the cars used on the Pacific Railway:
"From Chicago to Omaha, your train will carry a din'ng car, which is a great curiosity in its way. I expected to find this somewhat greasy, a little untidy, and with a smell of the kitchen. It might, we travellers thought, be a conven-
ience, but it could not be a luxury. But in fact it is as neat, ience, but it could not be a luxury. But in fact it is as neat,
as nicely fitted, as trim and cleanly, as though Delmonico as nicely fitted, as trim and cleanly, as though Delmonico
had furnished it; and though the kitchen may be in the for ward end of the car, so perfect is the ventilation that there is not even the faintest odor of cooking. You sit at little tables which comfortably accommodate four persons; you order your breakfast, dinner, or supper from the bill of fare which, as you will see below, contains a quite surprising number of dishes, and you eat, from snow white linen and neat dishes, admirably cooked food, and pay a moderate price.
"Beyond Omaha, unless you have taken seats in a hotel car, you eat at stations placed at proper distances apart, where abundant provision is made, and the food is, for the stations are under the supervision and control of the manag. ers of the roads, and at many of them, especially on the Cen tral Pacific road-in California, that is to say-your meals are served with actusl elegance. Sufficient time is allowedare served with actual elegance. Suficient time is allowed-
from thirty to thirty-five minutes-to eat; the conductor tells you beforehand that a bell will be rung before the train tells you beforehand that a bell will be rung before the train
starts, and we always found him obliging enough to look in starts, and we always found him obliging enough to look in
and tell the ladies to take their time, as he would not leave and te
" There is a pleasant spice of variety and adventure in getting out by the way side at the eating stations. We saw
strange faces, we had time to look about us, the occasional Indian delighted the children, we stretched our legs and saw something of our fellow passengers in the other cars. Moreover, if you have a numerous party desirous to eat together, the porter will telegraph ahead for you to have a sufficient number of seats reserved; and thus you take your places without flurry or haste, and do not have your diges pushing for a good place. In short, these treins are managed for the pleasure and accommodation of the passengers. The voyage would, I suppose, be unendurable else.
"The sleeping car, but for which the journey to the Paciflc by rail would be extremely uncomfortable, but by whose belp it is made a pleasure trip, owes its development and herfection to Mr. George M. Pullman, who is the inventor and patentee of most of the ingenious devices by which the traveler's comfort is secured in these cars. Of course he is an American. He began life poor, was once a miner in Colorado, and was, I believe, so poor when he began the experiment of his sleeping cars that it was with great difficulty he raised the means to build his first car. He is now president of the Pullman car company, which has five hundred sleeping, drawing room and hotel cars on different railroads, and is building more, at the rate of three finished cars for every week of the present year. The company is also building a new kind of day cars, to be put on such short routes as that between New York and Washington; and by from Chicago to Orden, in which you may sit and sleep and have your meals served at any time you may choose to order them. It is planning, and will fit up this year near Cnicago, them. It is planning, and will fit up this year near Chicago,
extensive car works of its own on grounds large enough to extensive car works of its own on grounds large enough to
contain also the cottages of the thousand workmen who contain also the cottages of the thousand workmen who to be planned with special regard to the convenience of the men and their families. The company has already found it expedient to keep and furnish, near the depots in all the great cities, rooms where conductors or porters may, at the end of a journey, bathe, change their clothes, make out their reports, and read, write, and amuse themselves. Mr. Pullman thinks that, as he requires much from his men, and as they are picked men, trained with care, it is an advantage to the company to furnish them such a home at the ends of the routes of travel, where they make themselves comfortable and at ease. Certainly it is a humane thought and likely besides, to give him the command of responsing. The Rus
"The Pullman cars are constantly improving. sian Grand Duke traveled last winter in perhaps the most commodious and perfect manner in which any one ever traveled by rail. He had in one train a day car, in which he and his.
companions could sit at ease, read, write, or amuse themcompanions could sit at ease, read, write, or amuse them-
selves as in a parlor; a dining or hotel car, into which they passed to breakfast or dinner; and a sleeping car. No doubt the impressions he gct of this kind of pleasure travel ing will facilitate Mr. Pullman's entrance into Russia, where,
as well as in England, Germany, and France, the Pullman as well as in England, Germany, and France, the Pullman
company will within two years have pleced their cars, as arrangements are now making for that purpose.
"The superiority of the American sleeping cars is in their
cleanliness, the perfection of their heating and ventilating
contrivances, and the presence of everything which can make car convenient to live in. There is nothing like them in Europe, and all European travelers in this country have been surprised and delighted with them. The Pullman company successful, as it deserves to be. It now runs cars on nearl one hundred roads, the railroad companies generally owning mutual interest. The Pallman company sells to the public what the railroad company in such cases does not furnishthe sleeping car accommodations. You may now ride in Pullman cars over sixty thousand miles of railroad. The Pullman company already employs over two thousand per ons, and in its new car shops will employ one thousand more; and all this vast business has grown from the small est beginnings.
"One of the pleasantest ways to travel across the continent though not, I think, the way in which you will see most of the people, is to make the journey with a party of friends numerous enough to fill or nearly fill, a car. Wo show you at what cost-exclusive of the regular railroad fare-such company may journey, I give you here somé extracts from a little book issued, for the information of travelers, by the company
For a regular sleeping car, containing twelve open sections of two double berths each, and two state rooms of two double berths each, (in all twenty-eight berths,) with conductor and porter, seventy five dollars per day.

For a drawing room car, containing two drawing rooms having each a sofa and two large easy chairs by day, and making up at night into two double and two single berths three state rooms having each two double berths, and six
open sections of two double berths each, (in all twenty-six open sections of two double berths each, (in all twenty-six berths) with conductor and porter, seventy five dollars per day.
describa hotel car, containing two drawing rooms, as above pen berths, ( and having also, in one end, a kitchen fully equipped with everything necessary for cooking and serving meals, with conductor, cook, and two waiters, eighty-five dollars per day.
"The Pullman hotel car is one of the most ingenious, as well as the most convenient,of modern arrangements for ravel. It can seat forty persons at the tables; it contains ing a sink, with hot and cold water faucets, and every modern convenience'-but a wine closet, a china closet, a modern coset, and provision lockers so spacious as to contain upplies for thirty people all the way from Chicago to the Pacific, if necessary; its commissary list contains, as I ascer tained by actual count, 133 different art:cles of food; it carries 1,000 napkins, 150 table cloths, 300 hand towels, and 30
or 40 roller towels, besides sheets, pillow cases, etc., etc. And unkess you are of an investigating turn, you would never know that the car contained even a kitchen.
Whenever a sleeping car arrives at the end of a journey, it is laid over for twenty-four hours. Thereupon the porter gathers up the soiled linen for the laundry, and a force of men and women enter the car and take out of it bedding, carpets, and every movable thing; all are beaten with rods and hung up to air; and meantime the whole car is aired and the wood work dusted, rubbed, and scrubbed in the mos thorou

The Hartford Steam Bboiler Inspection and In surance Company.
The Hartford Steam Boiler Inspection and Insurance Com pany makes the following report of its inspections in the month of April, 1872 :
During the month, 823 visits of inspection were made, and 1,652 boilers examined- 1,605 externally, and 563 internally -198 were tested by hydraulic pressure. Most of these latter were new boilers, in the yards of boiler makers, which use. 286 were regarded as dangerous. Many of these boilers were in iron works, furnaces, and rolling mills, and were operated by the waste heat, which is often very severe in its effects on boilers. Furnaces out of shape, 51-3 dangerous ; fractures in all, 164-65 dangerous. These cases were found mostly in boilers that had been used for some years and orworked, or in those which had accumulated quantities of deposit, and which were badly scaled. Burned plates,
$82-29$ dangerous; blistered plates, $137-21$ dangerous; cases $82-29$ dangerous; blistered plates, 137-21 dangerous; cases
of sediment and deposit, 166-28 dangerous; cases of incrustation and scale, 200-27 dangerous; cases of external corro sion, 79-25 dangerous; cases of internal corrosion, 36-5 dangerous. Internal corrosion is usually the res alt of impure feed water. Water in and about chemical works is very pools having no such boilers should be fed the works. *We have of late been obliged to condemn the boilers of a large manufactory of this kind, because, upon examination, they the found in a very dangerously corroded condition. When that are pure, that is, free from acids, carbonate of soda has been found beneficial, and is used quite extensively in England. Cases of internal grooving, 47-10 dangerous; water gages out of order, 40-6 dangerous; blow out apparatus defective, $30-5$ dangerous. One great trouble with
this last fitting $i$ s that it is often partly imbedded in brick. work; the valves and connections are poor or defective, and the result is they leak, and the water in the boiler is found
to be low, when the real cause is not understood. Hence the
pipes which connect blow out cocks to the boilers should be easily accossible, and in no case should they be imbedded in masoniy. Safety valves overloaded and defective, 31-23 dangerous ; boilers without gages, 10-7 dangerous; pressure ages defective, 76-17 dangerous, varying from - 10 to + and stays, 44-15 dangerous; boilers condemned, 13 .

## Artists with Bad Eyes

Rarely, perhaps never, has the skill of the surgeon been demonstrated in such an interesting manner as in the recent artistic researches of Mr. Liebreich. This eminent ophthalmist has lately been lecturing at the Royal and London Institu. tions on the effect of certain faults of vision on painting, with especial reference to the woriss of Turner and Mulready. His lectures have excited much interest, especially among artists and art patrons. And his lucid, carefully elaborated demonstrations, which he enforces with almost mathematical precision, lead the great majority of his hearmathematical precision, lead the great majority of his hear-
ers to the conclusions which he has formed. Mr. Liebreich ers to the conclusions which he has formed. Mr. Liebreich
truly says that many connoisseurs elevate the faults in truly says that many connoisseurs elevate the faults in
Turner's paintings into peculiarities of style, and some would Turner's paintings into peculiarities of style, and some would
even go so far as to form a school to imitate that style. even go so far as to form a school to imitate that style.
Turner's earlier paintivgs were not disfigured with the haziness and falsity of proportion which marked his later productions; and these faults the lecturer exactly reproduced to his audience by throwing a landscape or a tree on the screen, and then by interrupting the rays between the picture and the reflection by a lens so constructed as to diverge them to such extent as, according to this theory, they were diverged is known as " astigmatism," that is, the vertical rays and the orizontal rays of light were not brought to his sight at ex actly the same focus. Hence arose the vagueness and incorrect proportions we have referred to. Turner painted from Nature exactly as Nature appeared to him, but not as it apeared to him when his sight was truthful. Mulready's efect was a yellowness in the crystaline lens of the eye which came on with age, and which occasioned a compara ive failure of perception of blue colors. The result was that the artist added his blue tints much too extravagantly, and presented ploughboys in smock frocks as though they had been clothed in purple. Mr. Liebreich's opinions ar ndorsed by many of the ablest scientific and artistic author ities, and, as we said, seem to be conclusively established by his arguments.-Chemist and Druggist.

## Expeditions to the North Pole.

According to advices from Stockholm, the projected north olar expedition, under the control of Professor Nordenski ld, is almost ready for sea, and Swedish geographers enter tain great hopes of success for the new undertaking. Th xpedition will hqve on board, besides Professor Nordenskiold, Lieutenant Palander, of the Swedish navy, who has alread had some experience in polar exploration, having accompa nied the Swedish expedition of 1868 ; also a physician, physicist, and several other servants, who will accompany the expedition for the summer, returning from Spitzbergen in he autumn; making in all, with the crew, twenty persons. The principal object of the expedition, which is not expected or return before the summer or autumn of 1873, is to reach the pole from high latitudes by means of sleighs drawn by reindeer-an enterprise in which the German geographer, Dr Petermann, of Gotha, does not place much faith. The expedition will take with it from Gothenburg a portablehouse, of nine rooms and kitchen, which is to be put up on the Seven Islands, in $80^{\circ} 38^{\prime \prime}$ northern latitude-the most northern point at which an expedition has ever wintered in these regions. Great importance appears to be attached by Professor Norden skiold to the cargo of fifty reindeer, which he will ship from skiold to the cargo of fifty reindeer, which he will ship from
Norway, together with the necessary fodder and a number of Lapps to attend them.
Dr. Petermann and the great majority of the German geo graphical societies have given their entire support to the new Austrian expedition, which is to sail from Bremerhaven about
the end of June, and which Dr. Petermann greets as " the the end of June, and which Dr. Petermann greets as "the reatest event in the history of modern arctic explorations." The object of the Austrian expedition will be the farther avigation of the ice-free ocean which they met with las ummer to the east and north, and the exploration of the arctic ocean to the north of Siberia. The plan of the voyage is as follows: The expedition being provisioned for a period of three years, the first winter is to be spent on Cape Tschelinskin, the most northern promontory of Asia; during the second summer the exploration of the central polar ocean is to be continued, and an effort made to reach the pole; the second winter will be spent on the new Siberian island, and the third summer will be employed in reaching Behring's Straits and an Asiatic or American haven. The Austrian ex peditionary vessel is a three masted schooner, 118 feet long $25 \frac{1}{3}$ broad, $13 \frac{1}{2}$ deep, provided with an effective engine of 95 horse power, and coals for forty days.

A tablespoonful of quicksilver was lately found in an old grave in York county, Pennsylvania. It is supposed to have - bured there in the shape of calomel within the patlent. ure - [ 1 l old times, the doctors sometimes admo mercu rial administration was the blue mass. Either of these pre criptions would account for the presence of quicksilver ; but dosing with calomel would not.-Eds.]

By a single blast of nitro-glycerin, at the Hoosac tunnel, North Adams, Mass., the rock was blown out in the center of heading to a depth of eight feet ten inches.

Nature of the Action in Galvanic Ratteries.
Professor $G$. W. Hough, Director of the Dudley Observa. tory at Albany, N. Y., has made a series of experiments on galvanic batteries, extending over several months, for the purpose of investigating the cause of the decline in the strength of the electric current after the battery has been in operation a long period. It is well known that, since the invention of the American method of recording transits, the galvanic battery has become one of the necessary instruments in every first class observatory. The application of electricity also to the registration of meteorological phenomena makes it desirable to secure the best form of battery, as well as to be able to know what is the diffculty when the battery begins to fail in its work. Some of the leading conclusions reached by Professor Hough were as follows:
1st. In the sulphate of copper battery (Daniell's form) the principal cause of decline in the strength of the electric current is due to the formation of sulphate of zinc.
2 d . The quantity of electricity flowing in the external circuit depends upon the specific gravity of the sulphate of
zinc.
3 d . When the sulphate of zinc approaches saturation, po larization takes place in the battery itself; and, although the electromotive force remains the same, the int
may be increased more than a hundred times.
4th. The sulphate of zinc (or any fluid about the zinc) is nly useful as a conductor of electricity
5th. The copper, or negative metal, is useful only as a con
ductor, since it may be replaced by ductor, since it may be replaced by any other metal, even zinc itself.
6th. The internal resistance of the battery has been separ ated into two parts, namely, that due to the porous cell and that due to the liquids employed. The specific resistance of the liquid was found to be 13; that for a small clay cell, 17, and for a leather cell, 7 . Since the resistance of the leather cell is less than one half that of a clay cell, it has been used in the construction of batteries at the observatory, as the quantity of electrlcity is nearly doubled without any increase of surface. For the negative metal, in place of the copper hitherto employed, we have used sheet lead.
These investigations have rendered it possible to compute, with great precision, the length of time a battery will generate its normal quantity of electricity, provided the amount of electricity flowing in the external circuit is known, and the capacity of the vessel holding the sulphate of zinc is deter mined. The specific gravity of the sulphate of zinc shoul not be less than $15^{\circ}$ or more than $38^{\circ}$ degrees of Baumé
A new mechanism for the more thorough investigation of galvanic batteries has been devised by Professor Hough, but not yet constructed, by which the quantity of electricity
flowing in the external circuit will be recorded in the form of a curve so long as the battery is in action. This subject is one of great interest and importance, and it is proposed by Professor Hough to continue his investigation as circumstan ces may permit.

## Swiss School of wilk Production and

The Swiss Mountain Union, which has for many years been intereated in the milk business, has issued a circular in which it claims that milk production and the care of the mountain pastures are the inseparable factors of the nation's ported in 1868 to the value of $18,674,832$ francs, and in 1869 , to $21,453,796$ francs. The increase of milk products in other parts of the world is alluded to. American factory cheese, an imitation of the English Cheshire, is rivaling its cheese, an imitation of the English Cheshire, is rivaling its
prototype in its home market. Sweden and Denmark have prototype in its home market. Sweden and Denmark have the cheese trade of the world, has established at Utrecht a the cheese trade of the world, has established at Utrecht a
perpetual exhibition of dairy utensils, etc., for the instruction of dairymen. The Austrian minister of Agriculture has given two annual prizes for the benefit of cheese factor associations, while in Vorarlburg, Tyrol, Bavaria, Italy, and Prussia, the latest facts, principles, and improvements are
disseminated by means of itinerant lecturers, fairs, exhibidisseminated by means of itinerant lecturers, fairs, exhibi-
tions, and publications. It is proposed in Switzerland to tions, and publications. It is proposed in Switzerland to adopt this policy in the organization of a school of theoretical and practical instruction in milk production and manage ment. For this purpose, funds are to be raised from the sults are anticipated from this enterprise.

## Mesquite Gum.

Mr. F. Kalteyer, treasurer of the Agricultural and Indus. rial Association of Western Texas, says the mesquite gum of that region is almost identical with gum arabic, having been in use there for medicinal and technical purposes, es. pecially in the preparation of mucilage, gum drops, jujube paste, etc. The past year it has become an article of export, some 12,000 pounds having been gathered in Bexar county, and as much more between that and the coast. No gum is gathered west of Bexar, though the drought was favorable to a large crop. This gum is hardly known east of the Brazos. It exudes from the stem and branches of a mimosa, several species of which grow in Texas, New Mexico, and Arizona. One of these species, Algarobia glandulosa (Torrey tain region of western Texas. The species most common in Bexar county grows from twenty to forty feet high and Bexar county grows from twenty to forty feet high and
eighteen inches thick. From it, charcoal is manufactured. ighteen inches thick. From it, charcoal is manufactured.
It generally used for picket poles, being very durable. It is also made into handsome furniture, the grain being very
fine. It grows where no other fruit tree would live. It was fine. It grows where no other fruit tree would live. It was
favorably noticed in the last annual report of the American favorably noticed in the last
Pharmaceutical Association.

## The Air we Breathe

Dr. Angus Smith has gathered together and published the results of his investigations into air and rain, and those of the experiments made to determins their relative purity or impurity in various parts of the British Isles and on the Continent.
Numerous observers have experimented on the air and calculated the amount of oxygen it contains, and although formerly results differed, owing probably to defects in the modus operandi, latterly the analyses have come much nearer to agreement and minute accuracy. Gay Lussac and Humboldt gave the mean as $21: 0$ volumes per cent of oxygen. Cavendish, by making a series of 500 analyses, arrived at the conclusion that $20 \cdot 833$ was the mean amount, and later ex periments have shown that he was not far out, Graham and
Liebig both giving 20.9. Dr. Angus Smith found, from reLiebig both giving 20.9. Dr. Angus Smith found, from re-
peated analyses, the following percentage, which we extract from his table as characteristic situations :-
On the N. E. slore and heaths of Scotland
20.999
20.947 Outer circle of Manchester (not raining). .
Open places, London, summer........................
In a sitting room, which felt close, but not excessivel In a small roons with petroleum lamp. Theatre gallery, $10 \cdot 30 \mathrm{p}$. m.
Theatre pit, $11 \cdot 30 \mathrm{p} . \mathrm{m} . .$.
Backs of houses, and abo
Court of Queen's Bench.
Under shafts of metal mines (average of many).
When candles go out.
Worst specimen found in a mine.

## Difficult to remain in.

The cursory reader who does not stop to examine what these figures really mean will probablv exclaim: What difondon and that of Scotland-20.999 against 20.950 in air of of oxygen? It is quite true that a mere deficiency of oxygen to the extent of 49-1,000ths may affect us but little, but that to the extent of $49-1,000 t h s$ may affect us but little, but that
deficiency means something more than a mere absence to dhat extent of oxygen; it involves a question as to what has taken its place. Even so slight a difference as that between 20.999 and 20.980 is equal to 190 in a million, and if we put impurity into water at this rate, it amounts to $13 \cdot 3$ grains in a gallon. This amount, says Dr. Smith, would be considered enormous if it consisted of putrefying matter, or any organie
matter usually found in waters. But we drink only a comparatively small quantity of water, and the whole 13 grain would not be swallowed in a day, whereas we take into our lungs from 1,000 to 2,000 gallons of air daily. We must remember, too, that the blood receives the air and such im purities as are not filtered out in its passage, whereas the stomach has powers of disinfection and destruction which ender harmless many organic impurities contained in water But if we take the air found in the pit of the theater, w importance of the minute analysis becomes evident.
In the course of his experiments, Dr. Smith constructed leaden chamber in which the experimenter could shut him self up from the external air. This chamber contained 170 cubic feet of air when furnished with a table and chair, and occupied by one person. On a day when the temperature was $45^{\circ} \mathrm{F}$. no difference in the air breathed was perceptible for 25 minutes; but when drawn from the top by moving an
umbreila up and down, it seemed like a soft wind capable of producing a slightly pleasant feeling, being, however, utterl without the property of producing that cheering and ex hilarating effect to which we are accustomed in a gentle breeze. The air was moist, and a specimen of it deposited water. After an hour, the well known organic smell noticed in a crowded school room was perceptible on moving about minutes, had an unpleasant flavor and strength, and persons who entered immediately the door was opened pronounced it very bad. Still, Dr. Smith says he did not feel uncomfortable, although the percentage of oxygen must have been reduced below the average found in the ordinary circumstances of daily life, showing the seductive and insidious character of breathed air. After a stay of 2 hours 20 minutes in the and the air was found much less ans became more frequent, and the air was found much less agreeable when breathed at the upper part by standing on a chair; at the end of three
hours, the amount of oxygen was reduced to 19.61 . In an experiment with burning candles, it was found that the mount of light was sensibly diminished, and when the candles went out, the percentage of oxygen was found to be $18 \cdot 80^{*}$, and of carbonic acid $2 \cdot 28$. On entering the chamber with candles and a spirit lamp, the lights were speedily exinguished, and it was found impossible to rekindle them with matches, the ordinary wooden ones refusing to ignite. Still, it was possible to breathe without difficulty, although a feeling of discomfort was soon experienced. Afterwards gas was lit and burnt brilliantly; but on entering with candles after the gas had gone out, they were instantly extinguished. Nevertheless, it was still possible to breathe, although when Dr. Smith stood on a chair, he experienced a feeling similar to incipient faintness; " but the senses were not annoyed by anything beyond a feeling of closeness, by no means so unpleasant as a school room." This is an important fact, as
Dr. Smith says, showing almost conclusively that Dr. Smith says, showing almost conclusively that organic matter is the cause of the unpleasantness to the senses on
entering a school room; for there was comparatively little organic matter in the chamber, and the school room would have more oxygen than the chamber, the percentage found in the latter, after allowing the door to open for three persons o enter, being found to be only $17 \cdot 45$. The conclusion to be
*Candles placed in a tin box over water, however, were found to burn till
the oxygen was reduced to about 15.5 per cent: but in the lead chamber the andle
miners incline their candles so that the flame may melt the grease.
drawn from these experiments, therefore, is that the senses are bad and inefficient guides to the wholesomeness of air as regards the amount of oxygen and carbonic acid, save when the former is reduced and the latter increased to such an extent that the luags seem to refuse to expand and the whole vital action is threatened with paralysis. Rooms, badly ventilated, which contain less than 20.7 per cent of oxygen are very unwholesome, and the necessity of taking into consideration the proportion of oxygen and carbonic acid in the sanitary inspection of factories and workshops is abundantly evident from the results obtained by Dr. Smith.

Gathering Nicaragua Caoutchouc
According to Paul Levy, the harvester of caoutchouc in Nicaragua goes to the middle of the forest to look for caout chouc trees (castilloa elastica?), and when he has found one, he climbs to the top of the tree by the aid of a gaucho (a kind of hook) and by means of his gouge makes some zigzag incisions on the principal branches, communicating with each other, to form a kind of general gutter as far as the trunk. The gashes, which go through the bark, are only made on the under side of the branches, but on the trunk they are made all the way to the foot. Some trees give $t$ wenty pounds of caoutchouc the liquid is received in calabashes, where it is coagulated by simply agitating and leaving to itself. To aid in coagulating, the natives use the stalks of certain branchy plants, which allow their sap to flow down and act as a coagulating agent. Caoutchouc of good quality cannot be obtained from trees less than fourteen years old. Unfortunately, the harvesting is done with little care, and the gashes almost always penetrate beneath the bari. A slightly larger yield is obtained but it is destructive to the tree.

## Preservation of Grain in Vacuo

M. Louvel has brought before the French Academy a plan of storing wheat in portable sheet iron granaries, in which a vacuum is maintained equal to at least from three to four nches of mercury, this being found sufficient to destroy all insect life (although a more perfect vacuum is preferred) and to insure the evaporation of any moisture in the grain. The apparatus is of cylindrical form, placed vertically, and with convex top and bottom. The top is provided with an opening through which the inlet of the grain is had, with a valved pipe through which the air is exhausted, and with a gage by which the degree of exhaustion is indicated. The rain is removed through an opening (provided with a suita ble closing device) in the bottom. The pump, which can be ased for any number of the grain receivers, costs about one hundred and eighty dollars extra. In one experiment, where iving insects were introduced in large quantities with the grain, it was found that they were all killed before doin mischief, and at the end of six months the wheat was foun to be in as fine condition as at the outset.
M. Louts La Breche Viaer, of Montreal, has obtained a patent for a new method of manufacturing axes, hammers, and other implements, by first making them of wrought iron and then converting them into steel. The articles to be treated are immersed in a bath of molten cast iron free from sulphur and phosphorus, and carburized to its utmost ca. pacity. The best for that purpose is spiegeleisen, but such cast iron may be made by melting good malleable iron or blister steel in a cupola furnace. The articles are left in this bath a space of time which must vary, with the degree of hardness desired to be imparted to the metal and with the size of the articles, and also according to theintention of converting the whole mass of the metal into steel, or simply of onverting the surface so as to contain a core of malleable conve
iron.
A fearful boiler explosion recently took place at Man. chester, England. Five boilers, each 34 feet long and $5 \frac{1}{2}$ feet in diameter, were arranged side by side, each conniected by a stand pipe with one horizontal steam pipe. Five safety valves were arranged on the horizontal pipe, one directly over each stand pipe; but no safety valves were directly on the boilers. During the repairing of one of the boilers, a workman had plugged up the stand pipe by which that boiler was connected with the horizontal steam pipe, and had neglected to remove the plug at the conclusion of the job. The consequence was that, when steam was raised, a terrible explosion took place, by which several lives were lost and much property destroyed.

Use of Sewer Water as a Manure.-According to the Revue Horticols, experiments with the sewer water of Paris, in the cultivation of certain lands below the level of the city, commenced three years ago, have been of the most sat. isfactory character: and the eagerness that the farmers now exhibit to obtain permission to use these waters on their lands, wherever it is practicable, is justified by the great increase in their value, many of them having previously been of little worth. Thus certain lands now rent for six and seven times as much per annum as formerly.

IT is curious how toothache gradually abates as you get earer and nearer to the dentist's door. It seems almost as if your tooth were an intelligent being which turned coward when threatened, as bullies generally do. In such a case, the tooth has been made to understand that it was menaced,
and has been frightened by a process of telegraphy between and has been frightened by a pro
the mental and physical nerves.

The interior of the Hoosac Tunnel has lately been photographed by the aid of magnesium lights, while the drilling machines were at work.

## GUNPOWDER PRESSURE GAGES.

Amongst the various investigations, to which the great in crease in the dimensions of modern artillery has led, is that relating to the pressure exerted within the bore of the gun by the ignition of the powder charge. The object with which the experiments in this direction were instituted was to de termine the kind and quantity of the powder best suited fo heavy guns. The Committee on Explosions, having the ar rangement of the experiments, used the Rodman pressure gage in the first instance. This gage, we need hardly say
comes to us from the United States, having been devised by comes to us from the United States, having been devised by name. This gage is shown at Fig. 1, and in using it a hole is drilled through the gun at any point in the bore where it is desired to ascertain the pressure exerted by the exploding charge. Into this hole the tube A, is screwed, its lower end, which is open, being flush with the bore The other end is closed with the piston, $B$, the joint being rendered tight by means of the gas check, C The piston carries a knife, D, and upon the knife rests a piece of copper, E, which is held tightly against it by the screw F. When the charge is ignited, the pressure of the gase on the base of the piston forces the knife into the copper, and the indent produced is held to be the measure of the pressure which has acted upon the base of the piston.
The results, however, which were obtained with this apparatus were so exceedingly variable that the com mittee were led to devise a modified form of pressure gage in which som of the causes of error inherent in the Rodman gage were eliminated. Th crushergage, as it is termed, is shown at Figs. 2 and 8, our illustrations having been prepared from drawings with which we have been favored by
 the War Department. This apparatus was made in the Royal Gun Factories, and consists of a screw plug of stee provided with a movable base, Fig. 3, which admits of the insertion of a small cylinder or pellet of copper, $B$, in the chamber, $c, d, e, f$. One end of this cylinder rests against an anvil, A, the other being acted upon by a movable piston, C which is kept well up to the cylinder by means of a smal spring, $i$. The copper cylinder is retainod in a truly centra position within the chamber by means of a small watch spring seen at Fig. 5. In order to prevent any possible leak age of gas into the chamber, the head of the piston is fluted,
as seen at Fig. 7, as is also the body of the anvil, Fig. 4. as seen at Fig. 7, as is also the body of the anvil, Fig. 4 Four small holes, $a, b$, Fig. 3, communicate with a main vent passing through the upper portion of the plug. Against the
lower extremity of the piston a gas check, $D$, is inserted. The lower extremity of the piston a gas check, $D$, is inserted. The
crusher gage is used in exactly the same way as the Rodman gage, being inserted at any required point in the bore of the gun. In the eight inch experimental gun the pressures are taken at intervals along the whole length of the bore, holes being drilled for that purpose. As the gases expand, following up the flight of the projectile, the pressures become weaker, the reduction gradually increasing towards the muzzle as the expansion increases. The forward gages are therefore provided with cylinders made from a softer metal than those used at the immediate point of explosion. In the thirty-five tun gun, the pressures are taken at three points, at the end of the bore, at the vent, and at the base of the proj ectile. The gage for the end of the bore is placed in the

center of a shallow copper pan which is inserted at the muzzle of the gun and carefully pushed down the bore by means of a detachable rod, the same implement being used to withdraw it after a charge has been fired. The vent gage is inserted in the vent hole, while that for the projectile is placed in a hole made in the base to receive it. The gun is fired by electricity, the wires being inserted in the powder charge before it is placed in the gun. To prevent jamming, they are laid along a groove cast on the outside of the projectile, both powder and shot being rammed carefully home together. The action of the apparatus is very simple. Upon the explo. sion of a charge, the gas acts on the area of the piston and crushes the copper cylinder against the anvil. The
mount of compression which the copper thus sustains be comes an indication of the pressure exerted upon the piston. The area of the copper cylinder found most suitable for the ight inch gun is one twelfth of an inch, the piston area bein just double, or one sixth of an inch. In order to obtain dat whereon to base the calculations of the pressures, a series of experiments were made, by means of a testing machine, to de termine the pressure required to produce a definite amoun of compression in copper cylinders, similar to those used in he instrument. The results of these experiments were tabu lated, and they furnish a means of comparison whereby th mount of compression produced in the crusher becomes a part of the bore or chamber where the gage is placed.
The results of experiments show that, in the case of R. L. G. (rifle large grain) powder, the indicated pressure was from $22 \frac{1}{2}$ tuns to 40 tuns per square inch.
During the year 1870, the Russian Government instituted a series of experiments in this direction with $6,8,9$, and 11 inch breech loading rifles, and 15 inch muzzle loading smooth bore guns. The object of the experimerts was to ascertain the comparative action of grain and prismatic powders in heavy charges, and also to determine the charge suitable for each class of guns. The pressures varied with the charge and projectiles, from 11 tuns to 18 tuns per square inch.
These experiments led to the decided preference of pris matic as against grained powder. With equal velocities, the grained powder developed more than twice the pressure ob tained with the prismatic powder. This wide difference, how ever, was only developed when the velocities were very high;
and the higher these ranged, the greater the difference of and the higher these ranged, the greater the difference of
pressure became between the two powders-always showing in favor of the prismatic. The experiments also indicated the great importance of the size of the diameter of the cartridge in muzzle loading guns, and of the length of the powder chamber in breech loaders. For instance, in the 15 inch gun the velocities were equal with charges of 75 pounds and 100 pounds, when the diameter of the first was 12 inches, and that of the last $9 \cdot 7$ inch.-Engineering.

ON ICE, WATER, VAPOR, AND AIR.
[Report of a recent lecture by Professor John Tyndall, before the Royal
Attention was first directed to a large tub in front of the ecture table, containing a freezing mixture of pounded ic nd salt, in which were embedded some iron kottles with plugs screwed into their necks, and a large bomb shell, al of which were completely filled with water. Water, when frozen, expands, and these vessels being completely full, it can only do so in their case by rupturing the iron envelope which incloses it, which the speaker hoped would be the case uring the following hour.
The great body of the light rays from the sun, and even a portion of the dark ones, pass through ice without losing any of their heating power, and when properly concentrated on combustible bodies, their burning power becomes manifest ven after passing through the ice. In an experiment made by Dr. Scoresby, in the polar regions, he succeeded in so concentrating the sun's rays by an ice lens, as to make them burn wood, fire gunpowder, and melt lead; thus showing that he rays of the thing we call radiant heat retain their powe en after they have passed through so cold a substance
Yesterday we succeeded in making a very beautiful ice ens with which we burnt paper, ignited matches, lighted cigars, and exploded gunpowder by the light or by the heat rays-for they are synonymous. I may add, that Mr. Faraday, in summer weather, has been fortunate enough to get sunbeam through an aperture into this room, and after passing it through an ice lens, to explode gunpowder.
I take this slice from a block of ice and place it in this hot mold, and in a few minutes, as you see, we get it beautifully convex. The lens thus made was held in front of the light having its apex a few feet from the lamp and a cone ible; black paper and matches were ignited almost instantaneously when held at the point, and gunpowder was also exploded; thus verifying and repeating with the electric lamp ploded; thus verifying and repeating with. the electric lamp wonderful effects produced by heat which has passed through so cold a body as ice
I want you to take notice of the small still which is at the corner of the table. The small boiler contains water which is now getting hot, but as yet no steam has been formed; the water surrounding the worm is ice cold, and the glass vessel which will collect the distilled water is now quite empty. In a little while I shall revert to this again. Now let us mark the wonderful power of ice to mold itself to the valley through which it passes, as exhibited in the glaciers of Switzerland, where the ice can accommodate itself to the flexures of the valley, and the immense masses of ice, which are the tributaries of the Mer de Glace (the Cascade du Taléfre, the Glacier du Géant, the Glacier de Léchaud, and the Glacier des Périades), weld together and squeeze themselves into the extraordinary small space we find at the gorge of Trélaporte. Is not this a wonderful proof of the yielding power of ice
Now I want to make plain to you the possibility of a substance like ice, being squeezed in this way, changing its form but not its volume, and appearing after that change as solid and homogeneous as before. Below the freezing temperature point it is much softer and more yielding; it can be readily cut with a knife. But there is something more to be observed; ice not only can be cut with ease when it is melting, but it reunites as readily. This curious phenomenon was first observed by Mr. Faraday who found that, when two
pieces of ice with :moistened surfaces were placed in con tact, they became cemented together by the freezing of the $32^{\circ}$ Fab water between them, while, when the ceind could be produced. The freezing was also found to take place under water, and, indeed, it occurs even when the water in which the ice is plunged is as hot as the hand can bear.
Dr. Tyndall then repeated Faraday's experiment. A slice was sawn off a large mass of ice, and then laid on the place from whence it had been cut; a few moments rendered the junction as complete to all appearance as the rest of the block, and the large mass was lifted from the table by the e-united slice. Two smaller pieces of ice were then held losely together in a vessel of warm water, the result being the same as before-one mass of ice in place of two.
It is one of the most valuable features of the science we are studying, that it encourages thinking over facts; by relecting on the se facts, many additions have been made to ur knowledge of glaciers and icebergs. This phenomenon is known as regelation. Icebergs are sometimes formed in the open sea by the linking together in this way of separate pieces of ice, and still more frequently icebergs coalesce and orm huge chains and islands of ice in mid.ocean by the re freezing of the contact surfaces of melting ice
Generalization from these interesting facts led Dr. Tyndall o conclude that a bruised mass of cee, if closely confined, must recement itself whenits particles are brought into contact by pressure; in fact, the whole of the experiments about o be recorded immediately suggested themselves to his mind as natural deductions from the principle established by Faraday.
Professor Bottomley made an experiment recently, which, as it bears upon this subject, I have set going for you. A lock of ice (Fig. 1) wa placed on two uprights, with
loop of wire round it, to which was attached a twen ty-eight pound weight. The wire immediately began to enter the ice and passed right through it, afterwards dropping down with the weight; but the ice remained undivided, and except for a little opacity along the plane
 of passage, showed no signs of ever having been divided
Now let us ask ourselves what must become of the snow ranules when they are squeezed together? Every boy nows that they cohere and form a snowball. Salt will no act so. I; have no snow, but. I can find a substitute for it Snow is frozen water, and so is ice; if I scrape down this ice into a powder, we shall find it a very good substitute. This was done, and in order to make the snowball firm, the first rough mass was put in a boxwood mold and squeezed in the shape of a sphere, by a hydraulic press. The operation was then repeated, the mold being opened and more ice powder, or rather ice slush, being added, each time, until at length a beautiful solid ball of clear ice was obtained, which, from its containing scarcely any air in its interstices, was rolled before the boys as the firmest snowball they had ever seen.
Dr. Tyndall then made a number of experiments proving how readily ice can be molded to any shape. Were the re sult worth the labor, it would be possible to make vases and statuettes, to bend it into spiral bars, or even to form a kno upon a rope of ice by the proper application of pressure.


Two pieces of seasoneu duxwood, A B (Hig. 2), having cor responding cavities hollowed in them, so that when one wa placed on the other a lenticular space, C, was inclosed, had a rough sphere of ice scrapings placed between them, and were subjected to the action of a small hydraulic press. The ice crackled a little, and in a few moments a lens of compactice was taken from the mold. This lens was in its turn placed in the mold. This consists of a block of boxwood having in it a hemispherical cavity, and covered by a second block, upon which a hemispherical protuberance, smaller than the cavi ty, has been turned; so that when the latter is placed in the former, a space of a quarter of an inch exists between both Fig. 3 represents a section of
 he 3 represents a section of the brass pins, $a$ a, fixed in the slab, D E, and entering suitable apertures in the mold, F G, being intended to keep the mold concentric. After the ice was subjected to the hydraulic pressure for a few minutes in this mold, it was having reunited and estab pact cup, its crushed particles having reunited and estab
lished their continuity. The cup was filled with wine to lished their continuity. T
prove the perfect cohesion.
At this point of the lecture, the bomb, before mentioned n some unexplained way exploded; it did not, as was ex pected, burst, but shot out the screw plug with great violence up into the gallery of the theater; the iron bottles were ruptured with very little noise, but were split from end to end, thus impressing the fact very forcibly on the young
-hearers, that when ice freezes it is larger than the water from whence it comes, and that it cannot freeze without undergo ing this change of bulk, which will burst almost anything Two cups were next made in the mold above described, and a piece of sealing wax being placed in one, the other was brought down upon it, so that their pieces met, when a mo mentary squeeze with the lecturer's hand joined them to gether into a hollow globe. Rings of ice, which had been molded before the lecture, were joined to form a chain; in deed, there is scarcely any limit to these experiments if tim would permit.
The effect of subjecting ice to strain and ${ }_{s}^{\prime}$ pressure, when below the melting point, was next demonstrated. This was done by crushing chilled ice in an iron mold; a series of loud cracks announced the rupture of the ice under these circumstances, and at the end it presented itself as a white powder, looking very much like rough salt.
You can now understand how a substance which so readily changes its form under pressure, and so readily re-unites it self when broken, can be forced through narrow gorges, and can accommodate itself to the bendings of the valley through which it moves. But there was another famous theory, which will lead me to say something about another property of ice If you melt a quantity of ice, the water produced is not quite so big as the ice, and if you freeze water, the ice produced is somewhat bigger than the water; and as you have just now seen, the water swells in freezing, and the force with which it swells is enormous. It was this force that some eminent men thought to be the power which urged the glaciers continually downwards. But the glacier is not continually con verting water into ice, as this theory supposes. This experi ment leads me to think that you would like to see water fro zen and a little bombshell burst in a red hot vessel. But you must first give me your attention while I explain the process
Let us look at the still which, at the beginning of the lec

ture, I put in action. You see that in this space of time but a very small quantity of water has distilled; but look at the worm tub, and you see that a large quantity of water which was ice cold at starting has been made itself to steam-by what? By the heat which that small quantity of water contained when it was steam
You can also boil water in one vessel by the steam genera ted in another, and thus actually measure the heating power of the steam. Two wide test tubes (Fig. 4), connected by a piece of quill tubing which, starting from the neck of one, goes to the bottom of the other, were about half filled with water; and a spirit lamp, placed under the first, in a short time created sufficient steam to pass into the second tube; but, however familiar the result, it was almost startling to see how very much more rapidly the second was made to boil, by the steam which was passed into it, than that had done which had been heated by the lamp, and also the minute increase in bulk of the liquid.
The rule is quite general that, when a liquid passes to the state of gas, heat is consumed, and if heat be not supplied, intense cold is produced. Ether poured on the hand produces an extreme feeling of coldness from the rapidity with which it evaporates. And the rule is just as general that when a solid is dissolved, heat is consumed and cold produced. This explains the coldness of the mixture of salt and pounded ice, or salt and snow-the salt causes the ice to melt, and thus produces great cold. Salts which dissolve with great rapidity produce a correspondingly great degree of cold. This has been taken advantage of by many persons who have invented different kinds of freezing machines. That which we have here is by Mr. Ash, and the ice which I turn out has been produced by the absorption of heat by liquefying certain saline substances, without the use of snow or ice.
We are now prepared for an experiment. There is a gas, which is a very heavy one, often found in brewers' vats, at the bottom of deep wells, etc., a poisonous gas; accidents happen sometimes by the men, who go into these vats to clean them out, not taking: sufficient care to see that this gas is first removed. It extinguishes flame, and has many more remark markable qualities. This gas is carbonic acid; now when this gas is subjected to very great pressure, its particles are squeezed closer and closer together, until at length it be comes a liquid. In doing this, the gas gives off a great quantity of heat, the vessels and the pumps becoming very
hot. This you understand from what you saw and were hot. This you understand from what you saw and were
told in the earlier lectures. I have some of this liquid gas in this iron bottle. When the cock is turned on, what takes place? Some of the liquid is immediately turned into gas, and takes up, in so doing, exactly the amount of heat it lost in being converted into liquid carbonic acid; but this is done
with exceedingly great rapidity. Where is the heat, that it requires, to come from? All the tubes and vessels through which the liberated gas passes become intensely cold, the air in the immediate neighborhood is robbed of all its mois ture which falls as snow, but even the heat from thes sources is not enough, and it gets the remainder from itself The total amount of heat, required for part of the liberated gas, is got at the expense of another part, which loses a much heat that it becomes converted, not into the liquid but actually into the solid state.


Dr. Tyndall then allowed some of the gas to blow through suitable vessel (Fig. 5) for retaining the solidified gas, and in a few minutes e derable quantity
The recipient for the solid carbonic acid is an ingeniousl onstructed draw out box, the contrivance of M. Thilorier It consists of a brass cylindrical case, having tubular handles ffixed to its ends. Plates of pierced brass are fixed befor he outlet of each handle us shown by $f f$; these act as sieves, to keep back the jsolid acid and allow the gas to pass out he box has a short tube joined to the side, as in the section drawing, so as to form a tangent to the inner circle of the ase, and opposite to this tube is placed a bent piece of brass, in order to prevent the violence of the inrushing gas from lowing the solid matter into such fine particles as would en able it to pass through the perforated disks. For the pur pose of taking out the solid, the box is made separable, by one end sliding over the other, and retainable together by two obliquely grooved holders placed on opposite sides of the joint. When being used, the tangent tube fits over the noz zle of the gas bottle.
Following out the rule we laid down, if we liquefy this solid, or dissolve it rapidly, the reduction of temperature is now something beyond what can possibly be borne by living reatures. Faraday proved this temperature to be nearly $40^{\circ}$ below the freezing point of water, and he made ill, by putting it under the xhausting; the temperature thus obtained was $166^{\circ}$ below ero, or $198^{\circ}$ below the freezing point of water.
If I hold this test tube with the mixture of ether and car bonic acid in it in the electric beam, you can see, not only the hoar frost upon it brilliantly illuminated, but also that the cold in its neighborhood is sufficient to condense and refrig rate the moisture dissolved in the warm air of this room and in consequence, a miniature fall of snow is produced.
It is plain that a sufficient degree of cold is produced by this mixture to freeze the water in our little glass bomb a e proposed, but how can this be done in a red hot vessel ? Leidenfrost observed that if a sheet of metal, such as this iver basin, is mide very hot, and that then a drop of wate is allowed to fall upon its surface, the liquid does not boil but instead of wetting the surface as usual and fizzing off in steam, it rolls about in a lively way in a spheroida
 shaped mass (Fig. 6). The reason o his is that the temperature of the basin is so high that it immediately converts any liquid that touches it in to vapor, upon which the liquid rests as on a cushion; in fact, the water is ifted up from contact with the hot metal by a spring of its own vapor so that you see the possibility, at any rate, of a very hot and a very cold substance being very nea together, so near as apparently to be touching each other and that, nevertheless, the distance between them may be sufficient for each to maintain approximately its own temper ture
A mixture of solid carbonic acid and ether was then placed in a red hot platinum crucible, fixed in a circular hole in a large plate, to avoid firing the ether vapor by the flame of the lamp, and a glass tube, having a bulb filled with water at its end, was used to stir about the freezing mixture; in a few minutes a solid lump of ice was produced as it were rom the center of a fiery furnace
Some of the peculiarities attending cleavage were then ouched upon. The little atomic bricks which form crystals often arrange themselves in layers which are perfectly paralel to each other, and which can be separated by mechanical means. Rock salt can thus be cut up into layers, and these layers may again be divided in certain other definite direc tions. There are, however, other phenomena to which the erm cleavage is applied, and in some of these the cleavage only takes place in one direction. Sandstone cleaves in planes parallel to its bedding lines. Among the substances capable of cleavage, slate ranks very high; the blocks in which it is quarried cleave with the utmost facility into thin laminæ, which can be split up again almost indefinitely if the instruments be fine enough. Many theories explaining his peculiarity of slate have been promulgated, but at last it was found that the lamination of the mass was produced by pressure, and that these planes of cleavage were invaria ly at right angles to the direction of the pressure
The flattening out of fossils in the slate forms an addition1 proof of the correctness of the conclusion. Some specimens were exhibited, showing the distortion of trilobites and shells.
The same cause, which produces the cleavage planes of slate rock, also produces the veined structure of the glaciers.

The ice of the higher regions is whitish, through the diffusio of small air bubbles within it. At the sides of the glacier and at the bottoms of cascades, this ice is sometimes subject ed to enormous pressure. It yields laterally as the slat mud has yielded, and a laminated structure is the conse quence. On the surface of the glacier, under the medial mo raines, and on the sides of the crevasses, the lamination re eals itself as clear blue veins or streaks drawn throug the whiter ice.

## NEW DEVICE FOR RAILWAY SIGNALS

Our engraving illustrates a new form of railway signal which is now being introduced along the line of the New York Central and Hudson River Railroad.

In Fig. 1, A-the lamp in


Fig. 3 represents the signal post, on the exterior of which is a hand lever, K, working in a semicircular guide and tnrn ing the sheave, J, within the post. 'To the circumference of his sheave, the wire, H , is fastened, passing therefrom over ther sheaves for a distance of from 1,000 to 2,000 feet, until it reaches the lever, described on Fig. 1, to which it is at ached, as shown on Fig. 2
By raising the hand lever, $K$, the sheave is turned, and the orce communicated to the wire raises the lever, $F$, and weight, G, which, by the action of the miter wheels, revolve the rod, C. By this means, the red or danger side of the tar et and the red light are displayed. On returning the lever , to its former position, the wire is loosened, and the weight , falls, turning back the lamp and target
The apparatus was devised by Mr. J. M. Toucey, the su perintendent of the road, and is now in successful operation t many points along the route
vertical balance galvanometer.
The object of this galvanometer is to render sensible to a

arge audience the existence of weak as well as strong cur
expensive or cumbersome accessories, such as a lantern to project a magnified image of the galvanometer needle and scale on a screen, in order to render the deflections more evi
dent.
The chief part of this apparatus is a balance beam, A B, of magnetised steel poised on knife edges, as in a common weighing balance. At right angles to this beam is fixed a long pointer, D , the point of which can be adjusted at zero by means of two thumb screw weights $m, m^{1}$. The sensibility to motion of the beam can be rendered greater or less by screw ing up or down the weight $m^{2}$.
The magnetized beam is placed in the center of a bobbin ring, $\mathrm{FF}^{1}$, of dimensions sufficiently large to render the action of the current on the beam practically the same at whatever angle the beam may have turned through. The sensibility of this instrument will be seen when it is men tioned that the current produced by merely bringing the hand near a thermopile will give a very large deflection The beam of the instrument can be removed and remagnet ized with great facility if its polarity by any means becomes destroyed or reversed. It is necessary, in setting up the in strument, to place it in such a position that the vertical plane passing through the beam may cut the magnetic meridian.
It is sufficient if the part of this plane which contains the It is sufficient if the part of this plane which contains the south pole of the beam makes, with the south pole of the dipping needle, a less angle than $90^{\circ}$.-Mechanic's Magazine.

## Telegraphy without Insulation.

Mr. H. Highton recently read a paper on this subject at the meeting of the Society of Arts in London. He showed by experiment that water itself is for electricity of low tension so perfect an insulator, that a long wire on a plate of copper charged with electricity of low tension will retain the charge even for hours; indeed quite as obstinately as the glass of a Leyden jar retains a charge of high tension. The instrument he proposed to use for submarine telegraphy is a light slip of gold leaf, weighing from one 500 th ts one 2000th part of a grain, acted on by a powerful electric magnet, and with its motions optically magnified. The delicacy of this is so great that simply looking at a thermopile will transmit a visible signal through the resistance of the Atlantic cable, and a kiss or grasp of the hand a very strong signal. So that a modern Pyramus and Thisbe might exchange salutations not through a hole in the wall, but through the breadth of all the waves of the Atlantic. The use of this iustrument gives an opportunity of using electricity of the very lowest tension an opportunity of using electricity of the very lowest tension
which, besides its other advantages, has a much less tendenwhich, besides its other advantages, has a much less that a
cy to escape by faults in the wire. It was shown that cy to escape by faults in the wire. It was shown that
fault which caused the disappearance of all visible sigoals through Thomson's speaking galvanometer, with a resistance oi 500 units, or about 125 miles of the Atlantic cable, would still allow intelligible signals to be transmitted on this in strument with 10,000 units, or 2,500 miles of resistance. The other advantages were the absence of all swing, such as there is in a needle, and an instantaneous movement, in spite of electrostatic induction. Where it requires two or three seconds for the wire to accumulate sufficient charge, to is any friction, however slight, it moves at intervals of seconds by jumps, but the gold leaf, having no friction, begins to move instantaneously and proceeds by an equable motion. Again, where increased sensitiveness is required, the only thing necessary is to incrase the force of the elecro magnet at the receiving end. The conclusion the author drew from
his experiments was that, instead of the hundreds of thouhis experiments was that, instead of the hundreds of thou-
sands of units of insulation of the present calbles, it would sands of units of insulation of the present cables, it would
be quite feasible to work through a cable having only a single unit of insulation; or if greater insulation were desirable a wire might be used presenting much more resistance to the currents, such as a steel wire, possessing more strength and
cheaper than copper, and that electrostatic induction being cheaper than copper, and that electrostatic induction being less injurious, much cheaper, with less gutta percha, cables might be used costing some fifth or sixth of the present prices, and that thus telegraphy might be made mach cheape grants, instead of being the luxury of rich merchants, or speculators, or government officials. £50 a mile ought to provide a wire, sufficient for all purposes, of any required length.

## Vitrified Marble.

The material itself results from the admixture, and melt ing together in a furnacs, of equal parts of certain vitreous and silicious substances in about equal proportions, to which are added, at a suitable stage and in the requisite quantities, such coloring materia's as will 'produce the desired effecte, either as a plain body color equally diffused throughout the mass, or in veins of one or more colors wibh or without ground. When in a semi-fluid state, while yet hot, small or large masses of this plastic matter are cut off and pressed into iron or steel molds carefully formed to the desired shape In this manner decorative objects of any size, shape, or ap pearance can be prod
The manner in which natural materials of all kinds can be imitatively reproduced is extraordinary; ordinary marbles, veined and other, porphyry and malachite, jade, lapis lazuli ete., thus prepared are, if anything, more real than the genuine objects themselves, and have the advantage of being in forms that could only be obtained out of the originals with
great labor, waste, and cost. They can also be obtained and great labor, waste, and cost. They can also be obtained and applied in bulk and solid masses, as for vases paper weights, inkstands, table tops, etc., or in minuter portions, such as pateræ and tesseræ, or amorphous pieces for mosaic work in
every variety, suitable for dadoes, pavements, etc. For the every variety, suitable for dadoes, pavements, etc. For the
latter purpose, the vitrified marble paving possesses an impor-
tant advantage over marble and encaustic tiles, in relation to the surface, which is rougher and more safe and pleasant to tread upon, giving good foothold and equable wear, while
lending itself to every pattern, regular or the reverse. And lending itself to every pattern, regular or the reverse. And it is not only in respect of mere surface patterns, but also of raised designs and molded forms of every species, that this ness of definition and accuracy of detail, of which it admits are alike noteworthy.
It cannot, moreover, be said of this invention, as of so many others, that the fairness of its promise in conception is marred or belied in practical application. On the contrary, it is ufficient to say that the most eminent architects of the day have given their testimony, in evidence of its merits, by
adopting it in leading works, which are alike monuments of their skill and of national objects. Mr. G. Gilbert Scott, for xample, has made use of it largely in the bosses and gem orthe lecorative work of the Royal Albert Memorial in Hyde Park; and nearly 2,000 of these ornameuts have been
introduced therein, studding and decorating the work with introduced therein, studding and decorating the work with equal brilliancy and effect. Jesse Rust, of 15 Coleman street
E. C., London, England, is the patentee of the above maE. C., London, England, is the patentee of the above ma terial.

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Mas Rualtor's a
respondents.

## Petroleum and Coal

To the Editor of the Scientific American:
I find, in your paper of May 25th, an article copied from the Petroleum Monthly, in which the statement is made that o coal beds, capable of being worked, are to be found with in fifty miles of the oil producing territory. This, to the il men of West Virginia, is indeed a startling assertion, as we obtain all our fuel from the same hills on which the wells are located; and, within the present month, an instance oc curred wherein a party engaged in boring struck, as they upposed, a crevice of five feet, and knew no better until a miner came up and informed them that their auger had come through and, barely missing the mule, had disabled their car by falling through it; in another instance, a well, deserted as non-paying prior to the introduction of torpedoes, was leased by other parties; and in attempting to tube it, the hole was found obstructed and a man was sent into the coal bank about 100 feet below; andit was found covered with a pile of slates. In both these cases, the vein was about five feet hick and of a very good quality of bituminous coal. All the wells located on the hills pass through at least one vein of coal, and most of them through two veins; in some cases these amount in all to nine feet in thickness. It seems in these amount in all to nine feet in thickness It seems in
credible that any one should undertake to write on a subject in which he is so lost as to assert that "in boring for oil, no oal has ever been found even in the smallest quantities.' Again, the writer asserts that there is no evidence that petroleum is not derived from bituminous coal loy distilla ion. If such were the case, could we not reasonably expec to find at least a trace of petroleum in the rocks adjacent to the coal? But the facts are that at least one hundred fee of strata intervene before we reach the first rock in the least mpregnated with petroleum. Nor do we have any reason to believe that it is derived from the limestone, as we have the best authority that limestone under high pressure does not part with its carbon on being heated, no matter how intense the heat; and we do not find the oil in the limestone but above it, in the sand rock. He admits, also, that carbon oes enter into the composition of petroleum; put doe ydrogen, to any extent, enter into the composition of coal or imestone? And if not, whence is derived the hydrogen to onstitute the hydrocarbon? He tben asseris that petroleum is certainly a mineral oil," an assertion which the fact do not warrant, as geologists agree that $c, s l$ is of vegetable origin. Again, as to the reproductive po arer of wells; if he will take into account the increased experience and facilities, added to the fact that, in all territory where surface water is not allowed to flood the wells, the salt water is becoming xhausted, and oil which was held back is allowed to flow down to the bed rock and reach the wells, also the fact tha much of the oil is not in crevices but merely confined in the porous sand rock, and, as the cavities are emptied, it oozes out where it reaches the pump, he can readily account for his "reproductive power." I am not in the habit of catch ng folks on pin hooks, but when I see an article going the rounds of the scientific papers, so at variance with the plain acts of the case, I feel called upon to refute it, as my idea f science is that it is "truth demonstrated"
As one who has spent years in the oil regions and tried to rrive at the facts, I might say much that would at leas have the merit of being scientifically correct, but I defer fo the present, being firm in the conviction that enough has no been said to arrive at the " Origin of Petroleum," a knowledge of which would assist, as well in the location as in the work ing of the wells.
G. W. S.

## The Rubber Tip Pencil Case

## To the Editor of the Scientific American:

My attention having been called to-day to your editorial on he decision of Judge Benedict in case of the Rubber Tip Pencil Company vs. S. D. Hovey et al., I desire to correct sevral errors thereia contained. First, this case is wrongly re ported both in your paper and the Patent Office Official Ga zette. Judge Benedict declined to hear the above case, and
it came before Judge Blatchford in April, who dismissed the it came before Judge Blatchford in April, who dismissed the
bill with costs. The only case heard or decided by Judge Benedict was the case of the Rubber Tip Pencil Company
from the case against Hovey, as it contained no question of estoppel and was decided nearly two months prior to Judge Blatchford's decision. Your most serious error, however, is n construing Judge Benedict's decision into an opinion that attaching rubber to a pencil for erasing purposes, for conve nience, is not patentable; for the learned Judge says nothing which can possibly be construed into such an opinion. Blair did not claim to be the inventor of $\cdot$ attaching rubber to pen cils for erasing purposes, but only claimed to be the first in ventor of a rubber cap or tube (or as Judge Benedict de scribes it, " a piece of rubber with a hole in it") which could be applied to a pencil. If Blair had contented himself with laiming rubber on a pencil, the result might have been di ferent, but in claiming it broadly, off or on, he claims nipples and every style of rubber with a hole in.
As I fully agree with your views as to the patentability and importance of the invention of combining rubber with pencil for convenience in erasing, and as I believe Judge Benedict has the same views, I deem it but justice to him to correct these errors, into which almost every casual reader o this decision has fallen.

Samuel D. Hovey,
President of Goodyear's Rubber Head Pencil Company, 205 Broadway, New York.

Novel Method of Indicating a Hot Journal. To the Editor of the Scientific American:
My ingenious and able colleague, Dr. Mayer, has recently been experimenting, during the course of an interesting investigation, upon a number of substances which change color on raising their temperature and regain their original hue when cooled.
Iodide of mercury is one of these substances, and he sug gests that if a bearing, to which access is difficult while machinery is in motion, or which, for other reasons, cannot be conveniently reached by the hand and its condition thus nown be painted with iodide of mercury or some such ma terial of changeable color, its darkening when the journal heats, may make it a valuable indicator. Its change-from bright red to black at about $70^{\circ} \mathrm{C}$.-would attract atten ion from a considerable distance
I have sent you this suggestion, as I have no doubt that it may prove very useful to some of the readers of the Scien ific American. R. H. Thurston.
Stevens' Institute of Technology, Department of Enginee ng, Hoboken, N. J.

## Sea Sickness

To the Editor of the Scientific American
In your issue of May 18th, you have an article on sea sick ess which attempts to give a philosophical explanation of the phenomenon, namely, pressure of blood upon the brain uring the forward pitch of the vessel. Sickness from swing ing is referred to the same cause. The proper position to lie on board a pitching vessel is given as being with the head oward the bows, etc. In all the cases referred to, the mo tion was either rising and falling, or gyrating.
I was a witness and a sufferer in a case of sea sickness, wherein the conditions were so different from all other cases ever heard of that I thought them worth the consideration f those who wish to account for sea sickness, especially a could not see how the above explanation could account for this case.
Some time ago, while riding ir the cars between Cleveland and Columbus in Ohio, one side of the engine became dis abled and all the work fell upon one cylinder. All went wel enough till we came to an up grade, when the engine stopped with piston at the dead point. The engineer con trived to start again, but the motion, for every revolution o the drivers, was alternately fast and slow, being almost noth ing at the dead point, crescendo e diminnendo. In a few min ates I began to feel sick, and as the train did not move faster than I could conveniently walk, I got out and kept along with it. I was soon joined by others who said they were sea sick, and I suppose that half the passengers in the car I was in felt the symptoms of sea sickness, which lasted as long as the irregular motion. Now this motion was straightforward, no pitching, rolling, swinging, or turning and no position that could be assumed would avail against its unpleasantness. There was nothing about it to determin the blood to the head rather than anywhere else, as far as I e. I submit the case to those whose business it is to plain it.
a. E. Dolbeak.

Anomalous Spectra.-A recent number of Poggendorff's Annalen contains a short but iateresting paper by Christiansen of Copenhagen, in which he states that a hollow prism filled with the alcoholic solution of fuchsin produces a high ly anomalous spectrum, which, instead of proceeding regularly from the red to the violet, like the ordinary solar spectrum stops at a certain point, returns backward, then stops again and resumes a direct course to the end. Kundt finds that an omalous spectra are given by all the anilin colors, and by permanganate of potash. Such spectra generally turn back upon themselves, having the green at one extremity, the blue being situated between the green and the red.

Public Clock Regulators at Paris.-In the various squares and public places of Paris, instruments are being put up for the regulation of clocks and time pieces. This little invention of M. Detoushe, the well known clockmaker, called
the equatorial quadrant, appears to be a complete epitome of practical astronomy, as by it the true mean solar time can readily be determined anywhere, on the spot. M. Detouche has supplied numerous models of his invention, adapted for a variety of situations, and the little instrument is said to be coming into very general use.

## corks and cork cutting

The cork tree is a native of Spain and Portugal, being found in the latter country in large numbers in the vicinity of Lisbon. A recent visit to that capital afforded us an op portunity to inspect the method of obtaining this useful material directly from the trees, and a stroll through some of the cork cutting establishments in this city enables us to trace the progress of the bark from the time it is remove Cork is the soft cellularinterior bark found in a peculiar Cork is the soft cellularinterior bark found in a peculiar
variety of the oak (quercus suber). It lies inside of the exterior variety of the oak (quercus suber). It lies inside of the exterior
woody covering, growing from year to year as the diameter of the tree increases. During the first fifteen or twenty years of its existence, the cork contains considerable wood, which impairs its elasticity and renders it unfit for use, so that
until the tree has attained the above mentioned age, the mauntil the tree has attained the above mentioned age, the ma-
terial is not fit for the market. After that period, the cork terial is not fit for the market. After that period, the cork
begins to die. Its growth ceases, and the trunk, continuing begins to die. Its growth ceases, and the trunk, continuing to increase in diameter, splits it, off in layers which are re moved every eight or ten years, the quality of them the pro improving by age. The tree does not suffer from the pro The cork is removed by first making several longitudina clefts up and down the trunk, and then girdling the latter by horizontal incisions. The bark is pounded, detaching it from the tree, so that afterwards it is easily removed by the wedge-shaped handle of the axe used for cutting. This labor is done almost entirely by a peculiar tribe of nondescript be ings, either Indians or gypsie. who, originally inhabiting the
mountainous regions in the north of Portugal, seem at pres mountainous regions in the north of Portugal, seem at pres
ent to have abandoned their wild life, as they perform most ent to have abandoned their wild li
of the menial work of the country.
The layers of bark as they are removed are first soaked in water and then blackened over a coal fire, the object of this proceeding being to make the surface smooth and at the same time to conceal any flaws in the shape of knots or cracks which may be visible thereon. They are then pressed and finally packed on lighters, for transportation down the Tagus river to the warehouses of Lisbon. These lighters are vessels of peculiar shape, as they are of very broad beam though having a sharp bow.
Thwartships the boat, poles are placed quite close together on which the layers of cork are heaped to a hight of fifteen or twenty feet, often loading down the lighter until the water reaches her gunwale. The means of propulsion is a three cornered sail, and the crew consists usually of three men,
dressed in a highly picturesque costume, who contrive by the aid of long oars to manage their craft, in spite of the strong tide which often renders navigation a matter of difficulty.
After being received at the warehouses, the large sheet are cut into pieces of about three and a half feet in length, eighteen inches in width, and ranging from one half inch to three inches in thickness. Drying and packing in bales weighing one hundred and fifty pounds each follows, and the ork is ready for exportation.
We next find it in the hands of the cork cutter in this coun try, who pays from five to twenty-five cents a pound for the rough material in the bale. As the latter is unpacked, the slabs are inspected and assorted according to their sizes and quality, those of the finest texture being of the greatest value They are then placed in a steam chest and steamed, by which process the material is softened and rendered easy to cut. A the same manner as an ordinary circular saw, now divides the the same manner as an ordinary circular saw, now divides the
sheets into narrow lengths and again cuts them into small squares-the dimensions of the latter being governed by the size of the corks into which they are to be made. It is well known, that, in order to cut cork, a drawing motion must be given to the knife. Crushing strokes simply break off small pieces, and attempts to whittle the substance will show still more plainly that the knife edge must be drawn lengthwise and not forced downward. It is on this principle that cork cutting machines are constructed. Steel mandrels, made hol low, with cutting edges like those of a shoemaker's punch, are made to revolve with great rapidity. Pieces of cork pressed against their cutting edges become almost immediately smooth perfect cylinders. These are placed in groove on the circumference of a wheel which, working automatical ly, carries each cork to a point where its ends are received by a small lathe. The cork is then revolved slowly, while a large circular knife removes a thin shaving, thus giving it the nec essary taper and a surface as true and smooth as if sand-pa pered. As fast as a cork is finished by the automatic lathe $t$ is released and another substituted in its place.
Some manufactories do not make use of the mandrel and automatic lathe as above described, but employ another form of machine which is much simpler in arrangement though less efficacious in action. It consists of a horizontal revolving knife of some two feet in diameter arranged on a frame with belting, etc. The workman, sitting in front of the machine, places one of the square bits of cork, which have been previously cut of the required size, into a revolving spindle by which it is firmly held. This spindle is raised a measured distance and the edges of the cork come in contact with the revolving knife, which pares them off, leaving the cork in perfectly cylindrical form.
The operation is performed with great rapidity, the machine urning out some fifty gross per day. The size of the cork depends upon the distance the above mentioned spindle is aised, and the consequent quantity of the square piece which the revolving knife is permitted to remove. All sizes can be made on this machine, from the tiny stopper of the homœo pathic vial, scarcely one quarter of an inch in diameter, to the
four or five inch flat cork used to close jars of chemicals, etc. four or five inch flat cork used to close jars of chemicals, etc.
The shavings made by these machines are all utilized-
either as stuffing for cushions or life preservers, linings for refrigerators-cork being an excellent non-conductor of heat or cold-or for placing between floors or walls of buildings to deaden sound. Ground finely and mixed with india rubber, hey also make a durable floor covering, resembling oil cloth. The finished corks are sold by the gross, the present prices being 10 cents for the smaller vial sizes, $\$ 3$ to $\$ 5$ for the fine qualities used for closing champagne bottles, and from $\$ 10$ to $\$ 12$ for the extra large varieties. The use of machinery for this industry, introduced in this country in 1853, has proved a great saving of hand labor. It has been estimated upply New York alone with corks, if all had to be made by hand. There are at present 60 manufactories in the country cutting and supplying corks to the value of $\$ 2,250,000$ yearly

## THE NEW RAILROAD BRIDGE AT ALBANY.

The largest double track iron bridge ever built in this country has recently been completed, and now spans the Hudon river between East Albany and Albany. The work was commenced on May 24th, 1870, and the first stone of the sub structure was laid on the succeeding June 25th.
The main bridge is 1,525 feet long, and consists of seven pans over the basin, thirteen feet three inches each from center to center of piers; four fixed spans over the main channel, 185 feet eacb, and a draw 274 feet long, with two penings of 111 feet each in the clear. The curve of the bridge over the basin is on a radius of 710 feet. The main bridge is thirty feet above low water, and eight feet above high water mark, and is constructed on a vertical curve hav ing a rise in the middle of fifteen inches. The whole length of the bridge, together witk its approaches, including an em bankment crossing Van Rensselaer island, on the east side of the river, is 2,250 feet, thus being equal to 4,500 feet of single track bridge. The abutments and piers are built on pile foundations, 160,000 yards of stone being used in their conconstruction. The draw weighs 700,000 pounds and can be worked either by steam or by hand, the engine and boiler of en horse power being located beneath the roadway.
The superstructure consists of 2,000 tuns of iron, mostly wrought, its trusses being twenty-six feet apart in the clear The tension bars are made of double refined iron, and the fabric is calculated to stand a load of 6,000 pounds per lineal oot, exclusive of its own weight. The strain to which the bridge would be subjected under this load would not exceed ne sixth of the breaking weight. It is estimated that the structure would sustain a continuous train of locomotives on ach track, reaching from end to end of the bridge.
The entire cost of the structure was one million dollars. It is at present used for the crossing of freight trains and also for foot passengers, pathways on either side of the tracks being provided. The regular trains of the Hudson River road will not discontinue crossing the old bridge until the new epot in Albany, which has just been begun, is completed. Messrs Bagley and Hilt, both well known bridge builder ere entrusted with the supervision of the work, and $M$ Charles Hilton of Albany was engineer-in chief.

## Hints on Coloring Photographs

The increasing demand for colored photographs, either as artes de visite, stereoscopic enlargements, or slides for the magic lantern, opens a suitable field of labor for the educa ed of either sex: in fact, they are the only fit persons to un dertake it, as it requires a lightness of touch not generally oossessed by those accustomed to labor. But none can hope succeed without some degree of talent, and who have had a sufflcient practice in the use of colors to enable them to paint a tolerable picture without a copy, not a vile travesty o forded to school pupils. No particular box of colors, howeve prepared, will bridge over the want of experience.
Should any wish to follow this branch of art, let them color a prepared photograph to the best of their ability, and hen show it to some respectable publisher, who will, no doubt, give an honest opinion on its merits; and should this ,e adverse, unless the time and expense of further practice an be conveniently spared, it would be better to lay asid he idea, otherwise time might be wasted, during which op The greasiness of the surface of albumenized paper offers The greasiness of the surface of albumenized paper offers by adding a little prepared ox gall to the colors used, or even y adding a little prepared ox gall to the colors used, or even
by passing the tongue over the surface. The greatest drawby passing the tongue over the surface. The greatest draw-
back I have found has been the difficulty of obtaining purity of tints in the half shades and reflections of the flesh, owing to the muddy brown color to which the print has been toned sort of smudge, which no transparent color can remedy This, and the tendency of silver prints to become yellow by ge, has often caused me to consider whether it might no be better, when they are especially prepared for coloring, to use some other process which would give more favorable tint for working upon. As I believe any variety of tint can be iven in carbon printing, this, with its permand, probably greatly increase the expense of a single copy only.
When oil colors are to be used, two or three coatings of weak size, made of gelatin, should be given to the print beforehand, and allowed to dry. As in water, transparent color an be used, and the effect much improved by touching the high lights with opaque ones.
In portraiture, should the painter be sfficiently master of his art to paint a good picture in the usual way, he will find it much better to use the photograph as a copy than as a sub tratum.
Transparencies on glass must always receive a weak coa
f varnish before coloring, otherwise dabbing in the skie will do injury to the impression.
It should be understood that there is a great difference be ween coloring-that is tinting-a photographic print and painting upon one; the former requires little more than tasty manipulation, the latter the skill of a well trained artist.
Retouching negatives also offers suitable employment especially for female artists, as it requires light and delicate handling. I should think that an artist capable of retouching from the life-that is, taking sittings from customerswould be consilered a desideratum in many photographic establishments, and be liberally remunerated.-Photographic Neros.

## How the California Fields are Plowed

The fields are plowed with what are called gang plows, which are simply four, six or eight plow shares fastened to a stout frame of wood. On the lighter soil, eight horses draw a seven gang plow, and one such team is counted on to put in 640 acres of wheat in the sowing season; or from eight to
ten acres per day. Captain Gray, near Merced, has put in ten acres per day. Captain Gray, near Merced, has put in
this season 4,000 acres with five such teams-his own land this season 4,000 acres with five such teams-his own land
and his own teams. A seed sower is fastened in front of the plow. It scatters the seed, the plows cover it-and the work is done. The plow has no handles, and the plowman is, in act, only a driver; he guides the team; the plows do their own work. It is easy work, and a smart boy, if his legs are equal to the walk, is as good a plow man as anybody-for the team turns the corners, and the plow is not handled at all. It is a striking sight to see ten eight horse teams following each other, over a vast plain, cutting " lands" a mile ong, and when all have passed, leaving a track, forty feet wide, of plowed ground. On the heavier soil, the process is omewhat different. An eight horse team moves a four gang low, and gets over about six acres per day. The seed is hen sown by a machine which scatters it forty feet, and ows from seventy-five to one hundred acres in a day, and the ground is then harrowed and cross harrowed. When the farmer in this valley has done his winter sowing, he turns is teams and men into other ground, which he is to sum mer fallow. This he can do from the first of March to the middle of May; and by it he secures a remunerative crop for the following year, even if the season is dry. This discovery is of inestimable importance to the farmers on the drier parts of these great plaias. Experience has now de monstrated conclusively that, if they plow their land in the spring, let it lie until the winter rains come on, then sow heir wheat and harrow it in, they are sure of a crop; and the summer will have killed every weed beside.

How Summer Suits should be washed. Summer suits are nearly all made of white or buff linen, pique, cambric, or muslin, and the art of preserving the new ppearance after washing is a matter of the greatest impor tance. Common washerwomen spoil everything with soda and nothing is more frequent than to see the delicate tints of lawns and percales turned into dark blotches and muddy treaks by the ignorance and vandalism of a laundress. It is worth while for ladies to pay attention to this, and insist pon having their summer dresses washed according to the directions which they shiould be prepared to give their laundresses themselves. In the first place, the water should be tepid, the soap should not be allowed to touch the fabric it should be washed and rinsed quick, turped upon the wrong side, and hung in the shade to dry, and when starched (in thin boiled but not boiling starch) should be folded in shests or towels, and ironed upon the wrong side as soon as possible. But linen should be washed in water in which hay or a quart bag of bran has been boiled. This last will be found to answer for starch as well, and is excellent for print dresses of all kinds, but a handful of salt is very use ful also to set the colors of light cambrics and dotted lawns and a little ox gall will not only set but brighten yellow and a little ox gall will not only set but brighte
and purple tints, and has a good effect upon green.

## Boiler Explosions.

Our esteemed correspondent, John Wise, of Philadelphia Pa., in the course of a letter on this subject, makes the fol owing communication
"Why not make boilers egg-shaped? At all events, make them strong enough, as are made the big guns of warfare, so that they may bear, not double or treble their nominally guaranteed pressure, but strong enough, like Perkins', to
bear a red heat, and then we shall no longer call for daily bear a red heat, and then we shall no longer call for daily coroners' juries to inquest the steam boiler slain.
It is seldom we hear of a steam chambered fire box explo sion. And why? Because they are well braced and staytion as to form and material as to its work and incidents, and then, and not untii then, will explosions of steam boilers become rare."

An exchange says: "Cleveland has inverted a patent bug buster, worked with an air pump. All the apertures in a room are stopped but one, at which the deadly bug buster is placed. By exhausting the receiver, a current of air is pro duced strong enough to draw all the vermin out of the room hrough the air pump, into the hopper, where they are put nder the influence of chloroform, and stabbed in the back with a pitchfork."
We regret to hear of the death of Dr. Perry Prettyman who was one of the pioneers of civilization in Oregon terri tory. He migrated thither in 1847, and continued to reside here till the day of his death, March 27 , ult. His age was 76, and his life has been made useful to his country by many
inventions and improvements. 76 , and his life has been made
inventions and improvements.

Improved Ice Machine
The invention we illustrate consists of improvements in the method of, and machinery for, making ice by artificial means. At A is shown a tank, which is constructed of an outer chamber in which the freezing material is placed, and of an inner chamber to contain the water to be frozen. B is an air pump connected by a pipe with the freezing chamber in the tank; C is a vessel filled with oil or other hydrocarbon, into which the air from the freezing chamber is conveyed by a pipe from the upper part of the tank; $D$ is a second oil ves sel, which is connected by a pipe with the first; E E are two vessels having weighted covers; they are connected by pipes with the oil
vessel, $D$, and also with the air pump, vessel, $D$, and also with the ai
$B$, as shown in the engraving.
B, as shown in the engraving.
The freezing substance considered preferable is bisulphide of carbon, al though ether, rhigoline, or chloroform may be employed. The operation is as follows: The airisforced by the pump $B$, into the freezing chamber in the tank, A. There it passes through the bisulphide of carbon and becomes sur charged with it, abstracting the requisite addition of heat from the water chamber. The heat and vapor of the bisulphide are then carried, with the air, into the oil vessels, C and D "wher they are eliminated and the air puri they are ell is ir air puri fied. The puried air is from which it is returned to the air pump by weight ing their covers after closing the inlet cocks. The oil, when it has absorbed as much heat and bisulphide as is ex pedient, is drawn off and distilled, and the agent employed is re-obtained in its original quantity and purity. By the means described, the air is quite, or very nearly, restored to its original pu-
ity and temperature before it is carried back into the freezing liquid, and difficulties attending the use of other similar apparatus are thereby overcome. A further improvement in the process consists in depriving the air current of the aqueous vapor with which it is always more or less charged, and which forms frost and ice in the pipes; this is accomplished by passing the air over chloride of calcium placed in the bottom of the pipe leading from the pump to the freezing chamber. The invention was patented through the Scientific American Patent Agency by W. R. Johnston and W. Whitelaw, April 30, 1872. For further information, address the Whitelaw Ice Machine Company, Memphis, Tenn.

## BUNKER'S METAL CUTTER

Our engraving illustrates a new machine for cutting metal with rotary knives, which is appropriate for tinners' use, and also for cutting iron that is too heavy for ordinary bench shears to act upon.
Fig. 1 shows the general arrangement, in which A and B

are two shafts which carry the cutters. The top one, A, is adjustable, by means of screws, to any required distance from the lower one. The two are geared together, as shown in the engraving, and turned by the handle, C. Fig. 2 shows enlarged views of the cutting and feeding apparatus attached to the ends of the shafts. The circular cutters, D D, overlap each other, so as to cut shear-fashion. Behind the cutters are rings or cylinders, E E, which press upon, and serve to feed, the metal to the cutters. The operation will be fully feed, the mith it is thour fully understood withot further explanation. It is thought this machine will prove very useful for cutting off stovepipe, and for cutting out the holes for doors in stoves and furnaces. Several of the forms cut by it are shown at the foot of Fig.

1. Patented through the Scientific American Patent Agen1. Patented through the Scientific American Patent Agency, April 30, 1872. Further information can be obtained of
the inventor, Mr. A. S. Bunker, 288 Common street, Lawrence, the inv
Mass.

## Trial of Agricultural Implements

The Ohio State Board of Agriculture have appointed a trial of agricultural implements and machines, to take place at Springfield, June 18, 1872. The following is a list of classos designated for competition, with the premium for the best of each description: Plow for ceneral purposes, stubblo
plow, sod plow, double plow; premium in each case, a silver medal or $\$ 20$. Subsoil plow, hill side plow, one horse plow, double shovel plow, a premium for each of a silver medal or $\$ 10$. Steam plow, practical utility of operation to be fully demonstrated, $\$ 50$; improvements in plows, diploma. Two horse grain drill, $\$ 40$ and diploma ; one horse grain drill, $\$ 10$ nd diploma; garden seed drill, $\$ 5$; horse power corn plant er, $\$ 20$ and diploma; potato planter, $\$ 5$; potato digger $\$ 10$ wo horse corn cultivator, $\$ 20$ and diploma; one hors $\$ 10$ ultivator $\$ 10$ and diploma; farm read and crusher, $\$ 15$; harrow, $\$ 10$; mole or blind ditching ma-

A Simple Plan of Polishing Photographs.
Certainly a great number of my colleagues who have es yed the collodion and gelatin process for finishing photo raphs have met with many difficulties and uncertainties in erent to the method, and have, consequently, thrown it up was so with myself, and I went back again to an older plan of enamelling, which I had previously employed
In the year 1865, I met with a photograph which had ema nated from the studio of M. Dauthendey, of Wazburg, the picture being a bust with white oval margin upon a black ground. The photograph possessed a magnificent polish, and was of a very brilliant character; and experiments that I made with pape varnishes, etc., were all fruitless in giving the degree of finish possessed by the Dauthendey picture. Finally I came upon the following plan: I mounted about a dozen carte print upon a card, covered them with a so lution of gum-or, better still, gelatin -and when they had dried and been rolled and retouched, they were pol ished with a solution of white shellac in spirits of wine. This operation wa conducted as if it was a question of furniture polishing, a rag being moist ened with the liquid and rubbed to and fro over the prints for some time The pictures, after standing the night were again subjected to a second polishing.
Whenever the rag exhibited a ten dency to stick to the surface, a minute quantity (say half a drop) of almond oil was applied to the photograph, and the operation of polishing continued The photographs are subsequently cut out of the card. It is better to polish a number of small photographs at

## MACHINE FOR MAKING ICE

, $\$ 20$; post hole borer or digger, $\$ 5$. In giving premi ums on plows, the following points will be considered: Gross draft, weight, loss of power in overcoming friction net power required to cut and turn the furrow slice, width of furrow slice, depth of furrow slice, comparative draft, simplicity of structure, materials, workmanship, durability price, superiority of work. Competition is invited from all parts of the Union

## DURAND'S BURETTE.

This little appliance is the invention of M. Durand, of Saint Ouen, department of the Seine, France. Its operation will be readily understood on reference to the annexed illustration, in which $a$ is the body of the can, $b$ the long curved spout and $c c_{1}$ a small tube in the form of a seg ment of a helical coil. This coil is affixed to the cover of the can and has one end, $c$ open to the air, and the other $c_{1}$, open to the inside of the can. In using the oil can when full of oil, all that is necessary is to cover the external aperture, $c$, with the humb, which prevents any flow of oil from the spout, which is sufficiently small in diameter to prevent contrary currents When it is desired to supply any lubrica voir, it suffices to uncover the aperture $c$, and thereupon the oil will flow in a small stream from the spout until the atmospheric pressure is again cut off from the in terior of the oil can, after which no single drop will escape This oil can is ingeniously simple and effective, and has been reported upon most favorably by a committee of the French Academy on Mechanical Arts.

Sea Weeds a Thousand Feet Long
The Agassiz expedition, at the latest accounts, was off Sandy Point, Patagonia. Among the scientific curiosities noted by some members of the party were immense quantities of kelp, the Macrocystis pyrifera. This is the largest known alga or seaweed, and grows on these coasts in from six to twenty fathoms of water, in vast beds, warning the mariner to beware a near approach, unless he wishes to be entangled in an inextricable net work. It throws up from the oceanic depths stems of immense lengths, some of them from seven hundred to one thousand feet, the greatest development reached by any member of the vegetable race now in existence. Patches of this seaweed were passed in open sea, with large sea lions lying on its surface, who were apparently navigating in this novel manner with much satisfaction to themselves, and who afforded much amusement to their scientific observers.

## False References.

A firm, hailing from Mississippi and purporting to be en gaged in the business of selling patents under the style of Z. P. Dedrick \& Co., are making unauthorized use of the name of Munn \& Co. as a reference for their responsibility. Patentees will do well to keep clear of parties stiling under false colors.

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ay Park Row, New Yerk.
one time like this, as a large surface is
more easily operated upon than a smaller one. The proces is, probably, the same as that of M. Dauthendey, to be purchased for a honorarium of four florins
The method, as already stated, is much to be preferred to the collodion and gelatin enameling process, so often recom mended.-C. Hoffman.

## DYNAMIC REFRIGERATOR.

Mr. J. B. Toselli, of Paris, France, has invented a cooling nachine, which he calls the "Dynamic Refrigerator." It consists of a revolving disk, D, formed of a metallic tubs bent into a complete spiral, having one end open, and with the into a complete spiral, having one end open, and with the
other end communicating by a hollow shaft or axis of rota ion with an external tube, A, communicating with a worm contained in a separace vessel, C , and terminating in a discharge pipe, B, with outlet into another vessel, E, containing the revolving disk, to which a slow movement of revolution is imparted by a driving pulley and belt, G, making, say, one turn in a second of time. The disk is half immersed in cold water, and as the exterior surface of the disk above water is continually wet, it exposes considerable evaporating surface At the same time a continuous stream of water is forced through the hollow spiral, parting with some of its heat un der the influence of the external evaporation and radiation, which is intensified by the addition of a ventilator, F .


The current being thus lowered in temperature, refrige rates in its turn the líquid to be cooled in the vessel, C. The lowering of temperature thus obtained varies according to the hygrometric condition of the atmosphere; the minimum effect obtained, under the most unfavorable circumstance, amounts only to a difference of $5^{\circ}$ to $6^{\circ} \mathrm{Fah}$., while themaximum difference obtained in sunlight is between $32^{\circ}$ and $33^{\circ}$ Fah.
This machine is obviously calculated to be of great service in many manufacturing processes-such as for brewing, distilling, and effervescent beverages-also in hydrotherapeutic establishments; and probably also on shipboard for the evaporation and distillation of sea water, and its conversion into a potable fluid.-Mechanics' Magazine.

Acoustic Experiment.-Let a wide glass tube, open at both ends, be taken, and in this a piece of fine wire gauze be pushed up some little distance. If the gauze be now heated tortdness, over an ordinary Bunsen burner, and then removed, it will shortly emit a shrill note, lasting from five to ten sec onds. The experiment will be new to most of our readers, and has the merit of always going off.--Journal of the Eranklin Institute.

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meteorites, their origin
It is a most curious but, notwithstanding this, a well es tablished fact that sometimes stones fall from the sky, and formerly the most absurd hypotheses were invented to explain their formation, in the upper strata of our atmosphere, by the condensation of vapors of solids, as hailstones ar formed by the congelation of the vapor of water. Toward the end of the former century, La Place sought their origin at a greater distance; he concluded that as gravitation on the moon is some four times smaller than on the earth, $i t$ might be possible that the volcanoes there could prope stones with such a force as to go beyond the limits of luna attraction into the sphere of terrestrial gravitation, as a ve ocity double or triple that which we can give to a canno ball would be sufficient to accomplish this result; this hypothesis was accepted for a time, notwithstanding the objection of astronomers and chemists, the former proving that the observed velocity of the bodies and the force with which they strike the earth were much greater than they could possibly obtain from a source so near as the moon; in fact, astrono mers proved that aerolites possess a planetary velocity Chemists, from their side, pointed out that the chemical composition of aerolites was by no means that of matters ejected from volcanoes, but that they were compounds of
metals, as found in earth, but combined in a way different metals, as found in earth, but combined in a way different from any terrestrial mineral known; in fact, that the greate number of aerolites were imperfectly mixed alloys of iron and nickel, with 4 to 14 per cent of phosphorus, the iron being on the average present in the quantity of 60 , the nicke of 21, per cent. Chladni, in the beginning of this century founded his theory in regard to the origin of the aerolites on the opinion of Kepler, who maintained that there were more comets and smaller bodies of different kinds flying about in pace than fishes in the ocean. Chladni's theory was that, in the interplanetary and interstellar spaces, small masses of solid matter are moving about in countless numbers, either in regular or irregular orbits, and that when they happen to come within the sphere of gravitating attraction of any planet, they will fall towards the surface with a velocity the resultant of their own planetary velocity plus the newly acquired velocity of gravitation, minus the resistance of the air which surrounds the planet. On reaching its surface these velocities are destroyed, and the necensary consequence is the evolution of heat, this being nothing but molecular motion, the metamorphosis of mass motion when the latter heat of the masses when picked up immediately after thei fall, while the train of fire exhibited in many instances is easily explained by the consideration that they originally may contain comhustible substances which had no chance to burn in the highly rarefied interplanetary medium; but, coming in contact with the oxygen in our more dense atmos phere, and that with the immense planetary velocity, the friction, combined with chemical action,
The latest theory in regard to their origin is that of Proc tor, in England. It is based on the recent investigations of the solar atmosphere by means of the spectroscope and telescope, which show that continually the most gigantic erup tions take place in the solar surface, throwing up gaseous
matter containing iron vapor,etc., at an initial velocity of more than 500 miles per second to a hight of over 200,000 miles. Proctor thinks that if any denser material is ejected from the bowels of the sun by these explosions, it will never re some time around some planet, and finally descend on the same, as the meteors do on earth. If this view be correct the specimens of meteoric iron preserved in our cabinets are ieces of the sun.
If we take in account that the spectroscope shows that the most prominent substance in the sun is iron, and that the same is the case in the meteorites, that they are combined chiefly with nickel, another metal found in the sun, forming an ally not found on earth: that they also show a peculia crystalization, and in general a common origin, the view i by no means so improbable, however startling it may be; it moreover sustained by the unanimous testimony of all modern observers, who affirm that the solar eruptions sur pass in immensity any volcanic eruption which ever take place on earth, or which, in past ages, must have taken place on the moon.

## THE EIGHT HOUR STRIKE IN NEW YORK

The progress of the eight hour movement here, which until recently appeared successful, has encountered a check which bids fair to result in defeat. Elated by the easy ictories gained over the smaller employers, the striker ave carried the war to the doors of the great manufacturing frms and corporations. But here a strong opposition ha been encountered. Hitherto the action of the strikers ha been characterized by but few breaches of the law, and th public has been led to believe that the revolution migh effected without the usual recourse to riot and violence This in the beginning was the opinion held by us, but the ate reports of the new position taken by the workmen in dicates that our city is likely to be disgraced by acts of law essness.
This eight hour movement affects every working man in the land, and unless all or a very large majority of the la boring classes afford it an unwavering support, the accom plishment of its design isimpracticable. This encouragemen from other localities has not, with the exception of a few trifling instances, been accorded. The leaders of the upri ing are fully aware of this fact, and, stung by disappoin ment and at the same time forced to contend against un ooked-for and powerful resistance, they rush desperately to he last extremes, and endeavor, by threats of personal vio ence, incendiary documents, and other methods of brutal
intimidation, to enforce the ends which they have failed to ccomplish by peaceful measures.
We marvel that any sensible mechanic can lend himsel to such proceedings and virtually take the bread from the mouths of his family or devote the little sum he has lai aside for a rainy day to the furtherance of such principles. Organized gangs of malcontents have of late infested the urreundings of our large manufactories, seeking to induce he operatives, by persuasion or argument, to join thei ranks. Now, however, their policy seems to have changed, nd with the utmost audacity they enter the buildings, pread through the shops, and compel the workmen, who nay be perfectly satisfied with their hours and their wages, to abandon their labor; and this in direct contempt of the emonstrance of the manufacturer or corporation on whose premises they may be trespassing. The hands having been nticed away or forced to quit work, the next proceeding i declaration of terms on the part of the League to the em ployer, coupled with the information that, under no othe circumstances save a compliance with the demands therei et forth, will he be permitted to continue his business.
The outrageous nature of these claims is illustrated by th ollowing requisitions made to Mr.J. G. Batterson, the builde of the Masonic Temple on the corner of 23d street and Sixth avenue in this city, and communicated by him to the Hartford Times. Mr. Batterson had last fall resisted the trike at his quarry at Westerly, R. I. and has ,continued to ut granite under the system hitherto maintained, with ertain number of apprentices and last year's rate of wage He carried that through successively and is now met by th one cutters in New York with a declaration that he can only e permitted to carry on business in this city by complyin with the following exactions: 1st. He must throw away al he cut stone which has been wrought during the past six or eight months by "non-society" men and apprenticesmounting to about twenty-five thousand dollars in valuend have it all done anew out of new stone by "union" society" men. 2nd. He must reimburse the various trades nions who contributed money to support the striking work men in the Westerly quarries, or, in other words, he must pa them all they expended in the attempt to break him down d. He must dismiss all apprentices and recognize the powe of all trades' unions. Extra emphasis was given to these re quirements by the smashing of various ornamental parts of he cut stone about the building. Mr. Batterson refused acquiescence, appealed to the police for protection-and also continued work with men from his quarries at Westerly.
The detail of a force of police to insure the security of the Masonic Temple and also to protect other threatened point called forth the memorial from the League to the Governo which, as a specimen of matchless effrontery and insolence we have never seen rivaled. Like the Southern confederacy, he strikers wish to be "let alone," and they protest against he unwarrantable interference of the police in their peaceful ccupations of closing factories, threatening employers, and ffering personal abuse and violence to workmen who refus to agree to their wishes.

We sincerely trust that the Government, both municipal nd State, will invoke the full power of the law to repress and punish every act of violence these men may attempt. mple protection is due to every workman who wishes to continue his labor at old rates; the entrance of committees and delegations into factories should be prevented, and any riotous movement should be crushed with a promptness and severity that would teach these organizations, and bring home to the minds of trades' unions generally, the fact that the use f violence as a means of coercion is beyond their powers and that irresponsible associations, however numerically reat, have no more authority than single individuals to abridge or violate the rights of the citizen.

## HE PNEUMATIC RAILWAY BRAKE AND OTHER APPLI CATIONS OF THE PNEUMATIC SYSTEM

The pneumatic railway brake, or Westinghouse brake which for several years past has been so successfully used on the principal railways in this country, is now attracting great attention in England, where it is considered a remark able improvement. It is the invention of Mr. George West inghouse, Jr., of Pittsburgh, Pa. It is used on twenty thou sand miles of railway here. It has lately been adopted on the Caledonian railway of Scotland, a first class company. A the Caledonian railway of Scotland, a first class company. A
locomotive and train of six cars has also been recently fitted ocomotive and train of six cars has also been recently fitted
with it on the St. Albans branch of the London and Northwith it on the St. Albans branch of the London and North
western railway, and on both of the above roads the inven western railway, and on both of the above roads the inven tion has been subjected to the severest practical tests. The
train, running at a velocity of 50 miles per hour on a level, train, running at a velocity of 50 miles per hour on a level was stopped in 16 seconds after turning the air on, winh distance of 260 yards. On a down grade of 1 in 68 , train run
ing 60 miles per hour, the stop was made in 23 seconds, within a distance of 308 yards.
The invention, it will be remembered, consists in having an air reservoir placed under the locomotive, in which reser voir a supply of compressed air is maintained by a steam pump. The compressed air is conducted, through lines of ouble pipes, to a series of air cylinders or engines, one of which is placed under each car for the purpose of working he brakes. In order to apply the brakes, the engineer sim ly turns a cock which admits air to all the brake engines in he train at once. Nothing could be more effective or conve ient. An air pressure of 70 lbs . to the square inch is main ained in the reservoir
The practical applications of the pneumatic system are be oming yearly more and more various and extended. I London, there are now in operation some nine miles of neumatic tubes, for the conveyance of letters, etc., unde the surface of the streets. For some ten or twelve years, passenger trains were regularly operated on one of the Parisian railways by the pneumatic plan, while in Grea Britain, during a series of practical trials with the sam system, passenger cars were propelled at a velocity a high as sixty miles per hour. It is true that this method of propulsion has not yet been reduced to the same point of economy that is realized with the steam locomotive; but there are situations where the employment of steam is for special reasons so undesirable that even at an in creased expense, a good substitute becomes necessary. As for example, for city railroads, the pneumatic plan, which urnishes rapid speed and pure air, is decidedly preferabl o a steam road, which whether placed above or below round is more or less of a nuisance to everybody
Another important application of the pneumatic system elates to rock drilling, and is now very extensively employed for that purpose. It was used in the boring of the grea railway tunnel through the Alps. It is also employed at the tunnel now being bored through the Hoosac moun ains, Massachusetts, which, next to the Alpine tunnel, is th argest work of the kind. The pneumatic drills are also used in boring the net-work of tunnels under the East river, a Astoria, N.Y. In all of these examples a pneumatic pressure of about 60 lbs . to the square inch is used
Another very beautiful and successful application of the pneumatic system is employed in the construction of the foundations of bridges under water. The great bridge ove the Mississippi at St. Louis is an example, the foundations of which were carried down, one hundred and thirty-six fee below the level of the water, by the maintenance of a pneu matic pressure within the caissons of some fifty-two pound the square inch. The same system was employed here in the sinking of the foundations of the Brooklyn suspension bridge.

## IRON SHIP BUILDING IN WILMINGTON

Among our maritime manufacturing cities, Wilmington, Del., must now be held to take a very prominent position During the last eight or nine years, the energies of her capi italists have been directed to iron shipbuilding, and great uecess has resulted from their efforts.
The city is naturally well situated for shipbuilding pur poses, and the facilities for obtaining iron are unexcelled. Two railroad lines extend to the mining regions of Penn sylvania, and the ore is brought by them directly to the shipyards. The latter are all located on the Christiana Creek-a wide and deep stream which forms a junction with e Delaware River at Chester, Pa. Adjacent to Holling worth and Harlan's yard is a large dry dock, only rivalled by that at the Brooklyn navy yard, which has just been com pleted by that firm at a cost of $\$ 125,000$. The basin is of solid granite, built in terraces. The above firm alone em ploys 700 mechanics, and another, 500 ; the whole number mployed by the various builders is, according to a corre spondent of the Evening Post, about 3,000, which is rapidly on the increase with the extending business. The builders
roll their own iron plates and manufacture everything pertain ing to an iron vessel themselves. Many magnificent steamers have been built at this yard, the workmanship of which would bear comparison with that of the finest Clyde-built vessels. There are now on the ways a vessel of 3,000 tuns intended for the Pacific Mail Steamship Company, and one of 1,500 tuns for the Cromwell line. At the yard of Pusey and Jones, over sixty iron vessels for different lines have been built during the last seven years, and at present they have on th ways a 3,000 tun ship for the South American trade
The business of the other builders is also in a flourishing condition, and there is every prospect of Wilmington be coming the great center, on our continent, of this branch of industry.

HOW PAPER COLLARS ARE MADE.
One hundred and fifty million paper collars, it has been estimated, are yearly used in the United States; and statis tics show that even this immense number is steadily increas ing as improvements in the manufacture multiply
The collars are made in two varieties: of paper and cloth combined and of paper alone. The best materials are used in the manufacture of the paper. It is supplied in heavy white sheets, sixteen by thirty-six inches in dimensions, weighing 125 pounds to the ream. On being received in the manufactory, it is sent to the enameling room, where each sheet is covered with a thin layer of enamel and then placed on racks heated by steam pipes until thoroughly dry. This work is performed entirely by hand, and the enamel mix ture applied with an ordinary brush.
After the sheets have become thoroughly dry, they ar embossed to imitate cloth. To produce this effect, muslin is ightly stretched and pasted on plates of tin corresponding in size to the sheets of paper. Between pairs of plates thus
prepared, the paper is laid, about fourteen sheets at a time prepared, the paper is laid, about fourteen sheets at a time
being thus arkanged, making a pile of alternate layers of paper and tin. The whole is then passed between heavy steel rollera, the pressure being sufficient to imprint the threads of the cloth on the paper, so that a perfect fac simil thus obtained.
Each sheet is then polished by passing it over swiftly re volving brushes, when it is ready to be transformed into col lars. The paper is next sent to the finishing loft, where, by means of movable dies made of steel, with edges sharpened o as to penetrate the material readily, the collars are cut under a press the motion. A single stroke cuts through the paper, and the collars are shaped. They are now perfectly flat, destitute of collars are shaped. They are now perfectly flat, destitute of button holes, and,
At one end of the loft are large rolls of starched muslin, the one of which it is at first somewhat difficult to divine A glance at the next process through which the collars pass soon affords an explanation, for the muslin is seen cut up into little elliptical bits called "patches" which are pasted
on the extremities and middle of the collar. Their object is on the extremities and middle of the collar. Their object is
to give the button holes the necessary strength and to preto give the button holes the necessary strength and to pre vent them tearing out when soaked patches, cuts the butto ingenious machine puts on these paches, cats the button holes, impresses the imitation of stitches on the border, folds the collar, and stamps its size on it, all in one motion. re bent or molded so as to fit the neck. The molding appa ratus accomplishes its work with astonishing quickness, al though it may be fairly considered as rivalled in rapidity o motion by the girls who pack the collars in the boxes. bundle of a dozen is made up and twisted into its receptacle s if by magic, each girl packing some 20,000 collars pe day. The last process is to label the boxes, place them i cases, and the goods are ready for the market
The cloth lined collars are the more expensive of the two varieties. They are made of paper to which muslin, eithe white or colored, is firmly pasted, so that no embossing i necessary, and are cut out and finished in the same manne as above described. Cuffs and false shirt bosoms go through the same processes, dies being used of the required forms This manufacture is largely carried on in this city.

## AMERICAN INVENTIONS IN EUROPE.

Several American improvements of a valuable character are now attracting public attention in England and on the Continent. One of these is the Danks puddling furnace, by means whereof mechanism is successfully sul stituted for manual labor in the production of puddled iron. This is the invention of Samuel Danks, of Cincinnati, Ohio, and its in troduction is acknowledged by the iron masters of England to have effected a revolution in the paddling business. It re duces the cost of making the iron at least five dollars per tun. Another improvement is the Henderson process of ma king iron and steel, the invention of James Henderson, of other impurities from the pig iron, and convert it into fine wrought iron or steel at one operation without either mechan ical or manual puddling. This is accomplished by melting the iron in connection with fluor spar, ilmenite, and mangan se. Some very remarkable results have been obtained. At a trial at the Blockhairn ironworks, Glasgow, pig iron con taining $1 \cdot 14$ per cent of phosphorus was melted, and in 50 minutes after fusion only $\cdot 12$ of phosphorus remained, and n the finished wrought iron, only ${ }^{\circ} 07$
Another invention is the pneumatic railway brake of George Westinghouse, Jr., of Pittsburgh, Pa., already in ex tensive use in this country, but now just being introduced
abroad. In this improvement, the brakes are operated by
compressed air, supplied from a reservoir placed under the locomotive, a special pump being employed to effect the com. pression. The practical results obtained in England are conidered remarkable by the railway authorities there.

## THE SIGN BOARDS OF NEW YORK.

New York presents on her sign boards and in her streets a arge series of odd combinations of letters, more bizarreries large series of odd combinations of letters, more bizarreries
in color, form, and design, and probably a greater number of in color, form, and design, and probably a greater number of
ngenious advertising dodges, than any other city in the ingenious advertising dodges, than any other city in the
world. Among the many of these striking devices which sometimes ornament, often disfigure, the fronts of the buildings on the great thoroughfares, the sign emblematical of the business pursued, though one of the oldest, seems to be one of the most popular modes of arresting public attention, and its manufacture is made a specialty by several well known firms. Broadway is prolific in odd conceits in this class of sign. A depot for homœopathic preparations displays, n its front, a huge white pellet; colossal gilded pipes are suspended over the doors of vendors of meerschaums, and the most prominent of all is an immense gilt eagle which holding a basket in its beak and perched on the edge of a roof, is visible the whole length of the street, serving to ad vertise a manufactory of willow ware
We miss the impossible counterfeit of the noble red man or so long the favorite symbol of the tobacconist. Fashion has banished him from the aristocratic marts of Broadway to he less pretentious shops on the avenues; but his place is filled by elegantly painted images representing goddesses o liberty, base ball players, gorgeously attired damsels, or
perhaps simply by the upper half of a smiling individual perhaps simply by the upper half of a smiling individual
who, placed in the window, seductively beckons us to enter who, placed in the window, seductively beckons us to enter
These effigies carved from wood exhibit much artistic skill These effigies carved from wood exhibit much artistic skill ooth in coloring and in model. A large propoit cost is from fty to two hundred and fifty dollars each. A leading hat frm decorates the roof of its store with a wooden bear: im porters of toys favor figures of Santa Claus, and a speculator in dollar jewelry, on the Bowery, displays a banner on which an adm
pinted
New and odd conceits in trade mark signs make their ap parance almost daily, those of the umbrella manufacturer eing especially ingenious. One of the most striking is epresentation of a philosophic individual, calmly seated olding over his head an umbrella on which a youth pour uckets of water, the latter being furnished him by a thir arty who is represented as frantically pumping. Another rm in the same business symbolizes its trade by the picture of a South American guanaco, and obtains a still bette dvertisement by philanthropically distributing white su mbrellas, on which the name of the manufacturer is printed in large letters, among the stage drivers and cartmen. In many instances, signs are made to advertise a business and at the ame time prove valuable as public conveniences. Handsome clocke, surmounting iron columns placed on the sidewalk, are found in many parts of the city, bearing the nanes of jewel rs. A safe manufacturer places an enormous wind vane, on one end which his advertisement is inscribed, on the edge of his roof so that it can be readily seen from the street, and a maker of optical instruments takes advantage of the popula uriosity as to the temperature of the weather by exposing is sign attached to a large thermometer.
Queer conceits abound, the very oddity of which make hem noticeable. An entire building in Broadway is con tructed of iron after a Mcorish style of architecture, an is painted and stencilled in patterns of every hue in the rai ow. The tea stores in Vesey street color their fronts brigh vermilion and green, and ornament their interiors with Chinese lanterns and frescoes depicting scenes in celestia life. Signs with the letters upside down are often used, and ometimes the characters are so intermixed as to requir ome puzzling to decipher their meaning. A window glass anuacturer arranges the letters of his sign thus "W G I ads os w." Those pests of Broadway, the peripateti but their places carry banners, have happily been abolished, lous costumes, ander to force circulars into the hands asser. Helmbold the drugrist before his failure placed of passers. Helmbold the drugist, before his fallure, placed on he roof of his building the mast of a ship, fully rigged with yards, gaff, boom, etc. Each yard arm was decorated with a
flag, and a huge burgee with the name " Daunter" floated flag, and a huge burgee with the name "Daunter" floated
from the mast head. A warlike effect was given to the whole rom the mast head. A warlike effect was given to the whole rom the cornice.
One of the most ingenious devices was that of a photo grapher on Broadway. An automatic stuffed monkey was rep resented as taking the likeness of a female of his own species The figures were ludicrously dressed and, by means of clock work, made to go through various motions in a very natura manner. The sitter poses herself, the operator inserts the plate in his miniature camera and turns a way as if waiting after a short pause, he removes the plate, bows to the lady who turns her head, adjusts her dress, etc., and the same per ormance is repeated.
A printer in Center street displays an effigy of a Chinaman who, worked by machinery in the inside of the building ssiduously turns a wheel on which the sign is inscribed The fence surroundirg the new Post Office contains the ad vertisement of a western railway, which is embellished by he stuffed head of a huge buffalo, said to have been kille by Prince Alexis. Carts driven around the city, covered with posters and gaily painted transparencies are not so common
as formerly; their advent when they are used is generally quite forcibly announced to every body far and near by the
continuous tolling of what is known as the "Tammany" bell. An enterprising individual recently caused considerable astonishment and not a littla trepidation among the pedestrians on Broadway by leading a full grown lioness down the street. His advertisement was gaily painted on a coth which was thrown over the animal's back
The stereopticon and electric light have lately been em The stereopticon and electric light have lately been em-
ployed for night advertising. By means of the former, pictures and business cards are alternately thrown on a large screen, the exhibition always attracting a crowd of spectators. The electric light is used to flash suddenly on the sign to which it is desired to draw attention. Very attractive signs for night use are those made from prisms or cut crystals and glass. The latter are imported from Prussia and set in rames of galvanized iron wire, made in the required shape. Inside the frame are placed revolving gaslights which produce, when seen from the exterior, a dazzling effect. A new way lately introduced of manufacturing these signs is to make the frame of cast iron and set in glass bulls' eyes of different colors. They cost from fifty to one thousand dolars, the price depending on the size. Cups of colored glass, each containing a cas jet and arranged in the form of letters, devices, etc., are also used for illuminated advertisorents
There are not many novelties of late invention in sign making. A heavy wire network on which are fastened large wooden letters is being introduced as a roof sign. Block letters made of sheet brass and nailed to the sign board have lately come into the marizet and present an effective appearance. For smaller placards, mirrors are very handsome. The design is traced on the back by removing portions of the amalgam, and made prominent by the glass being placed against gilt or colored paper. In banners, those made from network, with strips of canvas on which the sign is painted astened upon them, have superseded the large pieces of canvas. The former are lighter and much more durable, as they are not apt to blow to pieces in a high wind.

## DEATH OF JAMES GORDON BENNETT.

Among the prominent men recently deceased is James Gor don Bennett, founder and proprietor of the New York Herald, aged 7. So far as concerns the ethics of journalism, he was unscrupulous and irregular, zealously advocating the cause of truth and justice on one day, but perhaps the very next day assailing the same cause with unworthy vehemence. Editorially regarded, the Herald, under Mr. Bennett's régime, was notoriously unreliable; but as a vehicle of news it was the embodiment of enterprise, and in this respect it outranked all its competitors of the press. The New York Herald is one of the most widely circulated daily papers in the world, and as a property one of the most valuable. The establishment falls, by the bequest of its founder, to his only son, Mr. James Gordon Bennett, Jr. He is a young man of about 26 years, of considerable physical activity, chiefly famous as a sportsman, particularly in the yacht line. No king upon his throne ever possessed such power for good or evil as that now wielded by young Mr. Bennett in the New York Herald. That he may use his great inheritance honorably and wisely is the earnest wish of every person in this community.
Quick Mails.-The largely increased mails to be carried from Chicago to New York have induced the managers of railways to put on mail trains proper, each to consist of one ocomotive and three mail cars, to be run through in twentyfour hours. Several cars are now building for this purpose, each fifty feet long and adapted for fast running. No stoppages are to be made except for coal and water, and it is inended that the distance ( 962 miles) shall be accomplished in the time stated, which would be running over forty miles an hour. Some such measures seem to be imperative, and will be attempted, at any rate, to relieve the Chicago and New York city post offices of an embarrassing glut of mail matter rowing greater from month to month.

Improvement in Fractional Distillation.-Linnemann has successfully applied to laboratory purposes the principles of a method largely used in the arts, in the construction of the so-called dephlegmators. This principle consists in parially condensing locally the vapor which rises from a boiling liquid, in such a manner that the vapors which subsequently rise shall pass through the condensed liquid, and thus in a ertain measure be washed. The apparatus employed consists simply of a vertical tube, attached to the flask in which he liquid boils, and containing six or eight little caps of plainum wire gauze separated from each other by small intervals.
Dr. Joule, in some experiments lately made on the polar zation, by frictional electricity, of platinum plates, has found that charge which they received was only diminished one half after an interval of an hour and a quarter. The plates were either immersed in water or were laid in alternate eries, separated by wet silk. The amount of charge they ook was massured by means of a delicategalvanometer. He has suggested that a condenser on this principle might be useful in researches on atmospheric electricity.

Milk of Diseased Cattle.-Mr. Husson, in a paper upon he milk of animals diseased with the cattle plague, announes, as the result of one of his researches, that neither the flesh nor the milk of animals suffering from this cattle plague -contagious typhus-will convey the disease, although they may suffer greatly in their nutritive properties. The milk of diseased cows he found to have a more or less marked reddish yellow tinge, and a disagreeable flavor, although cats fed upon it seemed to suffer no inconvenience.

## SCIENTIFIC AND PRACTICAL INFORMATION.

## new method of making borax.

When an alkaline sulphuret is added to an aqueous solution of boracic acid, the water is decomposed; the hydrogen, replacing the metal, forms sulphuretted hydrogen, while the oxygen goes to the metal to form a base, which then combines with the boracic acid thus:
$\mathrm{SNa}+2 \mathrm{BoO}_{3}+\mathrm{HO}=\mathrm{HS}+\mathrm{NaO}, 2 \mathrm{BoO}_{3}$
This property may be used in the manufacture of borax from boracic acid. The carbonate of soda heretofore used for this purpose is much more expensive than the sulphuret, since in the manufacture of soda the sulphate is first reduced to the sulphuret which is afterwards converted into the carbonate. By making use of the sulphuret instead of the car bonate, this last and difficult step of the operation is dispensed with. The sulphuretted hydrogen given off may be either employed in the manufacture of sulphuric acid, it being converted into sulphurous acid by burning, or the sulphur itself may be obtained from it by bringing it into contact with sulphurous acid.

LIQUID LENSES.
A new and beautiful lecture experiment has been adcpted by Professor Henry Morton, which illustrates very forcibly the action of refraction. A magic lantern is arranged vertically in connection with suitable mirrors to throw the image upon the screen. An empty watch glass is substituted for the usual objective lens. If now we introduce an object, as for example a photograph on glass of course no image will be produced on the screen, but only a nebulous patch of light. On pouring water into the watch glass, however, a well defined image is produced. On replacing the water by alcohol, muriate of tin, or other more highly refracting li quid, a lens of higher power is obtained.

## House building.

A paper on this subject, read by Edward Roberts, F.S.A. before the Royal Institute of British Arcbitects, closes as follows:

1. Never allow pervious drains in pervious soil.
2. Never allow a cesspool or drain near a well.
3. Never select gravel as a building site if well drained clay can be obtained.
4. Never allow drinking water to be drawn from a cistern supplying a water closet
5. Never allow waste pipes to beinserted into water closet traps. quired above
6. Never allow water to stand in pipes exposed to frost.
7. Never allow pipes to be fixed so that they cannot empty themselves.
8. Never ventilate except by pipes or tubes, inlets and outlets being of equal size.
9. Never use glazed earthenware pipes for upward flues.
10. Never allow chandeliers to be the exclusive light, merely because it has been customary.
industrial exhibition at newark, n. J.
Arrangements are now being completed for holding an exhibition at Newark, N. J., in August next. The specimens exhibited will be classified as follows: (1) Fine Arts and Ed ucation, (2) Dwellings, (3) Dress and Handicrafts, (4) Chemistry and Mineralogy, (5) Engises and Machinery, (6) Intercommunication, (7) Agriculture and Horticulture, (8) Tcols and Hardware. No premiums or anything in lieu thereof are to be awarded to exhibitors, and the merits of their pro
ductions will thus be pronounced upon by the public solely and wholly. Messrs. Marcus L. Ward, A. M. Holbrook, and Isaac Gaston are respectively the President, Secretary, and Treasurer of the exhibition.

A farmer in Connecticut is said to have contrived an infer nal machine for the destruction of crows, in the shape of a kernel of corn which explodes on being picked up by the unsuspecting bird, and blows his "durned eturnul head off"
without the slightest warning. without the slightest warning.

Facts for the Ladies.-Louisa Kelley, Ackworth, Ga., has, with the general use of a Wheeler \& Wilson Lock-Stitch Sewing Machine, for three
years supported a family of four adults and two children, built and paid for $\mathbf{2}$ house, and has $\$ 100$ cash on hand. See the new improvements and Woods 2 house, and has $\$ 100$
Lock-Stiteh Ripper
Burnett's Cocoaine gives luxuriance to the hair.
The People's Friend.-It is susceptible of easy proot that the Sewing Machine has been a greater blessing to the masses of American people than
any invention of the present century. Nothing else has done so much to save the lives and health of the wives and mothers, the patient, overworke women of the land, who, as a class, most needed relief from the burthens of
everyday life. Every father and husband fails in his duty if he neglects to everyday life. Every father and husband fails in his duty if he neglects to
endow his home with such a triumph of science as the wflson Under-Feed Sewing Machine. It is the cheapest and best sewing machine ever offered.
Salesroom, 707 Broadway, N.Y.; also for sale in all other cities in the U.S.

## Businest and cersumal. <br> The Chargeyor Insertion under this head is One Dollar a Linc. If the Notices exceed Four Lines, One Dollar and a Half per Line woill be charged.

The paper that meets the eye of manutiseturera througtont the Onited States-Boston Bulletin, 8400 a vear. Advertisements 17 c . 8 Linc, Wanted-Situation as Book-keeper in some good manufac turing business. Can invest means, if satisfactory. C. S. B., Box 929 ,
Cincinnati, Ohio. Cincinnati, Ohio.
Drying Glue-Wanted an artificial, economical, rapid process, in all weather. Address Glue, P. O. Box 6763 , New York.
Rapid Evaporator-Simple, 6 ft . $\mathrm{qq} .$, no pumps, no attendance, Wanted-A first class Sewing Machine Repairer T Shanks, Baltimore, Md.

Galvanized Slating Nails, Stove Reservoirs, and Hollow
Ware. Address Cleveland Galvanizing Works, Cleveland, ohio. Machinery Paint, all shades. Will dry with a fine gloss as soon as put on. 81 to $\$ 1.50$ per gal. New York City Oll Company, Sole econd hand Iron Pland
wide-good as new and cheap. Chas Plane 9 feet long, 33 inches Wanted-A party to make a wood workers' cast iron vise on royalty for the N. E., Middle and Southern States. No exp
chine work necessary. Crawley \& Baylles, Edgartown, Mass.
Moulds for Casting Soft Metals made to order. Die sinking the same. We will take a few small artioles to manufacture. Send model A steady mechanic, having some knowledge of pattern-making, wishes to perfect himselt in that branch at some good shop in or nea this city. Plenty of tools.
142 Nassau Street, New York.
Wanted-A Good Brass Moulder. A "steady" man can find Wants to Buy one 4 foot Plane and one 4 foot Screw Cutting Lathe. Defiance Machine Works, Deflance, Ohio
For Sale-Goodyears' Patent Hub Machine. Will turn 100 Sets Wagon Hubs per day. Deflance Machine Works, Defiance, Ohio. Wanted-A partner in the Machinist and Foundry business,隹 ortable Baths. Address Portable Bath Co., Sag Harbor, N.Y Verdi Water Mills for Sale, with 400 acres of Land. Address J. A. Beam; Verdi, Kans.

Nickel Plating with or without Battery. Instructions of plating with new and unsurpassed solutions given on moderate terms by
a practical plater. Address John Nagel, 83 East 7 th Street, New York. Standard Twist Drills, every size, in lots from one dirill to 10,000 , at $\$$ manufacturer's price. Sample and circular mailed for 25 c нам
The Shive Steam Engine Governor-Guaranteed to be the best in the world. Circulars sent free. Shive Governor Company, 12th
and Buttonwood Streets, Philadelpha. For the best Foot Power Jig Saw, address Goodnow \& Wight man, 23 Cornhill, Boston, Mass.
Dry Steam, dries green lumber in 2 days; tobacco, in 3 hours and is the best House Furnace. H. G. Bulkley, Patentee,Cleveland, Ohio. Hexagon Iron-superior quality for screws, \&c., $9.16 \mathrm{in} .09 \frac{1}{2}$, $\% \mathrm{in} .09,11-16 \mathrm{in} .09, \% \mathrm{in} .08 \frac{1}{2}, 2 / \mathrm{in} .08,1 \mathrm{in} 08,$. per 1 b . The above is
price per bundle; single bars 2 cts. higher. Goodnow \& Wightman, ${ }_{23}$ Cornhill, Boston, Mass.
For hand fire engines,address Rumsey \& Co.,Seneca Falls,N.Y T. Shaw's Steam Cauges, Ridge av. \& Wood st., Phila., Pa If you want a perfect motor, buy the Baxter Steam Engine. Brown's Coalyard Quarry \& Contractora' Apparatus for boiftive Mining, Wrecking, Pumping, Drainage, or İrigating Machin ery, for sale or rent. See advertisement, Andrew's Patent. iuside page. For Tri-nitroglycerin, insulated wire, exploders, with pamphlet, as us
Adams, Ma
All kinds of Presses and Dies. Bliss © Williamz, successor to Mays \& Bliss, 113 to 122 Plymouth St., Brooklyn. Send for Catalogue. For Steam Fire Engines, address R. J. Gould, Newark, N. J. Presses, Dies, and Tinners' Tools. Conor \& Miays, late Nisys \& fliss, 4 to 8 Water st., copposite Fuiton Ferry, Brooiklyn. N. y.
n the Wakefield Earth Closet are combined Health, Cleanliness and Comfort. Send to 36 DeySt., New York, for descriptive pamphlet. Best and Cheapest-The Jones Scale Works,Binghamton.N.Y. f you want to know all about the Baxter Engine, address Wm. D. Russell, office of the Baxter Steam Engne Co., 18 Park Place,N.Y T. Shaw's Blast Gauges, Ridge av. \& Wood st., Phila., Pa. Seeds and Fertilizers. R. H. Allen \& Co., New York.
Callow's New Patent Mode of Graining Wood,
Makes Painters grain all woods first class who never grained before
Address, with stamp, J. J. Callow, Clevaland, Ohio.
Wanted-A Purchasing Agent in every city and county, to supply Nye's fine Sperm Sewing Machine Oil. Put up in Bottles, Cans, and Presses,Dies \& all can tools. Ferracute MchWks,Bridgeton, N.J Also 2-Spindle axial Drills, for Castors, Screw and Trunk Pulleys, \&c. The Patna Brand of Page's Patent Lacing is the best. Or Absolutely the best protection against Fire-Babcock Extin absolutely the best protection against fire-Babco
Boiler and Pipe Covering manufactured by the Chalmers Spence Non-Conductor Co. In use in the principal mills and factories Claims-Economy, Safety, and Durability. O\#\#1ces and Manufa
E. 9th street, New York, and 1202 N. 2d street, st. Louis, Mo.
Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck \& Co., New Haves, Ct.
Anti Lamina" will clean and keep clean Steam Boilers. No iniury to fron. Five years' usc. J. J. Allen, Philadelphia, Pr. Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809. For the best Recording Steam and Indicating Gauges, address The Recording Stean Gauge Co., 91 Liberty Street. New York.
For Solid Wrought-iron Beams, etc., see advertisemenk. Ad diess Cnion Iron Mills, Pittsburgh. Pa. , for lithograph, etc.
Belting as is Belting-Best Philadelphia Oak Tanned. C. W Arn,on, Fightin Mar
wivton's Lightning Saws. The genuine $\$ 500$ chalienge Will cut five tines as fast as an ax. A 6 foot cross cut and buck
E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.
Hydraulic Jacks and Presses, New or Second Hand, Bough Shaw's Hydraulic Gau. Lyon. 470 Grand Street. New York.
 Betterthan the Best-Davis' Patent Recording Stean Gauge To Ascertain where there will be a demand for new Machin ery, mechanics, or manutacturers' supplies, see Manufacturing Ne
natisa states in Boston Commercisl Bulletivi. Termas s4.c0 a year.

Rights for Sale-Of the only Patent out on Stove Pipe Fit ters. Address Wm. Volk, 32 staats Street, Buffalo, N. Y.
What I know about Machinery, especially Engines, Pumps and Machtnists' Tools, which I sell at 93 Liberty Street, New York. s. N Hartwell, late agent for L. W. Pond
The most economical Engine,from 2 to 10 H.P., is the Baxter Over 800 different style Pumps for Tanners, Paper Makers, Fire Purposes, ttc. Send for Catalogue. Rumsey \& Co., Seneca Falls, N. Y The Baxter Steam Engine is safe,and pays no extra Insurance. Dickinson's Patent Shaped Diamond Carbon Points and Ad justable Holder for dressing emery wheels, grindstones, etc. See Scientif
American, July 24 and Nov. 20 , 1869. 64 Nassau st., New York. America, Jul
Self acting Screen makes 6 grades Coal, ores, \&cc. A State
right at a bargain. Geo. Lord, 232 Arch Street, Phlladelphta, Pa right at a bargain. Geo. Lord, 232 Arch Street, Phlladelphia, Pa.
Important.-Scale in Steam Boilers-We will Remove and prevent scale in any steam Boller or make no charge. Geo. W. Lord, 2 Arch Street, Philadelphia, Pa

## Moteseqquagius.

i We present nercroith a series of inquiries embracing a vartety of topics of -reater or less general interest. The questions are simpl
brefer to elictl practical ansobers irom our reaiers.]
1.-Mortars.-What is the size of the largest mortars used
2.-VARNISH FOR RUBBER.-Can any one inform me how to make a flexible varnish for rubber, so as to giveit a gloss?-W. W. W. 3.-Power of Screw Drivers.-Can more power be obthe by the use of a long screw
the same sized handles?-W. H.
4.-Proportions of Safett Valve Gear.- Can any one give me a clear and concise method of computing the position of,weight on the arm of a safety vadve, all things being proportional ?-M. I. C. 5.-Electro-Silverina German Silver.-Can some one anform meif silver can be deposited on German silver by electricity, so as many ways, but failed, as small blisters almost invariably show themselves. J. н.
6.-Protecting Copper from the Action of Mercury. -Can any of your readers tell me of any solution that will prevent mercary from adhering to or eating copper? I have tried shellac and copal var nishes, but And them o:lly temporary in their effect.-G. S. D

PEOCIAL NOTE. - This column is destgned for the general tinterest and in.
Btruction co our readere, not for gratuitous replies to questions of a purety Dusiness or personal nature. We woill publish such inquirtes, however. Ponen paid for
and Personab.
reference to back numbers must be ou volume and sace
Aquarium Cement.-D. C. will find a recipe for a good one on page 267, Vol. XXV. of the Soientifio Amerionn.
Velocity of Light.-G. M. V. points out an error in an ar ticie entitled "Celestial Space", on page 820 of the current volume. Light moves at 192,000 miles a second.
Suez Canal.-To W. B.-The Suez canal is the property of a joint stock company, which the French Governme
large concessions, " subventions," and guarantees.
F. W. G., of La.-You can make microscopic slides, showing the beautiful crystals of nitrate of silver, by placing a drop of the salt dissolved in water upon a slide and letting it dry. Then cover with glass
in the usual manner Use benzole,not benzine, in preparing objects. For many things Canada balsam is the best substance to use.
Supply of Water.-To H. G., of Vt.-Your question, as we understand it, is this: Can the quantity of water supplied by a pipe be in
creased by using a larger pipe without any additional head? It can, up creased by using a larger pipe without any additional head? It can, up
to the delivery of all the water in the spring. The head of water makes a to the delivery of all the water in the spring. The head of water makes a
pressure of so much per square inch on the area of cross section of your pipe, and the supply will increase with the size of your pipe, so long as pipe, and the supply wil increase with the size of your pipe, so long as
there is enough water at the head. The pipe to the tub will not affect there is enough water at the head. The pipe to the tub will not affec
your supply at the mill, unless both are open at once, in which case the water conveyed from the spring win be divided between the two
Thirty Tun Magnets.-I have a bet with a gentleman. I stated that there had been a magnet built that lifted thirty tuns; he dis-
puted it, and I agreed to leave it to you. Am I right? If not, what was puted it, and I agreed to leave it to you. Am I right? If not, what was
the strength of the largest magnet? Answer: There was a paragraph the strength of the largest magnet? Answer: There was a paragraph
published in the Scientifio AMERICAN some time ago describing the published in the Scientifio Ayerican some time ago escring
then new magnet built by Wallace \& Sons, of Ansonia, Conn., for the Stevens Institute, in which it was stated that the estimated lifting force of that magnet was between thirty and dfty tuns. But President Morton,
writing to us recently, states that its actuallift is probably only trom foue writing to us recently, states that its actual lift is probably only from four to five tuns. This is the largest magnet tiuat we remember. Its poles are
each three feet three inches long and six tuches in diameter. The nex each three feet three inches long and six fuches in diameter. The nex
in size is one lately constructed by Lord Lindsay in London, and is four in size is one lately constructed by Lord indsay in Lonim, and an the the College of Pharmacy, London, and that used by Faraday and Tyndal was in oblong section about three inches by four inches, and two fee long. If the power of electromagnets increased with their size, these
large magnets might lift thirty tuns, but as a fact, they do large magnets might lift thirty tuns, but as a fact, they do not by an
means. The largest magnet made prior to that of the Stevens Institut lifted about $21 / 2$ tuns.
Superheating Steam.-Query 1, page 354.-Let R. H. E able to heatit (the water) to $400^{\circ}$ Fab without boiling but the momen air is admitted, it instantly sinks to $212^{\circ}$. Now a little warning: If he heat it to $49^{\circ}$, the pressure would be 14,700 pounds per square inch and at $500^{\circ}$ it would equal 19,459 pounds to the square, inch. The latter would support a column :of mercury 3,243 feet in hight. (He wil
need a strong vessel.) The average latent heat of steam, as determine need a strong vessel. . The Sothage Lavoisier, Rumford, and Depretz, is $978^{\circ}$ Fah., but Thompson says he does not think it can fall below $1,000^{\circ}$.G. L. F.

Proportions of Engine.-Query 8, page 354.-The small engine will do abb
doing now.--P. R.
Proportions of Engine.-Query 8, May 25.-An engine with a cylinder of 11 incl bore, 3 feet stroke, making 40 revolations, will, with steam at 50 pounds pressure, be equal to $341 / 2$ horse power. An en-
gine with 7 inch bore, 14 inches stroke, 150 revolutions per minute, with 80 gine with 7 inch bore, 14 inches stroke, 150 revolutions per minute, with 8
pounds of steam, will be equal to $32 \%$ horsepower. Friction pounds of steam, will be equal to $32 \%$ horsepower. Friction is not take
in account in either case. Deduct two horse power for friction in account in either case. Deduct two horse power for friction, and yo
will have about the actual power of the engines.--A. H. G.

# Declined. <br> Communications upon the following subjectshave been received a by the Editor, but their 'publication is respectfully declined: 

aerial navigation.-C. M.
Divining Rod.-H. E. F.-I. N. B.
Force and Counter Force.-J. S.
Fruit Jellies.-I. D. T
Petroleum and the Precious Metals.-J. H.
Producing Motion.-A. U.
Propulsion on Canals.-P. J. D.-C. A. W.
Rotary Motion of the Planets.-P. R.
Scientific Religion.-C. B.
The First Steam Railroad.-D. M.
The Flight of Birds.-R. O. D.
The Rubber Tip Patent.-R.
Velocity of Light.-C. E.
Water Meters.-F. G. W.
Answers to Correspondents.-A. G. B.-K. L.-N. W. H. -J. F. K.-J. G. M.
Notes and Queries.-J. A. S.-F. O. H.-P. C. L.-J. D. P.

## Excent Gncricau aud forcigu eqatenty.

## Under this heading we shall pubulsh nent home and foreran vatents.

Canal Lock.-Irrael Townsend, Caperville, Va.-The object of thisinvenCANAL Lock.-Israel Townsend. Caperville, Va.-The object of thisinven-
tion is to economize water in taking boats through canal locks. This object is accomplished by the employment of a side reservoir. into which about
half of the water from the full lock is drawn off to lower the boat. The passage between the lock and reservoir is then clot as usual. When it is desir able again to fill the lock, another passage from the reservoir is frrst opened and the lock is partially flled therefrom, thus using that portion of the water, twice, and thereby saving a proportionate amount of water.
Iron Fenoe Paneying.-Floyd G. Brown, Chapel Hill, Texas.-The in-
vention consists in manufacturing a fence or fence paneling of hoop iron, so vention consists in manufacturing a fence or fence paneling of hoop iron, so
that it may be sold in sections, of any desired length, rolled up in a compact form, easily and cheaply tra
farmer with rapidity and facillty
Ceair Seat Frame. - Henry Buchter, Louisville, Ky.-The invention con. Chair Seat Frame.-Henry Buchter, Louisville, Ky.-The invention con. sists in improving the construction of a chair seat frame by using metallic
corner pieces to connect the ends of rounds, whereby great strength and
durability is given to that part of the chair which is subject to most strain. durability is given to that part of the chair which is subject to most strain. Bag String Inserter.-William J. Cussen, Richmond, Va.-The inven-
tion consists (1st) in a horizontal needle, having eye near the front and tion consists (1st) in a horizontal needle, having eye near the front and
thread guide near the rear end; whereby a child can insert the gathering thread gulde near the rear end; whereby a child can insert the gathering
thread in a tobacco bagiu ine tourth the time in which it can be done with spring that not only. guides but subsequently clamps the thread, so that it
can be held taut while peing cut off at the desired length. (3d.) It consists spring that not only guides but subsequently clamps the thread, so that it
can be held taut while betng cut off at the desired lengtt. (3d.) It consists
in providing a lever which shall simultareousiy and by a simple movement in providing a lever which shall simultaneously and by a simple movement
place in position both clamp and cutter. (4th. It consists in connecting
the same lever that carries the thread cutter in front and finishes up the the same lever that carries the thread cutter in front and finishes up the
work, with a registering mechanism in the rear, by which the exact amount of work that has been done is always indicated.
Fire Engine.-Jacob b. Van Dyne, Louisville, Ky.-The invention are mixed by the inversion of said cylinders, on pivots ingredients which are mixed by the inversion of said cylinders, on pivots in the frame of a
wheeled vehicle, and holding them in position by a latch. It also consists in providing the sides of frame with hooks upon which the ladder may be
Process for Coating Iron with Zino.-John A. Grey and John LippinProcess for Coating Iron with Zino.-John A. Grey and John Lippin-
cott, Baltimore, Md.-This invention is an improvement on the common process of coating iron articles with zinc by dipping the articles in a bath
of melted zinc resting on a stratum of melted lead within a pot of suitable size. By this process, no dross is deposited, and the wear of the article dipped will be pract
Oyster CaN.-John A. Tillery, Baltimore, Md.-The invention relates to
half square or narrow rectangular cans which are half square or narrow rectangular cans which are used in the trade for
raw oysters, and it consists in forming a raised annular rib, about the chanraw oysters, and it consists in forming a raised annular rib, about the colan
nel in, which the downward fange of the cap is soldered, for the purpose of preventing said channel from being, to a greater or less extent, filled by solder flowing from the joint between the top and body.
Peanut Thresher and Separator.- John h. Walker, Walker's Landing,
Tenn.-The invention consists in a machine whereby the peanuts and vines Tenn.-The invention consists in a machine whereby the peanuts and vines
are thrust down an incline, caught by a revolving cylinder (whose teeth act in concert with those of a concave, to tear the vines to pieces and from
the nuts), and transferred over an endless sieve to where the merchantable nuts are effectually separated from the vines and Where the merchantable nuts are effectually separated from the vines and
lightnuts. By this machine, the nuts can be threshed, cleaned, and pre-
pared for market, at a very small cost and with great economy in time.
Water Meter.-Edward Marsland, of ising Sing, N. Y.-This invention relates to a new water meter, in which the water is conveyed in spiral jets
against the recessed edge of a wheel, revolving the same in exact rat to against the recessed edge of a wheel, revolving the same in exact pat to
the volume brought against it, and balancing it at the same time to reduce friction. The invention consists, principally, in the arrangement of the wheel and the chamber whence the water emanates, and also in the appli-
cation of projecting wings or fans to the wheel and case, for regulating its motion and making it conform to the head of water.
Countersink.-Lewis H. Hunt, of Saxton's River, Vt.-This invention consists in the construction of countersinks for wood. It consists in constructing the tool of a solid shank and pad, and a detachable cutter fastened
by a screw. Cy a screw. enables the man at the end of the hose of a fire engine or of the discharge enables the man at the end of the hose of a fire engine or of the discharge mechanism of the engine or pump, and without its being necessary to stop the
pump. The construction is of such a nature that the increased pressure in pump. The construction is of such a nature that the increased pressure in
the discharge pipe,consequent on shutting off the discharge, forces a plunger valve which covers the mouth of a passage leading back into the receiver valve which covers the mouth or a passage leading back into the receiver
of the pump, and by these means the water is returned and circulated with: out danger to the pump or hose pipe.
Draft attachment to Plows.-Sylvester H. Dailey, of Olcott, N. Y.-
This invention relates to a new draft attachment to plows, and consists in the application to the draft rod of a guide wheel which is self locking and serves in place of a clevis. The guide wheel runs in a strap which is sus-
pended by sleeves loosely from the dratt pin. When draft is applied, these sleeves are pulled forward, and notches in one of them are made to engage with projections from the draft pin; this locks the wheel strap in a vertical position. When turning corners, etc., the strap is unlocked by the action of a spiral spring which encloses the draft pin.
Fertilizer.-James P. Crutchfield, of Fayette Corner, Tenn.-This in-
vention furnishes an improved manure distributer of very simple construcvention furnishes an improved manure distributer of very simple construc-
tion. It consists of the box or body of anordinary wagon, so arranged as tion. It consists of the box or body of anordinary wagon, so arranged as
to allow the manure $t$ o fall easily through holes in its bottom. The holes are provided with slides to regulate the quantity of manure released, and
under each is suspended a spout to convey it to the furrow. The spout is under each is suspended a spout to convey it to the furrow. The spout is
made adjustable as to its angle of inclination, so as to let the manure pour out at; whatever rate may be required.

DIsH W AsEER. -Safford D. Moxley, of Keeseville, N. Y.-This invention
consists of any suitable tub, pail, or bucket, with vertical pumps on the opposite sides. There are two pumps by preference, although one would
on the suffice, which have large openings at their bottoms. The piston rods ex tend upward through the tops, and are co nnected by bent bars with a rock
ing lever which is pivoted to the sides of the tub and provided with handles ing lever which is pivoted to the sides of the tub and provided with handles
for working the pistons; by which means the water is alternately taken into the pumps and forced out again with great intensity, calculated to wash th解的, vegetables, or other articles in the tub very quickly
Toy PistoL.-Benjamin Haviland and George P. Gunn, Herkimer, N.Y.
This invention relates to the construction of toy pistols, This invention relates to the construction of toy pistols, and consists in a
peculiar arrangement of the air cylinder and its piston in the stock, combi ned with a charging rod, to depress the piston and charge the pistol.
Photographic Lens.- Richard Morrison, Brooklyn, E. D., assignor to Scovill Manufacturing Company, New York city.-In this improved lens posed of a plano-convex lens of plate glass, cemented to another planoposed of a plano-convex lens of plate glass, cemented to another plano-
concave lens of flint glass, of such curves as to produce a combined lens sufficiently over corrected for actinic rays to properly correct the back
combination, which is chronatic, and is composed of two lenses of plate glass, the first, or interior one, being a plano-convex, or double convex of
the same focus as the second or exterior, which is a meniscus of nearly the same radiuses as the front combination.
Cultivator.-Asa Bennett Springsteen, Schodack L,qualing, N. Y.-Thi
invention furnishes a simple, convenient, and effective plow for cultivatin corn and other crops planted in rows; it may be readily adjusted to scrap the soil toward or from the plants, as may be desired. It consists in attach.
ing, adjustably, a surface scraper to the plow standard, which scraper is ing, adjustably, a surface scraper to the plow standard, which scraper is
made triangular with its rear edge curved downward, so as to scrape the made triangular with its rear edge curved downward, so as to scrape the
soil to one side. The scraper is followed by a leveler, also secured to the
standard, which is provided with a downwardly projecting tooth. This stirs up the soil near the plants, a downwardly projecting tooth. This stirs up the soil near the plants, and roots up any
growing near them, and, also, smooths the surface.
Three Horse Equalizer. - Adam Lafayette Thomas, George James
Thomas, and Thomas Newton Thomas, Lee's Summit, Mo.-This invention furnishes an improved three horse equalizer, and is so constructed that it may he readily adjusted so that the three horses may all nave an equal
amount to pull, or so that either the single horse or team may have the advantage, as may be desired; it consists in the arrangement of adjustable
bars, which are pivoted to the tongue, and connected by chains so as to bars, which are pivoted to the tongue, and connected by chains so as to apt them to receive the whifletrees.
Hay Elevator and Carrier.- John h. White, Columbus City, Iowa.-
 conveying hay, straw, and other material tor stacking or other purposes.
The carriage runs, suspended by pulleys, on a rope stretched between two osts, and by means of various ingenious contrivances is made to take up its load in one spot, and to deposit it in another.
Earth Avarr.- Xenophon Earle, Depere, W1s.-The boring part of this
improved post hole auger consists of two scoops, which are shaped like hall cones; they are connected by a scissors joint in such a manner that the may be securely shut together-thus completing the cone. When shut, one
edge of each scoop projects beyond the opposing edge of the other, forming a cutter to dig into the earth, and leaving a space through which the dirt passes into the interior of the cone. The dirt is discharged by opening the
cne. By this construction, the auger is readily and quickly forced into the ground, and when filled is drawn out easily, the dirt dug out by the auger being carried inward and packed into the cavity or space between the Ferd Water Heater for Steam Bollers.--Joseph Rodgers, Claring.
ton, Ohio.-This invention has for its object to economize fuel in the heating of water in steam bollers, and to insure a more thorough result from the of wate
heat.
Tıبтi
Tiuting Machink.- Bowen Mathews, Keyport, N. J.-The object of this
invention is to turnish a machine for the amusement or exercise of children invalids, and others, designed as a substitute for the rotating swing, etc. now in vogue. A couple of pulleys or rollers are attached to a celling or
horizontal beam at some distance apart, and over them is passed a band, from each end of which is suspended a chair. The length of the band is adjustable. The chairs are made to rise and fall alternately by their occu-
Stalk Chopper. -This invention has for its object to furnish a simple convenient, and effective machine for cotting or breaking up corn stalks
and cotton stalks so that they may be conveniently turned under by the and cotton stalks so that they may be conveniently turned under by the
plow. It consists of a roller, made of any material possessing the requisite and is suspended, tree to as the machine is drawn forward, the roller breaks down the dry stalks, and the knives cut or break them into pieces, longer or shorter, according
to the distance apart of the knives, so that they will not interfere with the owing.
Switoh for Printing Telegaraphs.-Patrick Kenny, of New York city everal telegraphic printing instruments, to use them, one after another without changing the different keys or using a separate battery for each.
It consists in the employment of an electromagnetic switch instrument It consists in the employment of an electromagnetic switch instrument Which is connected with the magnet and printing lever of each printing in-
strument in a manner to insure the following operation: As long as its tallic contact with the switch whee through its magnet and can be worked in the usual way. Only one instru-
ment at one time can be electrically connected with the switch wheel, as the springs belonging to the others are then resting on insulated portion of the wheel. Whenever the printing lever is raised, the circuit through
the printing magnet is interrupted and metallic connection with the of the switch is made. This enables the operator to establish, by touching an appropriate key, a current through the switch magnet which causes the switch wheel to rotate and brings the spring belonging to another printing instrument into metallic contact with it, while it breaks contact with the first. The key of the switch magnet is touched as often as is necessary to
bring the right instrument into circuit, supposing more than two are connected with it. If, during the elevation of the printing lever, the key is no toached, the printing instrument connected with it will be in circuit on it
tua Bugile.-James C. Barrows, of Centerville, Iowa.-This invention infnishes an improved tug buckle, which does not wedge the tug so as to
injure it; and which is easily adjusted and effective in operation. It conplained without draw arra

## Machine for drawing

Machine for Finishing Drain Tiles.-Andrew L. Brown, of London and recessing the other end of lengths of drain tiles so as to form a joint Its principal features are: An automatic carrier which receives the tile,
holds it while its ends are operated on, and disharges it when finished; and he levelig and carried on two more the the the ach other, and carried on
Seed Planter.-Augustus Richards, of Anderson, Texas.-Thisinvention furnishes a simple, convenient, and reliable machine for planting corn,
cotton seed, and other seeds, which is so constructed that it may be conveniently adjusted to plant less or more seed, as may be desired. The seed
dropper is barrel shaped and is carried between the wheels of the machine. dropper is barrel shaped and is carried between the wheels of the machine.
It has a band around its center which is pierced with discharge hole through which the seeds fall to the ground. These discharge holes are shut or opened by tslides which are adjusted so as to regulate to a nicet.
the quantity tachments, which we have not space to describe.
Elevator.-Alfred B. Darling and James Bones, of New York city.-Th
object of this improvement is to prevent the falling of the elevator plat object of this improvement is to prevent the falling of the elevator plat
form in case of the breakage of the main liftingrope. This is accomplished
by an ingenious arrangement of various devices.

SEwing Machink CASE.-Gustav Heckel, of Belleville, IIl.-This inven
on furnishes an improved sewing machine case and table. The case con sists of a back piece, which is hinged within a slot along the rear side of higed to the back piece. When closed, the sides form a support for th xible top. A prominent feature of the invention is an adjustable piec hich fills in the slot behind the hinged back so as to preserve the symme of the table when the case is closed.
Water Meter.-Hezekiah Olney, of New York city, assignor to himsel
nd Lueius R. Townsend, of Malone, N. Y-This invencion making the meter in two compartments, one for receiving, the other for dis harging the liquid, so that from the latter vessel the water may flow con nuously. The water fiows through a pipe into the receiving compart tes a valve attached to thepipe. The movement of the valveshuts ope flow of water into the receiving compartment and, at the same time, open a chariel between that and the discharging compartment. When the ater has passed from one compartment to the other, the float falls and the
operation is repeated. Other devices are connected with the apparatus, whation is repeated. Other devices are
Fence.-Andrew A. Garver, of Albion, Iowa.-This invention consist ame to admit of a better connection of the panel with the double trac than in other portable fences. The fence consists of panels composed of rails connected together by upright slats placed in an inclined position, so
that the upper rail will project six inches, more or less. The lower ends of the the upper rail will project six inches, more or less. The lower ends of
the lower rail are notches, just inside of the uprights. These notches and the arrangement of the slats allow the upper and the lower ralls of the pane engage with the brace of the fence
Dasper for Fire Place.-Joseph Bridgham, of New York city.-Thia
nvention relates to a new damper tor fire places, to be used in chimney above grates for regulatiog the draft. It consists in providing the
damper with projecting pivot pins and stops at the ends, and in the use of damper with projecting pivot pins and stops at the
Packing.-George Tetley and Charles D. B. Fisk, of Providence, R. I-nd valve rods, and for silmilar purposes. The packing is made in to tions; each section consisting of two parts, which are made to fit each
ther and the rod they enclose. The sections are laid one above the other ther and the rod they enclose. The sections are laid one above the other
reversingthe position of the two parts in each alternate section, and are sept pressed against the rod by two springs placed between them and the . The boxes may be circular, rectangular, or of other form
Ballasting Vessels in Pont.-Francesco Demartini and John Cher
zza, of Brooklyn, N. Y.-Under the ives in port and discharges her cargo, ballast must be immediately taken in toprevent careening and consequent injury to herself or other crafts.
To avoid the loss of time and expense attending this course, this invention 0 avoid the loss of time and expense attending this course, this inventio anploys ballast logs, connected with the vessel by ropes or chains, that lie
a.ongside and float in the water. The logs are not intended to hold the vessel down in the water, but merely to act as counter or balance weights whe he attempts to keel over from any cause.
Stove Pipe Fitter. - William Volk, of Buflalo, N. Y.-The object of this
invention is to provide a simple invention is to provide a simple, durable, and effective device for fitting inve pipes together, as, for instance, where the two parts are of the same
shere bruised or out of shape. It consists of a frame which ha o jaws, with lugs for two levers. One jaw is corrugated or serrated, an form, confined by fulcrum pins to the lugs. By the application of the ser rated jaw and lever to the pipe, the lattergis made to partake of the form or
the jaw, and its end is consequently reduced in diameter. When the other the jaw, and its end is consequently reduced in diameter. When the other
jaw and lever are applied, the tendency is to expand and smooth out the pipe. When the two parts of the pipe are operated upon in this manner-
and gether and may be joined without difllculty.
Sand and Gravel Separating Machine.-Nicholas J. Keller, of Eas and and gravel or other invention relates to a new machine for separating nachines. The framework of the machine is coupled by a dredge boat 0 edging apparatus, from which an endless chain or apron extends ove te end of the separator. This apron or chain conveys in its buckets all
he matter raised by the dredge on to an inclined sievelor perforated spout, Which is securely fixed at one end of the frame. Water is conveyed to the
spout by another endless chain or apron, and serves to so loosen the mud spout by another endless chain or apron, and serves to so loosen the mud
that all gravel and sand passes through, but all other matter is discharged. What all gravel and sand passes through, but all other matter is discharged. What passes through the sieve is carried toward the inner part of the sepa-
rator into the higher end of an inclined perforated cylinder. This cylinder, being covered with wire screen and revolved by suitable mechanism, sepa rates the sandand $\varepsilon$ ravel by letting the sand pass through its Aner meshes into a box, and the gravel through the larger meshes at the lower part into
another receptacle. All extraneous matter or refuse is discharged overanother receptacle. All extraneous matter or refuse is d
board through the lower end of the cylinder, which is open.

## Inventions Patented in England by Americans. From May 14 to May $20,1872,1$ C. L. Horack, Winona, Minn. <br> Electric Signals.-E. A. Calahaw, of Brooklyn, N. Y., London, Eng. Foul air Trap.-J. Daniels, Washington, D. C. Hub.-W. Lyman, East Hampton, Mass. <br> Magio Lantern.-L. J. Marcy, Philadelphia, Pa. <br> Making Pins. - T. B. De Forest, of Birmingham, Conn., London, Eng. Paving Blocks, ETO.-F. A. Luckenbach, New York city. PiANoForte.-C. F. T. Steinway, New York city. Projectiles, ETC.-J. G. Butler, Fortress Monroe, <br> Rojectiles, etc.-J. G. Butler, Fortress Monroe, <br> Propelling Ships.-L. B. Bruen, New York city. Seat and Desk.-H. W. Curtis, New York city. <br> eding Fruit.-G. L. Taylor, D. Holland, Springfield, Mass heet Iron.-W. Rogers, Apollo, T. J. Burchifeld <br> Shomanking Maohinkry.-W. J. B. Mills, Philadelphia, Pa., D. W. C Taylor, Elizabeth, N. J. Taylor, Elizabeth, N. <br> Sterl.-T. Brooks, Minerva, Ohio. <br> imekerper.-H. B. James, Trenton, N. J. <br> vehicle for Painting.-E. Densmore, New York city, Wood Cutting Machinery.-J. Richards, Philadelphi

## foreign patents-... hint to patentees.

It is generally much better to apply for foreign patents simultaneously with the application in the United States. If this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as
the laws in some foreign countries allo w patents to any who firstmake the application, and in this way many inventors are deprived of valid patents issued in Eninentions. It should also be borne in mind that a patent is real inventor; therefore, it is important that all applications should be entrusted to responsible agents in this country, who can assure parties that
their valuable inventions will not be misappropriated. The population o Great Britain is $31,000,000$;of France, $37,000,000$; Belgium, $5,000,000$; Austria
$36,000,000$; Prussia, $40,00,000$; and Russia, $70,00,000$. Patents may be secured by American citizens in all of these countries. Mechanical improvement of all kinds are always in demand in Europe. There will never be a better
time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address

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Iron，soldering，McMurray and Holiingswort
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Loom，circular，
Measuring device，liquid，Fisher and Be
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Nat，jam，J．M．Winslow
Packages，tap for liquid，A．Warth
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Planter，corn，Selby and Bowman
Plasters，machine tor spreading，W．N．Reed
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Pump，chain，W．Coope
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Saw fling machine，T．M．Chapman．
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Stalk cutter，corn，H．Martin
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Stamp and label，adhesive，F．Wal
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Stove pipe damper，C．Reed．．
Stove，base burning，E．Smith
Stove，top for heating，H．Whittingham
Stove，cooking J．
Stove，cooking，J．H．Shear（reissue）．
Sucker rod joint，A．Crosby．．
Sugar，apparatus for draining
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Table，sewing machine，E．W．Ho
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Top，toy spinning，A．
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Urinal pan and pipe，M．L．Lawrence
Valve apparatus，stop and waste，
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Vehicle，wheel for，H．R．Fry．．．
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Watch，stem winding，Bo
Water cooler，J．W．Brady
Water elevator，J．McCloske
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Water supply and waste arrangements，washstand，H．J．Ruthrauff
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Wheels to axles，device for attaching，D．A．Johnso
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Wood，process and apparatus for treating，I．Hayford
Wood，process and ap
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## DESIGNS PATENTED．

5883．－Carpet．－M．Blatchford，Halifax，England．
5，884 to 5，890．－CARPETS．－A．Cowell，Kidderminster，England
，892．－Clock Case．－Nicholas Müller，New York city．
5,853 to 5,896 ．－CARPETS．－D．Paton，Halifax，England 5，897．－CARPETT．－F．J．Peirce，Boston，Mass
5900．－GLassware．－J．S．and T．B．Atterbury，Birmingham，Pa
5，901．－Heating Stove．－C．H．Castle，Quincy，IIl．
5，902 to 5，904．－CARPETs．－J．Humphries，Kidderminster，England
5，905．－Carpet．－A．McCallum，Halifax，England．
5，906 and 5，907．－Floor Cloths．－C．T．and V．E．Meyer，Lyon＇s Farms，N．J
5，910．－Carpet．－E．J．Ney，New York city．England
TRADE MARKS REGISTERED，
843．－Scyties．－Beardsley Scythe Company，West Winsted，Conn． 844．－Oversiors．－E．F．Bickford，Malden，Mass
345 and 846 ．－Bitrers．－H．S．Flint \＆Co．，Providence，R． 847．－Lead．－Forest River Lead Company，Salem，Ma，
848．－Tamarind Beer．－W．H．Goss，Boston，Mass．
849 and $850 .-$ EDGE Tools，ETC．－The Collins Company，Collinsville，Con
851．－Stationery．－Mercantile Loan and Warehouse Co．，New York city
APPLICATIONS FOR EXTENSIONS．
Applications have been duly filed，and are now pending，for the extension are appointed for the days hereinafter mentioned：
21，240．－Lathes for Turning Bended Work．－F．Baldwin．August 7， 1872 21，272．－Fare Box For Onnibuses，etc．－J．B．Slawson．August 14，187． 21，464．－MANUFACTURE OF BRUSHES．－Stephen Barnes．August 21，1872．
21，574．－PREVENTING NUTS FROM UNSCREWING．－Samuel Noblet．Sept．4， 1872. 21，749．－Crobs Seaming Sheet Metal．－Lucian Fay．Sept．25， 1872. $21,268 .-$ Horse rakes．- M．Morgan．August 7， 1872 ．
21，306．－Hill Side Plow．－H．S．Akins．August 14， 1872.
$11,324 .-$ Sun Shade．－A．G．Davis．August 14， 1872 ．
1．，567．－Carrier of Thrashing Machine．－F．W．Robinson．August 14， 1872. 21，540．－Apparatus for Harvestens．－A．Sherwood．august 28,1872 ．

EXTENSIONS GRANTED．
20，314．－Valve Cock．－S．Adams
20，337．－Leveling Device．－H．Disston，T．L．Morss
S．P．Knigh
20，364．－Clothes Pris．－D．Pierce
20，385．－Power and Hand Drill．－H．Woodman．
EXTENSION REFUSED．
20，411．－Raking Attachment to Harvester．－D．o．De Wolf． DISCLAIMER
Looms and Fabrios．－W．Smith，New York city

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