a weekly journal of practical information, art, scievce, mechanics. Chemistry, and manufactures,


NEW YORK, JUNE 16, 1877.


## SEWAGE UTILIZATION NEAR PARIS

The sewage of Paris, which formerly wasted directly into the Seine, now flows into a subterranean canal which conducts it to Asnières, about four miles from the city, and there delivers it into the river. The consequence is that, while the water of the latter is little contaminated as it flows through Paris, that which passes the villages below Asnières is black and polluted, and wholly unfit for either domestic or industrial uses. Not merely are the waters rendered impure, but they are heavily charged with solid matter which fills up the channel at the rate, it is estimated, of nearly ten million cubic feet per year, thus obstructing navigation and furnishing a dangerous source of infection during low water. The population along the stream have long pro tested against this practica confiscation of the river by the capital.
In order to remedy this condition of affairs, two sys tems have been suggested One involves the direct utili zation of the sewage for agri cultural purposes, as it is a valuable fertilizer, and the other its complete disinfec tion and clarification befor diverting it into the Seine The municipal government desiring to test both systems, charged two engineers, MM Mille and Durand Claye with that duty; and experi ments were begun on a smal scale in a meadow at Clichy Trials have subsequently been continued on the plain of Gen nevilliers, near the river. The engravings given herewith represent the experimentin field, Fig. 1, and the basin in which the chemical pro cesses of purification are car ried on, Fig. 2. From the orifice of the subterranean canal leading to Asnières, the sewage is forced by steam the sewage is forced by stea pumps into conduits which cross the Seine under the sidewalk of the Clichy bridge; and thence it flows from this receptacle into a reservoir. The sewage travels in a canal to the experimenting field. The main canal is a little above the general level, so that the material easily flows into the smaller canals, which may be compared to the arteries of the system, and thence to smaller conducts or feeders, analogous to the veins. These feeders mark the boundaries of the various parts where marsh cultivation is carricd on. The sewage being thus brought w expelatter simple maned by provided whereby the supply provided whereby the supply from any portion of the area under cultivation, or whereby the entire surface may be flooded.
The surplus water runs into three huge masonry basins, in which sufficient sulphat of aluminum is placed at a time to purify a month's in flow of sewage. The water thus rendered pure and color less, is led into the Scine. Every month the basins are strained, the deposit collected dried, and sold as manure.
Recently attempts hav been made to utilize all the sewage of Paris for fertilizin purposes, without diverting any of it into the Seine; and any this end arran Sere; and to then made to distribute the been made to distribute the sewage over an immens tract of land near Gennevi liers. This plan, however,
so far from benefiting the farmers, has only served tr
arouse their strong opposition. The enormous mass of water absorbed by the soil of the experimenting fielis has corrupted the underground springs which supplied the wells, caused in-
undations in cellars, and resulted in the production of infectious and malarial disease. At the same time, it is stated, while the vegetables grown on this sewage-soaked ground are larger and finer in appearance than is usually the case, they are watery, poor-tasting, not nutritious, and do not keep well. As matters now stand, the problem is an open one. Paris cannot continue to pour her sewage into the Seine at Asnières for the reasons already stated; nor can the distribution of the sewage over the adjacent country be carried
excellent opportunity for some one to solve the problem and arn both fame and great reward

## Heat.

Recently, in resuming his lectures at the Royal Institution, Professor Tyndall, having caused a ball of lead to fall from he roof of the theater on to a stone, he drew the ball up gain and let it down gently with a string and pulley. Th heat generated by the collision in the first instance was the axact equivalent of the heat produced in his finger and humb and in the string in the second instance. The outlay of muscular force expended in drawing up the ball was of muscular force expended in drawing up the ball was
made obvious by causing the ball to be drawn up again by a small engine worked by compressed air. The exac equi valent of the heat evolved by a quantity of coal, com pletely consumed by con umption with oxygen, suf ficient to lift a weight of 50 tons to a height of 100 fee above the earth, would be produced by the collision of that mass with the earth when allowed to fall. Given the velocity of a body, the heat generated by the destruc tion of that velocity could be easily calculated, and some time ago he was led to the conclusion that the stop page of a rifle •bullet would produce sufficient heat to use the metal. This con clusion was proved in the Franco-German war, when bullets which had been stopped by contact with a bone showed on being ex tracted undoubted marks, in many cases, of fusion. The same thing had also been il ustrated incidentally in the experiments with gun cotton at Stowmarket. The old notion of heat was that it was a substance which could be some plan, which will admit of the utilization of this valu- squeezed out of matter as water was squeezed out of a sponge ble material without prejudicing any one's interest, is just at A bullet squcezed in a hydraulic press acquired heat, ren present very much desired. The sewage question is an dered obvious in the galvanometer by the thermo-electric open one the world over; and as it has vexed the brains of pile. Even as late as the time of Faraday it was conceived engineers for many years, we need scarcely hope for any that heat was something for which some bodies had a greater speedy solution of it. Still, in the case of Paris, there is capacity than others. If compressed air from one vessel every opportunity of experiment, and an exceptionally were allowed to pass into a vessel in which the pressure was urgent need, and therefore the requirements of the French much less, it would then have been said that the motion of the air gave to the comparatively empty vessel a greater ca thempa means of the galvanometer means of the galvanometer
and the thermo-clectric pile; and the thermo-electric pile; the reason for that heat was differently understood now. The co-efficient of expansion of gases was next described; and the explanation of different metals, when subjected to the same degree of heat, not possessing in themselves the same amount of heat, was that heat had two operations, one the production of tremors (which were heat), the other the weakening of molecular attraction. Thus, if lead and iron were exposed to the same high temperature, the lead would be much hotter than the iron, because in the former case less internal molecular work was performed, and more heat was expended in the production of tremors; while in the latter case more heat was used up in internal work, and less in the production of tremors. The same degree of heat was in operation, but the apparent results were different.

# srientifir Ameriram. 

ESTABLISHED 1845.

## MUNN \& CO., Editors and Proprietors <br> PUBLISHED WEEKLY AT

NO. By PARK ROW, NEW YORK
o. D. MUNN.
A. e. beaci.

TERMS FOR THE SCIENTIFIC AMERICAN. One copy, one year, postage included...
One copy, six months, postage included
Clubs.-One extra copy of Tine Scirvtipic Anfric

## The Scientific American Supplement

is a distinct paper from the SCIETIFFCC AMERICAN. THE SUPPLEMENT



 Address MUNN \& CO., 3 Ti Park Row, N. Y
Adiress MuNN \& CO., 3i Park Row, N. Y.
thenews Sugentions received and single copies of either paper sold by al Pub

time for which they have nreeraid Before the time indicated expires,
insurea eontinuityof numbers, subsibers shouid remit or another year
For the convenience of the mail clerks, they will please also state whe


VOL. XXXVI., No. 24. [New Series.] Thirty-second Fear NEW YORK, SATURDAY, JUNE 16, 1877


## TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT,
INO. 76,
For the Week ending June 16, 1877.

1. ENGINEERING AND MECHANICS. The "Vietory Pr Trinting an


## 







 Dear.-Y
nidustry

IV. NATURALHLTORY, GELOGYT. ETC. Evidences of the Age of



[^0]
## progress of electric mlumination.

In describing the Jablochkoff electric candle, recently, we noted the fact that the inventor was engaged on further ex periments, and that new discoveries would doubtless soon be forthcoming. M. Jablochkoff now announces that he ha succeeded in dispensing with the carbons of his candle alto gether, and derives the light from the insulating materia alone-a proceeding somewhat analogous to throwing asid the candle and igniting the candlestick. In fact, we canno see that the inventor has left anything of the original electri lamp at all. He began, a few months ago, by abolishing all the claborate regulating mechanism, and produced simply a pair of carbon rods, placed parallel, separated by an insulat ing partition of clay and held in a metal casing. This was made the subject of experiments by a War Office Committee of Royal Engineers, at Chatham, England, where the ap paratus was demonstrated to give 50 per cent greater powe of light than had ever before been obtained from any clectric of light.
Not contented, however, with this showing, M. Jabloch koff proceeded to denude his candle of its outer casing leaving merely a double carbon wick with a strip of the insulating compound between the carbon points, which terminated at the bottom in metallic tubes as before. It wa this form which we recently illustrated; and with this, M Jablochkoff succeeded in arranging means for dividing the current, so that, instead of one very powerful light, he had cight from one and the same circuit. Six of these light illuminated Marengo Hali in the Louvre, Paris, with a bril liancy equal to that of 100 argand gas burners of the larges size. The East and West India Dock Company, of London recognizing the value of the invention, began at once to make arrangements to use it for illuminating one of their docks and hardly have these arrangements been completed, when M. Jablochkoff now discovers that he can dispense with the carbon points altogether, and obtain the required light by passing the electric current through the insulating materia itself, which is simply kaolin clay. It seems that, while experimenting with sparks from a current of great tension, the inventor passed them through a plate of kaolin, placed between the two ends of the wires from a couple of coils in which the current was induced by a magneto-electric ma chine. He then found that, although the current wasunable to fuse the kaolin, it did heat it to incandescence. By prim ing the kaolin plate with a better conductor, he then suc ceeded in obtaining a very brilliant light with a very small consumption of kaolin, so small, indeed, that a kaolin plate barely half an inch in length is sufficient for a small light burning ten hours. A band of kaolin may be made to give a magnificent light; and as, practically, any desired numbe of coils can he placed on the circuit of the magneto-electric machine, and each coil can be made to produce an electri light, the divisibility of the light appears to be all that can be desired. In fact, the inventors-for M. Denayrouze is as sociated with M. Jablochkoff-have produced a series of clectric lights of intensities varying from the equivalent of two gas jets to as many as fifteen. What is more, any one of these lights may be turned out, or the whole illuminating power of the current diverted into one burner
The inventors state that they have used bands of kaolin longer than the induction spark which the coil is capable of making, and that the intensity of the light, which is soft and uniform, depends on the number of spirals and diameter o the wires used in the coil. By using fifty coils, M. Jabloch koff says, it is easy to obtain as many lights of variable in tensity. He has arranged coils so as to give a series of grad ually increasing lights, ranging, as before noted, from two to fifteen gas burners in power. By using alternating current the interrupter and condenser of the induction coils are dis pensed with. The total system of distribution of current is then reduced to a central artery represented by the series of interior wires of the coil, branching from which are as many distinct conductors as coils are placed in the circuit It is proposed to employ the carbons arranged as previously described where an intense light is desired, and to adapt the kaolin light to the ordinary illumination of streets and buildings.
This is clectric illumination minus voltaic arc, reculators and carbons, in fact, minus cverything except the electrical generator, wires, and kaolin. M. Jablochkoff is still a work, and promises even further improvements.

## sailing against the wind.

Wendell Phillips, in his famous lecture on the "Los Arts," used to delight in trying to convince his hearers that the ancients were more ingenious than the inventors of the present day; and it is well known that rude copies of some of our most noted devices have been discovered among the relics of past ages. Hence, without denying the possibility of there being anything new under the sun, we may natur ally hesitate to believe that every so-called new invention had no counterpart in former times. An instance of a singular coincidence in the views of two inventors, at an interval of nearly two centuries, may be of interest. John Wilkins, Lord Bishop of Chester, and Member of the Royal Society, was equaily celebrated as a philosopher and as a divine; and his writings on scientific subjects contain much interesting and valuable information. His treatise on Mathematical Magick," first published in 1648, has chapter entitled:
Horses be driven on Horses be drixen on the Land by the Wind, as ships are on the
Sea." In this, the writer speaks of the sailing chariots which were used by the ancients, and after describing their
construction, goes on to say: "I have often thought that it would be worth the experiment to enquire whether or no such a Sailing Chariot might not be more conveniently ramed with movable Sails, whose Force may be impres from their Motion, equivalent to those in a Wind-mill Their foremost Wheels (as in other Chariots) for the greate Facility being somewhat lower than the other answerabl o this Figure, in which the Sails are so Contrived, that the


Wind from any Coast will have a Force upon them to turn hem about; and the Motion of these Sails must needs tur the Wheels, and consequently carry on the Chariot itself to any Place (though fully against the Wind) whither it shall be directed. The chicf doubt will be, whether in such a Contrivance, every little Ruggedness or Unevenness of th Ground, will not cause such a jolting of the Chariot, as to hinder the Motion of its Sails. But this perhaps (if it should prove so) is capable of several Remedies. I hav often wondered, why none of our Gentry who live near grea Plains, and smooth Champions, have attempted anything to his Purpose. The Experiments of this kind being very pleasant, and not costly: What could be more delightful, o better Husbandry, than to make use of the Wind (whic costs nothing, and eats nothing,) instead of Horses? Thi being very easie to be effected by those, the. Convenience of whose Habitations doth accommodate them for such Ex riments.
Now comes the proprictor of the "Universal Wind Power," with a patent granted last year, for a carriage pro pelled by a windmill, which, he says, "runs readily agains the wind as well as in any other direction." He has gone urther than Bishop Wilkins, for he has built a machin which has satisfactorily demonstrated its ability to do wha is claimed for it; and now the inventor offers it for use in ocalities where there is plenty of surplus wind. On prairie and the sea coast, it is not improbable that this machine vould prove very useful. Doubltless the proprietor of the "Universal Wind Power" believes that he is the original "nventor of the device; but it may well be doubted whethe he can hold the patent right to the use of the invention as a whole-that is, to the application of a windmill to a vehicle

## PASSAGE OF THE NEW GERMAN PATENT LAW.

We announce with much pleasure the promulgation of the new patent law for the German Empire, to take effect on and after July 1 next. This new law, although it is not quite up to the progressive ideas of our countrymen, is neverthe less a great improvement on the previous system, and open to American inventors an additional market, of large extent for their new idcas.
Heretofore it has been necessary in order to patent an in vention in Germany to take scparate patents in each separat State, of which there are twenty-one. Thus twenty-one set of drawings and specifications were necessary, for each of which an agent must be employed and special fees paid. The total expense was so great that few patents were ever taken; the applications being confined to the larger States, foremost among which was Prussia. But here, unfortunate ly, was in vogue a stringent and narrow-minded system of official preliminary examination, resembling that which pre vailed in this country twenty or thirty years ago. Unde this Prussian system, patents for the most valuable improve ments were rejected. Thus a patent for the Howe sewing machine could not be allowed in Prussia because it was no considered by the Prussian patent office examiners to be an original invention, but merely an improvement on some for mer attempt to sew by mechanism. A patent for the cele brated Amcrican invention of Broadwell, for gas-check rings for breechloading cannons, was refused in Prussia on similar grounds; but the Prussian Government copied Broadwell' plan and introduced the invention into its army and nava service, without allowing him any compensation. The cele brated German guns of Krupp are provided with Broadwell's
invention, without payment to the inventor ; although, with
out the invention, Krupp's guns could not be successfully
used. All of these objections are removed by the new law which permits the patenting of improvements of all kinds except medicines and foods, as articles; b producing such articles can be patented.
The duration of the new patent is 15 years. It extend over the entire German Empire, comprising twenty-one States, and embracing an aggregate population of about fifty millions. more or less.
Every patent is to be granted subject to the payment of an annual tax: subject also to a commencement of the within three years from the date of the patent.
These are some of the principal provisions of the new German patent law, concerning which we shall from time to German patent law, concerning which we shal
time give our readers additional information.
In the meantime we would give notice to the many pat rons of the Scientific $\Lambda$ merican Patent Agency that Messrs. Munn \& Co. have already completed their arrangements for taking patents in the Gcrman Empire under the new law, and are now ready to receive and give prompt attention to all applications. The procecedings are simple, and the costs light; the expenses, including the first year's taxes, amount only to one hundred dollars. Circulars of information, with particulars about the new German law and the patent laws of other foreign countries, England, France, Belgium Austria, Italy, Spain, Russia, etc., may be had gratis at this office.

## TAXING POWER OF THE LEGISLATURE.

In our issue of July 18, 1874 (page 32, volume XXXI), an article appeared quoting a portion of a then recent opinion of the court of last resort of the State of New Jersey, at the suit of "The Mayor, etc., of Newark rs. Agens et al.," tax or assess property, along the line of and for local strect improvements, was limited to the special benefit which the property derived from such improvements. This position was contrasted with the nearly opposite view of the Court of $\Lambda$ ppeals of the State of New York, whose decisions have gone further perhaps than those of any other State in the Union, in holding that the power of the legislature was supreme in all matters of taxation, or, in other words, that "man was made for the State and not the State for man." The practical operation of this rule has been that, in many of our large cities, streets and boulevards have been built
through pastures and swamps, under these legislative acts, through pastures and swamps, under these legislative acts, without the wish or consent of a majority of owners; and thereto, has in many cases confiscated the property and ruined the owners; and the latter, under the incisions of our courts, have been without remedy.
That such a state of affairs should exist under a government not omuipotent, but where the people are supposed to rule, has led to much serious thought and discussion. It seems to have been considered by our courts quite fully, in the suit of Weismer $v s$. Village of Douglas-just reported in 64 N. Y. Reports, page 91 -opinion by Judge Folger.
While this case turns upon the question of the constitu tionality of the legislative act which authorized the village to issuc bonds, to raise money, to pay for stock subscribed for, and collect by taxation to pay the bonds, yet the court in its able opinion, holding the act unconstitutional, lay down a broad doctrine of equity, which, if applied, will re lieve the people from many wrongs and much legalized robbery, even if it does not check reckless legislation. Honest taxpayers have long suffered from oppressive legislative acts; and whatever the future may disclose, they have seemed in the past to have no proper remedy in the courts.

## UINC-LINED WATER COOLERS

Several correspondents have lately written to us concerning zinc-lined water coolers, complaining of the disagreeable flavor which the zinc imparts to water from melted ice. Several wecks ago, we had occasion to note the deleterious effects of water that had passed through zinc-coated or gal-
vanized iron pipes. It is obvious that what was there said vanized iron pipes. It is obvious that what was there said equally applies to zinc or galvanized iron-lined water reservoirs of any kind, although we admit that the corrusive action of any fluid is greatly diminished by a reduction in temperature. We think there can be no manner of doubt that the use of zinc or galvanized iron for such purposes is highly objectionable. The general action of zinc salts on the animal system is to cause persistent diarrhœa; and in conjunction with and other causes tending in the same direction, this may result in very serious consequences-more especially with young
children ano persons suffering under the infirmities of age children ano persons suffering under the infirmities of age. During the next few months, these ice water fountains will receive marked attention, so also will cholera mixtures. If our readers would avoid headache and nausea, let them banish these "crvstallized" coolers. The best lining for such vessels is, perhaps, porcelain enameled iron; but. unfor tunately, there is always a doubt as to the amount of soluble lead the enamel may contain. We have seen some of thes twice as much as an ordinary cooler their cost nearly twice as much as an ordinary cooler, their sale is very
imited, while the handsome galvanized iron ones are ouna nearly everywhere. Tinned plate has been found unsuitable as a lining material, as the tin soon wears off and exposes the iron. Iron discolors and imparts a disagreeable styptic taste to the water. Glass, porcelain in general, and stone ware or pottery, if free from lead glazes, may be used.

Sawdust is often used in lining the walls of water coolers;
but charcoal, in moderately fine powder, is much superior Care should be taken, in filling the vessels with water, no to wet the lining, as when wet it becomes almost useless. Ice water-that is, water from melted ice-is not conducive to health; but it becomes more pernicious when its reservoi has been a zinc-lined vessel.

## QUADRUPLEX TELEGRAPHY

"We are not aware," says the editor of the London Tele graphic Journal, "that a quadruplex circuit exists in Eng
land at present, although we are assured that since 1874 land at present, although we are assured that since 1874
quadruplex telegraphy has been an established fact in America, and that its employment there has been eminently suc cessful. Statistic

* ${ }^{*}$ ""We seem to be still as mucil in the dark as ever to the real advantages of quadruplex telegraphy. Without entering at all minutely into the system, it is sufficient to state that the difficulties inherent to the adoption of quadruplex telegraphy are greater than at first sight would be imagined. cuits upon one wire-to meet the requirements of busy cen ters of commerce, looks very much like intrusting too many of the eggs to one basket, and in the event of interruption could not fail to be attended with the most serious incon venience."
For the information of ourv alued British cotemporary, we would state, by way of statistics, that the Western Union Telegraph Company is now regularly operating, daily, by the quadruplex system, about twenty thousand miles of its wires. The lines between New York and all the large cities, as Boston, Philadelphia, Pittsburgh, Chicago, St. Louis, Washington, New Orleans, are worked by the quadruplex plan.
For

For the illumination of our cotemporary, we would state that the real advantage of quadruplex telegraphy is that it permits the sending of four messages over one wire during the time heretofore required for sending one message by the old method. In other words, as much business may be done over one wire, by the quadruplex, as can be done over four wires by the common plan.
There are no inherent difficulties about the adoption of the new system in England. All that is needed is to send over to New York a postal money order and pay for as many instruments as are wanted, and then set them to work. They will work just as well in London as here.
To stand in the gallery of the great operating room of the Western Union Company, in this city, and gaze upon the multitude of operators there daily at work with the quadru plex instruments, does indeed seem like looking upon a good many eggs in one basket; but we hear of no inconvenience or interruptions therefrom resulting. On the contrary, so great is the regularity and necessity for the new system that
the business of the Western Union could not now be transacted except for the quadruplex, the use of which is being rapidly extended. Finally, we suggest to our cotemporary that he make a summer excursion over here and learn someplex in Enstandern telegraphy. The absence ofthequan ar several telegraphic generations behind the age.

## LOCUST PROSPECTS.

by professor c. v. riley.
Before spring opened, the most gloomy forebodings pre vailed throughout the so-called Western States as to the prospective injury from the Rocky Mountain locust. Nor were those forebodings without foundation. Eggs were laid last fall over an immense stretch of country, from the 94th to the 98th meridian, and in some cases reaching into the mountains, and from near the British American line to the Gulf of Mexico. They remained for the most part sound throughout the winter; and notwithstanding that those which prematurely hatched, or were destroyed by the many different animals that feed upon them, more than sufficient remained as the ground thawed out to give birth to locust enough to ruin most crops. The young insects began to hatch whenever the weather was favorable, often in such cantlities as to daunt the most hopeful: they were "boiling out of the ground," and they cally described as "boiling out of the ground," and they
began to mow down the more succulent plants and to do great injury to young wheat. In some sections, the farmer was prepared and determined to make a fight; and wherever the war was waged with spirit, brains, and concerted action, the foe was vanquished. Yet in many, if not most, instances, he would nave given up in despair, had not Dame Nature
come to his aid with various most efficient allies. The insects soon began to disappear and to lose their voracious appetites, and at the present time there is, in most of the threatened country, no longer serious alarm, but, on the contrary, every prospect for more than average crops.
Having recently returned from an extended tour of in vestigation in Texas and Kansas, I take the liberty of quot ing from a letter written on the 10th of May and addressed by me to the Governor of the latter State, that portion which
bears more particularly on the disappearance of the young locusts:
"In every part of the State I have visited, and the young locusts have very largely-in some instances thatly-disappeared; and I now have no doubt whatever that the reports of such disappearance that are so gencral throughout the entire portion of the State that was threat-
ened have their foundation in fact. This disappearance is ened have their foundation in fact. This disappearance is and wet weather that followed the principal hatching. That
mon weather has been largely instrumental in causing death always a certain portion just hatched or just molting, which are particularly tender and susceptible to the injurious and are now, drenching rains. But they have been ying weather, and these dead insects are not parasited, but simply diseased-sick. In my last (9th) report made to the State of Missouri, in stating the causes that might diminish the pros pective injury, I wrote:
'We may therefore expect that, as compared with 1875, a larger proportion of the young that will hatch in 1877 will possibility that, after the bulk of the young have hatched and before they have commenced to do serious harm, we may have such unseasonably cold and wet weather as to kill them by myriads, and effectually weaken their power or injury.
Both possibilities have become actualities.
It is a singular fact, however, that, notwithstanding the arge numbers which hatched, no one has been able to dis anything like the numbers necessary to account for the disappearance; and in most instances where dead insects have been reported to me, an examination at once showed that the parties had mistaken therefor the exuviæ or empty skın of those which had molted; which skins are always abun where the young insects congregate when of a wheat stool molts.
The young locusts possess remarkable tenacity of life and the fact that the bulk of those remaining are in the third tage (that is, have molted twice) and must have hatched before the unfavorable weather set in, is in itself enough to how that other factors than those meteorological have en cred largely into the problem of disappearance. The prin corological or climatic influences, they may most of me be relied upon in future, are largely within man's control, and may even be rendered still more effective. They are, in sort, elements of certainty in the problems of locust de struction:
First-The natural enemies of the locust. These consis in the present instance (the parasites not affecting it till it
gets older) of the vertebrate animals which are known to feed older) of the vertebrate animals which as snakes, gophers, field mice, etc., and
firds. These last have been more efficient than most of us iragine, and I never saw blackbirds, plover, the Lapland ongspur, etc., so numerous. The dung often whitens the fields where the locusts were once thick, and they have been the principal cause of the latter's disappearance. The probenefited the wheat and rave our feathered friends an ex cellent c.pportunity to check them. We should employ al means to encourage the multiplication of the birds.
Second-The farmers. In most parts of the State I have raversed, the farmers had determined from the beginning o make war, and they did make war, and so successfully cold and wet occurred. The means employed were more the kerosene pans and burning-over 700 kerosene pans having been made at Salina alone.
Third-The weather. The continued cold, after the prin ipal hatching, had the effect, as already stated, to kill man hat were just hatching or molting. The heavy rains als ashed many away into the streams; and in some instances, o crack when dry the rains doubtless covered up and liable such as were sheltering in such fissures
Fourth-Climate. The fact that the insects, especiall after the second and third moltings, are dying, is simpl confirmatory of the views I have always held and advanced that the species is out of its natural habitat, and can never permanently thrive here. These views I need cot repeat at lied have not so far begun to compare with those which have perished in the other three ways mentioned, it will have perished in the other three ways mentioned, it win already they show a tendency to unnaturally group together
during the heat of the day, and feed much less ravenously during the heat of the day, an
than when in perfect health."

It affords me pleasure to be able to state that the favorable condition of things reported in the above-quoted passage is not confined to Kansas, but is general. In parts of Minneota, where the eggs were so thick that to dig the ground when at all moist was to make a paste, the little red mit trombidium sericeum) has swarmed and destroyed them. In ther places birds have pecked the ground full of holes in their search for eggs; and from Iowa,Nebraska, and Colorado the reports are almost unanimous that the young insect that continue to hatch also continue to perish.
A survey of the field at this writing gives every assurance of good harvests throughout the threatened country. They re needed! With ruined crops this year, following so osely the injury of the past few years, many a farmer would have been bankrupt, and the whole country would have eriously suffered. The sickliness of the locusts as com pared with those of 1875 is a most encouraging sign. Com paratively few will live to get wings. Those that became fledged in Texas are passing northwest in scattering and insignificant flights. The Saskatchawan plains and the northwestern hatching grounds were pretty well depleted last year; and there is every reason to hope for freedom from any general and disastrous invasion for some years to come. St. Louis, Mo.

## Sideraphthite.

Sideraphthite is the name given to a new alloy composed of 66 parts of iron, 23 of nickel, 4 of tungsten, 5 of alumin ium, and 5 of copper. It is said to resist sulphuretted hydrogen and the vegetable acids, and to be but slightly ttacked by mineral acids. It is really more useful than si

Is our notice of Mr. D. L. Holden's patent for an ice ma chine, published on page 330 of our issue dated May 26, we gave his address as "Carrington, Ky." It should be "Covington, Ky."

NEW TURKISH IRONCLAD.
Our engraving represents one of the two largest ironclads now possessed by Turkey, the vessels being sister ships in every particular. The present craft was originally called the Memdonhiyeh, but has recently been re-named as above in honor of the present Sultan Abdul Hamid. The Hamidieh was designed by Ahmed Pasha, chief naval constructor of the Turkish Government, and was built at the Thames Iron Works, London, England. Her dimensions are: Length, 332 feet; breadth, 59 feet; depth, 19 feet; displacement, nearly 9,000 tons. The hull is divided into 71 watertight compartments. A belt of armor plating 12 inches thick, backed by the same thickness of teak, surrounds the vessel. The maindeck battery has plates of similar thickness, and is 148 feet in length, containing twelve 18 ton guns. Four corner ports are so placed at an angle that their guns may be fired astern or ahead. The upper deck armament consists in two $6 \frac{1}{2}$ ton guns
The engines, built by Maudslay, Sons, \& Field, are of the usual type pe culiar to that firm. Ther are two piston rods to each cylinder connected by an inclined crosshead one rod passing over the one rod passing over, the luer. shaft. The two steam cyl inders are each 116 inches in diameter, with stroke. of 4 feet. The screw is 23 feet in diameter, with $19 \frac{1}{2}$ feet pitch. Thereare eight boilers, with 22,500 feet of heating surface Tests of this vessel on the measured mile gave: Revolutions, 66.3 ; vacuum 261 $\frac{1}{2}$; boiler pressure, $28 \frac{1}{2}$ lbs.; speed, 13.74 knots. The ship at last accounts was in England, but is ex pected to go into activ service on the Black Sea

## Investigations on th

Gastric Juice.
M. Richet, according to the Répertoire de Pharına $c i e$, has been enabled to in stitute a series of experi ments on this subject un der singularly favorable circumstances. A young man came before him on whom, in consequence of incurable stricture of the œesophagus, gastrotom had been performed, and a permanent gastric fistul had been established. The œesophagal stricture being complete, swallowing wa of course impossible, so M. Richet was enabled to procure the gastric juice without any admixture o saliva. He finds the aver age proportion of hydro chloric acid to amount to 0.17 per cent, the propor tion being increased by wine and alcohol, but di minished by sugar. The ingestion of acids or alka lies made little difference, as the normal proportion was soon restored. The acidity of the gastric juice is increased during the process of digestion, es
pecially towards its close. The sensations of hunger and thirst are in no way associated either with gastric acidity or with the state of the stomach as to emptiness or repletion. Ordinary kinds of food occupy three to four hours in digestion; but milk takes only half this time, while all traces of water or alcohol disappear from the stomach in about three quarters of an hour. M. Richet has availed himself of this favorable opportunity for the purpose of investigating the nature of the free acid in the stomach, and hopes shortly to publish his researches on this subject.

## The Nebula-What are They?

Mr. E. J. Stone, M.A., F.R.S., Her Majesty's Astronomer, Cape of Good Hope, says, in a paper recently read before the Royal Society:
' Before the announcement of Mr. Huggins' discovery of the presence of bright lines in the spectra of nebulæ, it was generally, if not universally, accepted as a fact that nebulæ were merely stellar clusters irresolvable on account of their great distances from us. This view had become impressed on the minds of many of our greatest observing astronomers in the progress of their work, and is one therefore which
should not lightly be abandoned. It appears to me that $\mathbf{M r}$ Huggins' observations instead of being inconsistent with th view formerly held by astronomers, are rather confirmatory the correctness of that view
"The sun is known to be surrounded by a gaseous en velope of very considerable extent. Similar envelopes mus surround the stars generally. Conceive a close stellar cluster Each star, if isolated, would be surrounded by its own gas eous envelope. These gaseous envelopes might, in the cas of a cluster, form over the whole, or a part of the cluster, continuous mass of gas. So long as such a cluster was within a certain distance from us the light from the stellar masses would predominate over that of the gaseous envelopes. The spectrum would therefore be an ordinary stellar spectrum. Suppose such a cluster to be removed further and furthe from us, the light from each star would be diminished in the proportion of the inverse square of the distance; but such would not be the case with the light from the enveloping sur


## THE TURKISH IRONCLAD HAMIDIEH

## formed by the gaseous envelopes. The light from this

 envelope received on a slit in the focus of an object glass would be sensibly constant because the contributing area would be increased in the same proportion that the light received from each part is diminished. The result would be that at some definite distance, and all greater distances, the preponderating light received from such a cluster would be derived from the gaseous envelopes and not from the isolated stellar masses. The spectrum of the cluster would therefore become a linear one, like that from the gaseous surroundings of our own sun. The linear spectrum might, of course, under certain circumstances, be seen mixed up with a feeble continuous spectrum from the light of the stars themselves.It should be noticed that, in this view of the subject, the linear spectrum can only appear when the resolvability of the cluster is at least injuriously affected by the light of the gas eous envelopes, becoming sensibly proportional to that from the stellar masses, and that in the great majority of such cases it would only be in the light from the irresolvable por tions of the cluster that bright lines could be seen in the pectrum.
"The changes in form which would be presented to us by
ach a nebula might be expected to be small. These change would depend chiefly upon changes in the distribution of the stellar masses constituting the cluster. It has always ap peared to me difficult to realize the conditions under whic isolated irregular masses of gas, presenting to us sharp angu lar points, could exist uncontrolled by any central gravita ional mass without showing larger changes in form than apear to have been the case with many of the nebulæ. In my view of the nature of nebulæ this difficulty no longer exists."-Nature.

## Cutting Down Trees by Electricity

A few years ago, a Dr. Robinson, of New York city, took out a patent through the Agency of the Scientific Ameri can, for felling trees by means of a platinum wire, in plac of the axe or saw, using an electric battery for the severing power, by keeping the wire at a white heat and drawing it back and forth, and keeping it taut to the tree as it pene trated the trunk. W published an account of the invention at the time the patent issued, which elicited considerable at tention from all parts of the world. According to the Lumberman, an ex periment with the same invention has recently been tried in the East In dies, from which our con temporary quotes from local paper, published in that country. The paper states that the patentees of the process are Mr. H. H S. Parkinson and Mr. W H. Martin, both of Bom bay; and the experiment was superintended by Dr Lyons. The plan is sim ple. The two $\epsilon$ nds of the copper wires of a galvanic battery are connected with platinum wire, which of course instantly become red hot, and while in tha state it is gently seesawed across the trunk of the tree to be felled. When arrangements were made for the experiment, it wa never for a moment doubt ed that the enterprising merchants of Bombay were possessed of all it. made thicknesses of pla tinum wire, but it turned out that the thickness of the thickest that could be got was only that of crochet cotton. It was at once seen that a wire of such thinness would be consumed before the tree was half severed from it trunk. However, the at tcmpt was made. The burning wire performed its task very well so long as it lasted, but, as antici pated, the wire continual ly broke, and at length there was noneleft. There can be little doubt that with a stronger batterythe one used was only a twelve-chambered oneand a thicker wire, the experiment would hav been entirely successful. As it was, the tree wa sawed one fifth through. It is calculated that, under proper conditions, a tree, which at present takes two hours to fell, will come to the ground by this process in fifteen minutes It is almost needless to add that there is no waste of woo and no sawdust.

## Propagation of Heat

We learn from the Répertoire de Pharmacie that M. Olivier has found that under certain circumstances heat is not prop agated by direct proximity. His experiment was thus con ducted: A bar of steel of certain dimensions being selected he operator places one hand over the center of the bar and the other over one of the extremities. The other extremity is then heated by rapid friction with energy. At the end of a few minutes the further extremity of the bar becomes so hot as to compel the operator to remove his hand, while his other hand, which had been placed over the middle of the bar (and, consequently, nearer to the extremity warmed by friction), perceives no heat whatever.

To bore a hole easily through a hemlock knot, wet your auger in turpentine.

## PIPE TOOLS.

The implements represented in the annexed engravings from Knight's "Mechanical Dictionary,"*) all relate to the manipulation of pipe. Fig. 1 is a pipe holder having a simple

Fig. 1.

corrugated cam clamp, whereby the work is tightly held. Fig. 2 is an implement for pushing obstructions out of bends

Fig. 2.


Pipe-Clearer in pipe. A force pump is usually employed for this purpose; but, in some cases, a jointed thrusting implement, such as that illustrated, becomes necessary. Fig. 3 represents a pipe cutter in which a movable jaw is hinged to a nut which traverses the threaded shank, and operates in opposition, either to the socket end of the shank or to a cutter inserted therein. Figs. 4, 5 , and 6 illustrate three other forms of this implement. Fig. 4 is a tool with three revolving cutters, so set that two cutters are in the body of the tool, and one adjustable cutter is held by a movable wrought iron

stock. Fig. 5 represents a tool in which a sharpened disk within a block is fastened to the end of the screw rod; and

the pipe, being clamped between the disk and the hook, is cut by turning the instrument around the pipe. In


Fig. 6 the tube and its bushing are made to encircle the pipe; and the cutter is forced into the side of the pipe by

turning the screw. The pipe is then severed by turning the instrument around upon it
Fig. 7 is a tool which is let down into a well pipe in order


Pipe-Grab. o hoist the latter to the ser consists simply of wedges on the head of the draw rod, which are expanded and caused to grasp the tube after being inserted to the proper depth. Fig. 8 is an apparatus for proving steam or water pipes by hydraulic pressure. It consists of a metallic bed plate (on which are fixed two cast iron head stocks connected by strong wrought iron bolts), a cast iron follower with square thread screw, and a hand regulating wheel, screw water valve, and air cock; also a gun metal pressure pump, inclosed in an iron cistern, and a pressure gauge. The method of using the apparatus is as follows: The pipe is placed between the head stocks in contact with ruber rings, and the joints are made by screwing up the follower by means of the hand wheel. The pipe is rapidly

$$
\text { Fig. } 8 .
$$


filled with water from any convenient source above the machine by opening the water valve, when the proof pressure may be applied by the pump.

* Pablished in numbers by Messrs. Hurd \& Hoaghton, New York city.

Fig. 9 is a machine for punching holes or slots in metallic tubes, consisting of a frame, $a$, in which is fixed a strong hol low mandrel, $b$. A semicircular wedge, $c$, is fitted into the mandrel and connected by a rod, $e$, to a lever at the other end of the machine operated by the rod, $f$. The frame, mandrel, and wedge are slotted at $g h i$, forming a series of openings through which the punch, $k$, may work. In using the apparatus, the pipe is slipped over the mandrel, and by forcing the rod, $f$, inward, the wedge, $c$, is caused to enter the pipe and resist its tendency to be bulged inwardly under the action of the punch. The lever, $l$, is depressed, operating the eccentric, $m$, and forcing the punch through the

upper side of the pipe: the piece of metal cut out is driven through the aperture, $h$, in $i$. An upward movement of the lever, $l$, permits a spring to lift the punch, and the rod, $f$, is pushed inward to withdraw the wedge, after which the pipe may be removed. By a reverse movement of the rod, a small projecting pin on the frame, $a$, is caused to push the chip cut from the pipe out through the longitudinal slot, $n$, in the wedge.
In Fig. 10 is represented a machine for finishing the moulding process of clay or concrete pipes by making a socket on one end to receive the smaller end of an adjacent pipe when laid; $a$ shows the pipe before socketing; $b$ after-

Fig. 10.

wards. The pipe, $a$, is placed in the bed of the machine, and the upper clamp brought down and locked. The headpiece, which has the counterpart form of the socket, is then brought forward by the lever, expanding the clay into the shape of the former
Fig. 11 is a machine of the nature of a screw stock to cut thread on the end of a wrought iron pipe. It is fitted for

Fig. 11.

and power, motion being transmitted to the several parts by means of gearing; the pipe is shown projecting toward the left, and is held stationary by the adjustable jaws of the pipe vise. The pipe passes through the center of the gear wheel, the rotary motion of which is imparted to the die in the die box by means of studs or guides upon which the die box freely slides forward as the die passes upon the pipe.
Fig. 12.


When cutting pipe, the tool post with the cutter has auto-
matic feed, cutting the ends of the pipe squarely and smoothly.
Fig. 12 is a machine in which sheet metal pipe is passed between the two rotating circumferentially ribbed cylinders he ribs of the cylinders meshing together. As the cylinders ctate they impress the thread upon the pipe.
Fig. 13 represents a pair of tongs with one short jaw

adapted to grasp a pipe or rod. Their range of grasp is but limited, and a number are provided for varying sizes of pipes.

Fig. 14.


Their grasp is more tenacious than that of a monkey wrench. Varieties of the implement are illustrated in Figs. 14 and 15.

Fig. 15.


Fig. 16 is a pipe vise or implement for holding a pipe while being threaded or otherwise fitted; $a$ and $b$ are different patterns, both for bench use.

Fig. 16.


Various forms of pipe wrenches are illustrated in Fig. 17. The instrument is usually made with a movable and a relatively fixed jaw, so arranged as to bite together when

Fig. 17.

they are made to grip the pipe, and are revolved in a certain direction around it. The figure shows several kinds, which will be understood without specific description.

## Conmmications.

## The Undulatory Theory of Light

## To the Editor of the Scientific American

Permit me to submit the following for the purpose of reconciling the undulatory or wave theory of light to that of the straight-line theory of Sir Isaac Newton
Let the inner circle represent the earth, the outer circle the exterior surface of the earth's atmosphere, and the inner lines the lines of temperature of the atmosphere. An observer, standing on the earth at A, at the moment when that portion of the earth was nearest to the sun, would notice that light of the els in a straight line. An observer at B would witness

the undulatory or the wave motion of the light passing in an oblique direction through the various degrees of temperature of the earth's atmosphere. A light at $D$ would travel in a straight line to $G$; but it would be seen traveling in waves, if an observer were at $E$ or at $F$. In like manner, sound would travel in waves from $E$ to $F$, but in straight lines from $D$ to $G$, and in waves from $D$ to $F, D$ to $E$. It seems to me that both theories are correct. One of the two may be the general rule, and the other the exception. Montreal, P. Q. Dugald Macdonald

## Steam Economy Computations.

To the Editor of the Scientific American
Your correspondent of Salem, Ohio, speaks in your issue of May 26 of "the proper allowance for clearance and compression" in steam engine cylinders. If the allowance referred to is for securing the highest percentage of useful effect from the steam used, the method indicated for making that allowance differs from at least one authority, which is regarded by many as the very highest on the subject of steam engineering, namely, Rankine "On the Steam Engine." On page 420 of this work, it says: "In order to represent the most advantageous adjustment of the compression, the quan tity of steam confined or cushioned is just su.fficient to fill
the clearance at the initial pressure." No demonstration of this is given in the work, as applying directly to this problem; but from principles set forth in the chapter. it can readily be shown to be correct. It may also be made plain by the aid of diagrams, Figs. 1 and 2. Let O E, Fig. 1, represent the atmospheric pressure, OF the absolute pressure of admission, $G C$ the stroke of the piston, and $E G$ the clear ance, such that, if G C is the volume of the cylinder, E G is the volume of the clearance: A will then be the initial position of the piston, B the point of cut-off, B H C the curve of expansion, and A D the curve of compression. The indicator diagram will then be A B CD A.
Many ascume the curve, BHC , to be a common hyperbola, with OF and OK as asymptotes; but both the theoretical and actual curves differ considerably from it. But whatever it be. it is evident that the operations going on in describing


BC are simply repeated, in the reverse order, with a les quantity of steam, in D A. From this it appears that any horizontal line, $L N$, is cut by the curves in such a manner that FA:FB::LM:LN::ED:EC, etc.; or we may put it: $\mathrm{AB}: \mathrm{FB}:$ : $\mathrm{MN}: L \mathrm{LN}$, etc.
Now if the piston could start from E F, the engine would virtually have no clearance; and the indicator card would be F B C E F. All engineers would say that this diagram has no loss due to clearance. But when the piston starts from $A G$, the diagram is ABCGA, the compression being suppressed, and the clearance supposed to be AF E G. The samesteam is used as before; but the work done is less than before, in proportion to the decrease, AF E G, of card area. In other words, a diagram indicating no loss due to clearance should
have its back line stand in the same relation to the expansion curve as E F does to B C; and A G is not thus conditioned. But the above proportions show that A D would be thus con D vertical, and preserve the horizontal secants, M N. On another set of right-angled axes, we may do this by laying off A B, M N, etc., as indicated in Fig. 2: when we get a card shorter, but the same in kind exactly, as F B C E, Fig. 1, already shown to be free from clearance loss. Hence when an engine must have clearance, it can only be com pensated for by cushioning in such a manner that the termi nal pressure of compression equals the initial admission pressure. The above discussion supposes that the expansion is carried to C ; but if the release occurs at H , there will be a loss, H C I, due to carlier exhaust. If the release line, H I, could be made parallel to D M, the corresponding linc in Fig. 2 would be vertical, giving the same kind of a diagram in Fig. 2 as EFBHIE, Fig. 1, and as good as is obtainable from an engine without clearance and a square release line In designing common D slide valves of engines, the clear ance, A F, should be known, so that the point, D, may be
found; G D being greater, evidently, as A F is greater. The found; G D being greater, evidently, as A F is greater. The practical effect of giving large clearance, and hence carly cushioning, is to increase the inside lap of valve, increase the angular advance of eccentric, and increase the expansion by
making the cut-off earlier. With a clearance of a tenth or twelfth of the cylinder volume, the cut-off may be brough back to half-stroke with all the other points favorably conback to $h$
ditioned.

School of Mechanical Engineering, Ilinois Industrial University

## Fast and Slow Grinding.

John M. Truax, a prominent and practical New England miller, in a recent communication on the above subject writes as follows:
"I have heard and read a great deal about slow and fast grinding, and how to dress and how not to dress a mill, ctc. etc. Many good millers have related their experience, and made elaborate arguments to prove their theories, and have done much to enlighten their brethren in the milling science, all of which is commendable. But to say who has hit th nail on the head would be hard to tell. If the nail has been hit, who has counted the effect of the blow? To my mind, the reasons given for fast or slow grinding have not been shown. The quantity to be ground must depend upon the texture or density of the stone, the draft, the number and depth of furrows, and the grinding without heating. No more grind ing should be done than can be done without heating. The heating is the stopping spot. The quantity that every mill ought to grind is that quantity that can be ground and not heat, whether it is 5,10 , or 20 bushels per hour. If every miller will observe this as his guide, he will do the best work that he is able to do.
" In speaking of heating, I mean to say that the grain should not be so heated by pressure or rubbing, as will start the juice or essential oils of the grain. If the grain oil is started by friction, that friction produces heat, and that heat dries and evaporates the grain juice, and the virtue of the flour $\mathrm{i}_{3} \mathrm{im}$ paired. Any amount of cooling will not repair the damage done by heating. The steam that rises from the hot running mill is the vapor from out of the essential cils of the grain, and is lost in the bread. To recommend the grinding of 10 15 , or 25 bushels of wheat per hour is bad advice, imprudent. Millers differ in the selection of stones, and differ about thei dress and the motion of their mill. One will have one kind and way, and another another kind and way; but whatever way they select, when they go to grinding, their quantity pe hour should be that which they can grind and not heat, whether it is $3,5,10$, or 20 bushels per hour. Do not impair the substance for the bulk per hour. Blood heat is as high as can be warranted without impairing the product. It may be an ambition to grind fast, but an old adage is 'haste makes waste.' If millers are ambitious, let that ambition be applied to the making of a perfect running mill. Select the very best buhrs, and put in a thoroughly common-sense dress, a dress that will granulate the whole kernel as nearly as pos sible. Keep the stones as far apart as possible, and keep the texture or grain of the stones clean. Let this be the miller's ambition. But stop adding to quantity wnen the mill is at blood heat, and let the breadmakers and caters have in their flour all the virtue that Mother Earth has produced.

One of the great evils in milling is low grinding, and its evil effects are only second to those produced by fast grinding. Wheat is composed of two parts-an inner and an outer part. The inner part is meaty, and the outer is a shuck, or skin, or hull; the meaty is pulverizable, while the hull or covering is a leather-like substance, and has thickness which thickness equals the meshes of No. 14 or 15 bolting cloth. Now, the question arises, how shall the miller grind this compound kernel and clean this leather-like covering, and granulate the inner meat to a proper fineness for bread purposes, and not over-rub or grind to dust a part of the hull? This is the question. And how is wheat being ground all over the world to-day? I need not answer, for all know that heavy grinding has been the order. The lands or face of one buhr rub the other, or nearly so. So much so that that portion of the bran which is caught between the face of the mill near the skirt is more than twice overground, and this overgrinding or rubbing the bran makes a brown dust,
and blackens the flour. It is like brown paint, and bolts and blackens the flour. It is like b
with the flour and goes into the bread.
"This is a mistake, and should be avoided. Bran may
make bread, but not the bread millers feel proud of. And to avoid this, millers must run a light mill. Heavy grinding is an evil. It not only powders a portion of the bran and blackens the flour, but grinds at the same time a portion of the kernel to dust, also destroying its juicy substance; and at the same time the fine ground dust is rubbed into the texture of the stone, and the face of the stone becomes glazed and smooth, and of course dull.
" Millers, so dress your mill as will enable you to grind the inner part of the kernel to flour, and avoid making brow paint dust from the bran. A miller that runs a heavy mil is like to look for a medicine to doctor his flour. Medicin for flour is a pooi substitute for a good diress and clean stones. Bread-eaters much prefer the full life of the cercals, not a doctored article. Grain once killed by overgrinding and heating will not be brought to life by the best medi cines. All the flour doctors in the world cannot repair the life that is first produced in natural growth. They may help a deadened flour, but a whole reparation is impossible. Throw away the dregs! Let us have a pure flour."-Mill Stone.

## Producti n of Salt in England

Of the many mincrals raised in the kingdom few play a more important part, or are less noticed, than that which is found in every houschold throughout the land-salt. It is an essential that we could not dispense with, not only as a culinary ingredient, but in many other ways. Our resources, too, are such that they have not only been fully equal to the wants of our own population, but we have bee able to spare yearly from 200,000 to 250,000 tons to other countries that are not so favored as ourselve3. There are districts in many parts of the country where salt could be met with were such necessary, for, some time since, whils boring near Middlesborough, in the expectation of mecting with the coal measures, rock salt was met with at a depth of 1,800 feet. $\Lambda t$ the Moira Colliery, ncar Ashby-de-la-Zouch, in Leicestershire, at a depth of 593 feet, salt water, beauti fully clear, trickles down from the fissures where the coal is being worked. The brine is taken to Ashby, and has bcen in good repute for rheumatic and other complaints. As to he origin of salt, there are many theorics, but if may be tated that in nearly all substances, wherever found, it is in the new red sandstone. By many it is believed that the for mations are due to the evaporation of the water from inland silt lakes or parts of the sea severed from the main body of the ocean by volcanic action, the evaporation causing the deposit of the salt held in solution by the sca. Writing more recently on the subject of the great European salt de posits, Mr. T. Ward propounds a rather different theory He considers that the salt deposits owe their origin entirely to the elevation of the mountain chains with which they are so intimately connected, during which small valleys and ravincs would be cut off from connection with the sea by ridges of land, and would form salt lakes and lagoons Cheshire is still the main source from which we draw ou own supplies, and export to the United States, Russia, and other countries. There we have had considerable laneslip in working it, but there are the red rocks showing keuper or saliferous marl, with thin beds of limestone, and then 200 cet of rock salt. In Worcestershire, at Droitwich and Stoke Prior, the salt is made from brinc alone. A large proportion of what is made at Norwich, Middlewich, and Winsford, in Cheshire, is sent down the river Weaver. th yuantity in 1857 having been 772,175 tons, and in 1866 it had increased to $1,118,991$ tons. During the last 20 years, how ever, the increase in the production has been of a mos marked character, whilst the price has gone down ver much. In 1855 the salt raised in the kingdom was $1,094,770$ tons, the average price at the works being about $\$ 6$ per ton In 1875 there was raised $2,316,644$ tons of salt, the price be ing barely $\$ 3.60$ per ton. The value of the salt exported in 18.55 was $\$ 1,738,570$, and in 1875 it was only $\$ 860,255$, when our exports were 916,468 tons, or nearly as much as the en tire produce of the kingdom in the former ycar. Our principal customers include the United States, British India British North America, and Russia. From the figures given it will be scen that nearly 40 per cent of the salt produced in the kingdon is exported to other countries.-Mining Journal.

## GAUGES.

Since the introduction of special machines and tools designed to produce and reproduce the various parts in quan tities, and of exactly uniform size and shape, the importance of standard gauges has been greatly increased; and in es ablishments where this system is followed, the best of skill and the greatest of care and watchfulness are necessary to maintain the exact standard. It is ubvious that, when the various parts of a piece of mechanism are made separately in large quantities, and are not assembled until the whole are finished, a slight variation of size or form would soon im pair the fit of the various parts, and therefore the value of the whole system. Now, theoretically, a new tool decrease in size from the moment it commences to perform cutting duty until it is worn out; and the point at which the wear ing-out process may have arrived at its greatest permissible limit is, under light duty, more of ten determined by the re duction of its size than of the loss of its keenness or other duction of its size than of the loss of its keenness or other
cutting properties. Many firms prescribe a definite permissible limit of wear to certain tools, such as the one thousandth or two thousandth of an inch, and make two sets of gauges, one of the precise size and the other showing the extreme
limit to which the range of size is permitted; and when that 4 ; and holding the female firmly, lightly press the male first duce greater uniformity in the progression of the sizes. This limit is reached, the tool maker or foreman is notified that in tire direction of A and then of $B$. There are few gauges will be clearly understcod by reference to the diagram shown the tool may be restored to its standard. For the purpose of which will not, under such a test, show some slight move- in Fig. 5, in which the two lines, A C and B C, meeting at this restoration a standard gauge is required; and this gauge ment, denoting defect. C , represent the opening of an angular wire gauge. The even is subject in some degree to wear, especially if it be not Solid cylindrical tools are often made of stecl wire divisions on the line, A C, show the size of wire by the comhandled with extreme delicacy. No more delicate proof of drawn to gauge, and to great accuracy of diametrical size. mon gauge; those on the line, B C, the sizes by the new this fact can be shown than in the following: If we take a There is, however, a slight degree of variation due to the American standard. Wire to be measured by such a gauge pair of cast iron surfaces, having an area of 100 inches, and wear of the drawing dies. In the table below will be found is passed into the angular opening until it touches on both clean them thoroughly with alcohol, and then, after freely the gauge numbers, and the sizes in decimal parts of an inch sides, the line of division at the point of contact denoting the lubricating them with the best sperm oil, rub one a few of the celebrated Stubs wire. The first column is the size ac- size by wire gauge number. Thus No. 13 by the old gauge strokes upon the other, we shall find that (though, from the cording to the Stubs wire gauge; the second is the size in is No. 15 by the new. The difference between the two existence of the oil, neither the eye nor the sense of feeling decimal parts of an inch, as given by Mr. Stubs; and the ganges, known resi ectively as the Birmingham or English gives the least indication that the surfaces have had the least third column represents the average sizes obtained from and the American, is shown in the table below: contact) still the oil will have become so darkened, or rather actual measurements of the wire, taken during a period of blackened, in color as to clearly demonstrate that abrasion several years by the Morse Twist Drill and Machine Comhas, to some practical extent, taken place. From this we pany, whose drills are made to great diametrical accuracy. may perceive that, in trying hardened steel tools with gauges, the latter, though of hardened steel themselves, may very easily become worn if rudely handled.

The gauges used as standards for male and female cylindrical forms are usually after the pattern shown in Figs. 1 and 2. They are made of steel; and after being hardened they are ground to size, the grinding process being so delicately performed as to leave a polish. In testing such gauges the

Fig. 1.

heat imparted to them by holding them for any length of time in the hand will cause a perceptible difference in the size; hence, to insure the greatest practicable accuracy, it is necessary to test the whole set at an equal temperature. As a test of accuracy, we may take a female gauge and place therein two or three male gauges, whose diameters added together will equal that of the female. Thus in Fig. 3, the

size of the female gauge, A, being $1 \frac{1}{2}$ inches, that of the male, $B$, may be 1 inch , and that of $\mathrm{C} \frac{1}{2}$ an inch, and the two together should just fit the female. On the other hand, were we to use, instead of B and C, two males, $\frac{7}{8}$ and $\frac{5}{8}$ inches, re-
spectively, they should fit the female; or a $\frac{1}{4}$ inch, a $\frac{5}{8}$ inch and a $\frac{8}{8}$ inch male gauge torer series of tests of this description, the accuracy of the whole set may be tested; and by judicious combinations, a defect in the size of any gauge in the set may be detected. A notable fact with reference to these gauges is that, if we take a male and female of corresponding sizes, and slide the one continuously through the other, it will pass through at a

proper fit; but if we arrest the progress of the male and allow it to rest a few moments, it will become fast in the female and require considerable force to remove it again. The wear of these gauges takes place most rapidly at and near the ends, because it is difficult in using them to keep them in lines true with the bores into which they are tried; and the movement due to the adjustment to line causesabrasion. It is indeed an excellent method of testing to place one in the
other to the depth of about $\frac{1}{10}$ of an inch, as shown in Fig.

|  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.227 | $0 \cdot 228$ | 23 | $0 \cdot 153$ | $0 \cdot 154$ | 4) | 0.081 | $0 \cdot 082$ |
| 2 | $0 \cdot 219$ | 0.221 | 24 | $0 \cdot 151$ | $0 \cdot 152$ | 46 | $0 \cdot 079$ | 0.080 |
| 3 | 0.212 | 0.213 | 25 | $0 \cdot 148$ | $0 \cdot 150$ | 47 | $0 \cdot 077$ | $0 \cdot 0 \sim 9$ |
| 4 | $0 \cdot 207$ | 0.209 | 26 | $0 \cdot 146$ | $0 \cdot 148$ | 48 | 0.075 | 0.076 |
| 5 | $0 \cdot 204$ | $0 \cdot 206$ | 27 | $0 \cdot 143$ | $0 \cdot 145$ | 49 | 0.072 | 0.073 |
| 6 | 0.201 | $0 \cdot 204$ | 28 | $0 \cdot 139$ | $0 \cdot 141$ | 50 | 0.069 | 0.070 |
| 7 | $0 \cdot 199$ | $0 \cdot 201$ | 29 | $0 \cdot 134$ | $0 \cdot 136$ | 51 | 0.066 | 0.067 |
| 8 | $0 \cdot 197$ | $0 \cdot 199$ | 30 | $0 \cdot 127$ | $0 \cdot 129$ | 52 | 0.063 | 0.064 |
| 9 | 0.194 | $0 \cdot 196$ | 31 | $0 \cdot 120$ | $0 \cdot 120$ | 53 | $0 \cdot 0.58$ | 0.060 |
| 10 | $0 \cdot 191$ | 0.194 | 32 | $0 \cdot 11 \mathrm{j}$ | $0 \cdot 116$ | 54 | 0.055 | 0.054 |
| 11 | $0 \cdot 188$ | $0 \cdot 191$ | 33 | $0 \cdot 112$ | $0 \cdot 113$ | 55 | $0 \cdot 050$ | $0 \cdot 052$ |
| 12 | $0 \cdot 185$ | $0 \cdot 188$ | 34 | $0 \cdot 110$ | $0 \cdot 111$ | 56 | $0 \cdot 045$ | 0.047 |
| 13 | $0 \cdot 182$ | $0 \cdot 185$ | 35 | $0 \cdot 108$ | $0 \cdot 110$ | 57 | $0 \cdot 042$ | 0.044 |
| 14 | $0 \cdot 180$ | $0 \cdot 182$ | 36 | $0 \cdot 106$ | $0 \cdot 106$ | 58 | 0.041 | 0.042 |
| 15 | $0 \cdot 178$ | $0 \cdot 180$ | 37 | $0 \cdot 103$ | $0 \cdot 104$ | 59 | 0.040 | 0.041 |
| 16 | $0 \cdot 175$ | $0 \cdot 177$ | 38 | $0 \cdot 101$ | 0.101 | 60 | $0 \cdot 039$ | 0.040 |
| 17 | 0.172 | $0 \cdot 173$ | 39 | 0.099 | 0. 100 | 61 | $0 \cdot 038$ | 0.039 |
| 18 | $0 \cdot 168$ | $0 \cdot 170$ | 40 | 0.097 | 0.098 | 62 | $0 \cdot 037$ | 0.038 |
| 19 | $0 \cdot 164$ | $0 \cdot 166$ | 41 | 0.095 | $0 \cdot 096$ | 63 | $0 \cdot 036$ | 0.037 |
| 20 | $0 \cdot 161$ | $0 \cdot 161$ | 42 | 0.092 | 0.094 | 64 | $0 \cdot 035$ | 0.036 |
| 21 | $0 \cdot 157$ | $0 \cdot 159$ | 43 | 0088 | 0.089 | 65 | 0.033 | 0.035 |
| 22 | 0.155 | $0 \cdot 156$ | 44 | 0.085 | 0.086 |  |  |  |

## The wirc:

| letter sizes of wire. |  |  |
| :---: | :---: | :---: |
| A........ $0 \cdot 234$ | J . . . . . . 0. 2 \%7 | S ....... . 0.348 |
| B . ..... 0.238 | K........ 0.281 | ' ${ }^{\text {c }}$. . . . . $0 \cdot 358$ |
| C........ $0 \cdot 242$ | L . . . . . . 0 0 290 | U . . . . . . . $0 \cdot 368$ |
| D . . . . . . . $0 \cdot 246$ | M........ 0. $0 \cdot 295$ | V......... 0.377 |
| E........ $0 \cdot 250$ | N.... . . . $0 \cdot 302$ | W......... $0 \cdot 386$ |
| F........ $0 \cdot 257$ | O.... ... 0.316 | X........ 0307 |
| G.... ... $0 \cdot 261$ | P..... . $0 \cdot 323$ | Y ......... 0.404 |
| H......... $0 \cdot 266$ | Q ..... . . 0.332 | Z .... ... 0.413 |
| I . . . . . . 0 0272 | R........ 0.339 |  |

Fiv. $\delta$.




The gauge adopted by the sheet brass manufacturers of this country is shown in Fig. 6; and in Fig. 7 is shown the Franklin Institute or American standard screw gauge.

## American Leather in Germany,

The United States Consul at Berlin, under date of May 1, in view of the fact that from its superior quality American leather is gradually finding its way to Germany, sulmits a prospectus of an exhibition of leather manufactures, to be held in that city from September 8 to 29 next. The Con sul thinks an observance of the provisions of the documents would be beneficial to American interests.

## NEW FEATHERING PADDLE WHEEL

Mr. Henry Williams, of Milwaukee, Wis., has patented through the Scientific American Patent Agency, April 3, 1877, a new paddle wheel in which the paddles or floats are feathered in passing into and out of the water. As shown in the engravings, the wheel carries a number of journaled radial arms, $b$, having at their outer extremitics paddles or floats, B, which are turned through a quarter of a revolution by $T$ levers, $c$, attached to the inner ends of radial arms, which carry a friction roller, $e$, at each end. These friction rollers move in a cam, $C$, of peculiar con struction, which turns the $T$ levers, and consequently the floats or paddles, at the proper instant.

Figis. The feathering
 part of the cam, C, paddles are turned paddies are turned the plane of rotathe plane of rotation as they enter
the water, but are the water, but are
turned edgewise or parallel to the plane of rotation before they begin to rise in the water.

## The Scientific American.

"The Scientific American for last week contains some excellent illustrations of the great engincering work of the Delaware, Lackawanna, work of the Delaware, Lackawanna, Bergen Hill, also a description of its Bergen Hill, also a description of its
progress and the expense of constructprogress and the expense of construct-
ing this great addition to the railroad interests of our State, together with many other matters of interest. Mechanics and artisans, and indeed professional men generally, who desire to keep well posted in the science of mechanics, and thus attain greater usefulness in their respective professions, can make no better investment of a few dollars than by subscribing to so valuable a periodical

## WILKINSON'S IMPROVED LIQUD MEASURE.

We illustrate herewith a convenient apparatus for grocers' use, designed for drawing kerosene oil in the store directly from the barrel in the cellar. It is so made that the hands need not come in contact with the oil; and it saves the time of traveling to and from the cellar whenever oil is to be drawn. At the same time, it affords an accurate means of measuring out the liquid, even to the smallest quantities; and it prevents evaporation of the same, and also chance contact with fire during handling.


The device consists of a pump, shown beside the stand in the engraving, which is connected to the oil cask by a tube which extends upward and communicates with the upper portion of a glass measure, which is marked with a graduated scale to represent gills, pints, quarts, etc. The construction is such that, when the stopcock is opened to draw off the fluid, a valve is also opened, and air is admitted to the top of the receptacle. When the measure is being filled by pumping the fluid into it, the air will open the upper valve and escape, the valve afterwards closing and preventing evaporation. The apparatus is made in any desired size and with any graduation.
Patented June 13, 1876, by Mr. J. W. Wilkinson. For further particulars, address the manufacturer, Mr. H. J. Appleby, 911 Market street, Meadville, Pa.

## Science in Mexico.

We are indebted to the Hon. C. Vincente Riva Palacio Minister of Fomento, of the Republic of Mexico, for a copy of the first volume of the Anales of that department. It is a very handsomely printed document of 208 pages. President Diaz has dirceted the publication, under the above title, of such scientific matters as the Minister may deem to be of


WILLIAMS' FEATHERING PADDLE WHEEL.

IMPROVED MACHINE FOR SHAPING SPRINGS.
Mr. E. C. Lewis, of Auburn, N. Y., has patented through the Scientific American Patent Agency, March 27, 1877, a novel machine, which we illustrate herewith in plan and sec tion, for automatically shaping or fitting springs in pexfect and quick manner, by any unskilled workman, so as to su persede the present imperfect method of pinching the heated spring leaves or plates into form by means of tongs.

A represents a solid former, and $A^{\prime}$ a flexible former, which are both sup ported on a bed plate, B, the solid former being secured thereto by a screw bolt, $\mathrm{B}^{\prime}$. The bed plate, B, rests on suitable supporting standards, C, which carry at one side an upright arm or post, $a$, with screw cam or knuckl device, E , and at the opposite side posts, $b$, to which a solid drop, F, with handle, $F^{1}$, to operate the same, is hinged, and supported in upright posi tion by an arm, $\mathrm{F}^{2}$, of the bed plate The drop block serves to straighten the edges of the plates in conjunction with the bed plate, while they are shaped by the formers. The solid former, A, may be interchanged for the purpose of shaping springs of different sizes, whil the flexible former, $\mathbf{A}^{\prime}$, is adapted to fit any size and shape of springs. The flexible former is constructed of a num ber of steel lugs, $d$, which are riveted to a band, $e$; or when the shaping machin is made in larger size, the lugs are con nected in such a manner as to form a continuous chain, each lug forming a link. A second band, $f$, bears on the back of the first band, or directly on It would appear from this publication that President Diaz |the connecting links of the lugs, and is attached at the cnds is a zealous friend of Science, and that he is disposed to do all within his power to advance the cause of scientific progress in Mexico. One of hisearliest proclamations was in relation to the formation of a national astronomical observa tory. The elegant palace of Chapultepec has been perma nently dedicated to this purpose. A meteorological and magnetic observatory has also been provided for on the same premises. The plans for construction are practical and ef fective. The situation is one of the finest in the world fo an observatory. Excellent lithographic plans of the pro jected new observatories are given, also a telegraphic map with an account of the Mexican system of telegraphs, about eight thousand miles in extent, worked chiefly by the gov ernment. President Diaz also recently ordered a survey for a new branch canal, to facilitate the transportation of pro duce from the narrow country near Mexico to the railway and Mr. Edward Davis, C.E., has surveyed an effective and economical route therefor
Some very interesting information is given concerning the earthquakes of Jalisco, with particulars of the volcano of Ceboruco, which latter has been in a state of constant erup tion since 1870. The members of the Scientific Commission established themselves for two weeks at the ranche of Uzeta, 2,000 feet distant from an approaching bank or stream of lava; and here, during day and night, they instituted observations and made surveys. With incredible difficulty they succeeded in ascending the volcanic peak and looking down into the crater, which was divided into three mouths, one of which belched forth flames and stones every eight minutes; the others poured out smoke and ashes; while two lateral streams of lava slowly flowed out sidewise from below the peak. The concluding chapter relates to the Mexican department of the Philadelphia Exhibition, gives the names of Mexican exhibitors, etc.

Value of the Scientific American.
"The Scientific American, published by Munn \& Co., of New York, is without a rival as a scientific paper, and to the mechanic is simply invaluable. We honestly believe any mechanic would derive information from a year's reading of the Scientific American which any amount of money could not buy. Some of our enterprising mechanic citizens, we hope, will try the experiment of reading this really valuable and practical journal one year. We know they would never give it up."
[Notices similar to the above (from the Glasgow Weekly Times) often meet our eyes in looking over our exchanges. We thank our contemporaries for their good opinion of the Scientific American, and wonder why the class of persons referred to above do not all subscribe and gain the benefit which they are assured would be theirs.-EDs.]

Electrical Treatment of Wounds.
M. Onimus has lately observed that the suppuration of wounds or ulcers may, by means of continuous electric currents, be increased or diminished, according to the direction of the current. The descending current, that is, when the positive pole is placed near the nerve center and the negative at the periphery, increases the suppuration, but, at the same time, the phenomena of nutrition are more considera ble, and the fleshy pimples are formed with great rapidity. On the other hand, with the ascending current, the suppu ration disappears very quickly. A small crust forms on the wound, which is difficult to remove, and under it there is a
cicatrization. cicatrization.
a rigid bow-shaped bar, G, to the center part of which compressing screw bolt is applied. The lugs are channeled along the center, the channels running in the direction of the longitudinal axis of the former The object of the chan nels is to produce the instant chilling of the edges of the

leaves or plates, while leaving them slightly warm at the cen ter to draw down the temper somewhat. The heated plates are placed on a center pin of the solid former, and then exposed to the action of the cold formers, which are

strongly pressed together by the screw, so as to shape, chill and temper the hot plate. The plates, when taken from the shaping machine, are ready to be bolted, and require no further manipulation.

Professor Taylor, of Chicago, accompanied by Lieu tenant Wood, U.S.A., with all the instruments for scientific exploration, recently left Victoria, B. C., for Sitka, to make a survey of the famous snow peak, Mount St. Elias, and ascertain its altitude. It is situated 350 miles north of Sitka, and has never been ascended yet, and its height has no been determined. The result of the exploration will be re ported by the department at Washington.

## perduian antiquities.

The plateau of Ancon, in Peru, is an arid table land overof Lima. It is the location of a vast sepulchre, dating back to have been brought from Asia, as it is believed that the to the earliest historical periods. Owing to the dryness of Japanese and Chinese knew of the New World and main the air and the impregnation of the soil with salts, the con- tained commerce with the inhabitant long before the discovtents of the tombs are finely preserved; and, as was apparent from the collection of mummies exhibited at the Centennial, even the lapse of ages has not determined the disappearance of either skin or hair. Fabrics, wooden vessels, and food have been found in the tombs in perfect condition: and as it was the custom of the ancient people to inter with theirdead their choicest ornaments and objects of utility, a rich treasure is now open to antiquarians, from which it is possible to determine the habits and manner of life of the Peruvians during the period prior to the Spanish conquest.
A collection of these relics now exists in Paris, at the Musée de St. Germain, and is to form a portion of a still larger gathering relative to ancient life in America, which is to be exhibited at the French Exposition of 1878. Several of the more interesting objects are represented in the annexed engravings, for which we are indebted to La Nature.
There was recently exposed for sale in this city a collection of Peruvian remains, which were sold at ridiculously low prices. The condition of the objects was scarcely such as to tempt the collector of bric-abrac, however interesting they might have been to the antiquarian; but despite the prevalent dilapidation, we noted, on examining the articles, the remarkable state of preservation of the woven fabrics-a circumstance which our contemporary also considers the most phenomenal feature in the fine French collection; not only is the tissue intact-as our engravings indicatebut the colors have kept their primitive brilliancy, and this although the fabrics seem but rough specimens of woolen weaving. The designs are always either fantastic or combinations of geometrical ly introduced, as witness the remarkable cubical birds and the geometrical cats shown in Fig. 1. The man represented is an astonishing figure: and it will be noticed that he is provided with but four toes or fingers on the respective limbs. This is an invariablepeculiarity in the pictures of the ancient artists of the country, which has not yet been accounted for. On the right of the engraving are two birds, which look like geese or swans, and which, strange to say, closely resemble the birds of like species represented on ancient Etruscan vases. We can commend these designs to those who are searching for new grotesqueries for Eastlake rugs. Mr. Eastlake suggests figures of animals not accurately drawn but possessing character, and these certainly answer the requirements.
quirements.
Besides manufactured fabrics, distaffs and spindles, used for spinning the cotton or llama wool yarn, of which they are woven, have been found. The spindles, F, Fig. 2, are often ornamented with pearls and are gaily painted. Hanks of yarn and hand looms, the latter roughly made of sticks, have been exhumed, and even pins and needles. The pins are simply long thorns, the thick portion at the point of junction with the branch serving as the head. The needles are the same, having a hole for the thread.
In Fig. 2 are represented a number of other curious articles. D is a wooden spoon with carved handle; $A$ is a llamain pottery, and B a terra cotta statuette of a woman; $G$ and $E$ are pendants in mother-of-pearl and ebony. $H$ is an ivory ornament; and C is a red earthen vase representing a man seated.
Not only are objects of metal and wood found in the tombs, but some beautiful specimens of glassware have been obtained. The glass is perfectly clear; and as there is no evidence that the people possessed the material for making it, it would follow that it was imported; but whence, it is impossible to tell. The glass vase represented in Fig. 1 is of light blue color, ornamented with opaque white glass, which bears the traces of gilding. The ornamentation bears no resemblance to that commonly employed by the Peruvians, and thus another proof is added of its foreign origin. The handle and the neck were made separately, and fastened on afterwards in a manner which shows

The plateau of Ancon, in Peru, is an arid table land over- $\left\lvert\, \begin{aligned} & \text { superior skill on the part of the workman. The neck is or } \\ & \text { namented with a kind of griffin's head, which has no re }\end{aligned}\right.$ looking the sea coast and situated about 12 miles northwest semblance to any animal indigenous in Peru. It is supposed ing. The designs are always either fan- PERUVIAN ANTIQUITIES, MUSEE DE ST. GERMAIN, PARIS.-Fig. 1.
tastic or combinations of geometrical


Photographing Machinery.
It is a common practice with large manufacturers of ma chinery in this country and in England to have photograph taken of their products, especially of any new class of machine to send to customers. For producing good photographs of this kind, the British Journal of Photography makes the following , the British Journalof Ph

To execute this class of work success fully, every contingency must be provided against-not alone in the direction of chemicals, but in apparatus equally as well. A swing back camera is indispensa ble. It frequently happens that the ob ject to be photographed is in such close proximity to the camera itself-some por tions of it lying in a plane oblique to that of the camera back-that accurate focus sing can only be thus obtained, unless a stop of such diminished aperture be made use of that the exposure becomes so long as to introduce too many elements of non success. Again: the usefulness of a swing-back will be seen when an objec of regular form lies on the ground close to the camera, which latter has to be tilted to get the object in the field of view at all Here a swing of the back-the top out wards-prevents all want of truth in the perpendiculars, and there will be no fear of the result representing a truly constructed machine with sloping sides and irregular contour.
For the successful prosecution of this class of work a good selection of lenses is necessary. The size of the picture re quired is generally fixed upon before hand; and as the standpoint is often of limited area, if not absolutely fixed, there are not afforded the opportunities tha landscapists enjoy in the selection of thei point of view. The lenses, it must be re membered, should be chosen for their focus -not from their being wide or narrow angled, quick, or slow. Let the latter qualities, of course, govern one in decid ing; but the focus of the various lenses should so rise, step by step, that, whereve he point of view may be chosen or fixed upon, one lens may be found among th ery by Europeans. But the decoration is not Oriental, but series which will take the picture the required size. The strictly Spanish; and hence the more probable assumption is lens selected, the diaphragm used should be the largest it is that the object was brought into the country by the Spaniards possible to employ with the aid of a swing-back. the 16th century, and

It will frequently happen that the object to be photo graphed lies at one end of a dark workshop. It would then, be greatly conducive to rapidity and excellence of re-
New Guano Deposits.-An English commission, sent to sults if it could be brought forward, perhaps, into the open examine some recently discovered guano deposits to the air; for it very commonly happens that the windows or sky south of Tarapaca, in Peru, has confirmed the reports of lights which illuminate such places are covered over with previous explorers as to the immense quantity of the deposit, fuliginous deposit, which seems to rob the light which passe amounting to at least $10,000,000$ tons; and it is richer in am- through them of every particle of actinic power.
monia and phosphates than that of the Chincha Islands.

perduian antiquities, musee de st. germain, paris.-Fig. 2. will be well to mention a very usefu wrinkle. It will be impossible to get a very satisfactory picture of an iron cast ing, or, indeed, any metallic object which is not finely polished, unless it be pur posely painted beforehand in a specia manner-that is, with turpentine flatting -a light slate color being the tone most advisable, as its photographic value can be seen at a glance, without the chance of miscalculation which a green or a brown for instance, might offer. This will be found to be a matter whose usefulness can not be too highly valued. The contrast between a machine, no matter how excel ently photographed, which has not been specially painted and the same subject with a coating of the flatting, will be so reat that no one who has once seen the wo would think of photographing an un painted piece of ironwork if he could pos sibly avoid it. There is one precaution to be taken in laying the color on which though it is more especially the painter's province to look after, may be pointed out here: it is that it should be made with so little oil or gold size that it will not dry patchy or cloudy-that is, with some parts dead and some bright. The effect then produced would be worse than if the ma chine had remained untouched
During the exposure care must be taken that no workmen are allowed to lounge about and smoke; for it is remarkable what a small amount of smoke will suf fice to fog a picture if it blow across the field of view, this being due, no doubt, to the highly actinic quality of the light reflected from the minute particles com posing the smoke. We once had an other wise excellent negative ruined through a imilar cause, but from another source The wind was strong, and carried a puff
of smoke from a neighboring office chimney right into the open doorway of the room in which we were photographing; it permeated the whole atmosphere of the place, and rendered it impossible to secure a clear nerative, though at the moment the occurrence was not noticed.
When the negative is obtained, it will generally be found that the background will be required to be eliminated, plain white paper being gencrally preferred by manufacturers to show off the peculiarities and excellences of their machines, there being no chance of confusing their details with those of the surrounding machincry in the background. To stop out all these and leave a white background, we have tried a multitude of expedients, but find no plan better than to make an edging of about half an inch by means of Bates' black varnish, carefully following the outlines of the machine as accurately as possible, and then placing a paper mask to block out the whole of the ground left outside this edging. This plan reduces the risk of cracking from the black varnish, and is at the same time more expeditious. We have tried Indian ink, gamboge, and water colors ad libitum; but we find it most difficult to obtain the requisite body to stop out all the light, so as to avoid any stain or streak.
We trust that the few points that we have touched upon may tend to render this class of work easier to those intend-
ing to try it, and we advise all, from a pecuniary standpoint to do so it, and the it is certain that in time to come photography will be more and more in request for work of this description, and we are in a position to state that, even in small establishments, the annual expenditure for photographs of machinery forms a conspicuous item.

## Dangerous Paper Hangings.

The sanitary chemist of Breslau, Dr. Franz Hulwa, reports that he has frequently found not inconsiderable quantities of arsenic in tapestries and hangings sent to him for examination. It was not alone in the well known bright green paper that arsenic was found, but also in bluish green, gray, brown, and red patterns, corresponding to similar results in other places.
In most cases it was not due to the direct use of arsenical pigments like Scheele's green, Paris green, Braunschweig or Brunswick greens, orpiment, royal ycllow, etc., but the arsenical reaction was so strong that it ought not to be passed over in silence. The presence of arsenic was attributable in some cases to impurities or adulterations; sometimes it was referred to additions made to brighten the shades of color. Not infrequently suspiciously bright green paper was printed over with harmless dull green to make it more salable. Such hangings must be the more dangerous because people are deceived in regard to their poisonous characters. In one such case, a dull bluish green pattern was found to contain a surprisingly large amount of arsenic. In another beautiful green and very elegant velvet paper, the arsenic was evidently added to increase the brilliancy of the colors. The amount of arsenic on 1,000 square feet of surface of
this paper, enough for a large room, was about 2 gramthis paper, enough for a large room, was about 2 grammes, or 30 grains.
Lakes, which are precipitates from alkaline solutions of organic coloring matter by means of alum or chloride of tin, frequently have arsenic added to them to make them brighter and more pleasing. These lakes were made of madder, cochineal, and sandal wood; but the brightest and most beautiful are the lakes made with aniline colors with the addition of arsenic. In the lakes we meet with a series of dangerous colors previously but little noticed; these colors must now all be suspected of containing arsenic. Reichardt of Jena found from 1.96 to $3 \cdot 49$ per cent of arsenious acid in such lakes which were designated as free from arsenic. Hallwachs, of Darmstadt, found an enormous quantity of arsenic in a very popular Pompeiian red paper hanging. In one French paper, printed with dark red velvet flowers on a gold ground, arsenic was distinctly proven by the Reinsch, Bettendorf, and Marsh tests, and with Fleck's silver solution.
Arsenic is least suspected in the dull gray or brown hangings. These indefinite mixed colors are frequently made from the residucs of different dye pots and contain arsenic, partially for this reason, and partially because of the greater or less contamination of the raw materials used in dyeing
with this poisonous substance. These phases of the case were observed both in a yellowish gray paper with gold figures, and one of light and dark pattern; the brown contained $2 \cdot 1$ grammes on a surface of 1,000 square feet. Although these figures are relatively small as compared with those of Sonnenschein, where green papers contained 1.8 to $4 \cdot 4$ grammes of arsenic in a square foot of surface, yet in general the injuriousness of arsenical hangings has been es-
tablished. Gmelin first proved that living in rooms covered with arsenical paint or paper was very destructive to health; and these facts were substantiated by Oppenheim, Bunsen, Von Fabian, Kletzinski, Philips, and others. Beside the above-mentioned investigators, the following chemists have
examined this subject, namely, Gintl, Wittstein, Halley examined this subject, namely, Gintl, Wittstein, Halley.,
Williams, Basedow, Vohl, Kirchgiser, Hager, Hamberg, and others. Recently Fleck has furnished the most striking proofs, by his very interesting and rationa!ly conducted experiments, that not only does breathing the arsenical dust loosened from the walls and hangings injure the health, but that, by the action of moisture and adhesive organic substances, like glue, paste, and gum, the arsenical pigments evolve that terribly poisonous arseniuretted hydrogen gas, which is diffused through the room and may be the cause of dangerous illness. It is desirable, says Hulwa, to direct public attention to the use of arsenical colors in clothing,
artificial flowers, toys, window and lamp shades, wafers, and other articles. The public must be continually taught that ble of seriously injuring the done much harm and are capa possible, to be excluded from common use. The sanitary police of Breslau, acting on Hulwa's suggestion, have passed an ordinance forbidding
senical dyes or pigments.

## The New German Patent Law.

The new German Imperial Patent Law has just been passed by the Reichstag and will come into force on the 1st of July next. This new law puts an end to the disorder concerning patents in Germany that has existed until now, there being at the present time twenty-one different States grant ing patents of their own. These will be all embraced by one law after the 1st of July, and this a good and practical one, far better than many now in force in other countries. Pharmaccutical compounds, medicines, alimentary preparations, and chemical products cannot be patented under the new law; processes, however, by which these articles are ob tained, can be patented. An invention must be novel, and not have been introduced to the public so that arother per son can imitate the same. Importcd inventions are patent able only to the real inventor. Foreigners must be repre sented by a German citizen. It is unlawful to manufacture a patent article, to import the same from another country, or even to use without permission a patented machine, tool, apparatus, or process. Any one having an invention in use cannot be prevented from continuing to use the same. A patent remains good for fifteen years on payment of an annual tax. The duty may be paid three months after date. Patent rights may be withdrawn by the government after three years if the invention has not been carried into opera tion to a proper extent, or if the inventor has not taken the necessary steps to carry the patent into effect, if he refuses licenses to others who offer a fair royalty, or if it is advis able for the pullic good to grant such licenses. When the invention or improvement relates to purposes of war or marine, or affects the general welfare, a patent will not be granted, but the inventor will be recompensed by the State. The decision in this case will rest with the Imperial Chancellor. Any one having obtained a patent for improvements on a patented article, and wanting a license from the first inventor, is obliged to give the latter a license for his improvements. The applications will be examined by the Patent Commissioners and experts appointed for this purpose; an appeal can be made. in case of refusal, to a special commissioner, and from him to the Imperial Court at Leip sic. In the case of poor inventors, the payment of duty will be postponed for two years, or may be altogether remitted. Specifications and drawings can be inspected immediately after the application; on account of this, patents should bc taken in other countries first. Patents being delivered, a short specification of the same will be published in the " Patent Journal." Infringements of patent rights are punished with a fine or imprisonment not exceeding one year. Marking articles as patented which are not so, is punished with a fine. At the publication of the invention, any one thinking he has a prior right, may enter an opposition, which is then examined in the presence of those concerned Existing German patents may be transferred to the Empire but cannot be prolonged.

Paris Cement white a Substitute for White Lead.
The best coating for painting has hitherto been white lead, the manufacture and use of which are so injurious to work men that Mr. L. Henry, of Paris, has sought a product which, while rendering the same services as white lead, does not present the disadvantages mentioned, and he claims that he has not only attained that object but gone beyond it, as his product is superior to white lead, without taking into account that it is 50 per cent cheaper, and that with an equal weight he can cover one third more surface. All cements do not completely destroy humidity or damp, they only isolate it, and little by little the layer of paint is eaten away. The Paris cement white will be found of great service used as a cement, that is to say, applied upon the moist or damp parts as mastic, and the paint placed over it will al ways preserve its freshness, will not peel off, and there will be no blisters; this part will be as hard as stucco. When executing rich or costly works, it will only be necessary to use Mr. Henry's cement as mastic to obtain pancls of a brilliant whiteness or marbled, as may be desired, and with a perfect polish. In order that the resistance of the composition may be understood, he gives a comparison. It is well known that when it is desired to remove paint from a sign-
board, for example, the painter is obliged by means of a small apparatus to apply flame to the part first coated in order to remove the white lead; now, his composition resists this firing, thus proving its hardness, and it also resists potassium. The Paris cement white is manufactured like white lead with kneading machines; it is, therefore, delivered in a paste, and when to be used for painting it is dissolved in linseed oil, as is done with white lead; it consists of whiting or Spanish white, baryta, oil, water, and zinc. He does not give the proportions of each product, as they vary with the quality of the said products and their destined use, whether at a mastic cement, for painting, for preserving railway sleepers, for making troughs or tanks watertight, and the innumerable other purposes to which his composition made of the above-mentioned matters in various proportions may be applied. The invention will be of considerable im-
ortance to mines producing barytes, as it will extend th arket, whilst it will be of equal interest to consumers, nce they can use the Paris cement white at a low price instead of paying the price of white lead for a material large proportion of which consists of baryta.

## Two Great Crops.

The United States produced last year a cotton crop worth about $\$ 250,000,000$, and a corn crop worth abou $\$ 583,000,000$. Of a total agricultural product of $\$ 4,000$, 000,000 the corn crop forms the largest item, being largely more than double the value of the crop which used to be called the King of American commerce. The King has now laid aside his purple robe and crown of jewels and become a highly respectable citizen, who is well received cverywhere but the whole of his estate is far less than that of his plebeian neighbor Indian Corn, who enters into the business of ciety in a wonderful variety of forms. His guests sit down to a homely bill of fare, offering hominy, griddle cakes, eg bread, roasting ears, pudding, Johnny cake, popcorn. He bread, roasting ears, pudding, Johnny cake, popcorn. He
shows with pride his well-filled stockyards of corn-fed shows with pride his well-filled stockyards of corn-fed
beeves and porkers, which supply the home and foreign beeves and porkers, which supply the home and foreign
markets with the finest meat in the world, from the sweet beefsteak to the fragrant sugar-cured ham, fit for the table of a king. He has immense factories employed making starch and syrup, consuming millions of bushels. He runs great distilleries, which send out alcohol enough to float a fleet of war vessels, furnishing material to the arts, revenue to the government, rascality to the whiskey rings, and themes to the temperance lecturers.

The developments and applications of the great Western rop being so much greater than the Southern crop, it is not strange that the former is the stronger of the two. The principal use of cotton is for clothing; and while it has an excellence for that purpose, there are many substitutes for it, and its extinction would be a serious but not an irrepara ble loss to commerce.

The extinction of the corn crop would not only take from commerce a merchandise of more than twice the value of the other, but it would revolutionize many departments of trade.-Louisville Commercial.

## A Possible Utilization for the Tramp.

Since writing our recent article on "Scwage Irrigation on Small Scale," it has occurred to us that the chief item of expense in this most advantageous utilization of waste namely, cost of labor of digging trenches, laying drain pipes, pumping, etc., might be materially compensated for by compelling tramps to do the work. It is a fact that the number of these vagrants is increasing, while society still stands puzzled before the problem of how to protect itself against them. Putting aside the actual depredations committed, their idleness alone renders them a dead weight upon the producing classes; and it therefore logically follows that no remedy which does not compel these vagrants to contrib ute their quota of useful effort toward the general welfare can ever reach the root of the evil. It is universally con ceded that work is the punishment most dreaded by the tramp. Make it hard work, such as is involved in digging and pipe laying, and he will fear it the more. If, therefore, a village or town, desiring to test the profitableness of sew age irrigation, should, whenever a tramp comes within jurisdictional limits, arrest him under a vagrant act, and compel him to labor for so many days, it would probably be found that the necessary irrigation works could then be cheaply constructed, or the other much to be desired result, of sup pressing the tramp nuisance in the vicinity, attained.

## Zigzag Sparks

With a view to finding the cause of the peculiar zigzag form taken commonly by clectric sparks, especially those of the Holtz machine, in air, Professor Tait, of Edinburgh, has recently had a number of photographs of such sparks prepared. These sparks were produced partly in ordinary air, partly in the free air one or two fect above the flame of a strong Bunsen burner, partly in a wide glass tube, into which air was passed through a long iron tube, heated to a adk red glow. The general result of the examination is that the zigzag form depends on something which heat is capable of removing from the air. This is, therefore, not water vapor, nor is it very small drops of water, for even water vapor, nor is it very small drops of water, for even
falling water drops were inactive, except that they produced falling water drops were inactive, except that they produced
simply an interruption in the photographed sparks. It is simply an interruption in the photographed sparks. It is
probably, the author thinks, organic substances which, as probably, the author thinks, organic substances which, as
Schilier and Pasteur have shown, would be kept away from the apparatus by a cotton stopper as well as by direct combustion.

## Fletcher Harper.

Mr. Fletcher Harper, the surviving member of the original firm of Harper \& Brothers, one of the largest publishing houses in the country, recently died in this city at the age of 71 years. Mr. Harper began work as an apprentice to his elder brothers; and when 19 years old, having become proficient in his trade, he was admitted into partnership with them. It was through his enterprise that the several period icals now published by the firm were started; and until his virtual retirement from active business, two years ago, they were the objects of his constant care. He was a man of great executive ability, and of superior business capacity in brief, one of those upright, intelligent, industrious citi zens, whom every one respected, whose death is a loss to th community, and whose life was an exemplification of the rewards which justly fall to honest labor and sterling worth.

## The Value of Small Inventions.

An excellent exemplification of the large returns which a small invention may often bring to its fortunate originator is found in the experience of Mr. Charles W. Cahoon, who recently died at Portland, Mc. Mr. Cahoon possessed much inventive ability, besides that quality of persistent determination to succeed which usually characterizes the successful inventor. It is said that he realized sixty thousand dollars out of a little lamp burner, which had an appliance for lift ing the chimney so that the wick could be reached for lighting or the mouth of the lamp for filling. This saved the frequent removal of the chimney while hot, and so doubtless prevented many fingers from being burned and many Mr. Cins fron. it and Mr. Cahoon studied hard over it, and nearly lost his eye-
sight by persistent watching of the lamp flame under different conditions. It was the first invention of the kind patented (February, 1861), and infringers were plenty, but Mr. Cahoon protected his rights manfully and triumphed in the
end. It is to be regretted that he could not have lived longer to have enjoyed the fruits of his strivings.

## NEW BOOKS AND PUBLICATIONS.

Blue and Red Ligitt. By S. Pancoast, M.D., Philadelphia, Pa.: T. M. Stoddart \& Co., 7.33 Chestnut strect.
This appears to be an attempt to galvanize new life into the moribund
blue glass mania, through the production of some alleged benefts to invalids, supposed, this time, to be derived from red glass. A sense of duty
to our readers has impelled us to devote some utterly wasted time to the examination of this work. which we now consign to the waste basket with解 misfortune to find in so few pares-Pleasonton's boik not excepted

Digest of Cotton Bale Ties. By Messrs. L. W. Jinsabaugh and T. C. Tipton. Price $\$ 10$. Published by the authors.
This is another one of those very valuable digests of special classes of nventions, several of which works have already been prepared by gentle-
men connected, as are the present authors, with the United states Patent offlec. We have no doubt but that this volume will prove exceedingiy useful to inventors, manufacturers, and patent experts interested in its
subject-matter. It is admirably compiled, and all the drawings are given complete, on a reduced scale. We should like to see more digests of this
kind appear, one for instance on churns. another on cultivators, and another on beehives. The railrnad people have been asking for just such a

Annual Record of Science and Industry For 1876.
Edited by Spencer F. Baird. Price $\$ 2$. New York city: Harper \& Bros., Franklin square.
This volume purports to be a complete history of the progress of science
and industry for the past year. It consists, first, of a series of summarized eviews by Professur Barker. Dr. Dana, Professor Holden, and others, and,
second, of a compilation or receipts mostly from technical periodicals.

## DECISIONS OF THE COURTS.

Supreme Court of the United States.

## 

 [Appeal from the Supreme Court of the District of Columbia.-Decided The powers of the supreme court of the District of Columbia, in patcntcases, are the same as those of the circuit courts of the Unitcd States. cases, are the same as those of the circuit courts of the U inited States.
Upon a bill in cquaty for the enfringement of a patent it is a matier of
discretion and not jurisdiction whether a case shall be first tried at
law; and in this matter, the coirts of the United States, sittin as courts law; and in this matter, the coirts of the United States, sitting as courts
of equitity in patent cases, are much less disposed than the English cour:
are to send partes a jury befor ensuming to decide npon the merits. The jurisdiction of the circuit courts in cascs arising under the patent
and coppright laws is not changel by the Revied statutes, and conse-
quently the original cognizance of the circuit courts situng quently the orizinal cognizance od
equity in patent cases is retained
Where it is discretionary with
 ground of appeal.
But if the appellate court were convineed that the case was not proper:'y
decided, and could not be properly decided withe cat such a reference, it
might, in the exercise of its own discretion, remand it to the court below or that purpose.
It does not detract from the validity of a patent that the inventions of
others are made use of in carrying out the patented invention. One inver tion may include within it many others, and patents for each and all be
valid at the same time, but in such case ancin inventor would be precluded
from using the inventions made and patented prior to his own, except by icense from the ownet st thereof.
Aproces is a mode of treatment of certain materials to produce a given
Assult, an act, or a series of acte, performed upon the subject-matter to be ransformed or reduced to a different state or thing, and if new and useful
is patentable.
The patentability of a process is entirely independent of the instrumenThe patentability of a process is entircly independent of the instrumen-
tatities employed and it is immaterial whether or not the machinery
pointed out as suitable to perform the process be either new or patentThe process requires that certain things shonld be done with certain sub-
stances and in a certain order; but the tools to be uscd in doing this may eo secondary consequence.
In the langaage of the patent law a process is an art.
One device may be the cquivalent of another in the general combination with other elements, and yet, when taken by themselves as separate piecers
of machinery, they may not be the same, and the use of one not the inWhile the parts of machinery which go to make up a combination could
not when separatly considered be regarded as identical or conflicting not when separately considered be regarded as identical or conflicting
with thosed described in a patent, yet having the same purposin in the com.
bination, and effecting that purpose in substantially the same manner, bination, and effecting that purpose in substantially the same manner,
they are the equivalents of cach oherin that regard
A foreign patent in order to invalidate an American patent must antedate the invention patented.
Mr. Justice Bradpey deli.
This is a suit in equity, in
Columbia for injunction and rel:ef against an allemeged ourt of thingement of vari ous patents belonging to the complainants. The bill was dismissed, and
the complainants have appealed.
The patentis sued on are ix in number, originally five granted to the ap
 method of bolting flour the first bcing for the gencral process, and the
others for improvements in the difterent parts of the machinery rendered
necessary in carrying on the process. Thiree of the original patent necessary in carrying on the process. Three of the original patents, Nos.
$37,317,37,38$, and 37,321, were surrendere, and reisue
which rcisues were numbered $5,8+1,6,6,29$, and 6,030 , the first being in for the process, and the other two for portions of the machinery. Reissue 6,029 ,
being in place of the origian paten numberre. 37,321, was also subse.
quently surrendered, and two new reissued patents substituted therefor, numbered 6,594 and 6,595 .
The case has becn mainly arcued on the question of infringement, the
defendants asing a botiting apparatus constructed according to letters
patent issued to Edward P. Welch in A pril, 1873 for improvements upon
 the apparat'sp and process of Cochrane.
A preliminary question is rased with regard to the jurisdiction of the The powers of phe suies in an action at law. court of the District of Columbia, in patent The powers of the enprome court of the District of Columbia, in patent
cases, are the same asthose © the circuit courts of the United States. (See
Revised Statutes relating to tue District of Columbia, sections 760,

 meal first the superfine flour, and then the pulvarulent impurities mingled
with the flour-producing portion of the middlings meal, so as to make
'white 'white ' or 'purified' m'ddlings, which, when reground and rebolted,
would yield pure white flour, which, when added the the therfine, would
improve the quality of the flour resulting from their union, nitead of de-














 improvenents
S. Reynolds.
In this proce
process reels are not used for purifying the middlings, but a flat
aty inclined vibrating screen or sieve is used for the purpose,
ch the ground meal is passed, and while passing is subjected to








The use of a flat screen instead of a revolving reel for bolting and clean-
ing the middlings is a mere matter of form.
and, perhaps, patentable as an improvement. But it is is an importoved form.































 Cham ber somewhat imiliar had been nued in another con oection. thooph onsider








 that the combin




















 trine dean phatidect numbers

Mr Justice Cliford, disesenting;
Id disent from the opinion and judement of the court in this case, tor








## United States Circuit Court-District of Maryland.

Motion to - Before Bond, C. J., and Giles, J.-Decided March, 1877.]
In this case, an injunction had been issued restraining defendants from
infringing on the reissued patent granted complainant May 18, 1858; reissued April 8,1862 ; for an an improvement in machinery for hulling, and
thrashing cover. The defendants afterwards changed the construction thrashing clover. The defendants afterwards changed the construction
of their machine and proceeded to sell clover hullers of the changed con-
On a motion made by complainant to commit them for construction. On a motion made by complainant to commit them for con-
tempt of court, for violating the injunction issued arginst them, by seling
machines of this changed construction, the court held that, on the showing
 of defendants--some of whom were using the original machine that thad
bben enjoined, and someo whom were using the machine as it had been
changrd-that, unless settlement were made with him a changed-that, unless settlement were made with him forthwith, suit cross petition filed in the criginal case, for an injunction to iisede upan a a
tlie complainant, restraining him, while the original suit was still pending aqainst them, under which damage and profits could be collected for all
the machines that they made and sold, from binging any suit, or threatening to bring any suit against any vendees of theire, based upon a user of
a natachine that might become eubject of account in the original case.
Counsel for defendants, seeking the injunction acainst complainant Counsed for defendants, seeking the injunction against complainant,
binasmuch as ation upon the eneneral equity jurisdiction of the court; that, inasmuch as complainant had submitted himself to the jurisdiction of the
conrt to obtain relief against the defendants, he was also subject to the
orler of the court in relation to any matter relating to the granting of that orler of the court in relation to any matter relating to the granting of that
relief; that the defendants were thoroghly reaponsible; and that unon the
original suit being carrid on to completion if reovery oripinal suit being carrid on to completion, if recovery was made the come
plainant would recover in that saitall the profist that defendants had ob-
tained from the wronful manufacture and ained from the wrongul manufacture, and the damages that he had
suffercd by reason of the wrongful manufacture, and that complainant
would, therefore, be put in the sin would, therefore, be put in the same position as if he had originally sold
all the machines. That, this being the case he ought not to be allowed to
interfere with the vendecs of defendants while the suit against them was pending. In support of their defendants while the suit against them was
notion they cited the decrees of Judge


 court of the United States for the southern district of Ohio, in the case of
Hezeniah B. Smith bringing suit against the defendants' vendees in other circuits, the complainant in this case having obtained an interlocutory decree and a a refer-
ence to the master, and the suit being, at that time, pending before master
on the question of the and The question of the account.
of Indiana, and reled not bed that the complainant was a resident
Ine the court, and had sought the jurisdiction of the court for the purpose of bringing the suit, and for no other purpose. He
woan not, therefore,
not enforect to any order upon him; that the court could


[^1]

Inventions Patented in England by Americans.
From May 8 to May 14, 1877 , inclusive
button Hole Sewer.-W. Randel et al., Troy, N. Y
Cleaning Guns, etc.-b. L. Budd, New York city
GLove STRETCRER.--J. Herts, New York city.
Lamp Burner- Benedict \& Burnham Co., Waterbury, Conn.
Motive Power for Vessels.-T. S. Seabury, New York
Paint Oil.-G. Walker et al., Chicaco, Ill.
Rolling Leather, etc.-A. F. Stowe, $M$
SCREW, ETC.-H. A. Harvey, Orange, N. J.
Shoe-FAstering.-F. G. Farnham, Hawley, Pa.
Spex Governor, ETC.-G. Westinghouse, Jr.
. (of Pittsburgh, Pa.). Liver
Wivding Reel.-W. Grover et al., Holyoke, Mass.
Wood PAVEMENT.-F. C. Taylor, Chicago, ill.

## Gecent gancricam and forrign zatents.

## Notice to Patentees.

Inventors who are desirous of disposing of their patents would find greatly to their advantage to have them illustrated in the Scientific Amer ican. We are prepared to get up first-class wood engratinas of inven-
tions of merit, and publish them in the Scientific American on very erms.
We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the outs become the property of the person ordering them, and will be found of value for circulare for publication in

## NEW MECHANTCAL AND ENGINEERING INVENTIONS.

mproved blacksmiths' tongs.
James H. Gregory, Columbia, Tenn.-These tongs are so constructed
hat they may be used for holding two pieces of iron together, cither that they may be used for holding two pieces of iron together, either
straight or at any desired angle, for welding. They may be used ac a straight or at any desired angle, for welding. They may be used ac a
clamp, for holding the two ends of a tire with any desired lap, for holding clamp, for holding the two ends of a tire with any desired lap, for holding blades and cutters to be ground, and for other similar purposes.
mproved mill spindle bush.
Harvey T. Ashworth, Chatham, Va.-This consists of a bush for the eye of the bedstone, which is made of a block of hard wood or metal, and relatter are recessed near the upper end, and filled with a suitable lubricating mixture. The top of the journal block is tightly closed by a rubber cap fitting tightly around the spindle.
improved railroad signal.
Charles Haise and Frank Haise, Atlanta, Ill.-This is an improved device to enable an approaching train to be signaled from the office, so that there may be no delay in making the signals when promptness is reces-
sary. Wires and levers are so arranged that a lantern can be turned through a quarter of a revolution, so as to show a white or a colored light, as may be necessary.

IMPROVED CAR COUPLING.
Gurdin D. Lease, Jeffersonville, Vt.-This coupling couples in automatic manner by the entrance of the link. It consists of a longitudinally slotted drawhead with centrally pivoted and weighted lever bar, and curved or
hook-shaped coupling pin, that is pivoted to the rear end of the lever bar, and dropped with the same by the action of the coupling link into a top recess and bottom pinhole of the drawhead, coupling thereby the link.
improved apparatus for carrying railroad rails. Andrew J. Gustin, St. Albans, Vt.-This is an improved apparatus by which the rails are taken up and conducted to the cooling bed, after having been passed through the bending rolls that impart the proper camber,
so as to compensate for the unequal shrinkage of the rail while becoming cold. The device may also be used for moving the rails en masse from the position where they are left to cool to the end where they are taken off to
the straightening machine. The invention consists of a bed frame with the straightening machine. The invention consists of a bed frame with
lateral chains and rail carrying shoes, the chains and shoes being guided lateral chains and rail carrying shoes, the chains and shoes being guided
in grooved rails, fush with the bearing rails of the bed, and the chains in grooved rails, flush with the bearing rails of the bed, and the chains
automatically adjusted to expansion and contraction by movaiole and weighted pulley bearings; also, two long screws with suitable bearings at the ends, and dogsshaped to fit the screws, and guided in grooves to hold them in position. The dogs are provided with trip latches, and the screws are connected with reversible driving shaft with gears.
improved plate printing press.
Horatio W. Browne, Philadelphia, Pa.-This consists in a novel device or moving the bed under the impression roll, the object being to increase the rapidity with which the impressions may be taken from the plates.

> improved rock-drilling machine.

Aaron J. Mershon, Warsaw, Ind.-This invention consists in the combination of a disk secured to a shaft, and having an arc-shaped slot, in the the drill rod, and extending through the slot of the disk, so as to be en gaged by the concave roller as the disk is revolved. It was fully described and illustrated on page 358 , current volume.

## IMPROVED REVOLVING ORE ROASTERS.

John Howell, Benton, Cal.-This is an improved rotary tubular furnace zor chloridizing silver ores and desulphurizing copper, gold, lead, tin, and having the chambers, and a fnrnace at the lower end having a pit, into which the ore is discharged after treatment.
improved iron moulding.
Joseph Hursh, New York city.-To the pattern is secured a male ecrew, screw is covered with a small slightly tapering cap, while the sand is bein packed upon it, and which protects the threads of the screw from being flled with sand. When the cope is raised from the pattern the cap is either left upon the screw or taken off with the sand, and can then be drawn, in either case leaving a smooth hole in the sand, which can be easily filled. sand, and the same will not be worn by the latter.

IMPROVED SQUARE.
Charles A. Schrier, Holyoke, Mass.- The object is to soimprove the universal square in general use that a line may be drawn along the whole length of the tongue or blade without removing the square from the roll or
other object. To this end the square has a crossbar with curved or raised portion above the central edge of the tongue to admit the continuation of the line along the same.

IMPROVED GRAIN CRUSHER.
Joseph Reid and Robert Reid, Philadelphia, Pa.-This is a machine for crushing and pulverizing grain. Grain to be crushed is delivered to a hopper, and the machine being in motion, it is caused by vibratory motion to flow rapidy down a chute to the rolls by which it is crushed and de
to another chute, through which it passes to a suitable receptacle.

## IMPROVED PIPE TONGS

Christian States and Harry I. Cook, Topeka, Kan.-This combines the advantages of a pipe tong, wrench, and screwdriver. It consists of a double jaw, with curved end and notches, in connection witha single jaw
and lever sliding in the double jaw, and having projecting pivot pins for and lever sliding in the double jaw, and having projecting pivot pins for
entering into the notches. This invention was illustrated and described entering into the notches. T
on page 310 , current volume.

## NEW HOUSEHOLD INVENTIONS.

improved picture frame
Samuel Sargeant, Brooklyn, N. Y.-This consists in a frame formed of metal tubes, halved to each other, and secured to a back frame or board by of the said tubes, and screwing into pieces of wood placed within said tubes.

## mproved bootjack.

 John Niver, Sherman, N. Y.-This is an improved bootjack designed tobe attached to a wall, and to be turned up against the wall when not in

IMPROVED LAMP BURNER.
Jonas Rasch, Christiania, Norway.-This is an improved round burner
for petroleum lemps, on which the chimney may be adjusted to different for petroleum lemps, on which the chimney may be adjusted to different heights, for the purpose of obtaining a more perfect combustion and better
light. The chimney is quickly set at the proper elevation above the aperlight. The chimney is quickly set at the $p$
ture of the kurner by a simple mechanism.

IMPROVED SHIRT-DRYING APPARATUS
John McCartan, New York city.-This is an improved apparatus for drying starched shirts, formed of a hollow metal plate, made of such a
shape and size as to be passed into a shirt, which is spread out smoothly apon it. Hollow metal cylinders are made of a proper size for the cuffs of the shirt to be spread out upon them. The hollow plate and cylinders are each provided with a steam inlet pipe, through which steam is introdnced
from a boiler or other steam generator, and a steam outlet pipe, to enable the said plate to be brought to and kept at a suitable temperature to dry the shirt and cuffs quickly.

## NEW MISCELLANEOUS INVENTIONS

improved combined letter sheet and envelope.
Leo Ehrlich, St. Louis, Mo.-This invention consists of a sheet of suitable size having sealing flaps that extend at one corner along a portion of
the sides, so as to close in the nature of an envelope when the sheet is olded up.
IMPROVED PROCESS OF FINISHING CARDBOARD FOR
PERFORATING.
Bernard Dreyfuss and Samuel Sachs, New York city.-This consists in coating a suitable quality of cardboard with a mixture of powdered metallic zinc, glue, starch, and wax. The board is given a bright silvery sur-
face, which is very hard, and well prepared for perforation in the usual way. improved photographic printing apparatus. Oliver Sarony, Scarborough, England.-The object of this invention is
to obtain by two successive exposures the title, tint, or fancy border on the to obtain by two successive exposures the title, tint, or fancy border on the same negative with the picture, so as to dispense with the use of registerfering presses and registering the second printing A print having the appearance of whet is known as a chromotype may be thus produced in the ordinary printing frame at one printing instead of two, as at present.
improved sleeve button and stud.
Alexander Goll, Frankfort-on-the-Main, Prussia, Germany.-This sleeve button or stud has an elastic piece of metal, double or open slotted, and
naproved
aparatus for weighing liquids. John G. Valentine, Florence, Mass., assignor to himself and Edward
Valentine, of same place.-This is a receptacle for liquids, that is sus Valentine, of same place.-This is a receptacle for liquids, that is sus-
pended from a scale lever pivoted in a frame, in the handle of which is pended from a scale lever pivoted in a frame, in the handle of which is pivoted a spring connected by a scale with the said lever, for indicating
the weight of liquids contained by the receptacle.
improved coffee roaster.
John A. Caldwell and Adolph F. Pleitz, Brownsville, Tenn.-This im proved coffee roaster is so constructed as to keep the coffee constantly urning over, so that it cannot slide upon the vessel and burn.

## mPPROVED SUSPENDER.

Leonard V. Richmond, Sand Lake, N. Y.-The suspenders are so made that whatever position the body of the wearer may take, the tautness of some of the straps will take up the slack of the others, so that there wil be no perceptible strain upon any of the buttons.

IMPROVED GALLEY SUPPORT.
Peter A. Kelly, Baltimore, Md.-This is a support for printers' galleys
which may be readily attached to the case, and which may be folded out which may be readily attached to the case, and which may be folded out
of the way when not in use. The device is put into position for use by of the way when not in use. The device is put into position for use by
placing hooks on the edge of the case, and unfolding the brackets so that placing hooks on the edge of the case,
they are at right angles to the frame.

IMPROVED bOX AND box holder.
Joseph A. Cotten, Thomaston, Ga.-The object is to provide a means for handing boxes upon high shelves without the use of steps or necessity of
climbing. The box has its end slotted and bent inwardly and supported by the strengthening band, the whole being adapted to engage with the grap ple or lifter, which has a widened head for the purpose.

## IMPROVED STRAP FASTENER.

Wesley Hyre, Collins, Ind.-This invention consists in a flat wedge shaped case, and a wedge provided with the points combined with each other to adapt them for use for fastening a strap. In using the fastener
the strap is passed through the case. The wedge is then placed upon the the strap is passed through the case. The wedge is then placed upon the
strap, and the strap and wedge are drawn forward together into the case. IMPROVED WATER CLOSET PROTECTOR.
Benjamin R. Brown, Petersburg, Va.-This consists in a shect of them a ring having an inwardly projecting narrow flap and an outwardly projecting wide flap.

IMPROVED SPRING FISH HOOK.
John O. King, Altamont, Kan.-This invention relates to that class of fish hooks which are sprung when the fish tampers with the bait, so as to
close and catch the same. It consists of fulcrumed grab hooks having close and catch the same. It consists of fulcrumed grab hooks having
outer claws and U-shaped ends back of the fulcrum, in connection with a sliding loop at the end of a coiled hook actuating spring, the hooks being opened by a swinging trip lever, connected by a link to the spring loop

IMPROVED INDICATOR.
George W. Daniels, Lexington, 0 .-This is an index for account books, by which the name may be more readily referred to than in the indices usually applied to such books. It consists in a polygonal drum that turns ceive upon each of its sides a division of the alphabet, consisting of one or more letters. IMPROVED CIGAR.
James H. Campfeld, M.D., Ottawa, Ill.-The object of this invention is to render the smoke of cigars made of tobacco less offensive and injurious. In the process of manufacture, a chamber or cavity is formed in each cigar and a piece of sponge or other suitable absorbent material, which has been saturated with a solution of tannic acid, is inserted thercin for the purpose of extracting from the smoke drawn through the cigar the nicotine and
empyrematic oil, which are poisonous and inimical to health.
improved toy skating rink.
Sophie E. Bachmann, Tenafly, N. J. - The skating rink consists of a box having its top formed of paper or other thin material, representing ice, on which diminutive figures representing skaters, and weighted by means
of iron shoes, are moved about by the attraction of a magnet held in the of iron shoes, are moved about by the
hand, and applicd beneath the paper.
improved grain-reducing apparatus.
Cyrus Bailey, Akron, O.-This consists of a perforated revolving cylinder or recl, that feeds the oats or other grain to fixed cutting knives, regulating the length of the projecting kernel portions by adjustable guard-
plates. The holes tbrough which the oats or other grain are dropped are plates. The holes through which the oats or other grain are dropped are
straight at the end toward the knife, and inclined or countersunk at the other end to carry the grain into position for cutting.

## NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED SASH FASTENER.
Joseph Hatzl, Spades, Ind.-This consists of a eash with sliding and spring-acted bolts entering between guide strips of the window casing and
into sockets of the same, the sash bolts being secured into the differen positions required for locking, guiding, or removing the sash, by being set into corresponding recesses of the face plates of the bolt sockets.
improved sash fastener.
William Kemp, Jr., New York city.-This consists in the combination of a sliding bolt, placed in a suitable guide that is attached to the upper meet-
ing rail of the lower sash, and provided with a spindle and slotted arm moving the bolt; and two slotted bars, one of which is attached to a stile of the upper sash, and the other to the roller stile or jamb of the window. The object is to simultaneously lock both sashes by a single operation and by a single bolt.
improved saw set.
William H. Smerdon, and Baylies F. Phillips, Taunton, Mass.-This consists of an anvil with pivoted and spring-acted set piece, and a gauge
and bevel plate, jointly adjustable, so that there may be simultaneous adand bevel plate, jointly adjustable, so that there
justment of gauge and bevel to the saw teeth.

IMPROVED HORSE DETACHER.
Moses Amidon and Edgar N. McKimm, Lathrop, Mo.-Theobject of this invention is to furnish whiffletrees so constructed that the traces may be instantly released and the horse allowed to go free should be become IGPROVED SNOW GDARD

IMPROVED SNOW GUARD FOR ROOFS.
George F. Folsom, Boston Highlands, Mass.-This consists of a right-
angled or L-shaped strip of sheet metal that is folded to angled or L-shaped strip of sheet metal that is folded to form a square face, a brace for holding the same, and wings which pass under the slate
for supporting the brace. In addition to these features, the square face is for supporting the brace. In addition to these features, the square face is
slit up for a short distance each side of the brace to form prongs, that slit up for a short distance each side of the brace to form prongs, that
spring against the surface of the slate, and, in conjunction with the wings, clamp the slate, so that the guard will not slip from it. The object of the
and invention is to provide a snow guard for roofs that may at any time be at tached to the same, and that will effectually prevent the snow from sliding bodily from the roof.

## NEW AGRICULTURAL INVENTIONS.

mproved butter pail cover.
Joseph G. Fisher, Grand Rapids, Mich.-A spring made of elastic wood crosses the center of a bar on the cover, and its ends project euffciently to
allow metal straps, attached to its said ends, and having elongated holes formed in their free ends, to be passed over the heads of small knobs at tached to the sides of the pail, so that the cover may be held securely in place by the elasticity of the spring.

## IMPROVED PLOW.

Anton Lauer and Julius Hartmann, Louisville, Ky.-This is an improved landside sio so as to enable the point to be made of steel landside, and so as to enable the point to be made of steel.
improved combined stalk cutter and hay rake.
William W. Fuller, Elmira, Ill.-This machine is so constructed that it may be readily adjusted for use as a stalk cutter or as a hay rake. The
stalk cutter, the stalk adjuster, and the rake can be raised and lowered by operating a lever.

IMPROVED POWER CHURN.
William H. Sterns, Humboldt, Neb.-By turning the crank, the churn the milk contained in said churn body into violent agitation, the ribs break ing up the circular currents that would otherwise be formed in the milk.

## improved gate.

Isracl D. Jewett, St. Omer, Ind.-This invention is an improvement in he class of gates which are supported by parallel pivoted bars, and cal plane and in the arc of a circle. The improvement relates to the use o a horizontal bar or lever, to which the bars supporting the gate are pivoted a horizontal bar or lever, to which the bars supporting the gate are pivoted
and whose function is to assist in maintaining the gate in a horizonta position.
mproved cultivator.
Nathan T. Brewster and Abraham D. Neher, Roseville, Cal.-This inven tion consists in the particular arrangement of a double wrought iron frame parts of the frame, one set of which blocks in the front, and also in the rear, of the cultivator form bearings for wheeled axles through which the cultivator is raised for transportation or lowered for use; the particular ar rangement of the cultivator being such as to impart to the same grea strength and durability, and to permit the same to be readily taken to pieces and used independently of its wheels if desired.
improved bee-hiving apparatus.
Reuben B. Oldt, New Berlin, Pa.-This consists in a pivoted case containing two inclined planes that run downward from slots in the top of the ivoted, and is capable of moving upward when the shifting of the bee changes the center of gravity of the casing, so that it turns on its pivots. There is also a new arrangement of a mica trap door, which allows bees to escape from the hive from which they swarm, but does not permit them
to re-enter.

## Butintss and efrsonal.

## The Charge for Insertion under this head is one Dollar a line for each insertion. If the Notice exceeds four

 a line for each insertion. If the Notice exceeds fourlines, One Dollar and a Half per line will be charged. Spy Glasses and Telescopes of all kinds and prices, Lenses for making the same, with full directions for
mounting. Illustrated priced circular free. McAllister, For Boult's Paneling, Moulding, and Dovetailing Machine, and other wood working mach
Chester Steel Castings Co. make castings for heavy gearing, and Hydraulic Cylinders where great strength
is required. See their advertisement, page 382 .
For Sale at a Sacrifice-Two Valuable Patents. In-
close stamp to Inventor, R. Holeroft, 3106 N. Front St., Philadelphia, Pa .
John T. Noye \& Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all
kinds, and dealers in Dufont \& Co.'s Batting Cloth. Send for large illustrated catalogue.
For Sale-A Valuable Patent Right of a Safety-Fold-
ing window Jack for family use, to clean outside of windows, and other purposes. For particulars, addres he Inventor, D. M. Pfautz, 818 Filbert St., Phila., Pa. Steel and Iron Set Screws, man
Standish \& Son, New Haven, Conn.
Electric Gas Lighting Apparatus, applied to public nogart's patent. Address 702 Broadwav, N. Patent Taper Sleeve Fastening and Wooden Pulley
Works are now in full operation, Orders solicited Works are now in full operation. Orders soli
isfaction guaranteed. A. H. Gray, Erie, Pa.
Painters, etc., get circular, prices, etc., of New Metal-
lic "Wiping out " Graining Tools; 75,00 now in use. J. lic "Wiping out "Grain
J. Callow, Cleveland, 0 .
Removal.-Fitch \& Meserole, Manufacturers of Elecces, have removed to 40 Cortlandt St., N. Y. Expe lices, have rem.
For sale.-Large lot of Tools in Sewing Machine Man-
ufactory. ufactory. Send f
Philadelphia,
Pa.
Power \& Foot Presses, Ferracute Co., Bridgeton, N. J. Superior Lace Leather, all sizes, cheap. Hooks and
Couplings for flat and round Belts. Send for Couplings for flat and round Belts. Send for
C. W. Arny, 148 North 3d St., Philadelphia, Pa.
For Best Presses, Dies, and Fruit Can Tools, Bliss \&
Williams, cor. of Plymouth and Jay Sts., Brooklyn, N.Y Lead Pipe, Sheet Lead, Bar Lead, and Gas Pipe. Send for prices. Bailey, Farrell \& Co., Pittsburgh, Pa. Hydraulic Presses and Jacks, new and second hand
Lathes and Machinery for Polishing and Buffing metals.
E. Lyon \& Co., 470 Grand St., N. Y.
Solid Emery Vulcanite Wheels-The Solid Origina Emery Wheel - other kinds imitations and inferior Standard Belting, Packing, and Hose. Buy that only The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.
Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circ
Pittsburgh Steel Casting Co., Pittsburgh, Pa.
For Solid Wrought iron Beams, etc., see advertise ment. Adaressaph, etc.
Lithographic Stone Grinders. Simplest, cheapest, and
best in use. Send for illustrations and testimonials. rank Thomas \& Co, for illustrations and testimonial Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey \& Co., Senec
Falls, N. Y., U. S. A.
Help for the weak, nervous, and debilitated. Chronic and painful diseases cured without medicine. Pulver full particulars, mailed free. Address Pulvermache
Galvanic Co., 92 Vine St., Cincinnati, hio The Zero Refrigerator was awarded a grand Centen Silver Su and Silver Solder and small Tubing. John Holland, Cin Patent Scroll and Band Saws. Best and cheapest in Patent Scroll and Band Saws. Best and
ase. Cordesman, Egan \& Co., Cincinnati, o.
Best Glass Oilers. Cody \& Ruthven, Cincinnati, 0 .
Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

. H. W. will find articles on the canal boat award in New York State on p. 81, vol. 30.-A. B.
will find on pp. 235,
whe, vol. 36, directions for coloring brick work.-J. H. P. can use olive oil in combination
with phosphorus in a glass tube. We cannot work out
his problem his problem for him.-W. E. N. will find directions for
imitating black walnut on p. 90 , vol. 32 .-J. P. L. will find the dimensions and threads of gas pipe on p. 378 ,
vol. 32 .-J. B. B. will find a recipe for lacquer for brass vol. 32.-J. B. B. will find a recipe for lacquer for brass
on p. 116, vol. 33.--P. A. F. will find a recipe for a filling on p .116 , vol. 33.-P. A. F. will find a recipe for a filling
for safes on p. 75, vol. 32.-C. D. C. will find directions for polishing brass on p. 298 , vol. 29.-J. K. will find diW. F. S. will find an article on the on $p$. 155 , vol. $31 .-$ age stamps on pp. 208, 277, vol. 27.-G. W. A. should read our article, on p. 33, vol. 33 , as to ascertaining the
power of an engine.-J. W. P. will find something on power of an engine.-J. W. P. will find something on
the manufacture of starch on p. 154, vol. 30.-C. B. M. will find the proportions of a surface condenser on $p$. 395, vol. 3.-C. . . Win and an explanation of the vol. 31. The other question is too absurd to need reply. -E. S. K. will find a recipe for a durable paint for fioors
on p. 165 , vol. 34 .-W. M. will find directions for mag netizing steel on p. 37, vol. 31. - E. J. L. is informed that the relative power of different batteries is described on p. 26, vol. 26.-L. B. should read our articles, on pp.
325,340 , vol. 36 , on granite and marbleized ware.-M. G. will find directions for melting vulcanized rubber on $p$. 119, vol. 28. To mend rubber boots, see p .203 , vol. 30 . fully discussed on p. 112, vol. 32.-H. B. K. will find
that the ball droppedintoa holethrough the earth is dis-
cussed on pp. 138. 250, vol. 31.-D. H. will find directions for manufacturing corn starch on p. 154, vol. 30.-W.
Z.'s query as to carrying a piece of timber is answered on p. 363, vol. 36--D. K. H. will find on p. 156, vol. 31,
directions for making rubber stamps,-W. B. P. cannot make better manifold transfer paper than is described on p. 278, vol. 28.-A. R. will find a recipe for hair dye
on p. 220, vol. 35.-S. J. H. will find on p. 298, vol. 27 directions for preserving insects.-J. C. S. will find a description of a method of utilizing the motion of a ship to pump water from the hold on p. 13, vol. 26.-C. L.
will find directions for making charcoal into blocks for filters on p. 395, vol. 32.-H. D. H. is informed that we do not kuow what he means by " enameling on pearl or
ivory."-H. C. H. will find directions for waterproofin canvas on p .347 , vol. 31.-W. S. V. can enlarge his de signs by using a pantagraph. See p. 179, vol. 28.-Dr. J Z. T. can make a good rubber cement by following the
directions on p. 139,vol. 35 . This also answers T. T., who asks for a cement with which to mend a rubber belt A. R. F. will find directions for making printers' rollers on p . 283, vol. 31-W. W. M. will find directions for preserving eggs on p. 219, vol. 31.-E. A. W. will find an excellent recipe for hair wash on p. 138, vol. 33.-L. M. will find a recipe for a depilatory on p. 186, vol. 34.-R. T. P. is informed that no sensible person believes in the
efficacy of a madstone.-T. D. is informed that we do not answer vol. 31, directions for making permanent magnets.-C C. T.'s query as to cement for making rubber bags was w. R., J. B. D., J. L., C. S. F., S. P. F. F., N.J. T., and others, who ask us to recommend books on indussellers who advertise in our columns, all of whom are
then sellers who advertise in our co
rustworthy firms, for catalogues
(1) W. A. C. says: I claim that the proper way toget the equation of panel wainsccating, ascending ights of stairs, should be to plumb up from the steps or stringboard. A friend claims that the proper way is
to square out at right angles from the stringboard. Who is rights A. Your friend is right, if the object is to make the wainscoting upon the stairs appear of the same width as that upon the level floors of the building. struct it per line or foot, measured upon the raking line of the cap moulding, as that upon the level floor follow
(2) F. S. asks: If, in a church design, it be desired to use a statue standing erect thirty feet above the observer, what height should be given the figure, ac-
cording to scale? What is the rule for finding such cording to scale? What is the rule for finding such
height? A. Statues when set above the horizontal
lat height? A. Statues when set above the horizontal
plane of vision should be suffciently elongated to compensate for the dwarfing effect of the perspective. This
does not refer to the size, but merely to the proportion between the width and the height. If you take a point distant 3 times the height as a proper station from which toobtain a good view of the statue, a line drawn rom that point to the base of the statue and another rom the same point to the apex, will limit the length of statue and running at right angles to the lower line from the eye; this cross line will indicate the height of the statue as it appears to the eye, and should be 6 feet. The statue itself should be of the increased height indicated
by the vertical line at the end of the lines proceeding rom the eye. But the width of the parts should be very slightly increased, if any
Why does water disch
Why does water discharge more rapidly through a tube than through an orifice of same size? A. It may
be from the greater accumulation of the momentum which this form affords over the mere orifice. However the fact is known, but not the cause.
(3) W. R. H. asks: What is the best method of treating shingle roofs so that the ice will not adback up and leak through? A. The remedy is to line your gutter with tin, and extend the tin up the roof to a
(4) M. A. says: I have an underground cistern in good order, which was well cleaned out before letting in water. The water now has a strong sulphurelectricity discharged into it by means of the conductor pipes during a severe thunderstorm, as it had not this taste and smell previous to the storm. I am anxious to purify this water for drinking; can you suggest a meth od? A. The unpleasant taste, etc., of the water cannot
be due to the effects of lightning. It may be due to the corrosive action of the water on the lightaing rod termi-
nals; but it is far more probable that the trouble ts nals; but it is far more probable that the trouble is
caused by decomposing vegetable matter. Throw into the cistern several bushels of well and freshly burnt charcoal. If this does not improve the water, try a of the water to determine the proper quantity.
(5) D. S. M. asks: What is the shortest and mount of lumber at a given price per thousand feet? A. It is considered a very simple operation, and consists
simply in multiplying the number of feet by the price
(6) H. D. D. says: 1. I propose building a oat about the proportions of the Whitehall boat de scribed in your SUPPLEMENT
the size, that is, 32 feet long by 8 feet beam. I
in will put which I will run two oscillating engines about $5 \times 7$ inches, with a screw 14 inches in diameter and of 3 feet so arranged screw will work half below the kecl, and be as not to strike the bottom. This I will do by having joint on the shaft; and the block by which the shaft passes through the stern post will slide up and down,
having a guard running under the screw to a hinge on the keel, which on striking the bottom will force the block up the stern post. Do you think my plan is a good one? A. The screw is rather small, and we think your engines are larger than is necessary. 2. About what will be the draught? $\mathbf{A}$. The draught can be made
(7) N M
(f) N. M. H. asks: Can you tell me of a
cheap paint or substitute for paint for brick walls? We
have been using some old bricks which show stains of mortar. What is a good sabstitute for oil and Venotian be worth while to try.
(8) F. S. C. says: We are told that sulphate of lime is one of the most insoluble substances we
have: in fact, that it cannot be dissolved in water therefore, if we drink water containing it, it cannot be deposited in the system, causing gravel or other kindred diseases. What I cannot understand is this: Sharon
Spring water contains 85 grains of sulphate of lime the gallon; and when it is drawn from the spring (and thatis the time wedrink it) it is as clear as crystal, a though after it has stood a few hours it becomes milky and opaque. If a little is spilt on the boots, it leaves crystal, how can the sulphate of lime be otherwise than dissolved? And if dissolved, why does it not become deposited in the system? A. Sulphate of lime dissolves in water; but its solubility is not great. All spring waters contain more or less of it . The opalescent appear of the other lime salts and carbonate of magnesia on the escape of the excess of carbonic acid, and the oxi dation of the hydrcsulphate of lime to form sulphate As to why the lime in solution does not cause gravel and
Bright's disease, it would be impossible to give othe Bright's disease, it would be impossible to give other
enswer than that, in a healthy condition of the system answer than that, in a healthy condition of the system,
means are naturally provided for utilizing part of it as means are naturally provided for utilizing part of it as
bone food, and for discharging that which is not re-
(9) F
(9) F. S., Jr., asks: How can I make an ar tificial stone sidewalk? A. The most important ingre dient is a good cement. English Portland cement is
generally preferred. Procure a sharp, light-colored sand, and wash it free from all particles of soft earth or soil; also eome stone chips, gravel, and large stone. Ex
cavate the sidewalk about 18 inches deep, and fill in the large stone to within 6 inches of the surface; prepare concrete made of the cement 1 part, stone chips and gravel about 6 parts, and bed it in upon the stone bot tom to within 2 inches of the surface; then prepare a
concrete of the cement 1 part and fine sand 2 parts, and lay it in up to the surface fioating the surface with the cement at pleasure. Finish by lining off into very regular blocks. A more cconomical sidewalk can be made by omitting the stone bed, but it will require a good hard
soil to lay it on, and then will not be so sure of being soil to lay it
permanent.
(10) J. H. D. says: About a year ago I bought some bleached shellac gum, and cut it with alco-
hol without any difficulty. A few days since, I tried hol without any difficulty. A few days since, I tried
some of the same gum, it having been kept in a dari dry closet; and it would only soften in alcohol, but not aissolve. After trying it in three different purchases of right. I would like to know why I could not dissolve the gumI had on hand? A. Break it into as fine a powder as possible, boil with clean water, and partially dry.
We think it will then dissolve readily in alcohol, if the same be not too dilute.
(11) J. B. asks: Can a piece of iron drawn at square be termed wire? A. It would not be wire in
(12) L. R. says: 1. I asked you some time go how to clean dirty lubricating oil. You said: "Fillarge funnel and put raw cotton in it, but it will not work. A. Agitate it with a small percentage of oil of
vitriol, and then thoroughly wash it with water by agiation; syphon off the oil, and let stand over quicklime. To filter oil from mechanically contained impurities, fit so that it will not impede the passage of liquids, and cover this loosely with cotton wool (raw cotton). If
properly arranged, the oil will pass through, leaving the mpurities in the cotton. 2. Please let me know how to wash dirty cotton waste? A. A strong, hot solution of soap and was-ing soda is generally employed. 3. Is concentrated
(13) H. S. P. asks: Which runs lighter, Parm wagon with the usual sized thimble-skein axle, or
a wagon of same size, etc., with an iron arle the thimble made tapering as usual? Does not the rule hold good in this case that the smaller the spindle, the less the fricion? A. Yes, if the pressure does not become so great
(14) J. McC. says, in reply to A. D. S., who asks how he can clean out his canal without drawing off
the water: A very inexpensive dredging machine consists of a small scow, three men, a shovel with a long handle, and a rope. The shovel is made to take up, say
a half bushel, and to have a bail to which to attach the rope. This shovel is manipulated by one man at the sary by the other men pulling on the rope; and when the shovel is full, or supposed to be full, it is lifted up to the
scow and emptied by being turned over by the man at the handle. If the canal is not very wide, a small mast and boom can be set up, and the shovel elevated to the ey of the boom by running the rope through a single pulacross the scow to the opposite bank, and the dirt de-
(15) C. A. C. says: Please tell me how to top foaming in a boiler? We have a $11 / 2$ horse power upright tubular, in use 15 minutes a day only, for
steaming silk. I have tried black oil in vain, and am carefult to dra. $x$ with only $1 / 4$ open valve through $1 / 3$ inch plpe. It operated nicely till we accidentally got a little soapsuds in it. I have blown off 5 times, but it is no whit better. A. Try the plan of running the boiler for a
few hours with the blow valve partially open, and a strong feew hours with the blow valve partially open, and a strong what is fed in will not be blown out again directly. If otherwise, run the boiler several hours, pumping up with a strong feed, and blowing down as often as practia strong
cable.
(16) W. B. says: I have seen it stated that experiments had been made in England not long ago,
testing the draught of farm wagons of different con-
struction, and as a result it was found that a wagon with the fore and hind wheels of equal height was the have the details of the above experiments or of the con struction of the wagon. A. The experiments referred to were probably made by the Royal Agricultural Soci ety of England. If so, you will find full details in their
(17) F. G. W. asks: 1. What is the strength of a boiler 22 inches long, 10 inches wide, and 6 inches high, the heads of which are $3 / 4$ inch thick, of cast iron,
and sides of wrought tire iron $1 / 4$ inch thick? The boiler and sides of wrought tire iron $1 / 4$ inch thick? The boiler
has round ends with straight sides. A. Carry 35 or 40 has round ends with straight sides. A. Carry 35 or 40
lbs. steam. 2. Would it be suitable for an engine havlbs. steam. 2. Would it be suitable for an engine hav-
ing a cylinder of 3 inches stroke by $11 / 2$ inches diameter? A. You can prohably make the boiler anar for this A. You can probably make engine. 3. If I put twelve 1 inch pipes in it, and set $t$ on a common stove, would the boiler be improved? A.
It will be more efficient if you use the fiues as sng. gested.
(18) E. P. C. says: My steamboat is using a surface condenser; the boiler is only 8 months
old with no grease or sediment in it; but I cannot keep old with no grease or sediment in it; but I cannot keep
the socket bolts from leaking, and every little while I the socket bolts from leaking, and every little while I
have to renew them. What is the cause of it? A. In such cases, if the boilcr is allrwed to receive a very thin
(19) W. R. McD. asks: What can be done to prevent rust in a wrought iron warmair furrace, en closed in brick walls, when not in use? Is there not tion to the iron itself? A. We think you will find this difficult, unless you can expel the air, and seal the fur nace hermetically.
(20) G. M. M. says: I have a cellar into which the water comes after a heavy continued rain.
It is walled with stone and the walls are cemented. Th floor or bottom has $21 / 2$ inches of hydraulic lime and gravel. How can I keep the water out? A. To make your cellar perfectly tight may be attended with considerable expense. It would require several coats of as-
phaltic cement applied on bottom and sides when the cellar is dry, and then loaded with brick or concrete of a weight equal to that of the water when at its highest point. When properly applied this would insure your cellar from water not only, but even from dampness. (21) A. says: Miramichi (New Brunswick) the water in floating down stream-that is, that they always go faster than the current; also that single logs go somewhat faster than the current, but are invariably passed by rafts; they also declare that a $\log$ with its ends up and down stream goes down faster than a log
which drifts down sidewise. A. We would like to be sure that these assertions are founded on fact before atempting an explanation.
(22) W. W. E. says, in reply to A. D. S., who asked as to cleaning out his mill race: Put in sluice should be 12 or 18 inches below the bottom of the canal: then open one gate at a time, so as to drain the water
from the canal, and the water will carry the mud and from the canal, and the water will carry the mud and sediment with it. To facilitate the moving of the mud, put a small punt or fiat-bottomed boat in the canal, get
in it, and rock it until the water is moving rapidly under it. This has been my practice for 20 years. One hand can thus move more mud in one day than 20 hands
(23) O. H. Y. says: I would say to E. C. H.,who askshow to put Babbitt boxes on a shaft without their becoming fast. Oil the shaft slightly and sprinkle
the surface lightly with powdered plumbago. The shaft will slip out very easily and all the little holes in the box will be filled win a valas. lobricant
(24) J. L. M. asks: Is there any process by which tin can be brazed? I wish to make a large num-
ber of smooth metal tubes capable of resisting mild ber of smooth metal tubes capable of resisting mild
acids. A. You fail to state what kind of acids. As a general thing, any ordinary metal or alloy cannot be sulphuric, copper, ied, or an alloy of these mate sulphuric, copper, lead, or an alloy of these maion of
used; but neither of these entirely resist the action of even very dilute muriatic, nitric, acetic acids. Tin of-
fers more effectual resistance to some of them as it is fers more effectual resistance to some of them as it is
seldom pure, it will also give way after a time. Perhaps the best, and certainly the most economical, way would be to enamel the exposed parts of the metal (see a varnish made of gutta perchacticable, coat them with ture of the two dissolved in coal naphtha.
(25) W. E. says: I have a wooden tank to keep silver solution in. I tried pure pitch for lining, but that is used for lining wooden tanks to hold silver solution? A. Wooden tanks are not best for silver baths. Use a paint made by dissolving equal parts of gutta
percha and gum rubber in hot coal naphtha. Heat the phtha over a large water bath.
(26) I. Q. G. asks: How can I paint a sign d apply smalt blue? What is used to make the smalt adhere, and how is it applied? Is the smalt dusted on
and left till the background is dry? A. Dust in on a and left till the backgro
background of oil size.
(27) C. E. G. asks: What can I put into paraffin oil to prevent it from staining cloth, not de-
stroying its lubricating qualities? A.We know of nothstroyin
ing.
(28) G. B. asks: How can I make gunpowder and gun cotton? A. For gunpowder the materials (charcoal, sulphur, and saltpeter) are first perfectly
dried and separately reduced to impalpable powders. These are then sifted together, moistened with water, and ground for some time between large millstones kept constantly moist with water. The wet powder is then
collected into large lumps and carefully dried. These collected into large lumps and carefully dried. These
lumps are grained by bringing them in contact with lumps are grained by bringing them in contact with
sharp teeth fixed upon the periphery of a revolving wheel, and agitating in sur from niter, 13 parts of charcoal, and 11 parts of sulphur. Gun cotton is made by immersing clean dry cotton for a
few moments in a mixture of equal parts of fuming su!-
phuric and nitric acids, and then washing the acids off
in running water. The acids must be those known as fuming-the most concentrated.
(29) J. D. R. says: In the study of geology, I meet with one serious difflculty: There are five principal geological periods, each of which has its characteristic
formations. Geologists speak of the the " oldest rocks," he " lowest rocks," etc. All their examinations are necessarily confined to the carth's surface. How, then, do understand that eruptions might heave the rocks of the interior to the surface, and that rocks of all periods might be found on the surface; but how do geologists ascertain the period to which a given rock belongs?
How do they tell the age of a rock 9 A. The older rocks -granite and basalt-are those upon which rest the stratified deposits constituting gneiss, sandstone, etc.; they are, therefore, often spoken of as the lowest, the
foundation stones. They are unquestionably the result oundacon stoses. Tirect congelation from a state of fusion: whe resule sandstones, etc, are as evidently the product of the coros:on and attrition by violently agitated water of high temperatures. The material thus abraded and dissolved, at first held in suspension by the water, was gradually deposited and cemented as it calmed and cooled. The ocky crust, at first formed, had become wrinkled into the still molten nucleus and the falling in of the weaker portions of the crust. The valleys receivedmost of the sediment, while the mountain tops, some of which pro jected above the surface of the water, were lightly or not at all thusclothed. Denuding floods and glaciers or cut great chasms in them, so that geologists may withoutgreatdifficulty, study their nature and that of ion, thrincumbent strata. The order of their forma ure, are the data from which their relative ages are computed. Space will not here permit us to go further into the subject. You should consult some comprehe
(30) E. J. W. says: I have a wood-turnin lathe, the cone pulley of which has two steps, one is 3 ? ${ }^{7}$ inches, and the other 912 inches in diameter. From center of spindle to center of countershaft is $31 \frac{1}{8}$ inches. With the $3^{\frac{1}{2} \pi}$ inch step I am running a pulley on the
countershaft $29 ?$ inches diameter. I wish to put a pulley on the countershaft to run with the $99_{10}^{\frac{1}{0}}$ inch step. and to use the same belt on either step. What must be the size of the pulley? A. Make it $9_{8}^{7}$ inches

About $81 / 3$ troy ozs. Worth about $\$ 173$.
How much heavier is a cubic foot of sca
abic foot of fresh water? A. About $13 / 4 \mathrm{lbs}$.
(31) C. A. R. says: I desire a compound in quich form, wihout same and adhere firmly thereto, and that will dry quicky when spread thinly, and exposed to the air. When ry, it should be transparent and insoluble in wate your requirements.
make it dry quickly when spread thinly? A. No. Use the solution hot.
(32) A. J. Z. \& S. ask: 1. Is coal tar from gas houses a good thing to put on a shingle roof to pre-
serve the wood? A. The use of coal tar as a roofing paint is open to a number of objections, chief amons which are its black color and low point of fusion, which ause it, under exposure to strong sunlight, to readily absorb heat and run into the gutters, and its strong dor. Besides this it is very inflammable, and easily ig with it to make it dry, and to prevent it from amelling A. The odor and liability to run may be somewhat wood.
(33) H. F. asks: How can I feather or crysallize on galvanized iron? A. Clean it perfectly with solution of chloride of zinc, and you will find that the
coating is already crystalline. Or use a wash of dilute nitric acid ( 1 of acid to 1 water), and wash in a stream clean water
(34) J. M. B. asks: What is the best material for a step in which a steel spindle, weishing about 1
b., is to revolve at 4,000 turns per minute? A. Use hardened steel or iron.
(35) F. C. asks: How is the dotted shade put upon crayon drawings? A. If we understand you,
the shade is composed of small dots worked in with the rayon point. 2. How can I obtain a solar print from in type? A. A negative of the picture is taken and placed in front of within the focus of a large camera and be
The sensitized paper extended on a frame is then introuced into the camera and exposed. The cameras used or this purpose are peculiar in shape, very long, and are provided with suitable machinery, clockwork, etc., to maintain them in the same relative position with respect
(36) W. C. R. says: A calcium light company has several different sizes of gas cylinders
in use, holding $15,25,50$, and 60 feet of gas; and when each one is fully charged and sent oatt, its pressure gauge will indicate the same number of los., namely, 225
lbs. to the inch. By what rule can I ascertain how many feet have been used, and how many still remain in the cylinder? A. The pressure varies nearly as the quantity pressure only half as great as the original, about half o the gas has been used, and so on. A simple method of voir when empty, and with a definite amount of gas. voir when empty, and with a definite amount of gas.
From this the weight of a cubic foot of gas could be ascertained, and, by weighing the reservoir at any be ase simple calculation would show how much gas it contained.
(37) L. N. M. asks: 1. What will prevent ordinary shellac varnish from bubbling under the brush, hol, and give a flowing coat. The wood must be dry. In repainting defaced water colors, which would
best, colored varnish or common paint, or would neither f them answer the purpose? A. You do not say what
ind of a color. Probably colored varnish would give he best results, if we understand you.
(38) S. asks: Does the diameter of an ec entric affect the position of a valve, that is, will not locomotive work as well with one eccentric of 10 inches oth equal, providing that the ches, as it would were here is a slight difference on thrownt the samer A. ngularity of the eccentric rod. All other things being
(39) E D S asks:
(39) E. D. S. asks: How can I split $\frac{8}{4}$ inch square iron either hot or cold? A. If the bar is heated
o a red heat, a circular saw will answer. If the bar is , a fast running disk of sheet iron will cut it.
(40) G. W. R. asks: Can a steam cylinder f inches bore work a 20 inch stroke? A. It
(41) J. W. C. asks: Can iron be w ithout being. ny chemical? A. No.
(42) W. F. S. says: A friend of mine says the Dead Sea is devoid of fish. I do not see why other water. Who is right? A. It is said to be lifeless as its waters contain a vcry large quantity of chloride of magnesium, chloride of sodium, and sulphate of
soda. A bath in its waters parches and cracks the
(43) J. J. T. asks: How is it that all bought taps are so clean and bright? How are they the oped? A. The taps you refer to are not heated in which we shali shortly publish.
Minerals, etc.-Specimens have been received from the following correspondents, and examined, with the result stated:
J. S. B., of Cal., sends us a box marked with his initials, but no letter. It contains pieces of red jasper and quartz, with oxide of iron. The bright specks are no gold, but iron pyrites.-B. J.-No. 1 is clay with red ox are of iron. In. No. 2 the bright specks are mica films, contains no metals.-J. B., J.-It is red oxide of iron and umber.-G. B.-The crystals in No. 1 are lime iron arnets. No. 2 contains hornblende, albite, and ortho clase.-J. D. S.-No. 1 is iron pyrites in limestone. See p. 7, vol. 36. No. 2 contains carbonate of copper (malasulphimestone, and orthoclase. No. 3 contair.s galena sulphide of lead). No. 4 is limonite, with a few crystals of pyrites.-A.D. T. -The material is an infusorial or Norasigma, lancoolatum, and $p$. angulatum.-A. J. A No. 2. See "Hints to Coride of iron). Sec p. 7, vol. 36 B.-It is metallic antimony.-G. W. H. - It is bitumi nous shale. You will probably find coal by going deeper Some of the shale might be used as fuel, but it co tains much a h. Dr. M. B.- Hiss and from decomposed (silicate of alumina) containin's much taic or hydrous sil cate of marncsia. It is not suitable material for cruc bles, but might answer for soft firebricks.
J. H. B. asks: Is there any remedy for a parrot which, for four or five years, does nothing but sks: Can any one give me a recipe for manufacturin palatable cider from wild crab apples?-A. I. asks: Ha off of its center? Many such wheels, and stationary en gines also, stop in the dead center, and have to be pricd off before they can start again.-G. S. says: I bave sce in machine shops straight bars of iron 2 feet long, bolt d on to shafting at different points and standing out at ight angles. What are they for?

HINTS TO CORRESPONDENTS
Correspondents whose inquiries fail to appear should that, for good reasons, the Editor declines the conclud address of the writer should always be given,
Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given,
are thrown into the waste basket, as it would fill half of our paper to to the waste basket, as it would fill half of our paper to print them all; but we generally take pleasis given. ric medical belts good fer anything? What will ece pression pump cost? Who sells incubators and brood ing apparatus, and what do they cost? Where can powder paper be obtained. What does selenium cost be observed, in the column of "Business and Per sulal," which is specially set apart for that purpose subject to the charge mentioned at the head of that colunn. Almost any desired information can in, colunn. Almost any desired info
this way be expeditiously obtained.
official.
INDEX OF INVENTIONS
Letters Patent of the United States were Granted in the Week Ending

May 8, 1877
AND EACH BEARING THAT DATE.
[Those marked (r) are reissued patents.]
A complete copy of any patent in the annexed lis ncluding both the specifcations and drawings, will be furnished from this office for one dollar. In ordering and remit to Munn \& Co., 37 Park Row, New York city.

Anti-incrustation compound, E. L. Hurd Bag holder, A. Johnson
Bale tie, H. C. Stouffer Bale tie crimping tool, H. C. stouffer
Band or cord, driving Bed bottom, spring, smith \& Beversto Bedstead, sofa, H. Compes...... Bee hiving apparatus, R. B.
Beer measure, J. McInnes...
 Boot and shoe, H. Brossel.
Boot and shoe, H. White
Boot and shoe, H. White ............
Boot edges, burnishing, G. A. Fullerton
Boot sole fastening, L. Goddu........... Boot soles, trimming, Forster \& Tolles Boot cleaner, D. II. Lauric. Boots, treating leather for, J.J. $\operatorname{sawin}(\mathbf{r})$ Box and box holder, J. A. Cotten
Boxes, making wooden, W. Hue Boxes, making wooden, W. Hue
Brake lever, E. H. Wheeler
 Brick machine, T.
Bridge, W. Irelan

## Bridge truss, R. H. Davies Bride bit, A. C. Tickner

Burial casket, H. Sander
Can opener, I. Cutting.
Car axle box, E. . . Colman
ar coopling, C. M. Carnahau
Car coupling, A. S. Albright.
Car spring, W. P. Thansell.
Cars, propelling, G. T. . . eauregard
Carbureters, toat for, J. Clingman ............ Carriage king bolt. J. If. Combs
Carriage t $t$ p, G. F. Cannif, sr. Carriage shifting rail, $\Lambda$. M. Whipple Chrriage shifing
Churn, S. Bair.
Clurn, W. C. Bu
 Churn, rotary, H. L. Gordon
Churn, rotary, C. I. Hale
Cigar lighter, automatic, M. L. Ross
Cigarette machine. H. H. Bromwell Cigarette machine. H. H. Bromw Cigarette machine, C. Palatini......
Clasp for wristbands, A. v. Sanfor Clevis, W. S. Weir...

## Clock alarm, R. Sayer.

Cloth spreader, etc., C. A. Luthe
Coal box, G. M. Church
Coal hod, w S . Potwin
Coffee huller, J. . .I. Pendileton.
Coffee, hulling and polishing, II. B. Steven
Collar and toy money box, Mack \& Coo
Corn gatherer, M. P. Pr Br,wn
Cotton press, A. B.
Cotton press, A. Baldwin.
Cradle, rocking,I. Bushong
Cultivator, T. W. McDill.
Cups, securing handles to, C. S. S. Baron
Curling iron, C. Maggi.....
Curtain fixture, H . Broom
Curtain Axture, Williams \& Kerr...
Decanters, etc., lock for, E. II. G
Dental engine, C. M. Curtis(r)...
Door bolt, F. Davis........
Dra wer pull, G. W. Tucker
Drier, w. गickhardt.
Drying cylinder, C. C. Butt.
Dust pan, I. . Lauback..
Egg beater, J. H. scofield.
Egg crate, W. J. H. Kappe.............
Eggs, desiccating, W.O. Stoddard.
Envelope, w. S Holding.
Exercising machine, A. W. Lozie
Feed water heater, J. Eckersley
Feed water heater, J. Ecsers.
Fence, portable, S. G. Burke........
Fences, post for wire, S. Regnolds
Fire escape (hydraulic), Gerard \& Turnbul
Flax, etc., treating, N. De
Flower stand, C. F. IIall.
Food, composition, J. T. Cragin
Frost on windows, preventing
Fruit jar, T. G. Otterson.
Galley support, P. A. Kell
.
Garbage sink, T. X. Walsh
Garter, F. Armstrong ..
Gas burner, J. Halstrick, Jr..........
Gas, etc., generating, M. W. Kider
Gear cutting machine, G. H. Corliss
Grain binder, F. W. Randall.
Grain drill, M. M. Fttzgerrell
Grain gatherer, etc., R. Eick
Gun machine, J. P. Taylor.
Gutters, machine for making wooden, J. Dole
Hame fastener, A A Phillip
Hame fastener, A. A. Phillips.
חame fastening, s. A. Woodard
Hame for harness, G. E. Fletche
Hoe, A. Schwehr.
Horse collar pad,
Horse detacher, Amidon \& McKimm
Horse hay rake, W. Adriance
Horse hay rake, w. S. Arche
Hot air hay rake, Hock \& Marti
Hydrocarbon oil, supplying, W. Major
Indicator, G. W. Daniels
Iron moulding
Iron moulding, J. Hursh .............
Ironing apparatus, P . O'Thayne..
Ironing apparatus, P . O'Thayne.
Labels, attaching, C. L. Pond....
Lamp chimney, R R
Lamp chimney, R. R. Crosby (r) ....
Lamp, safety, D. R. Harde
Lantern, C. J. Rogers
Laundry apparatus, G. C. Bovey
Leather, staining, G. S. Woiff..............
Letter sheet and envelope, L. Ehrlich.
Life-preserving dress, C. Grin
Lifting jack, D. W. Brown
Liquid heater, Nors. M. Simonds
Lock for cell doors, J. Sargen
Lock, seal, J. Dewe (r)....
Lock, tumbler, T. Fox....
Loom, shuttle, I. Dumas.
Lubrication of ice machines. F. V. De Coppet
Lubricators, J. Gates (r) ................661,
Lubricators, J. Gates (r).
Iap, mounted, A. McNally


종dututivanti.
 Engravings may head advertisements at the same rate
per line, by measurement, as the letter press. Adver-
tisements must be recived at publiction oftce as early
as Friday mot mind Kemlo's Watch Repairer's Hand Book








 Boult's Patent L- Reverse Motion

 N
 Bariety Mouldersmade to order, nan warranted by the \$8 Yorld. J. M. BEUGLER, M'frr, WULIamsport, Pa. BERLIN. MANUFACTORY FOR SALE






25 per cent. Discount on Price List o.
Superior Wood-Working Machinery

GIGHTT CASTINGOS To Arder promptly. We make a syeciauty of light work. TO ELEOTROPRATERS.JEWELERS, AND
 Gold and Siver Plating. IHOMAS HALL, Manufac
turing Electrician 1 IIromflel. Street, Boston, Mass.
Illustrated Catalogue sent free.
 STOVER $r$.sWOOD-WORKING INTEREST For full particulars of the controversy between the
Hoston Conductory Company
the wood-working interest, pertaining H. Do pover and
 18 cents ${ }^{\text {postpaid. Address the the pubisher }}$ AUSTIN
BLACK, 3 Park Row, New York. CELEBRA'TED FOOT LA'THES.



 Catalo. Huse BALDWIN. Laconia, N. . .
THE DRIVEN WELL.
 WM. D. ANDREWS $\underset{\text { NEWRO., }}{\mathcal{L}}$ BRK.
LEAD SAEEENOS PATENTAPS.







## INVENTORS.

The frst Auction Sale of Patent Rights havin proved
a decided success, the second sale will be held early in
a decided success, the second sale will
July. For terms, etc., address
GEO. W. KEELER, GEO. W. KEELER,
Salesrooms, 53 \& 55 Liberty St., New York.
 RISDON'S IMPROVED
TURBINE W TURBINE WATER W HEEL elded at the test of Turbines at Centen-
al Exposition the best results at all stages T. H. RISDON \& CO.

Mt. Holly, N. J.
Manafacturers of MIL. MACHINERY. MPORTANT FOR ALL CORPORATIONS AND mands 'IIme Detect or. capable of accurately con-
tralling the motion of a watchman or patrolman at the

 clocks infringlin.
accordinf to law.

EUREKA SAFETY POWER!
 Practically impossible to ex-
plode. Tested to 30 lbs. pressure
per square inch. 2 -Horse Power,
$\mathbf{\$ 1 5 0 , 3} 3$ to 4 H . P., $\mathbf{8 2 5 0}$. Also, Stationary Engines and Boilers, and
Spark Arresting loortable En$\underset{\text { Sines for plantation use. Send for }}{\text { Sind }}$ cines for plantation use. Send for
our circular. Discount to the trade. B. W. PAYNE \& SONS,

AIR COMPRESSORS A SPECIALTY of HEAVY PERESSURES. TRADR RNGINE.
Noiseless in operation-Perfect
in
of Corkmunhip-all light parts Every Engine indicated, and
valve corcted
to eive the highest attainable results.
Warranted superior to any semi-portable Engine in the
market Send for Price List and Circu-
lar.
Herrmann
RODE MrG WESSELL METAL, A PERFECT IMITA-


##  UTSS.  

 Lathes, Planers, Shapers, Drills, Wood-Working Machinery,





THE UNION IRON MILLSS, Pittsburgh, Pa., Xianufrantures of improved wrought iron' Beams and
 the undoubted advantages of now erecting Fire Proof
 terruption to business caused by fire these and like con
siderations fully justiry any additional frst cost. It

 complete, for any speciffe structure sot hat the differenc
in cost may at onee be ascertanine. Adres
CARNEGE, BROS. © CO., Pittsburgh, Pa.
ROOTS' PATENT PORTABLE FORGE. Hd.

ADAPTED TO EVERY VARIETY

OF WORK.
THE ONLY FORGE WITH FORCE BLAST BLOWER. THE ONLY EFFECTIVE FORGE MADE.
P. H. \& F. M. ROOTS, Manuf'rs, CONNERSVILLE, IND.
S. S. TOWNSEND, Gen'1 Ag't, 6 Cortlandt St., NEW YORK
$\$ 12$ a da y at home. Agents wanted. out ant and 50 AIXEDCARDS, with name ioc and stamp.


Steei Name Stamin
N. Y. Stencil worhs, 87 Nassau St., N. Y. WANTED - FOR MONCLOVA, STATE of Coahuila, Mexico a man who knows how to make
Starr candles. without the use of sulphric Acta, capa ble to put up and put in running order the necessary
apparatus, superintend the
teach same to the parties imanufacturing process, and

25 4 MONKEY WRENCH $35^{\Phi}$ A strong, convenient, and durable Tool, for the factor shop, farm, etc. 8 inch, 25 cents; 10 -inch, 35 ce
For circular, address BOX 1998, Phila., Pa.
Eibuns: $=\$ 85$
EXTRAORDINARY. With engravings; price, 81.1 WONDERFUL, $\begin{aligned} & \text { prescriptions for prevailing } \\ & \text { diseases, each worth ten } \\ & \text { tise }\end{aligned}$





[^0]:    
    adir Single coples of any desired number of the SUPPLEMENT sent to any

[^1]:    Bond, J.:
    This
    ein
    This cause coming on to be heard upon the petition oi the defendant
    erein for an injunction to issue against the complainant to restrain him
    rom commencing or prosecuting, or threatening to prosecute ans suits from commencing or prosecuting, or threatening to prr secutestrany any suits
    against any of the vendees, or vendees of vendeesof defendant. for the use
    or sale of clover hullers manufactured by the defend and sold by them or their agentsc, and it by the defendant at Hapering to the court town,
    complainant thas bent threatening to bring suits against said vendees while
    suit is still tending by him in this court againgt the defendant the manu
    facturer
    

