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| (NxTIT-No. ${ }^{\text {3 }}$ ] | W YORK, JULY 18, 1874. | m |
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## THE ECLIPSE STEAM GENERATOR

We illustrate herewith an improved form of the Eclipse steam generator, a sectional boiler which was described in these columns several months since. The invention, as modified, is claimed to combine safety, durability, and economy with cheapness of construction and facility of repairs.
The boiler, we are informed, has been used for driving all classes of machinery with great success. The improved method of construction now adopted allows any tube to be easily removed, replaced, or entire sections detached or added, without interfering with other parts of the generator.
The water and steam chambers, A, are of a mple size, made of semi-steel, and so formed that the steam can rise to the surface and the water freely return to the lower tubes. The tubes, B, are lapweld rd, and the bends, C are semi-steel. These parts, being exposed parts, being exposed to the fire, are ar ranged so as to allo for expansion and con traction, and provid for complete circula tion. The top or roo pipes, F, are used, the lower row for carrying a supply of water and the upper for drying the steam. There ar hand holes, $G$, in the ends of each roof pipe F , for the purpose of cleaning; also hand holes in the backs holes in the backs of all the chambers, A so situated that an and every one of th circulating tubes, B can be commande their entire insid length, or detached ever necessary, with out disturbing the up right or main parts. The space between each tube will allow the removal of any < without disturbing unother.
The object of giving the tubes the $<$, or angular, shape is to secure the greatest possible amount of heating surface of a continual upward incline, and to allow of unequal expansion. If one arm of the $<$ becomes longer from the heat, the other will springs up or down to accommodate itself, without opening a joint. The water has a complete circula tion, running up the inclined tubes, B, and falling down in the sections, A. This is caused by the steam and hot water rising to the surface, and the colder water rushing to its place. The upright return chambers, A, are large enough for the free passage of the water from the exhaust or top openings of the tubes to the lower. This secures a continued and uninterrupted circulation up through all the inclined tubes, B (which are immediately over the fire), and back down the sections, $A$, where there is larger volume and less effect from the furnace. The steam, as generated, escapes to the upper part of the boiler. The sediments settle in the drum, E, below the fire surface, where they can do no injury and can be readily removed. The heating surfaces are kept clean by this arrangement.
There are no chambers exposed to the action of the heat sulficiently large to cause a destructive explosion. The boiler is short, so that all parts are brought into close proximity to the fire. No packing or caulking is said to be necessary. The joints are ground iron to iron. The tubes are attached with improved lock nuts which can be unloosed at any time, and every part is easy of access for cleaning or repairs.
It is claimed that the bulk of the water, being carried in the upper part of the boiler, prevents the heating surfaces from becoming dry so long as any water remains in the generator. This obviates the necessity of having large water chambers for a reserved supply, while requiring but little at tention to keep the water at a proper level.
For further particulars address the Eclipse Steam Manu facturing Company, Sharpsburg, Pa. Information can also be had at their branch office, 87 Wood street, Pittsburgh, Pa. or of the general agent, Isaac H. Shearman, 45 Cortlandt street, New York city, and 132 North 3d street, Philadelphia Pa .

## THE ECLIPSE STEAM GENERATOR.

body electric tensions of surprising intensity were found Independently of the long sparks obtainable, a metallic wire brought near the belt was traversed with a continuous cur rent powerful enough to deflect the needle of a galvanometer, with electricity of tension to weakly decompose water, and in slightly modified Geissler tubes to produce a distinct stratification of the electric light. The circumstances influencing the electric production may be referred to three causes: separation, more or less rapid, of the bodies; the complex mechanical action of incurvation, depending, in the case of leather, on the elastic state and dimensions of the pulley, and the number of incurvations in a given time; lastly, the comm.

## irius.

At a recent meeting of the Royal Astronomical Society, a paper on Sirius, by Mr. J. M. Wilson, was read. His obser vations tended to confirm the speculations of spectroscopist hat Sirius is intrinsically much brighter than the sun, and must, therefore, be of a higher temperature. His measures of the position of the companion of Sirius showed that it is now passing away from its periasteon, and that the time of a complete orbital revolution is probably nearly two hundred years. Taking the parallax of Sirius as $0 \cdot 22^{\prime \prime}$, the distance of the companion from the principal star is about fifty times the earth's distance from the sun. This would give the mass of Sirius as only $3 \frac{1}{8}$ times the mass of the sun, while the amount of its light is estimated at more than two hundred times the light of the sun. He therefore concluded that, area for area, Sirius must be much more intensely lumi nous than the sun. He wished to direct attention to the companion of Sirius, and to point out that it is within the reach of instruments of only moderate aperture. The telescope with which his observations have been made is a re
of $8 \frac{1}{4}$ inches. He has ordinarily used a power of 400 .
Mr. Mattien Williams said that it seemed to be assumed that increased brightness was necessarily an indication of

Electricity Produced in Mechanical Actions. Certain phenomena of electricity of tension, observed in leather belting by M. Joulin, have recently been the means of directing the attention of that physicist to the subject forming the above heading. He has constructed machines in which the mechanical tension of the belt can be varied at will, and has used for conducting pulleys the following materials: Iron, brass, zinc, red copper, white iron, lead (the last four metals applied in thin laminee to wooden pulleys); the imperfect conductors, walnut wood, leatuer, hardened rubber, in sheets of 036 inch, applied to wood ; cloth and silk fastened in form of cushions, also to wooden pulleys.
In the machines formed of metal and leather. in the latter
increase of temperature; but that though this might be true for solids, it did not follow that it was true for gaseous bodies. When one gas Hlame was placed behind another, the brightness was doubled, but the temperature remained the same.

Mr. Ranyard said that the speculations of spectroscopist as to the heat of Sirius were founded on the blueness of its light rather than on its general brightness.

## Check Chains on Car Trucks

At the recent session of the Master Car Builders, the me rits, pro and con, of check chains were diacussed. A large $\theta$ of which the truck had the chains and in others no chains. thought the member were of no value, bu the mass of the evi dence was in favor their use, and the re port of the commit tee to that effect wa adopted. Member believed that every truck ought to have four strong check chains. The committ ee say

Check chains, a usually applied, with eye bolts through the truck sides and sill o the car, are defective from being so placed from being ao place that the full strengt of the timber is no available, as th strain is down and sideways on the sill and usually tears ou the lower portion of it, leaving the upper part in place, and with the truck vic versû. Where hook or eye plates are bolt ed to the truck side and sill, the strain bears on the bolt bears on the bolt nearest to the hook o eye, and the result i or timer the bolv ive way in detail, and in cases wh are used, the result is the same.
"In order to have check chains of value, they should be of such proportion that their strength will be equal to the re sistance of the timbers to which they are attached, and th fastenings to the timber should be so constructed that the full strength of the timber would be utilized. The point of attaching chains to truck and car body, respectively, should be such that the chains would be at right angles to the body of the car when the chains are drawn taut, and the length of chain just sufficient to admit of running the shortest curves with safety.
" There are different methods of attachment to the sill or special timber, so that the full strengih of the timber can be made available. One method, which your committee would recommend, is to place an iron plate of suitable size and strength on the inside of the sill with an angle turned over and extending half across the top of the sill, and an eye to and extending half across the top of the aill, and an eye to corner of si'l ; also a similar plate on the opposite side, with an angle extending half across the top, and another angle a the lower outside corner; the plate extending across the bot tom of sill to near the inside corner, with an eye to receive the ring above referred to; then by bolting through the plate and sill, and the ends of the plates being drawn together by the ring passing through the eye near the ends, the sill or timber is secarely inclosed, and, with the irons properly pro portioned, its strength is fully utilized

Oil Tank Cars.-On the Atlantic and Great Western Railroad, these tanks are made of three sixteenths iron and are sixty-one inches in diameter. They hold eighty-five barrels. They resemble cylindrical boilers; are fitted with man hole, dome, filling and draw cocks, and are strapped down to platform cars by means of plate iron bands. The arrangement is cheap, safe, simple and durable. Pipe lines leading from the wells to the railroad stations convey the oil, which pours directly into the tank cars.

## Srientifir gmmerican.

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## O. D. MUNN

A. E. beach.

## TITRMK

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## A COMETARY RETROSPECT.

From recent calculations of the elements of Coggia's comet by Mr. Plummer, an English astronomer, there ap pears to be a close similarity between them and those of Comet II of 1737. There is a sufficient correspondence, it seems, to warrant the belief that the two comets are identical, and that we are receiving a second visit from the vagrant body which attracted the notice of the astronomers of a hundred and thirty-seven years ago. We find no record of its being a very prominent object, although it appears to have been observed in many of the great cities of Earope. Nor do we find statements of any pecaliar phenomena connected with its appearance.
There will doubtless be many who, in gazing at the comet night after night as it gradually augments in brilliancy, will ponder as we have over the vast progress which the world has made since the era of the former visitation.
Locking at the condition of Science in 1737, from our present standpoint, it is easier to regard the circumstances negatively, to imagine our own condition if deprived of the results of discovery and of progress which have accumulated in the intervening years. The spot, on which the building in which we now are stands, was then but a green meadow. The crowded metropolis was existing only in the germ, and that merely a few straggling streets close to the water's edge. George II. was on the throne of England, and Louis XV . on that of France. Both amiable sovereigns were struggling to monopolize as much of North America as possible; and although at the time peace reigned in the colonies, it was but a temporary one, which ended in still fiercer hostilities seven years later. Sir Isaac Newton had been dead for six years, and the mathematicians of England were arrayed againat those of the continent, squabbling and bickering, with an acrimony intensified by international jealousy, over the theory of gravitation. Newton had studied out the subject of electricity and had invented the glass globe machine. Steph•nGray had also made some investigations, but no one had ventured a thrcry, nor had an application of the new pbenom. na been suggested. Telegraphy, the galvanic battery, the ionumerab.e inventions based thereon, were ail things of the future. There were plenty of alchemists in Europs, and the science of chemistry was just wrenching itself free from connection with their chimerical fancies. Stahl had but recenily announced his theory of philogiston, a substance whi $:$ h Cavendish in subsequent discoveries believed identical with hydrogen. But the transition period in chemical acience was yet nearly forty years distant. Priestley, the discoverer of oxygen, was but an infant. Black, the investigator of the alkalies,and Scheele, the inventor of modern organic analysis, were likewise children. Out of the sirty-three elements, but fifteen were known. Aluminum, chlorine,orygen, hydrogen, nitrogen, platinum, and nickel were among thone which had never been recognized.
Newcomen's steam engine was used in the mining dis-
tricts, and the boy, who sat beside it and worked the condenser valves, had not been struck with the brilliant idea of making catches and strings perform the labor in his stead. The Marquis of Worcester and James Watt were unknown
to fame. The first railrosds were in use in the coal districts to fame. The first railrosds were in use in the coal districts
of Northumberland and Durham, but the rails were nothing of Northumberland and Durham, but the rails were nothink more than wooden beams, and iron was not to be substion
for them for thirty years. In the blast furnaces wooden bel for them for thirty years. In the blast furnaces wooden bel
lows were in use. Puddling, rolling, and the hot blast were un known. In Europe cast steel had never been made, and but a short time had elapsed since the publication of Réaumur's work, making known the process of manufacturing ordinary steel. In this country Jonah Higby's patent, obtained from the Connecticut legislature, for a "curious art to transmit common iron into good steel" had just run its term of ten years. Having no autonomy as a nation, we had no patent
weffort toward establishing one. The arts of photo graphy or sun painting in any form were undreamed of The sciences of aeronautics and of agricultural chemistry had never been imagined. Surgeons hacked off the limbs of their victims and seared the flesh with red hot irons, regardless of the agony they inflicted, for anæsthetics were un known. The phenomena of digestion were but little under stood, and quinine, with hundreds of other remedies now common, had not been discovered.
Whale oil was burned in the lampe, which formed the sole means of illumination when candles were absent. Pe troleum, paraffin, and illuminating gas were yet to be found. In artillery and implements of war, the bayonet had just superseded the pike, the flint lock muaket was just coming in to use, while a single monster cannon of the present day would have dispersed whole regiments armed with the prim itive artillery then employed.
Laplace had not given his labors to the world. Saturn's rings and satellites had not been discovered, and the path of that planet was supposed to be the outer bound of our solar system. The spectroscope had made none of its wonderful revelations, and the diatances of the fixed stars, their ap parent motions, and the fact of their being suns and centers of other systems, the 5,700 nebulæ, and the 136 asteroids, al were unknown.
India rubber had been discovered one year. There was no definite system of botany, and Cuvier's researches in natural history had not appeared. The caloric engine, the hydraulic press and ram, the sewing machine, and the diving bell had never been thought of. Blowpipe analysis and the atomic theory, a system of logarithms, calico printing, the steam printing press, all were yet to be invented. No one
had deciphered the inscriptions on the monuments of Egypt. Jenner had not introduced vaccination, nor Hahnemann ho mœopathy as a school of medicine. Steam navigation and the screw propeller were yet to appear. Captain Cook was making his celebrated voyayes around the world. Immense portions of Australia, of Africa, of the polar regions, had never been visited by civilized races. Anthracite coal had to Science burned, nor the powerful explositistry was un known as a profession on this side of the Atlantic, and artificial teeth had not been invented. The first chronometer had not been completed. The pianoforte was a new-fangled invention, which no one would have aught to do with until his Majesty Frederick the Great of Prussia deigned to buy one ten years later. Polarized light had not been discovered. No post office system had been developed by any government nor had any improved means of teaching the deaf and dumb been adopted. Steel pens were unknown, and the Scienti-
fic American was not one of the seven newspapers then existing in North America.
Our retrospect already extends beyond intended limits, and we have far from even summarized the great discoveries of the past century and a half. That our descendants wil surpass us as much as we do our ancestors is within every pears, of probability. When our celestial visitor again ap gaze of earthly inhabitants, regarding the magnitude o whose knowledge and whose powers it would be idle even to speculate.

## TAXING POWER OF THE LEGISLATURE.

Law, in its true sense, is the product of the highest reason coupled with the most exact justice. The Civil or Roman Law and the Common Law of England are to be admired as models. The great deviations from genuine law are to be found in arbitrary acts of our State Legislatures, seriously affecting the rights, liberties, and property of individuals, and the tendency of the courts to give validity to such acts
in contravention of constitutional guaranties and those of the common law.
The most notable instance of this may be found in such legislative acts as provide for the disbursement of large sums of money in making public improvements, and then charging the whole cost as a tax on specific individual prop times happened, to the ontire owners, and, as has some perty. The power of the legialature to do this, and act as the final judge on the propriety of any public improve ment, from which the individual has no redress, although ruined thereby, is now, as we understand the law. laid down by the Court of Appeals of the State of New York.
This doctrine is so arbitrary in form and so destructive of individual rights that it becomes a reliof to know that our sister State of New Jersey, through Chief Justice Beasley, of its Court of Errors and Appeals, lays down a much mild-
er and wiser rule for that State, in a recent decision made
by him at the suit of "The Mayor
Newark ads. The State, Agens et al.
Newark ads. The State, Agens et al.
The facts were that a certain street in Newark had been repaired under an act of the legislature which provided that two thirds of the cost should be imposed on the owners of lots fronting on the line of the improvement, and one third on the city treasury; and the question was whether the legis lature could fix, at its mere will; the ratio of expense to be put upon the owners of the preperty along the line of the improvement. The following is an extract from the very able opinion of the Chief Justice, fully concurred in by his associates, and well worthy the attention of the courts o this and other States
"* * * That the effect of such laws may not extend be yond certain prescribed limits is perfectly indisputable. It is upon this principle that taxes, raised in counties, towns
and cities, are vindicated. But while it is thus clear tha the burthens of a particular tax may be placed exclusively the burthens of a particular tax may be placed exclusively ure, it seems to me it is equally clear that, when such burthen is sought to be imposed on particular lands, not in themselves constituting a political subdivision of the State
we at once approach the line which is the boundary we at once approach the line which is the boundary
between acts of taxation and acts of confiscation. I think it impossible to assert, with the least show of reason, that the legislative right to select the subject of taxation is rot a limited right. For it would seem much more in accordance with correct theory to maintain that the power of selection of the property to be taxed cannot be contracted to narrow er bounds than the political district within which
If such prerogative has no trammel or circumscription then it follows that the entire burthen of or of of these public improvements can be placed by the force of the legislative
will on the property of a few enumerated citizens, or even will on the property of a few enumerated citizens, or even on that of a single citizen. In a government in which the legislative power is not omnipotent, and in which it is a fundamental axiom that private property cannot be taken
without just compensation, the existence of an unlimited right in the law-making power to concentrate the burthen o a tax upon specified property does not exist. If a statute should direct a certain street in a city to be paved, and the ex pense of such paving to be assessed on the houses standing at the four corners of such street, this would not be an act of taxation, and it is presumed that no one would assert it
to be such. If this cannot be maintained, then it follows that it is conceded that the legislative power in question is not completely arbitrary. It has its limits, and the only in quiry is where that limit is to be placed.
So far as the particularized property is specially benefited an exaction to that extent will not be a cond mnation o property to the public use, because an equivalent is returned upon the land owner is justified
Speaking on this subject, Chief Justice Green says: 'The theory upon which such assessments are sustained, as a legitimate exercise of the taxing power, is that the party assesse is locally and peculiarly benefited, over and above the ordi nary benefit which, as one of the community, he receives in all public improvements, to the precise extent of the assess
ment." ("State $v$. City of Newark, 3 Dutch. 190.) It follows ment." ("State $\boldsymbol{v \text { . City of Newark, } 3 \text { Dutch. 190.) It follows }}$ then, that these local assessments are justifiable on the ground then, that these local assessments are justifiable on the ground
alone that the locality is especially to be benefited by the out alone that the locality is especially to be benefited by the out
lay of the money to be raised. Unless this is the case, no reason can be assigned why the tax is not general. An as sessment laid on property along a city street for an improve ment made in another street in a distant part of the same
city would be universally condemned, both on moral and city would be universally condemned, both on moral and
legal grounds. And yet there is no difference between such an extortion and the requisition upon aland owner to pay fo an extortion and the requisition upon aland owner to pay for apubic improvement over and above the exceptive benef of the high and indispensable prerogatives of the government nd it can be only in cases free from ail doubt that its exer cise can be declared by the courts to be illegal. But such a is specified outof which a public improvement is to be paid for in excess of the valuespecially imparted to it by such improve nent. As to such excess, I cannot distinguish an act exacting its payment from the exercise of the power of eminent domain. In case of taxation the citizen pays his quota of the common burthen; when his land is sequestered for the public use, $h$ contributes more than such quota; and this is the distinction between the effect of the exercise of the taxing power and
that of eminent domain. When, then, the overplus beyond henefits from these local improvements is laid upon a few benefits from these local improvements is laid upon a few required to defray more than their share of the public outlay and the coorcive act is not within the proper scope of the power to tax. And as it does not seem practicable to defin
the area upon which a tax can be legitimately laid, and be the area upon which a tax can be legitimately laid, and be
yond which it cannot be legitimately extended, and as there yond which it cannot be legitimately extended, and as ther
is, as has been shown, necessarily a limit to the power of se s, as has been shown, necessarily a limit to the power of seis, perhaps, the only one that can be devised whereby to graduate the power. Consequently, when the improvement, a in the present instance, is primarily for the public welfare, nd is only incidentally for the benefit of the landowner, the rule thus
hered to."
A full review of this able decision and the cases it cites would interest and instruct all lovers of sound law. It im. parts the good old doctrine that States and Legislatures ar nly the product of an aggregate of individuals, created alik or the general and individual good, and not to be the mean of oppression or extortion of the highest or the most weak and humble citizen.

## RECENT PRINTING PRESS IMPROVEMENTS.

In the working of nearly all printing presses the sheets of paper are supplied by hand, the workman being known as "feeder." Each sheet must be taken up singly and exactly placed on the feed board, where it can be seized by the press ippers at the proper moment, and carried to the typer. Any arelessness on the part of the feeder results in bad printing and the spoiling of sheets. Measured by the manual force xpended, the feeder's labor is slight; but no press can be run, not even for the smallest job, unless the feeder is o hand to place the sheets, while his inexorable weekly wage are a serious expense in every printing office. Many have
been the attempts made, extending over a period of twenty.
five years past, to substitute mechanism for this species of hand lsbor, but without much success until the present time. We have recently had the pleasure of witnessing, at the extensive press rooms of the Independent newspaper, Rose street, in this city, the practical operation of a mechanical feeder which is, apparently, the perfection of success. It takes up the sheets separately upon a steel point, carries them forward and delivers them to the nippers, between the adjustable guides, with almost infallible accuracy. Every contingency seems to be provided for. If by any possibility the device fails to place the sheet properly, or fails to feed, the press instantly stops. If two sheets in the pile are by any means tucked or folded together, or if two sheets are lifted, the press stops. All inaccuracy of feeding, or the running through of doubles or "packets," is prevented, and much soiled work obviated. The first move or slide of the upper sheet of the pile is given by a rubber-faced presser, no air suction being used. The apparatus is suited to nearly all presses, and is quickly adjustable to sheets of various sizes.
When we consider that there are some thirty thousand power printing presses now worked in the United States, to which this improvement is applicable, its importance becomes in some degree apparent. It is believed that the invention will save its cost in less than a year by its diminution of spoiled sheets, to say nothing of its saving in the wayes of feeders. It is applicable to steam, lithographic, and other presses used in color printing, and it will greatly reduce the cost of producing fine chromo pictures, some of which are required to be fed through the press from twelve to twenty times, a separate impres ion being necessary for each shade or print of color. Mr. C. E. Baker, the superin. tendent of the Independent press rooms, 21 Rnse street, New York city, will furnish additional information concerning this invention.

## PATENTED CAR IMPROVEMENTB.

Two or three years ago the Master Car Builders' Association adopted, as a plank in their constitution, the brilliant idea of excluding from discussion afl mention of patented devices concerning railways. If any man patented a car that could be built equally as strong as the present cars for half the money, or if he should invent and patent a truck that would not leave the track, and thereby greatly improve the safety of card, preventing loss of life and property, he was forbidden to explain its merits before the Association, and that enlightened body could not, officially, take any cognizance of the new discovery.
There is no mistake about it that the discussions of the Master Car Builders,composed, as they are of practical, wideawake men, are of great importance in imparting and circulating sound, valuable information about the needs and merits of railway vehicles. We doubt whether there is a more able body of practical workers associated together in any of the various branshes of American industry than these same car builders; and how they could ever have permitted such a streak of narrow-mindedness as this anti-patent declaration to creep into their constitution is to us quite unaccountable. At the late session of the Association, one of the members, in discussing the merits of various car roofs, was taken to trak because he had spoken well of somebody's pat. ented roof. But it was alleged in reply that, if the Association had done wrong heretofore in such matters, it was time that correction should now be made, for it was demonstrated that, in order to make progress, the Association must, of necessity, investigate patented improvements, and adopt those that are best. This is a sensible conclusion, and one that almos any old lady would have come to without waiting three years, or stirring up bile in the family.

## the mines and minerals of india.

For ages unnumbered, Indic has been famous for wealth in precious stones. Our geographies still speat of it as a land of gold and diamonds; and the popular idea is that its min eral resources are immense and inexhaustible
So much for current fame. The facts of the case, as de veloped by the labors of the government geologists, show a very differont state of thinge. The greater part of the vast area of the Indian Peninsula is either destitute of valuable minerals, or they occur in a manner which throws serious obstacles in the way of their utilization; while in the richer districts, the real mineral wealth lies not at all in the mines for which the country has been celebrated. The only diamond mines that pay or promise to pay for working are of the "dusty" variety, more useful for fuel than for ornament and its precious ores are chiefly those of iron,as yet but little developed.

Copper occurs in many parts, and is mined in several places among the Himalayas, especially in Kamaon, Gurhwal, Nepal, and Sikkim. The mines are worked by natives, and the product is so inconsiderable that, even where the mines are most abundant-in Kamaon,-it is insufficient to supply the local demand. In the alluvial plains of Northern India, the copper-bearing points are few and the yield insig nificant. In the metamorphicareas of the eastern and south-
ern parts of the peninsula, where metallic ores occur but ern parts of the peninsula, where metallic ores occur but sparingly, the principal points, at which copper mines have
benn worked by the natives at various periods, are in Rajbern worked by the natives at various periods, are in Raj-
putana, the countries southwest of Bengal, and in the Presidency of Madras. At present the only works regularly car ried on are near Jaipur, in Rajputana. Ancient workinge abound near Chaibassa, in Bengal, where an extraordinary series of deposits occur, partly in lodes, partly disseminated through schists, and extending for a distance of eighty miles. Much fine ore still remains here, chiefly carbonate and red
oxide of copper, with copper glance occasionally; but atoxide of copper, with copper glance occasionally; but at-
tempts to re-establish the workings by European miners have never proved successful.
Lead is less abandant than copper, with which it is commonly associated. Rich veins of galena are said to occur in Kulu, in the Northwestern Himalayas, and more sparingly in Gurhwal and Sirmur, but little has been done toward de veloping them.
Tin has been reported from two to three localities in the plains of India proper, but nothing is accurately known of its occurrence. Rich tin deposits are believed to exist among the mountains between British India and Siam, the same range which affords the well known stream deposits of Malacca, farther south: but the inaccessible character of the country has hitherto prevented any attempts to work them. Silver is said to occur with the galena in Kulu, and with certain copper ores in Deogurh, but the quantity is small. The Deputy Superintendent of the Geographical Survey The Deputy Superintendent of the Geographical Survey
visited the latter place, but could find no evidence of a vein visited the latter place, but could find no evidence of a vein
or other regular deposit of the ore. Gold is found in many parts, but always in very small quantities, in atream gravels. It is extracted by rude processes of washing, and the yield is so small that none but the poorest of the natives engage in the search, and these only in the spring, when agricultural work is suepended.
Small quantities of an ore of cobalt are found near Jaipur, Rajputana, and are used for the coloring of enamels. Anti mony occurs in Kulu and Labaul, and zinc at Jawad in Mewar. Chromiciron ore is found near Salem, in the Madras Presidency.
Considering the immense area of India, its share of the more precious metals must be rated as extremely small. Nor is it probable that future discoveries will greatly increase its resources in this respect. For thousands of year the country has been thickly populated by natives familiar with at least the rude processes of mining and metallurgy; and as the remains of extinct and in many cases exteneive
workings abundantly testify, the country has been thoroughly exp'ored. Besides, with the abundance of labor at the absolute control of the rulers, it has been possible to work mines, especially for gold and precious stones, which would not pay expenses with hired labor. Even the diamond workings, which helped to supply the ancient rulers with their stores of gems, were very likely carried on at a cost of labor which, if paid for, would greatly exceed the value of the proceeds.
The diamond-bearing districts are chiefly in the country around Karnul, Kuddapah, and Ellore, in the Madras Presi dency, near Sambhulpar on the Mahanadi; at Weiragad southwest of Nagpur, and at Panna, in Bandelkband. O late years comparatively few diamonds are found, and the few attempts that have been made to reopen the mines have roved unprofitable.
Of rubies, sapphires, and other precious stones, India is quite destitute, though they are found in Ceylon, Independ ent Burma, and in the countries northwest of the Himalayas. The best that India can offer for jewelry are agates, cornelians, and other forms of quartz derived from the trap rocks of the central and western portions. Corundum occurs in Mysore and Salem, also in Rewah, where there is a bed several yards in thickness, associated with jade.
Infinitely more valuable than the gold and gems of the past are the salt beds of the present. The deposits of this homely yet necessary substance in the salt range of the Punjab furnish upwards of fifteen hundred millions of dollars a ear to the revenue of the government. The deposits are practically inexhaustible, and for extent and purity have no known rival. The prevalent color is white, sometimes tinted pink or reddish, the mines forming crystaline grottos of in describable beauty. Another kind of salt is found in great quantities in the Trans-Indus county of Afganistan, occuring in masses in the bads of ravines; and though less white han that of the Punjab, is considered more savory.
More important than the salt mines are the extensive de posits of coal. So far as explored, the coal fields of India arechiefly comprised in a tract of country stretching from the neighborhood of Calcutta, and from a line roughly par allel with the coast of the Bay of Bengal and distant from it between one hundred and one hundred and fifty miles, to about the 78th parallel of east longitude. On the north it is bordered by the plain of the Ganges, and on the south it ex tends locally a little beyond the Godavari. Outside of this rea, the only coalfields of promise are those of Upper Assam. The geological age of these coals, long in dispute, has now
been clearly ascertained to be that of the Australian coal, been clearly ascertained to be that of the Australian coal
differing little if at all from the carboniferous of Europe A few deposits of lignite occur in the Punjab, but they are mall in quantity and inferior in quality.
Geographically the coal fields of India are roughly divided into four groups: 1. Those of Bengal, including the coals of the Rajmahal Hills and those of the valley of the Damuda 2. Those of Rewab, Sirguja, Bilaspur, Chutia, Nagpur, and the tributary mehals of Orissa. 3. Those of the Nerbudde valley and the hills to the south of it. 4. Those of Chande and the Godavari.
The principal field is that of Raniganj, beginning about 120 miles northwest of Calcutta, and extending northward bout eighteen miles, with an extreme breadih of fourteen miles. This field supplies about half a million tuns a year ten times the yield of all the other fields togather. The
seams which are mined vary in thickness from $4 \frac{1}{2}$ to 35 feet, and are individually variable. Eighteen distinct coal-bearing reas are enumerated in the several groups, but the most of them are so little explored that no trustworthy estimate can
be made of their contents. In all the basins the coals are mostly concentrated in one bed of great thickneas, consisting

of alternations of coal and shale, and the beds thin out ra pidly to the west. In the Raniganj field, where the forma tion attains its maximum thickness, the upper group is 5,000 feet thick, the lower 2,000 , each containing several seams of coal. To the west the upper group is replaced by rocks con taining no coal, while the lower diminishes greatly in thick| nees. |
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| scar |

Scarcely anything is known of the Upper Assam fiellds eave that there are several seams and the coal is of excellent
quality, containing only two to five per cent of ash. Unforquality, containing only two to five per cent of ash. Unfortunately these deposits are almost at the extreme east end of the Assam valley, in a country thinly inhabited and hard to be got at. Some of these coals are said to coke while burning; but with this exception, the Indian coals are all free burning and will not form coke. Generally, too, they are very lean, containing from ten to thirty per cent of ash. For mechanical purposes, they are little more than half as valuable as English coals, and are consequently unfit for use in rea going vessels, owing to the great bulk and the labor of handling. Unless they can be made available for smelt ing purposes, especially for iron, the demand for them will be restricted almost entirely to railway use, river steamer and stationary engines. It is hoped, however, that with pro per selection and care they may be made available in the manufacture of iron; in which case the greatest possible im pulse will be given to coal mining, and there is reason to believe the immediate future will bring to India an iron age of productive wealth compared with which the barbaric splendor of the past will be as nothing.
Unlike the ores of the rarer metals, those of iron are wide ly and generously distributed throughout India, some of the deposits being unsurpassed in quality and abundance. The more valuable of these deposits are of magnetic and specu lar ores and red hematite, in beds or veins among metamor phic sub cr-jtaline rocks; for size and character, they re mind one of the iron mountains of Missouri. There are, be sides, clav iron ores in the coal-bearing strata and beds of brown hematite in other stratified ro"ks; also surface de posits of magneticiron sand, and nodules of brown hematite which supply the ores chiefly nsed by the native smelters.
The most remarkable deposits are near Salem, in the Madras Presidency. They consist of immense beds, from fifty to a hundred feet or more in thickness, the outcrop ex tending frequently for miles. One of these forms the ridge of a hill 1,500 feet high and four miles long. Another hill of equal length, not far distant, contains five bands of magnetic ore, from twenty to fifty feet thick, which can be traced all round the hill. These are but two instances out of many that might be cited from this locality. At Lohara, in the Central Provinces, a hill two miles long and half a mile wide appears to consist entirely of specular and magnetic a which yields 70 per cent of metallic iron.
The deposits of hematite, though on a less imposing scale, re often of great extent and ricbness. The clay iron ore are similar to those of the English coal fields, and the quan tity large. A great number of apecimens from the Ran ganj field yielded on assay an average of 39 per cent of iron. Thus far the few attempts to manufacture iron in India on a large scale have, for various causes, resulted in failure. There is no reason to doubt, however, that the diff culties will be overcome, and these vast bfds of iron ors be made the sources of immense industrial activity and wealth.

The Next Fair of the American Institute.
We have received the usual pamphlet containing the an ouncement of the 43d fair of the American Institute. The oxhibition will be held in the same building as last years n Third avenue between 63d and 64th streets in this city and opens, for the reception of machinery, August 17, 1874 Goods will be received from the 31st of the same month, and the formal opening to the public takes place on the 9th of September. Unless it be deemed expedient to continue the fair an additional week, the 14lh of November is designated as the closing day.
Some changes have been made in the classification of en tries, and the number of awards bas been increased to nine They now consist of gold medals of honor and progress, medal for taste, a silver medal, a bronzo medal, diploma and special diplomas for continued saperiority and excellence and for coöperation.
We would remind intending exhibitors of the necessity of early preparation. There is plenty of time afforded, to have everything in readiness before the fair opens, and so to avoid the confusion which usually occurs during the opening week

## Cincinnati Industrial Exposition

The success of the expositions held annually in Cincinnati or the past four years has justified the managers in enlarg ing their space and extending the field of operations. The ery elaborate circular now before us contains over 90 remiums to be awarded for excellence in all department of manufactures, domestic industry, agriculture, science, and art. Although the space at the disposal of the managemen is very large, it is desirable that early application be made or allotments, as the wish to exhibit at these expositions be comes more and more extended. The buildings will be open for the reception of goods from August 3 to September 1 and the exposition will open to the public on September 2 and will remain open till October 3. Applications for in formation and documents must be addressed to W. P. An derson, Secretary, Cincinnati, 0.

Powdered chalk, added to common glue, strengthens it a glue which will resist the action of water is made by boil ing one pound of glue in two quarts skimmed milk.

## CASTING THE STANDARD METER.

Some time ago we gave a brief accourt of the labors of the International Metrical Commission in Paris, with regard to the determination of the exact length, properties, etc., of the standards to be used as the basis of the metrical syatem of weights and measures, in neariy all the countries of the globe. The metals fixed upon for the alloy were iridium and platinum ; and about a year ago, the former component in its proper proportion, some 55 pounds, was prepared in the laboratory of M. St. Claire Deville.
Quite recently the ingot from which the standards are to be made was cast, the utmost care being taken to secure a perfectly homogeneous alloy. The platinum together with the iridium was melted in quantities of 22 pounds. The ingots thus formed were cooled, cut in pieces, and again melted, 176 pounds at and again melted, 176 pounds at a time. These masses wereagain
cooled and once more cut up and cooled and once more cut up and
finally run into a single block. finally run into a single block.
The work was done at the Conservatoire des Arts et Métiers in Paris, and occupied two hours. We give berewith an engra. ving, extracted from La Nature, showing the furnace used. The apparatus is the largest of the kind ever constructed, and it has served to prove that the lique. faction, by heat, of great masses of platinum is no longer an obatacle to Science. The lump of metal, when inserted, measured 44.8 inches long by 6.6 inches broad, and $3 \cdot 1$ inches thick. Its value was $\$ 50,000$, and it was the largest quantity of platinum ever melted at a single time.
The crucible was made of Saint Waast stone, a large grained cal. careous material, containing about five per cent of silex, and lightly pulverulent. When the platinum was melted, in a cavity hollowed in the stone, the carbonic acid (due to the heating of the mineral) only became disengaged on the edges of the liquid mass, and did not bubble up through the same. The decomposition of the limestone took place through a depth of about 0.6 of an inch, so that the metal rested on a bed of lime of quite considerable thickness.
At each extremity of the crucible were openings through which the platinum, cut up as we have above described, was passed. As soon as the seven osyhydrogen burners were lit, the fusion began with great rapidity. Through opening left for the purpose, the aspect of the melted metal could be observed. It appeared of a brilliant silver white, as fluid as mercury, and having a mirror-like surface. Large and very brilliant flames also burst forth from the side orifices of the crucible. The temperature of the mass was about $4,172^{\circ}$ Fah.
The numerous small tubes shown in the engraving serve to lead the gases to the burners, and each set springs from a copper sphere. The consumption of oxygen was about 3,327 cubic inches to a pound of platinum. During the melting, the innited products arising from the vessel were carefully examined by means of the spectroscope. Some traces of miladium, it is said, stlll exist in the alloy. It is stated that in preparing the iridium, enough osmiam was obtained to make 22 lbs of osmic acid, one of the most deadly poisons known. The above quantity, M. Deville said, in addressing the French Academy, was enough to kill every person in the world. The block, after being rolled to 77 times its present length, will be cut into rectangular bars and formed to the proper standards by accurate mathematical measurements.

## THE CLAMOND THERMO-ELECTRIC BATTERY.

In 1821, Professor Seebeck, of Berlin, discovered that by soldering together a bar of bismuth and a bar of copper, and applying heat to the junction, an electric current was generated of sufficient intensity to be plainly indicated by the galvanometer needle. To this current and couple, he gave the name of thermo-electric, in order to distinguish them from the hydro-electric or ordinary current and couple. The thermo-electric current is ascribed by Becquèrel to the unequal propagation of heat in the different parts of the circuit, since, when all the portions of the latter are homogeneous, no current is produced on heating because the heat is equally proparad in all directions As compared with the hydro-electric current, the electro-motive force is very small, producing but fesble chemical action.
small, producing but fesble chemical action.
It is unnecessary to enter into the details of past investigation into this subject, since a reference to any standard work on physics will afford all necessary information. The principal application of thermo electricity is to be found in the thermo electric battery, which accumulates the tensions produced, in a circuit composed of several metals, when the alternate solderings are heated, the others being kept at constant temperature. This battery, in the form of Nobili's pile, omployed in connection with a galvanometer, is used in Melloni's thermo-multiplier for measuring temperature, the the slightest differences in which it indicates with unfailing accuracy. Those of our readers familiar with Tyndall's
work "Heat as a Mode of Motion" will remember that the thermo-electric battery was the thermometer used in the entire course of brilliant experiments described in that volume. Save for purfoses of demonstration, the thermo-electric pile has been of little practical value. It has played no part in industrial operations, thocgh attempts thus to utilize the current have not been wanting. Farmer exhibited two models at the French Exposition of 1867, of ingenious construc tion, but they lost their power rapidly, and the bars, being excessively fragile, broke in cooling. In 1869, Becquere presented to the French Academy a battery constructed by presented Clamond and Mure, of couples of galena and iron
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## PURNACE FOR MELTING PLATINUM.

plater, in which, however, the current gradually weakened because of the augmentation in the resistance of the apparatus. As this invention formed the basis on which the remarkable device which we are about to describs is founded, it may be well to notice more carefully its defects and the means taken to cure them. The difficulties lay, first, in the means taken to cure them. The difar plates with the crystal Fig. 1.

ized bar under the influence of heat. S6cond, in the split ting of the bar of galena and its separation into differen portions in planes perpendicular to its length. The result of
M . Cl\&mond's efforts to overcome that was the battery represented in our engraving-in perspective, Fig. 1, section, Fig. 2, and plan, Fig. 3. In order to get rid of the first

Fig. 2.

trouble, he altered the mode of attachment of theiron plate, bending it back on itself irregularly so as to present many re-entering angles. These are made to envelope the bar so
that as the latter heated it expanded more than the surrounding metal, and so forced itself all the tighter into the angles. This disposition will be understood from Fig. 3, in which B $B$ are the bars, and $L L$ the plates. The second difficulty offered greater obstacles, as it had been found that, when a thermo-electric body, either metal or metallic sulphide, is cast in a cold cubical mold, splitting ensues, parallel to the faces of the cube. These divisions become visible after heating, and are supposed to be due to the extreme fragility of the body and its crystalization against the surfaces of the mold. In order to prevent the splitting, M. Clamond heated his In order to prevent the splitting, M. Clamond heated his
molds to temperatures nearly equal to the fusing point of the thermo-electric substance, and employed couples made of an lieu of galena) and his iron plate lieu of galena) and his iron plate as before. This alloy he adoptrical conductivity, and because the temperatare of its melting point rendered his method of casting easier. Iron be used in preference to copper or argentar, because it resists the effects of the alloy more effectually.
The bars of alloy, as shown in our engravings, for which weare indebted to La Nature, are assembled in crowns and coupled for tenpion. These crowns are each composed of ten bars, $B_{1}$ Fig. 2, superposed and separated by collars of asbestos. paratus forms a cylinder the in perior of which is lined the in bestos and heated by with as pipe, A, of refracting clay, pierced with holes. The gas entering at Tescapes through these orifices and mingling with air, which comes in at D, burns in the an nular space botween the tube and bars. The extremities of eavh crown are held in clamps of cop per fixed in two standards, show separately at the left of Fig, 2 and at the front of the apparatusin in Fig. 1. The left of Fig. 2 coupled for tension or for surface, the latter for each crown being 7 square feet, or 35 square feet for the entire battery. The Gerond regulator is used to render the flow of gas uniform ; and thus arranged, the battery works for months with out requiring the slighteet attention. The apparatus exhibited before the French Academy of Sciences uses one cent's worth of gas per hour to deposit 308 grains of copper in in milar time. So that for fifty cents 2.2 pounds of the metal may be deposited. The quantity of electricity augments in proportion to the size of the bars, which are made of differ ent dimensions, varying from half an ounce to nine pounds. Experiment also shows that, with an equal number of couples, the weights of copper deposited are proportional to the weight of the couples.


The battery, we understand, is now being used in the printing office of the Bank of France, and in the large photo. engraving establishment of Goupil, at Asnléres, giving remarkably successful results.

Epsom Salts and Sulphurous Acid in Dyeing.
It has been long remarked that woolen goods dyed with aniline colors, and treated with Epsom salts, will stand the action of soap and soda, and the dressing process generally, better than when not so treated, or than when treated with any other substance.
Dr. Reimann advises the use of Epsom salt on yarns to be dyed violet. By the action of soda, the magnesian salt is decomposed, with separation of insoluble magnesian com pounds, which exert no action upon the coloring matter any alteration in color by the alkali is thus prevented
All woolen dyers are agreed that, in dyeing with methyl and dablia-violet, the use of sulphurous acid is very advanta geous. The colors are thus obtained of a brighter, clearor tint.
It may be that, a partial reduction of the methyl-rosaniline to leucaniline having taken place, oxidation then effects the transformation of the latter into the former.-Dingler.

A NEW life-saving invention has recently appeared in Parls in the shape of a durable garment which covers the entire body. It is made of rubber, and is provided with a ferible tube which has a mouthpiece. By blowing into the latter, the person in danger inflates the garment, which buoys him up when in the water.


hall with the white pillar.

the hanging man.
The
VIEWS IN for

## fountain cave, virginia.

Though of much less extent than the Mammoth, Weyers, or other great caves which rank among the chief natural curi osities of the United States, Fountain Cave, in Augusta connty, West Virginia, is remarkable for many singular as well as beautiful formations, interesting alike to the student of geology and the tourist for pleasure. We give on another pages series of illustrations, engraved from sketches madeo the most prominent features, from which a most excellent idea may be gained regarding the curious freaks of Nature within the recesses of the cavern. Many of the most delicate and fascinating attractions are not of a character to be adequately represented, so that the sparkle of the incrusta.
tions and the myriad and ever changing forms of the stalactions and the myriad and ever changing forms of the stalactites and stalagmites must necessa
One of the most striking portions of the interior is "Panel Hall," peculiar both for its size as well as for the odd mark ings on its walls and roof, caused by the drippings from the rock. "Jefferson's Tobacco Barn" derives its name from a singular row of stalactites which resemble tobacco hung across a pole to dry. The "Tannery" has formations, the size of the largest side of leather, depending from the roof. "The Hanging Man" is a stalactite nearly seven feet long and located seme ten feet above the floor, which, as will be seen from the illustration, looks very much likea suspended human body. " Pompey's Statue," a beautiful white forma tion about two feet in hight, on a pedestal twelve feet high, bears a striking resemblance, when the light is held in the proper position, to a figure in helmet and antique dress. The group of stalactites and stalagmites given in one of the
smaller cuts, is about thirty feet in total hight and very beausmaller cuts, is about thirty feet in total hight and very beau-
tifully marked. "The Elf's Bath" is a picturesque series of basins filled with pure sparkling water, in which it is easy to imagive that the elves or the griomes which we read of in fairy lore may choore to disport.
Although the existence of the cave had been suspected for several yeara, it was not discovered until four years ago. It is located seventeen miles northeast of Staunton, on the Chesapeake and Ohio Railroad. Access to its interior has been made quite easy, and explorations may be cenducted to a long distance from the mouth.

## Contetgyoudenct.

The Transmission of S
To the Editor of the Scientific American:
On page 177 of your journal is an account of the investigations of Professor Tyndall respecting the transmission of gations of Professor Tyndall respecting the transmission of
sound, and the varying distances at which the same sound sound, and the varying distances at which the same sound
can be heard. I have a theory that differs from his, which can be heard. I have a theory that differs from his, which at the same ti
therein stated.
It is known that atmospheric air can hold a considerable quantity of watery vapor in suspension; but the amount depends directly on the temperature. For example, at a temperature of $30^{\circ}$, air will contain $2 \cdot 2$ grains of water per cubic foot without being saturated. At a temperature of $90^{\circ}$ it will require 14.5 grains per cubic foot to bring it to the point of saturation, or dew point. It has been observed that, when the atmosphere is saturated with vapor and about to deposit dew, sounds can beheard at a great distance; whereas when it is devoid of moisture or far removed from the dew point,sounds can be heard but short distances; in other
words, the ability of the atmosphere to transmit sounds is directly as its proximity to the point of saturation. The following case will illustrate: On a certain occasion the puffing or exhaust steam of a locomotive, in starting a train, was heard distinctly six miles. This occurred in the winter season and on a day when there was neither wind nor sun,and I for it was a dark, hazy morning, just before a misty rain storm. A few days subsequently, the same sound, over the same course, was entirely inaudible at a distance of three quarters of a mile. This, too, was on a cold, cloudy, still day, and the atmosphere must have been devoid of moisture, excited as day in which electrical action could be readily the hand; and it is well known that, in order to excite electrical action, there must be an entire absence of moisture.
This readily accounts for the phenumena of Professor Tyndall. He states that, on a hazy day, his fog horn could be heard twelve miles dead to windward, whereas on a clear warm, sunghiny day, neither horn nor gun could be heard two miles. On the former day, it is evident the atmosphere was
near tbe point of saturation; but on the latter day, the sun near the point of saturation; but on the latter day, the sun
was shining hot. This would raise the temperature of the was shining hot. This would raise the temperature of the
air and remove it from the point of saturation, as it requires a greater amount of water to saturateit at the high tempera ture. "But," he adds, "a cloud obscuring the sun, the sound began to be audible and became louder and louder till sundown, when it had increased fortyfold." It is evident that as the sun became obscured, the atmosphere began to cool, and therefore came nearer the dew point, and in that proportion the sound became more audible.
This theory can be verified by many ordinary observations. For example, it is known that sounds can be heard more readily at night than in the day time; and it is likewise known that the atmosphere is thennearer the dew point. It is also regarded by many that the hearing of nounds a great distance, as the running of trains, is a sign of an approaching storm, and this is only an indication that the atmosphere is becoming saturated with moisture. Violinists are also aware that, when electrical action can be excited, as by stroking the fur of animals, their instruments lack power ;
and that is only an indication that the atmosphere is de void of moisture
Respecting the theory of Professor Osborne Reynolds tha sound is refracted or bent upward under certain conditions,it does not follow that such is the case, because sound is heard more distinctly from an elevated location than from one near he earth. If the observer be in an elevated place, besides the amount of sound passing directly to him, the earth would re flect a large additional volume. That could not be the case i the observer were near the earth, as the reflected sound would be intercepted by objects near the earth. Besides, if sound is refracted similarly to light, by certain varying temperatures, etc., why should light be refracted or bent downward, enabling us to see the sun before it has arisen and sound be, bent upward, as it would seem that similar causes should produce similar effects in both cases?
Professor Osborne Reynolds seems to have pretty clearly demonstrated that sounds can be more readily heard from an elevation than near the ground, and infers that the sound is bent upwards. But suppose, in the place of the sounding body, a loaded shell be placed and exploded. An observer in an elevated position would be much more likely to receive injury than one on the ground, not because the course of the fragments of the shell is bent upward as they radiate from the point of explosion, but because the force of the explosion seems-to be directed more upward than horizontally, on account of the reactionary force of the earth.
Bridgeport, Conn.
F. G. Fowler.

## A Simple Ear Trumpe the Scientific American:

## To the Elditor of the Scientific American:

I am afflicted with deafness, so that I cannot hear a conversation carried on in an ordinary tone of voice. In order to assist my hearing, I have constructed an apparatus which enables ordinarily deaf persons to hear a lecture or a ser mon,or to enjoy a theatrical performance.
The horn is made of paper (two thicknesser) with some
 ornamental paper covering the exterior and interior. It is shaped over a confectioner's
"pyramid mold," of the hight of 18 or 20 inches, and width, a the large end, of about 15 or 16 inches.
At $A$, it is surrounded by a strong brass wire, of which one end is inserted into the upper end of the stand, which has a hole bored in it sufficiently large for the wire to act like a pivot A flexible tube, B, of any desira ble size, is attached to the smal nd of the horn, and ends in mouthpiece of horn or gutta percha, connected with the ear
C is a cross piece with holes bored into each end which en C is a cross piece with holes bored into each end which en
ables one, by turning, to elevate the horn, and D acts as a supporter and also as an elevator if desirable. The rest ex plains itst lf. Asthis simple device is probably nct patentable give it to those unfortunates who are similarly afflicted. Sacramento, Cal.

Join Eitel.

## The Spiral Theory of Phyaical Phenomena.

 To the Editor of the Scientific American:I once saw a juggler take a long cord, fastened at its fur ther end a few feet above the floor, and by quick movement of the other end in his hand produce the appearance of a re volving apiral, having a pitch and diameter which varied a the will of the mover. I then thought and said: That sug ests an explanation of the wave theory of sound and light Just now, in looking over Thambers' Encyclopadia, I came upon the article on sound, and was startled by the appear ance of a diagram of the above described movement in ex planation of the wave theory, but my eager search for an in timation of my screw theory was unrewarded; and I came home to copy the above deacription, and the following outine from a manuscript written a few months ago (although I have a sketch of the theory written in February, 1872); and now present the idea
Briefly, my suppositions are (1) that the ultimate ethe molecules have a constant rotation upon their axes, with po arity; (2) that the intermolecular apaces contain the elastic magnetic fluid; (3) that any disturbance of thoir equilibrium occasions rather an accelerated axial rotation of the mole-
cules with decrease of temperature, or a retarded rotation with increase of temperature: (4) that any change of initia molecular velocities is accompanied by a progreasive rota ion at right angles to the plane of the disturbing impulse (5) that the actual progression is limited to the vicinity of otructed; (6) that the velocity of the helical revolution or progressions, is determined by the impulse, and continues in the same time for the same impulse; (7) that all observed phenomena are manifestations of personal presence and character in effecting the action and interaction of the fluid and the molecules, with and upon the cosmic dust. If hy drogen gas is a metal in particles, there can hardly be an particular objection to the word "dust" as generally de scriptive of co
The formulated suppositions are, as you will observe partly adopted and partly speculative, the theory arising in he described manner several years ago; from that time to this, my desultory reading and observation have often ap read your articles of June 13 on "The New Theory of

Quantivalence," and "Refraction of Sound," I for the hun dredth time thought " my spiral theory makes these point lear; strange that some one does not see it!" When Mr. Proctor was lectaring in this city, I bastily put togethe hese formula to bring them under his notice through one of ar daily papers, but the editor was suddenly called out o wn that morning, and the article slumbered in his drawe everal days past the time when I wished it to appear. I re produce it mainly now, and wish you to notice the coincidence between parts of it and the closing paragraph of your article n quantivalence.
In view of my inexperience as an experimenter, and wan of knowledge as an investigator, I may appear presumptu ous in my suppositions, but I fall back upon my inherited Yankee right to guess, even to the degree of thinking that physical facts generally will be found in accordance with the formula; while I venture particularly to suggest, for in tance, that the string of a musical instrument does not vi. brate, but does gyrate, and that the sound is due the given velocity of rotating helices of proper sized ether molecules appropriate polar relations to the dust, suspended at a uitable temperature in the magnetic fluid. Reed, pipe, and vocal sounds are likewise gyratory, and are perhaps pro uced as wator is twisted by angle of exit and friction on leaving the hydrant faucet; for example, in a flute, the high tones reault from entrance at a proper angle, high velocity amall friction, and exit at a fine pitch of epiral, while the lower tones have different angles, lower velocities, greate friction and exit at a coarser pitch of acrew; the trombone may be similarly explained, the " mouthing" consisting in giving the right twist and size to the rope of air
Put a bright iron screw in rapid revolution, and you will have a striking illustration of the apparent movement of ight in waves and emissions, light thus arising from change in the velocities and other enumerated conditions of he molecules, and of the fluid and dust ; and the phenomena of reflection, refraction, and polarization of light will soon find lear explanations on the spiral theory
The solar spectrum with its Fraunhofer lines may thus be aid to be an untwisting of the ray thread to show its coi ored atrands, which also, being untwisted, throw out the en tangled dust which casts its shadow lines across the field.
The electric current will also be found a helicoid, and the bare statement of this proposition is startling in its sugges ion of many well known analogies which send in spira hrills of quick succeeding sense, and the pleasing thought hat now at last we have the clue long sought.
Whirlwinds and watersponts need only to be mentioned o bring at once the thought of spirals,grand and awful, and waves may readily appear before the mind as formed by early horizontal screws, whose pitch, diameter, asd speed decide if ripples, billows, or great water hills shall in pro ession move.
This given theory embraces the small and great, the gen ral and particular, the seen and unseen; therefore it may be humbly anticipated that the displayed cross section of a cord of light would afford a clear illustration of all aerolitea, asteroids, satellites, planets, suns, and stars, as viewed rom the axis of the rotating helicoid Universe.
W. Storer How.

## Foul Wells.

To the Erditor of the Scientific American
My well, though yielding in general very good water, will ccasionally get foul both to taste and smell. I suppose al wells are liable to the same difficulty. Generally it results from some body, a potato or other vegetable, or (atill worse) an animal substance, which has accidentally found its way into the water. But sometimes no cause is apparent. I use common wood charcoal, which I pound quite fine in a cloth bag and throw into the well-one or two quarts in quantity But this, though efficient, and finally settling to the bottom requires one or two days for the process, and will sometimes requires one or two days for the process, and will sometimes
occasion inconvenience by choking up the valves of a pump connected with the well. If any of your readers practise a better method, I should be grateful for the information.
Being obliged to continue using the water in spite of its ill amell and taste, it occurred to me to boil it for five minutes. This I did at evening, boiling a bucketful for drinking the next day and allowing it to cool over night The result was very satisfactory. The water was deliciousperfectly aweet and pleasant, even without ice.
Englewood, N. J.
J. V. B.

## The Growth of Timber.

To the Elditor of the Scientific American
I send you a small piece from my flagataff, recently rected; before it was trimmed, its diameter was fourteen nches at the base, and its length sixty-six feet.
When you examine the closeness of its concentric rings 63 in three quarters of an inch, you will not be surprised to learn that it was 230 years growing, that is, that it was living in the time of Oli ver Cromwell.
When we consider that the straight and tall growth of the pine depends on its being so crowded by other trees as to have all its foliage grow at the top, while the lower branches die for want of light and air, and that the ground room is insufficient to support roots enough for the growth of much op, we may conclude that the growth of the wood for tall, straight tree must necessarily be very slow, and that many years are required to produce one of much thickness. if, then, such a small tree be two hundred and thirty year old, what must be the age of some used for large masts Cannot some of your correspondents tell of some pine trees 500 or 1,000 years old?
[The concontric circles in the specimen are wonderfully, egular and close. -EDs.]

## sCiEntific and practical information.

## How to KIL Grasshoppers.

Reports of Western railway trains stopped by grasshoppers are apt to be taken by Eastern people as samples of Western humor rather than as statements of actual fact. Similar incredulity was manifested on the other side of the Atlantic, a few days ago, when a telegram came from $\Delta$ gliers telling of the delay of a train from Oran, six hours, for the same cause, namely, the accumulation of grasshoppers on the rails. But it was no joke. The grasshoppers are as great a pest there as lhey are in some parts of the Far West, and just now they threaten the utter destruction of the growing crops over considerable areas.
Many plans have been tried for their suppression, the most successeful, according to a circular of instruction lately issued by General Chanzy to the generals of division and presued by General Chanzy to the generals of division and pro-
fects of Algeria, being that employed in Cyprus. By this fects of Algeria, being that employed in Cyprus. By this
plan the attack is made neither on the egge nor on the fully plan the attack is made neither on the eggs nor on the fully
developed insect, as practised elsewhere, but during the indeveloped insect, as practised elsewhere, but during the in-
termediate or wingless period of their development, a stage beginning about a month after the eggs are hatched, and lasting three or four weeks, during which the "crickets" wander about in compact masses and are easily taken in V shaped traps open to the line of march. The sides of the traps are made with strips of silk a hundred yards long and two or three feet wide firmly attached to poles set in the ground. The bottom edges of these walls of silk are banked with earth so that the crickets cannot crawl under them, and the upper edges are waxed or bordered with oiled silk, which prevents their climbing over. As they have no wings to escape with, they are forced to mass themselves at the apex of the system (as it is called) where they tumble into a trench edged with plates of zinc, which offers no foothold, so that they are effectually trapped. When the trench is full the insectig are covered with earth, and the system is moved on to continue the work of destruction elsewhere Upwards of 7,000 cubic yards of grasshoppers were thus destroyed in Cyprus in a single season. With the conversion of our Western plains into farm lands, it is becoming more and more necessary to combat the grasshopper plague on a grand scale. Our farmers will do well to profit by the experience of the East.
vanilla from pine trees.
There has recently been submitted to the French Academy some small crystals which are the pure aromatic principle of vanilla. These, it is remarkable to note, were extracted from conifers. The cambrium of the latter contains a crystalized glucoside, coniferine, which MM. Tiemann and Haarmann consider represented by the formula $\mathrm{C}^{16} \mathrm{H}^{88} \mathrm{O}^{18}+2 \mathrm{H}^{2} \mathrm{O}$. Submitted to the action of emulsion, the coniferine separates into glucose and a cornponent crystalizing in fine prisms which melt at $163 \cdot 4^{\circ}$ Fab. The latter material is readily soluble in ether, less soluble in alcohol, and insoluble, or nearly so, in water. It contains $\mathrm{C}^{10} \mathrm{H}^{18} \mathrm{O}^{3}$. Under the influence of oxidizing agents, the product of the fermentation undergoes a remarkable change. In warming it with a mixture of potassic bichromate and sulphuric acid, it disengages first ethylic aldehyde, and then an acid substance soluble in water, which may be separated by agitating with ether. By evaporating the latter, star-shaped crystals are obtained which melt at $177 \cdot 8^{\circ}$ Fah., and which are identical with the
aromatic principle of vanilla. The formula is $\mathrm{C}^{8} \mathrm{H}^{8} \mathrm{O}^{3}$, aromatic principle of vanilla. The formula is $\mathrm{C}^{8} \mathrm{H}^{8} \mathrm{O}^{3}$,
which corresponds exactly with that attributed to the aromawhich corresponds exa
tic extract of vanilla.

## NOVEL IMPROVEMENTS IN STEAM BOILERS.

Mr. Charles H. Haswell, a well known engineer of this city, has recently patented a new steam boiler which presents many valuable points of advantage, and which appears to be well worthy of the examination of steam users generally.

- It is hardly possible to enter into the details of the invention without the aid of illustrations. In the improved boiler, the priacipal features consist in inclined tubes, which extend transversely across the boiler and slope from the central flue down to the two side flues. By this arrangement, a transverse area required by the area of grate surface, the area of heating surface, and the volume of the ateam chamber above can all be obtained without prejudice to the hight of the furnace below, and without involving an impracticable length of boiler. The tubes can also be readily removed and re. placed, and the necessary work can be prosecuted within the boiler. A vertical diaphragm is introduced in the return flue, which serves to direct the products of combustion so as to admit of the base of the smoke pipe being located at any portion of the length of the boiler, a matter of great convenienc 3 in the construction of sailing steamers. The smoke conm.itions are arched, and consequently afford the required ogth without bracing.
r. Haswell has also patented another invention relating tu steam boilers having a steam chimney-notably marine boilers-which has for its object to strengthen the boiler and to brace the chimney. It consists in retaining the boiler shell between the outer shell and the inner shell of the steam jacket, and jointing it to the latter instead of catting it out as heretofore. The reclaimed portion is perforated, so as to allow a free circulation of the steam between the boiler proper and the steam chimney. Mr. Haswell is of opinion that the usual removal of this part of the boiler is a cause of weakness, which is obviated by his invention; while, at the same time, he secures increased strength to the chimney and adjacent portions.
Both devicis aeem to us practical and useful, and there is little doubt bit that they will meet in practice with that ready appreciation from steam engineers which is so confidently


## Natural Gas for Puddling.

A novel feature in iron working has been introduced recently by Mesrrs. Rogers \& Bruchfield, of the Siberian Iron Works, Pittsburgh, which consists in the application of gas from a gas well as fuel. Their mill is situated at I,eechburg, Armstrong county, and is devoted to the manufacture of sheet iron. The well is situated on the opposite side of the Kiskiminetas River from the works,and is 1,200 feet deep. The gas is let from the well through steam pipes into a horizontal cylinder, with safety valve near by, and thence across the river to the mill. Here it is fed under the boilers through a horizontal pipe, running longitudinally their entire length, pierced with small holes. A very perfect combustion is secured in this way. It is fed in the puddling and heating furcured in this way. It is fed in the puddling and heating furbridge, but here the combustion is not so perfect, and considorable black smoke is seen issuing from the stacks. An ample supply of gas is furnished by the well, and at a very re gular pressure, which has not been measured, but is thought to be over 30 lbs. The volume of gas used is easily controlled by cocks, and can be adjusted for various purposes with the utmost nicety. "Mr. Rogers estimates that the saving to them in fuel amounts to $\$ 700$ per week and states that they obtain $33 \frac{1}{8}$ per cent more yield from the metal than they did when using coal-at the same time producing an article of very superior quality, on account of the purity of the gas. The firm fe now manufacturing an article of tin plate, which they claim to be equal, if not superior, to any manufactured abroad which they could not do when using coal. The well was bored for oil originally, and had been in existencesome four years when the idea was conceived to utilize its gas in this way, four months ago.
Our readers may remember that on page 370 of our last volume we gave an account of the gas wells of New York State, as presented by Professor Wurtz, who shows that there are three belts of gas wells running across this State. In view of the successful application of natural gas to puddling in Pennaylvania, he suggests a trial boring here. "Think," he says," what a noble thing' may be before us: should we find ourselves able to tap and draw from stores of gas pent up under the Catskill range, conduct this gas to the brink of tide water along the Hudson, and operate therewith upon the magnetities of Orapge and Rockland, Champlain and the Adirondacks. "Making two blades of grass grow where one grew before" would be a feeble figure of speech to ap ply."

## Hygienic Treatment of the Aged

Mr. Habershon, in a clinical lecture at Gay's Hospital, London, referring to the case of an old man, remarked The man died simply from the shock produced by coming out into the cold and fog, which, though only an inconveni ence to us, was sufficient to lead to a fatal result on one whose
circulation had become enfeebled, and whose vital force had so nearly lost its power. I am reminded, by this case, of an instance of longevity communicated to me by a gentleman the other day. His mother, who had died at the age of one hundred and two, during the winter months 'had refused to get up, saying that she was only warm in bed.' I have no doubt that it was owing to this uniform, warm temperature that she lived so long; and I mention the instance as a re commendation for you, when you have to prescribe for old people, to advise that they be kept warm. You should also look carefully after their nourishment. Old people cannot eat large meals; therefore they must take them more fre quently. Many old people will wake up about three or four o'clock in the morning. It is a good plan that they should have some nourishment then; otherwise the interval between
the night and morning meals is too long for their declining strength. It is by care in such minutix that we may prolong the life of the aged.

## The Magnetization of Steel.

If a recently tempered steel needle be introduced into magnetizing bobbin connected with a battery of constan current, battery and bobbin comprising the circait, it ac quires a total determined magnetism at the end of a perio which appears not to exceed that of its introduction. On slowly withdrawing the needle, it is found to retain residua magnetism which, together with the total magnetism, in creases with each repeated introduction until a limit is reached. The needle may be magnetized in the bobbin by three other methods

1. Establishment.-Introduce the needle ; establish the cur ent ; slowly withdraw the needle.
2. Interruption.-With a closed circuit introduce the needle owly ; break the current and withdraw the needle.
3. Instantaneous Charge.-Introduce the needle; establish and break the current; withdraw the needle.
Repetitions of any of these three processes (all things being equal) insure an augmentation of the needle's magnetic moment.

The Largest Locomotive in the World.-A correspon Pent states that the largest locomotive in the world is the "Pennsylvania," on the Philadelphia and Reading Railroad The principal dimensions of this engine are as follows Diameter of cylinders, 20 inches; length of stroke, 26 inches umber of driving wheels, 12 ; diameter of drivers, 4 feet and the weight of the engine alone is 60 tans.

Cement for Caustic Lye Tanks.-The tanks may be formed of plates of heavy spar, the joints being cemented to gether by a mixture of 1 part of finely divided caoutchouc dissolved in 2 parts of turpentine oil, with 4 parts of powdere heary spar added.

Qualitien Most Estimable in the Rose.
A rose, taking all things into consideration, is, perbaps, the most splendid of flowers. Throwing aside the national af ection for our emblem, the rose is appreciated for itself. It has qualities peculiar to itself. It is beautiful, from the mo ment when the color peeps from its green covering, until its flower is complete-handsome in all its stages. Its perfume is unequaled; and whether it be a single bud or bloom in the hand, a bush in the border, a tree on the lawn, or climbing the pillar, or winding around the archway, or covering the front of a house, it is equally admired.
In estimating the various qualities which give value to the rose, we are almost inclined to place that of continual blooming first, even before perfume, although without this a rose loses its great charm; but continuous flowering is of so much importance, the prolonging of the beauties of the garden is so essential, that we think it of more consequence than any othe feature. See a garden, liberally planted with summer roses, in a blaze of beauty in June or July, and it is a second para dise; but what is it before or after that period? The rose trees bereft of adornment are eyesores; they are, in fact, in the way until they bloom again. But see the sameo another garden, judiciously supplied with continuous bloom ing roses of the nature of the common China, and we have them in flower the last of all our favorites. A frost that will kill down dahlias to the ground will only injure the flower of the rose; the budsare acarcoly damaged, and it is not an un common thing to see continuous blooming rotes floweringin a mild autumn up to Christmas; and be it $r$ membered that we have now hundreds of beautiful varitties postessing this valu able quality.
We now come to a quality which is of more impor'anc than it at first seems-namely, thickness of petal. The ad vantages of this are, first, that. wbater. r be th $\rightarrow$ color, it is more dense than it can be in a thin pe‘al ; tu'apart from the
superiority of color, thick petals are $m$ re lasting than thin superiority of color, thick petals are $m$ re lasting than thin
ones, and sun and winds have less effect upon them. A rose ones, and sun and winds have less effect upon them. A rose
with thick petals will remain perfect for days, while thin with thick petals will remain perfect for days, while thin
ones are burnt or shrivelled in a few hours; and we hardly know of a more disagreeable fault than speedy decay. To se the ground strewed with petals in a few hours, and the plants disfigured by the remains of decayed flowers, is very far from pleasant, and this is inevitably the case with thinly petaled oses.
Upon the whole, the qualities of a good rose are-continu ous blonming ; thick,smooth-edged petals ; flowers round,form ing halfor two thirds of a ball, very double and full-faced, very symmetrical and imbricated; wood short-jointed ; color dense that is, whatever its shade be, the color decided ; and, if striped or blotched, the stripes or blotches well defined. -The Farm. er.

At some of the colleges the training of the racing crews is bout as follows:
In the morning an easy walk of an hour's length, at noon a quicker walk of half a hour, and in the afternoon a pull of seven or eight miles, after which comes a bath and a good rubbing down. The system of diet is rather one of proscription than prescription. Certain articles well known to be unwholesome are proscribed. Other things may be eaten. Pas try, tobacco, coffee, pork, and all stimulants are ruled out try, tobacco, coffee. pork, and all stimulants are ruled out.
The crew pulled a plain forward and beck stroke, with no special pretension to style or scientific points, making general y 32 strokes to the minute.

Car Conplers, Draw Bars, and Buffers.
It appears from the discussions of the Car Bailders' Asso ciation that the members are not quite decided as to which of the various devices for couplers, draw bars, and buffers they ought to recommend for general adoption. The subjec is regarded a

Recently Planted Trees and Shrubs in Hot Wea ther.-This is a trying time for young trees. Those that were set this spring, and have appeared to be'doing well thus far, may succumb to the long continued drought and
heat of midsummer. It is safest to mulch all young trees; heat of midsommer. It is safest to mulch all young trees but where this has not been done, all those that show signs
of suffering should be attended to at once. A timely mulchof suffering should be attended to at once. A timely mulch ing may save the tree. It makes but little difference wba from losing its moisture by evaporation. Stones, if most convenient, will answer as well as anything. If the trunk is fully exposed to the sun, it should be protected from in tense heat. A couple of boards, tacked together like a trough and set up againsi the trunk, will farnish the required shade or the trunk may be bound with a hay rope, or be loosely strawed ap as for winter protection.

A correspondent, J. H. aqy: " I consider the Scienti fic American to be an actual necessity in my shop, and I do not intend ever to be witheut it. I have gained more in formation from it than from allother papers and books com bined. I have been a cons:ant reader of it for nearly thirty years, and you may put me down for a life aubscription.'

Charnes Mmrrill \& Sons bave juet comp'eted, for the Lallance and Grosjean Manufacturing Corr par y, of this city, the well known manufacturi rs of stamprd tin ware (klown as French tin ware), the largest drop prens, we blieve, yet wade, it having a hammer and die 36 inches in ian. The base of the drop weighs 6 tuns, and its elovation is about 12 feet

## IMPROVED HAY AND COTTON PRESS.

The invention represented in the annexed engraving is a novel and simple form of hand hay or cotton press, designed to replace the more cumbrous machines usually actuated by horse power. The present device, we are informed, can, if necessary, be operated by one man, and two men can, it is stated, by its aid, bale from six to eight tuns of hay per day

A are toothed bars secured to the lower cross piece of the frame, which pass up through slots in the follower beam, B, and are attached to the upper crosa beam, C . It D are other bars notched outwardly, also passing through a slot in beam, B, and attached to beam C. To their lower ends are pivoted the hand levers, as shown the inner extremities of which work upon the bars, $A$, that by means of work upon the bars, A. so that by means of said Pivod the map Pivoted to the ends of the follower beam, B are stirrups, $E$ and $F$. E passes around the bar A, so as to engage in its teeth, and thus hold th follower against the back pressure of the mate rial being baled. The other stirrup, F, passe around the movable bar, $D$, no that, as the latte is raised by the lever, it will slide through th stirrup; but as the bar is drawn down, its teet will catch in the stirrup, and thus carry the fol lower down with it, so compressing the materia The teeth of bars, A and D , are made larger a the upper end, and gradually become smaller to ward the lower end of the bars, so that the pres is worked with the greatest advantage of lever age where the heaviest resistance is encountered To the follower beam are connected rope which, passing over guide pulleys, carry weight which balance the follower at any dosired point $G$ is a short lever which is pivoted to one of the stirrups. Its inner end is so formed as to strik against the opposite stirrup, E , raising the latte away from the teeth of bar, A. The lower par of stirrup, E , then strikes a stop, H , attached to the follower beam, and is arrested, capsing the lever, G, to raise the stirrup, F, from the teeth o bar, D, in which position lever, stirrup, and stop lock themselves, so that the follower may be readily elevated

As the follower rises, a pin on lever, G, strike a stop, I, on the framework of the press, which disengages the lever and allows the stirrups to drop, ready to take a new hold of the teeth on the bars when the hand levers are again ope rated.
Patented through the Scientific, American Pa tent Agency, April 21, 1874, by Mr. M. Mickel son. For further particulara address the owner of the patent, Mr. O. A. Davis, Ashland, Jackson county Oregon.

## AN IMPROVEMENT IN STEAM PUMPS

The Wright patent double.acting bucket plunger steam pump, an engraving and description of which, not very long ago, appeared in our columns, has recently been made the subjeet of some valuable improvements which will doubtless tend to add considerably to the efficiency of the machine. The points of novelty consist in constructing the apparatu nuch heavier than ever before, a complete set of new pat

terns (nine sizes) having been made for the purpose. Bronze or gun metal has also been substituted for yellow brass, and steel has replaced iron, in portions where the latter metale were formerly employed. By simple medifications the wate valves may be removed from the pump with great readiness.

By the unscrewing of a single nut and the withdrawal of key, which is inserted by hand, the discharge valve and seat may be taken out, thus giving access to the suction valves nderneath. The key above mentioned is not driven in, but work out of place
The valves are simply circular pieces of metal, rubber, or eather, rising on a stem, which is fastened to the valve eats. Thus, should a valve fail, a circular piece of leather


## DAVIS' HAY AND COTTON PRESS

or rubber packing would answer temporarily until something better could be obtained.
Another improvement is in the lower end of the wate lunger, which is now made separate from the remainder of ne cut in them, causing them, it is stated, to wear much longer and more evenly than when divided into several longer and more evenly than when divided into several
pieces, as was necessary in the old style of plunger. The in ide ring also being made thinnest at the cut, greater elastici $y$ is gained.
We give herewith a sectional view of the pump, from which the operation will be readily understood. A is th steam valve, and $B$ the steam cylinder; $C$ is the upper and small portion, and $D$ the lower and large portion of the plunger connected thereto. $E$ is the water cylinder, $F$ the suction valve, and $G$ the discharge valve. $H$ is a hand hol for access to the water valves. I is a passage in the upper end of the water cylinder, through which water is taken in on the down and discharged on the up stroke. $J$ is the ve cuum, and $K$ the air chamber.
The crank shafts, crank, and pin are in one continuous forging. The manufacturers, the Valley Machine Company, of Easthampton, Mass., (who may be addressed for further of Easthampton, Mass., (who may be addressed for further
particulars), inform us that, out of seven hundred pumps of particulars), inform us that, out of seven hundred pumps of
this description now in use, but one failure has taken place and that could only be ascribed to neglect.
The agent for the company in New York is I. H. Shear man, 45 Cortlandt street, where the pump may be examined.

## Microscopical

At a recent meeting of the Royal Microscopical Society Mr. Slack called attention to a slide exhibited under one of the Society's instruments as being a remarkable specimen of Herr Muller's technical skill in mounting. The slide has pho tographed upon it, in an extremely beautiful and perfect man ner, eighty spacea, with the names of diatoms below each and a diatom of corresponding species was mounted in every space. Mr. Slack said he had received specimens on silica solution in the milky condition described by Mr. Read at the last meeting, but was himself unable to detect any particles suspended in it, though some had been detected by ticles suspended in it, though some had been detected thy
Dr. Anthony. Mr. Charles Stewart described and figured on the board the peculiar position of the touch corpuscles in the skin board the peculiar pasition of the touch corpuscles in the skin
of the hand, and he also exhibited and described a section of of the hand, and he also exhibited and described asection
an ascidian, and explained the method of preparation.

## The Hotchkise Marine Log.

The self registering log, made by Captain Truman Hotch kiss, of Stratford, Conn., consists of a sort of clock which is placed on the tafrail or stern of the ebip. A cord is then hrown overboard, to which is attached a small float that ha eathers on its sides like a screw propeller. The feathers csuse the float to revolve with a speed equal to the progress
of the ship, and the float twists the cord which operates the pointers of the clock, and thereby shows at all times, day or night, the exact speed of the vessel in miles per hour, and also adds up and keeps account of the total distance traveled by the ship. We have received a letter from Captain Blakeman, commander of the large steamship Isaac Bell, plying between New York and Richmond, whostates that this log has been for a considerable time in astual use on that steamer, with entire success. He informs us that during six passages between the Highlands of Neversink and Cape Charles, the log indicated substantially the same distance and corresponded in its showing with the government chart. Captain Blakeman considers it a valuable as. sistant and safe guard for navigation, and thinks that no ship, whether steamer or sailing vessel, ought to go to sea without the clock log.

## A NOVEL COOKING STOVE.

The necessity of constantly maintaining a coal fire in a range or cooking stove during hot summer weather, in order to perform the ne cessary culinary operations, is an annoyance which many families would gladly be rid of. A device which avoids the trouble, saves fuel, and, at the same time forme a convenient sub atitute for the rance, is represented in the an stite nexed engrang. Hich in al angeniously heated by a coal oil lamp sufficiently to fulfil all culinary or laundry requirements. When no longer needed, the flame can be extinguished, and the heat, which would otherwise render the kitchen and house uncomfortable, be done away with.
In Fig. 1 is shown the peculiar form of lamp, in which any kind of oil may be used, and which requires no chimney. There is a central air tube between the wicks, and air passages outside of the latter. A suitable air chamber protects the oil from the heat of flame. The arrangement is such that a current of air is brought in contact with the tip of each wick, thereby supplying oxygen and causing, it is thereby supplying oxygen and causing, it is
claimed, a clear and smokeless flame. Means claimed, a clear and smokeless flame. Means
are provided for regulating the size of the latter, and consequently the heat, and also for governing the draft.
A sectional view of the stove will be found in Fig. 2. A is an oven, at side of which is a hot water tank. Heat is applied to the tuben at C. B is a steamer having a perforated bottom.
The inventor claims that the stove will roast $12 \frac{1}{2}$ pounds of meat in two hours and a quarter, and will bake a loaf of bread, 3 pounds in weight, in one hour. It will heat water, steam vegetables, and roast meat at one and the same time. It is claimgd to steam potatoes perfectly in half an hour and, in brief, will do any cooking that can be accomplished

with an ordinary coal stove. There is no smell from the lamp Patent pending through the Scientific American Patent agency. For further particulars regarding aale of rights, etc., address the inventor, Mr. James Iredale, 101 Queen street, Toronto, Canada.

## MORE CURIOUS VEGETATION

We give below descriptions of four curious plants, in which, while proving novelties to the horticulturist, will be found many features of interest to the student of botany. With one exception none are indigenous to this continent, and, so far as we are aware, no specimens of the peculiar species represented are under cultivation in the eastern portion of the United States.
The plant represented in the first engraving-for which, with the other illustrations, we are indebted to the English Garden-is a cycad. It is not a quick grower, but very permanent in its character, quick grower, but very permanent in its character, as are all the other species of similar ferns. Other
species in this group are also very effective when species in this group are also very effective when
well grown, and none more so than the e. horridus, well grown, and none more so than the e. horridus, and one of the most striking of all foliage plants for conservatory decoration. E. Caffer-or, as it is popularly called, Hottentot bread-is another noble plant, forming, as it does, a fine trunk, surmounted by deep green, leathery foliage, which droops or arches gracefully on all sides. There are some good specimens of this in the palm house at Kew, England, and it deserves a place in every collection of warm conservatory plants. Cycads are as invaluable and as deserving of general culture as are the palms themselves, although they are more limited in number. Many come from the Cape district and Natal, or Southern Africa, where they form distinctive features of vegetation.
The odd-looking plant shown in our second illus ration belongs to the genus Dicksonia. They are distinguished by their coriaceous fronds, the sori being situated upon the end of a vein near the margin of the pinnules, and inclosed within a coriaceous two-valved involuare.
The species represented is the $D$. antartica. The stem is both tall and stout, attaining in its native country, we are told, to from 30 to 35 feet in hight, and measuring from 1 to 2 feet in diameter. Upon the summit' of these stately stems is borne a grand crown of dark green, plume-like, somewhat coriaceous fronds, which vary from 3 to 10 or more feet in length. The young fronds are beantifully arched but with length. The young fronds are beantifully arched, but with age they bend or his belo tiful symmetry of this stately plant cannot fail to recommend it to every plant grower. It would appear to be common
mountain gullies and ravines in Tasmania and Australia. mountain gullies and ravines in Tasmania and Australia.
Although the flowers of the stapelias are not merely deAlthough the flowers of the stapelias are not merely de-
void of fragrance, but exhale a repulsively fetid, carrion-like odor, many of them are, nevertheless, beautiful in color and singular in form. There are about ninety species of these plants, all of which are natives of the Cape of Good Hope, with the exception of 8. Europaea, which is found in Spain and Algeria, as well as in South Africa. S. hirsuta minor, of which we give an illustration in Fig. 3, and the allied species emit such a powerful scent of decomposing flesh that the common blow fly is decoived into depositing its eggs among the hairs of the corolla. Its numerous succulent stems are thickly set with quadrangular, conical, ascending branches, forming tufts from 12 to 16 inches in hight. As in the genus cactus, the leaves are very rudimentary, being reduced to insignificant scale-like processes. The flowers are solitary, from two inches to two and a half inches in diameter, and are produced near the bases of the branches. The petals are thick and fleshy, smooth, and greeenish on the under side, very much wrinkled on the upper surface, marked near the base with transverse sinuous lines of purplish brown, and marbled and spotted all over with blotches of sulphur


Fig. 2.-DICKsonia antarctica.
yellow. The bottom of the corolla is concave, circular, and of a parplish brown color in the center, while the edges are marked with yellowish spots. The structure of the stamens is very singular. From the bottom of the corolla rises a sort of cup, nearly pentagonal in shape, the upper part of which is divided into ten narrow strips, five of which are turned in. wards and five out wards. The five inner divisions are straight,
cylindrical, slender, and covered with purplish tabercles. Each of them is again subdivided into two parts, of which the outer one has a thickened apex, and is bent over the pistil; the other, or inner division, is quite straight. The five external primary divisions are of a green color, spotted


Fig. 1.-Encephalartus altensteinil
with purple, are flat and oblong in shape, and forked at the pex. The anthers are of au orange color.
Fig. 4 is a California cypress, described by some authors as a variety of c. Californica grauilis, while others make it a distinct species. It forms a small bushy tree, from 16 to 20 feet high, with numerous spreading branches, and small scale-

like leaves, closely set together, broad at the base and pointed at the apex. It is particularly distinguished by the shape of its cones. These are of a dark brownish color, streaked with lighter lines, each of the four scales bearing, near its apex, horn like projection, nearly half an inch long, whence it de rives its specific name, cornuta. These horns are generally curved at the point, as shown in our engraving, which repre sents the cones in their natural sizg. The tree is a native of the mountains of California, and is a hardy and tolerably or namental subject.

Dog Killing by Electricity.
Whether the slaughtering of scores of dogs by carbonic acid gas, as practiced in this city, is a painless operation to acil gas, as practiced in this city, is a painless operation to
them seems rather questionable from the length of time them seems rather questionable from the length of time
which their struggles continue. A correspondent asks why which their struggles continue. A correspondent asks why
cannot electricity be used? He suggests that, with a powerful cannot electricity be used? He suggests that, with a powerful
battery and a good sized Rhumkorff coil that will give a spark of from twelve to eighteen inches, thirty or forty doge at a time might be killed instantly and painlessly. The wires could be led along the floor connecting with every staple to which the animals are secured. The chain and metal collar would serve to conduct the shock to the body.

Waterproof Sluk Paper.-Silk paper is allowed to floa for a little time on the surface of an aqueons solution o shellac in borax, and then dried in the air. By the admix colored papers are obtained

Korting's Condenser.
We notice that a Mr. Körting has invented and introduced novel condenser, in which the work required to eject th condensed water is performed by its own velocity, instead of the old-fashioned air pump and hot well. The condenser is of the old injector principle, in which the exhaust steam is admitted by various concentric conesaround a stream of falling water. This disposition of part causes the exhaust steam from any cylinder to offe a large surface to the cold water. Condensation is thereby effected, and a very considerable velocity is produced in the descending column of water. This causes a considerable vacuum behind the falling columb. In order to produce the required effect, $i$ column. In order to produce the required effect, it small initial velocity. In M. Körting's arrange ment, the water has a velocity due to a head of 98 feet. The water is pumped up into a tank at tha hight by means of a pump attached to the engine; en that the power required to work this pump must be deducted from the effectire gain of the condenser The advantages of the apparatus are thus summed up.

1st. Its price is not more than from an eighth to a quarter of an ordinary condenser. 2d. There is no need for any foundation, and consequently it is easily applied to existing engines or to new ones. 3d. It works without air pump, which saves the loss of work and the inconvenience of setting up and of ope ration of the latter. 4th. There is nothing to regu late, and, in consequence, it demands no particula care from the attendant. 5th. As there are no mo ving parts (pistons, valves, ttc.), there is no wear, re pairs, or interruption in work. 6th. lts application is espe cially advantageous to small machines, where the inconve nience and the price of an air pump is very great.

## Atmospheric Dust.

M. Vorlet d'Aoust says, in La Nature,that in Mexico de posits of atmospheric dust occur in beds of sumicient thick ness to stamp them as true geological layers. These strata which have frequently formed a puzzle to geologists, ar composed of a yellowish clayey earth, which not only en velopes isolated mountains but forms the flanks and bases of some of the most elevated ranges, such as those of Popo catepetl and Ouzsba. The revetment extends upward to a hight of about 12,000 feet and in its lower portions varies in thickness from 180 to 320 feet
In the midst of the deposit are found blocks if stone and detached fragments which have rolled down the mountain and which have become agglomerated by the dust as if by cement.
The dust is raised by dust storms (remolieros de pulvo), which frequently occar on the Mexico plains. These throw up great clouds to highis of 1,500 and 2,000 feet in the air, often obscuring the sky and changing its blue to a yellowish color. The dust is then blown by wind currents toward th mountains, which act as a barrier and check its further pro

Fig. 4.-CONES OF CUPRESSUS CORNUTA.
gress ; for,once deposited on their slopes, it cannot again rise as the storms take place only on the plains. It is curious to notice that this action of the atmosphere completes a c rcle begun by the water. The latter carries earth from the hills down to the plains, where it is transported back to the mountains by the winds, and so a continual circulation is maintained.

## MEDICAL NOTES. <br> Erysipelas.

Professor D. M. Salazar, of Madrid, repbrts that he has cured eight cases of facial erysipelas in 48 hours by the use of glycerin of borax, without any ill effect following. He applys the solution to the diseased parts with a brush, and applys the covers them with a mask of raw cotton.
In erysipelas in general, tincture of muriate of iron, used internally and locally, has been the chief remedy of late, but it is found not to be proper in all cases. When the redness of the inflamed part is vivid and deep, and there is increased redness of tongue and mucous membranes, the iron tincture is the true remedy. Internally it may be given in doses of from 5 to 20 dropsevery three hours,and outwardly applied from full strength to a dilution of one part to 8 or 10 of water and glycerin. Erysipelas has been cured with veratrum alone, used internally and externally, when the cases were marked by high febrile action and a full pulse. In othercases of the zymotic type, when the cellular tissue is affected, the remedies should be taken from the group o antiseptics. Sulphite of soda is good when the tongue is pallid and dirty. The dose is 10 to 20 grains every four pallid and dirty. The dose is 10 to 20 grains every four In phlegmonous erysipelas, permanganate of potash solution is the best outward application. In these cases the color is purplish or dusky. Carbolated glycerin is also a good dressing. It should not be forgotten that, in erysipelas of children or of adults where the skin is very sensitive, a simple dressing of fresh lard will of cen give the best results.
To conclude the subject of erysipelas, the collector of these notes would mention that he has observed the cause of the disease $t$ wice in himself and two or three times in others, where there was no doubt. That cause was animal fat, either fat fowls or, generally, lard and pork used to excess. It seems that 去he disease is very frequent in the West during winter, hog's fat being eaten there most extensively. Those who have never had the disorder can easily bring it
on by persistence in such diet; and though it will trouble on by persistence in such diet; and though it will trouble
even when it is light, yet, if they try the remedies above even when it is light, yet, if they try the remedies above
mentioned, and especially the lard or bacon fat when the mentioned, and especially the lard or bacon fat when the
complaint ends with a ticklish itching in the palms of the hands and soles of the feet, they will be almost amused. In acute erysipelas, the bane and antidote are one, as a rule.

## Iodide of Petassium.

This chemical is used to a vast extent; but after a thousand prose pœans in its praise, many doubts begin to be expressed as to its value. Some of the best physicians of the old and new schools assert that the iodide is sometimes a failure, and sometimes much worse. The most discriminating doctor of the lot seems to us to be Dr. John M. Scudder. He says: "If your patient has a pallid tongue, especially of a dull leaden color, large, sodden, immobile, you have the in-
dication for the drug, and then it becomes a remedy. If the dication for the drug, and then it becomes a remedy. If the
color of the tongue is deeper than is natural, whether dusky red, purplish, violet, or bright red, if it be contracted, pinched, pointed, dry, then the iodide is contra-indicated, and will probably prove a poison."

Hypodermic Injections.
Subcutaneous or hy podermic injection of medicines, namely injection, by very fine pointed syringes,of liquids into the cellular tissue, form the grand now feature of medical practice. Until recently, these injections have been confined to narcotics or anæsthetics, where they have accomplished their object better than by the old style of dosing or inhaling, but in some cases the amount has proved too great. At this time, the trials of new articles used in this way for a host of diseases would require a volume to give full account of. We condense a few of the more important experiments. Dr. Zülzer, after having used every other medication, without success, in exanthematic typhus, and finding the pulse imperceptible, the extremitios cold, the voice inaudible, etc., employed the ammoniacal tincture of anise in injections, 15 to 30 drops, one injection for each limb. In a few minutes the palse became fuller and stronger, the death-like appear ance and collapsed condition disappeared, and a good number of patients who seemed hopeless owe their life to this
means, not sufficiently used. In some cases it caused little abscesses at the point where the injection had been made, abscesses at the point where the injection had been made,
but these accidents have never had any serious consequences. but these accidents havenever had any serious consequences.
The formula is as follows: Oil of anise, 1 fluid dram; alcoThe formula is as follows: Oil of anise, 1 fluid dram; alco-
hol of $85^{\circ}, 24$ drams; ammonia, 5 fluid drams; mix. This medication is indicated in cholera, grave fevers, and paroxysms, where it will permit one to wait the favorable moment for the administration of quinine. Dr. Hinter strongly recommends a two per cent solution of carbolic acid in water as an injection in all inflammations of the cellular tissue. According to his experience, the results are almost miraculous. He says there are no material impediments to spleen. If he is correct, and a solution of carbolic acid can reach and heal the ulcers in consumption-but it will not do to put entire faith in such a wonder until the experiment has been fully and successfully tried.
Dr. James B. Garrison, of De Witt, Ark., reports a curious case in his own practice, where a man had taken by mistake a large dose of sulphate of morphia. He was unconscious, cold and livid, and the pulse had ceased entirely at the wrist. The Doctor considered the case hopelesis, but still went to work vigorously, causing the pationt to be stripped,
rubbed with dry mustard, then with water, which was rubbed with dry mustard, then with water, which was
poured on head and back, till a very strong decoction of coffee could be prepared; then almost a pint was injected into various parts of the patient's body during an hour, while rabbing with hot flannels and dasi of of cold water were kept up. At the end of the first $b_{1}$ ur his pulse was per
ceptible at the wrist. The hypodermic injections of coffee were continued for two hours, his skin being perforated in every part where it could be done with safety. The friction and cold water lasted four hours, when the patient could
swallow. Then he was made to drink a quart or more of swallow. Then he was made to drink a quart or more of
the strongest coffee; quinine and brandy followed, as his pulse was feeble. Finally the man recovered, and did not complain of soreness from all these punctures. The coffee caused no abscesses.
Hypodermic injections of one or two grains of ergotin every few days have cured varicose veins in pregnant women. The same substance, 10 parts to 100 of water, has cured pro lapsus ani.

## New Method for the Transformation of the Alcohols into Nitric Ether

This process, recently reported by M. Champion, allows of operation at the ordinary temperature and upon considerable quantities of alcohol. It is founded on the reciprocal action of a nitrosulphuric mixture and of sulphuric combinations of the alcohols; and as this action is progressive,but a small quantity of heat is disengaged. It is otherwise necessary to cause the concentration of nitric acid to vary. Thus, for example, for the alcohols derived from the fatty series, butylic amylic, etc., ordinary nitric acid with an excess of sulphuric acid should be employed : in other circumstances, fuming acid should be employed: in other circumstances, fuming
nitric acid ${ }^{\text {at }} 118 \cdot 4^{\circ}$ Fah. The sulphuric combinations of the alcokols are obtained by 2 of acid to 1 of alcohol, care being taken to prevent elevation of temperature and the mixture being left to itself for several hours.
This prozess is possessed of particular interest from its application to the industrial production of nitroglycerin. To glycerin at $30^{\circ}$ B., ordinary sulphuric acid is added, care being taken to keep the heat below $122^{\circ}$ Fah. After cooling the liquid is turned into a light excess of nitrosulphuric acid. Two pounds or so of this mixture can be almost immediately used, without requiring cooling. Although the temperature rises, it in no case gives place, if the operation be properly conducted, to the violent reaction which results from the action of glycerin on the acids, an effect manifesting itself by a sudden increase of temperature and sometimes by ex. plosion. After a time, which varies with the proportions employed, the oily drops appear. If the operation be performed on some few ounces, the temperature remains con stant during several hours. The action continues for twenty hours.

## Alcohol.

As the result of the chemical change which sugar under goes in passing downwards towards a dead, inorganic condition, a substance is produced which has been the cause of more sorrow, crime, and suffering than all other evil agencies
that have afflicted the world. It has caused tens of thousands of murders, and uncounted instances of robbery, theft, arson, incest, and suicide; it has brought misery and want into miliions of households; it has filled almshouses and asylums with wretched victims; it sends a never ending procession of crime-stained men and women to prison and the a substance which awful indictment this is to brisg againal tionship to innocent sugar! Alcohol is not a natural product; it can only result from a spontaneous change which is excited in saccharine liquids under the influence of a ferment. If in the order of things this chemical change had been impossible, the human race would have been saved from shedding tears, the aggregated volume of which bon, hydrogen, and oxygen are permitted to group themselves in a way to form the maddening liquid; and the grea enemy to human happiness confronts us in all our domestic, industrial, and commercial relations. If through disarrangement of Nature's laws, the vinous fermentative process should suddenly cease, and not another drop of any kind of spirituous liquors be produced, no sensible harm would come to any induetrial or art process, and no absolute want matter from the standpoints of the chemist, physician, and artisan, we unhesitatingly declare that the world in its present ad vanced stage has no need of alcohol; it is simply convenient, but not necessary. Why not then make a determined effort to rid the country and the world of the monster? Although alcohol results, as we have said, from apontaneous changes, yet the aid of man is necessary to
form the various liquids containing it into attractive and permanent beverages. The fermentation of the juices of grapes and other fruits produces alcohol; but if let alone Nature will not allow the spirit to remain except for a brief pace of time. Nature abhors not only a vacuum, but mani festly one of her products, for alcohol is so unstable in its attenuated combinations that, if left to itself, it speedily runs down into the harmless form of acetic acid.
If man ceases to interfere in the series of natural changes which saccharine liquids spontaneously undergo, alcohol will not survive long enough to do mischief. Why not then compel the great army of men,engaged in isolating and com pounding the agent, to let it alone? Alcohol is a foison; it acts inharmoniously with vital processes in the aniual or ganism. In its purest and best form, it slowly undermines tissues; in its vile associations, as presented in these modern times. it kills with the certainty and almost with the ra pidity of strychnine and arsenic. We ask again, why not attempt to arrest its production, and thus strike a blow at the root of the evil? There is virtue and moral force hibiting its importation in any form; and there is virtue and moral force enough in most,of if not in all,the States to com
pel legislatures to enact laws prohibiting its manufacture This is the point to which we must, sooner or later, come All the laws ever made, or thatever will bemade, conjoined with all the prayers of all the well intentioned women of the with all the prayers of all the well intentioned women of the
country, will never siop the gnawings of human appetite, or prevent its gratification, so long as rum, whiskey, wine malt liquors, etc., are imported and manafactured under the sanction of law. Alcoholic beverages must cease to exist, before the world will be released from the terrible thraldom which they exercise over buman appetite. In making a remedy for the enormous evils caused by alcohol nothing absurd or impracticable is associated with the sug gestion, and the time is not far distant when the poison will be placed under a ban, as regards its importation and manufacture, which will give a forced emancipation to the tens of thousands of siaves now in subjugation to the monster. Boston Journal of Chemistry.

## Cold Applications to the Neck.

Dr. B. B. Richardson. in the London Medical Times and Gazette, recommends a neck bag of rubber, with a constan stream of cold water through it, as an efficient means of applying cold locally to the neck. He says:
"I have used this method of applying'co'd to the cervical re gion now several times, in pyrexia, with increasing confidence in its usefulness. In a case of apoplectic seizure, with convul. sions, in a lady of middle age to whom I was summoned, I found a temperature of $102^{\circ}$ Fah., with deep unconscious ness, rapid pulsation of the carotids, and intense fullness and tension of the jugular vein. In this extreme instance I had the cervical region enveloped in a bladder of crushed ice, with the result of a fall of temperature to the natural standard in six hours, a quiescent condition of the circulation, and subsidence of all the acute symptoms, so marked in chaiacter that it is, I think, impossible to doubt that cause and effect were in their true place. This patient made a good recovery, and, although I do not attribute the recovery solely to the special remedy now being considered, I am convinced the remedy wa of good service.
Ihad an opportunity of trying the effect of this mode of ap plying cold on myself. I took a feverish catarrb, attended with a rise of animal temperature to $100^{\circ} \mathrm{Fah}$. I had the bag neatly adjusted, and let pass freely through it water, taken simply from the cistern, the temperature of the day being at freezing point. As the water current began to pass over the front part of the neck, with a gentlo presesure which I regulated myself by the stopcock, I felt the \& ffect of the cold regulated myself by the stopcock, I felt the ffect of he cour very deeply, and at first not pleasantly. In three or four
minutes, however, though the skin over the throat was ten minutes, however, though the skin over the throat was ten
degrees lower than on the other parts of body, the sensation degrees lower than on the other parts of body, the sensation
of cold was lost, and ali unpleasantness was gone. Within of cold was lost, and all unpleasantness was gone. Within
a quarter of an hour I was conscious of a general reduction of a quarter of an hour I was conscious of a general reduction of
fever, and of lessened vascular activity. The cold also had a fever, and of lessened vascular activity. The cold also had a
soothing influence, producing desire for sleep. On this fol lowed perspiration, and within two hours a reduction of the temperature to the national standard.
These effects were satisfactory, because no other mode of reatment was employed to complicate the experience.
I shall look out with interest for the results of the observations of other practitioners on this method of reducing pyrexia. It stands on a good physiological basis; I believe its practical worth is clear; and I would that its usefulness were tested by the independen

## I wou

I would urge on those who may study the effect of cold, more or less extreme, applied to the cervical region, to observe the influence it exerts, in different classes of cases upon the heart If I am correct that it reduces the action of the heart, and if I am also correct in the view that it promotes a tendency to sleep, this remedy, so simple, will prove useful in many oth er forms of disease than acute pyrexia. In acute mania, in cases of insomnia, in cases of palpitation and cardiac irrita bility, it deserves the test of esperience."

## A Good Education.

The late Edward Everett condensed into a single brief fara graph his estimation of what constituted a good education. Here it is: "To read the English language well, to write with dispatch a neat, legible hand, and be master of the first four rules of arithmetic, 80 as to dispose of at once, with accuracy, every question of figures which comes up in practice-I call this a good education. And if you add the ability to write pure, grammatical English, I regard it as an excellent educa tion. These are the tools. You can do mach with them, but you are hopeless without them. They are the foundation; and unless you begin with these, not with flashy attainments, a little geology, and all other ologies and osophies, are osten tatious rubbish."

Explorations have recently been made into the mounds of Ottumwa,Iowa. In one, a mass of charcoal, a bed of ashes, and some calcined human bones were found, showing that cremation was practiced by the people who erected them. As Indians never burn their dead, this adds another proof to the theory that they were not the original mound builders. The similarity of the mounds of Mexico and of Iowa point to the fact that they were constructed by the same race of an cient Mexicans.
A paragraph is goitg about the papers that the larges room in the world under a sivgle roof, unbroken by pillars or other obstructions, is at St. Petersburgh, in Russia, an is 650 feet long and 150 feet wide. It is said to be used for military display. The Grand Central Depot, in this city, is 800 feet long by 240 wide, covering about 4 acres; the roof " "supported by the aide walls.

## A PETROLEUM MOTOR.

An Austrian inventor has recently constructed the device represented in the annexed engraving, consisting of a petroleum engine, the principle of which is analogous to that of single acting steam engines, with the difference, however, that the expansive force of steam in the latter is replaced by the explosion of the finely divided oil. The Revue Industrielle says that the invention has been applied to sewing machines with considerable success. Although purporting to be an Austrian invention, we believe that it is nothing more than a poor copy of the petroleum engine invented by George B. Brayton of Boston, Mass., patented here in 1871-2 and now in successful operation in this country.
At the rear of the cylinder, A, are three valves. in the center is covered with a finely perforated nozzle and allows of the entrance into the cylinder of the cil from a receiver, B. The valve opening on the left allows of the penetration of a flame, C , at the proper moment, said Hame being driven through the orifice by air pressure as hereafter described. The effect of the flame meeting the oil in a finely divided state is an explosion, which shuts thetwo valves
and at the same time drives the piston ahead. and at the same time drives the piston ahead.
To the latter is hinged the connecting rod. The crank skaft, G, carries at one end a fly wheel and at the other a common pulley. The fly wheel has a cam, $H$, which at every revolution strikes against a lever, $F$, which communicates a pressure to an india rubber air bag, $E$. The current thus produced is led by tube, $D$, to the gas or petroleum flame, C, which is thus for an instant elongated and driven into the cylinder as above noted. The petroleum is introduced into the cylinder by atmospheric pressure, into the cylinder by atmospheric pressure,
through a vacuum being formed in rear of the through a vacuum being formed in rear of the
advancing piston. The return stroke of, the udvancing piston. The return stroke of, the
latter is caused by the inertia of the fly wheel.
latter is caused by the inertia of the fy wheel.
The cylinder is jacketed, and is kopt cool by the circulation of water through the intermediate space, forced by pump, J, from a reservoir, L. The governor, shown on the cylinder, connects in the ordinary way with the crank shaft; and by means of a combination of levers, governs the time of entrance of the petroleum. The smoke produced by the combustion of the latter escapes by the third valve before referred to, and into a chimney. The movement of the valve is governed by an eccentric on the crank shaft. The engine has been made of three horse power and is said to work quite cheaply.

## The Use of Petroleum Benzin for Exhausting

 Oleoresinous Drugs.*Many uses have been discovered for petroleum benzin since it became an article of commerce; and though but recently brought to notice, its applications, from thinning white lead to purifying rare alkaloids, from dissolving india rub ber to removing grease from a silk dress, have secured for this product of Mother Earth a name and a place not to be de spised.
The immense and overgrown development of the petroleum interest has tended to reduce the price of benzin to very low figure; the common unpurified article is a drug in the market ; and although efforts are constantly made to fit it for illuminating purposes, a means of rendering it free from liability to explode and to cause fearful accidents is yet to be discovered.
The purified benzin commands a much better price, is put to finer uses, and should alone be used for solvent purposes in pharmacy; the common article is unfit for any purposes in a preparation, for it will be sure, from its offensive odor, to leave its tracks in it.
The first requirement, in answering the query: What merit has petroleum benzin as a solvent for the extraction of oleoresinous drugs, like buchu, chenopodium, etc. ?: was believed to be to secure a good benzin. This was readiiy done, and an article having the specific gravity of 0.642 was obtained, which on being tested proved to be free from objectionable impurities, and no odor was left on a clean sheet of paper when a small portion was poured on it, and suffered to evaporate.
Eight ounces of finely powdered buchu leaves wore taken, and firmly packed in a Squibb's glass percolator, with the siphon arrangement. It was found to be best, however, to substitute the rubber lid for one made of wood, the wooden lid having a groove cut in the under surface to fit the rim of the percolator; and at the bottom of the groove, a rubber band made the joint airtight.
After allowing the powder to macerate for four days, the siphon was started, and the percolate, very dense and highly charged with extractive matter, came over, at first slowly, and afterwards rapidly; after two pints had paseed, the buchu seemed to be exhausted, and so great had been the solvent power of the menstraum, so far as the chlorophyll and other coloring matters were concerned, that the residue looked as if it had been bleached.
The fercolate was allowed to evaporate spontaneously, and the amount of oleoresinous extract obtained weighed 305 grains. This, at first sight, was supposed to contain all the active properties of the drug; and in order to test it, five grains were swallowed in a little water by the writer, producing, however, but little diuresis; the dose wasincreased to ten grains, which had but moderate effect.
Taking the dose of fluid extract of buchuat a fluid drachm and granting that, one flaid ounce of the extract represents

[^0]one ounce of the drug, it can be readily be seen, by a simple calculation, that, if the benzin had fully extracted the virtues of the buchu, five grains of the oleoresinous extract obtained would produce the same effect as a fluid drachm of the fluid extract, while ten grains would be a large dose.

This fact suggested that, although the buchu had every ap pearance of being thoroughly exhausted, it might yield som activity to alcohol, and it was then percolated with stronger al cohol, and a dense, dark colored liquid obtained, possessing a bitter taste and considerable odor.
Ten grains of this liquid produced active diuresis, and the writer has no hesitation in asserting that he believes alcoho to be much the better solvent for buchu.
Various other experiments with other drugs are now pro-


## A PETROLEUM MOTOR.

gressing, but sufficient progress has been made to justify th assertion that the uses of benzin in this direction are cir cumscribed; the principal objections to its use being inflam mability and great volatility ; it requires the use of apparatus not always at the command of all pharmasists; the odor is objectionable generally, and in many cases could not be toleratod by a weak stomach. A continuance of this subject was re quested, in order to obtain further information with other plants.-Joseph P. Remington.

Medical Value of Asparagus and Celery.
A medical correspondent of an English journal says that he advantages of asparagus are not sufficiently appreciated by those who suffer with rheumatism and gout. Slight case of rheumatism are cured in a few days by feeding on this delicious esculent ; and more cbronic cases are much relieved, es pecially if the patient avoids all acids, whether in food or everage. The Jerusalem artichokehas also a similar effect in relieving rheumatism. The heads may be eaten in the usual way; but tea made from the leaves of the stalk, and drank three or four times a day, is a certain remedy,though not equal y agreeable.
So the English paper says. It may be well to remark that most plants which grow naturally near the sea coast contain more or less iodine, and in all rheumatic complaints iodine bas long been a favorite remedy. One who was long in the drug business told the writer some years ago that many the popular patent nostrums which some disinterested peo-
ple-"for the good of their fellow creatures"-sold at two ple-" for the good of their fellow creatures"-sold at two
dollars a bottle, consisted simply of a few cents' worth of io dine in solution.
Iodine is dangerous, however, in overdoses, affecting espe cially the eyes. The same effect may be produced by eating bundantly of asparagus or celery, which are well known sea side plants. If these have no effect, the patentspecifies wil have none, and in that case a conscientious and intelligen physician is the best resort.

## The Microscopic Examination of Well Water.

 The author has sought an expeditious method of determining the quality of drinking water, and recommends the use of the microscope in detecting salts in solution by their crystalline form. For this purpose, a few drops of the water under ex amination are evaporated on a slip of glass either at a high or low temperature, and the forms of crystals obtained are compared with those of known salts, dissolved in water and recompared with those of known salts, alssived in water and rewith dispatch and certainty, common salt, calc spar, gypsum, etc., and to a certain extent the relative quantities pres ent.
## Sausages Colored by Aniline.

Aniline red is used to impart to rausages a fresh and healthy appearance. It can easily be detected by the use of alcohol or ether, either of which substances dissolves aniline, but not blood. The use of aniline red is severely reprehensible, not only from the fact that it is known to have caused the illness of entire families who have eaten meat colored with it, but also because, from ite mode of preparation, it frequently con tains arsenic, and must, therfore, act as a poison.

Ice is now selling in New York city at $\$ 20$ a tun retail. This high price is alleged by the deslers to be necessary on account of the slim supply obtained lsat winter. The estimated cost of producing ice by machinery is $\$ 3$ a tun. There is evidently a wide margin for profit and a good opportunity for inventors to bring out effective ice-making machines.

New Method of Coloring Metals.
Metals may be colored quickly and cheaply by forming on their surface a coating of a thin film of a sulphide. In five minutes brass articles may be coated with any color, varying rom gold to copper red, then to carmine, dark red, and from ight aniline blue to a blue white, like sulphide of lead, and t last a reddish white, according to the thickness of the coat, which depends on the length of time the metal remains in the solution used. The colors possess a very good luster and if the articles to be colored have been previously tho roughly cleaned by means of acids and alkalies, they adhere so firmly that they may be operated upon by the polishing steel.
To prepare the solution, dissolve $1 \frac{1}{2}$ ounces of hyposulphite of soda in 1 pound of water, and add $1 \frac{1}{2}$ ounce of acetate of lead dissolved in $\frac{1}{2}$ pound of water. When this clear solution is heated to from $190^{\circ}$ to $210^{\circ}$ Fah., it decomposes slowly and precipitates sulphide of lead in brown flakes If metal be now present, a part of thesulphide of lead is deposited thereon, and, according to the thickness of the deposited sulphide of lead, the above colors are produced. To prod uce an even coloring, the articles must be evenly heated. Iron treated with this solution takes a steel blue color; zinc, a brown color; in the case of copper objects the first gold color does not appear ; lead and zinc are entirely indifferent.
If, instead of the acetate of lead, an equal weight of sulphuric acid is added to the hyposulphite of soda, and the process carried on as before, the brass is covered with a very beaut ful red, which is followed by a green (which is not in the first mentioned scale of colors), and changes finally to a splendid brown with green and red iris glitter. This last is a very durabl coating, and may find special attention in manufactures, especially as some of the others are not very permanent.
Very beautifulmarble designs can be produced by using a lead solution, thickened with gum tragacanth, on brase which has been heated to $210^{\circ}$ Fah., and is afterward treated by the usual solution of sulphide of lead. The solution may be used everal times.

## Biack Leading of Iron.

In these days of general diffusion of chemical knowledge it is scarcely necessary to state that the "black lead" or "plumbago" of commerce is not lead at all, or any com pound of lead, that it includes no lead whatever in its com position. Neither is it a carburet of iron, as is sometimes tated. It is simply carbon; pure plumbago is pure carbon, mpure plumbago is impure carbon. Its proper name i grapbite, that is, writing stone. I may venture to describe it as the softest of all true solids, and have often pondered wonderingly upon the apparently unnoticed, but very curious chemico-mechanical, paradox that the hardest and softest of all the solids existing upon this earth are, chemi cally speaking, the same substance: graphite and the dia mond, being both carbon.
It is this wonderful softness, combined with persisten solidity, that enables us to smear it over any other solid surface, and thus obtain a solid paint, all body and no me dium. For the class of castings to which it is commonly ap plied, where its application can be readily repeated, and where it is not exposed to the direct action of water, it is unrivaled as a protecting film to iron. Its chemical action, so far as it does act when cold, is reducing or anti-oxidising so far as it does act when cold, is reaucing or anti-oxidising.
Its color and tone are so similar to iron that Mr. Ruekin Its color and tone are so similar to iron that Mr. Ruekin
himself could scarcely make any æsthetic objections to its use, and the film is so marvellously thin that it obliterate nothing. I have never met with any attempt to estimate the thickness of a well brushed film of graphite, but I suspec that, if a hundred strata of such films could be piled in con tact with each other, their combined thickness would fall short of that of the thinnest gold leaf.-W. Mattieu Wil. liams.

The Magic of an Auctioneer's Advertisement.
The Building News, London, is responsible for the follow ng:-An English country gentleman recently became tired of his house. and determined to sell it. He instructed an uctioneer, famous for his descriptive powers, to advertise it in the papers for private sale, but to conceal the location, tell ing persons to apply at his office. In a fow days the gentle man happened to see the advertisement, was pleased with the account of the place, showed it to his wife, and the two con cluded it was just what they wanted, and that they would secure it at once. So he went to the office of the auctioneer and told him the place he had advertised was such a one a he desired, and he would purchase it. The auctioneer burst into a laugh, and told him that that was the description of his own house, where he was then living. He read the advertisement again, pondered over the "grassy slopes," "beautiful vistas," " smooth lawn," etc., and broke out, "Is it possible? Well, make out my bill for advertising and ex penses, for, by George, I wouldn't sell the place now for three times what it cost me."

Hot Filitering.-The apparatus coneists of a tube of sof sheet lead which can be wound around the funnel containing the filter in the form of a spiral. One end of the tube passe through a cork in the neck of a fask, in which water, or other hquid of higher boiling point, is boiled; the other end dipe into a receiver into which the condensed liquid flowa.

Final Test and Opening of the St. Louis Bridze.
The final test of the strength of the St. Louis bridge wa made on the 2 d of July, under the supervision of Capt. J. B Eads, the chief enginear. He was assisted by Cul. Henry Flad, Oscar Scheultze, Messrs. Klemm, Varrelman, Shhmidt Cooper, and Devon, with ten assistants, and Mr. Schale Schmidt, of the Baltimore Bridga Company. Col. H. B. Car rington, United States Army, Professor of Dynamic Ensi neoring at Wabash College, was also present, and expressed his satisfaction at the result of the tests. At a given signa there were fourteen locomotives ready to obey the command of Capt. Eads and Col. Flad andicheir assistants. At abou 10 o'clock seven locomotives, crowded with people on pilot, cak, and tender, moved in a body, coupled together, and ascended the approach; and when arriving on the two 56 feet spans over Front street and the levee, east of the abutment pier, they halted, and by a signal notified the other caravan of seven iron horses to come up to the rack; and they followed up, and the test was begun in earnest.
The following is Capt. Ead's sunimary of the result of tests made upon the Illinois and St. Louis bridge with four teen locomotives

Soven locomotives were placed upon one track of each span. This produced a deflection of 21 inches on center span and $2 \frac{8}{8}$ inches on each side span. Seven locomotives were then placed on each traci of the west approach, and
both trains of locomotives, fourteen in all, were moved out both trains of locomotives, fourteen in all, were moved out
out abreast and simultaneously over each one of the three spans. The locomotives weighed from 35 to $\tilde{51}$ tuns, averaging 40 tuns each, making 560 tuns in all. The two trains thus formed were stopped on each span, and the effects of this load carefully noted. Thedeflection of the midcle span was $2 \frac{1}{2}$ incbes; of each side span, 3 inches. The two trains moving abreast upon each arch was the severest possible test to produce distortion of the curve of each arch. Ten locomotives were then coupled together, and these were run over each track on each eide of each arch of the entire bridge, covering the entire track of each span, and throwing the whole weight of the train, 400 tuns, on one side of each span. This test was applied to each side of the bridge, and produced the severest twisting s'rain to which each arch can be subjected. The vertical deflection produced by this test on the center span was $t$ wo and one half inches. The locomotives thus coupled were run at a speed of ten miles per hour. The local traffic on the upper roadway of the bridge was uninterrupted during the progress of the tests. Various other observations in detail were made, noting the effects of the load on the arches as it entered upon and left the different spans, but this posserses no special interest to the general public. The result of the tests agreed almost exactly with the theoretical computations previously made, and the whole trial proved eminently satisfactory. The instruments failed to dstect any side motion whatever during the tests." The river is spanned by three arches, of which the central arch has a span of 520 feet, the other two of 502 feet each. The arches are composed of cast steel, and the bridge is really a double structure, consisting of two arches placed side by side. The arches are made of steel tubes, each
twelve feet in length. twelve feet in length.
The formal opening of the bridge was celebrated on the 4th of July, with great enthusiasm. The display was finer than ever before witnessed at St. Louis. The procession
was five hours in passing a given point. Addresses were was five hours in pasaing a given point. Addresses were
made by Mayor Brow, ex-Senator Gratz Brown, Governor made by Mayor Brow, ex-Senator Gratz Brown, Governo
Woodson of Missouri, and Governor Beveredge of Illinois.

## Contraction of Tyres.

M. L. Merlet proposes the following method of reducing the inner diameter of a tyre which has been unduly enlarged by the hammer or the rolls, so that it cannot be put on when hot in the usual manner. The plan consists of heating it to redness, and then plunging it horizontally but only to balf its breadth in water, and leavingit there till quite cold. The operation is then repeated in the same position, after which the tyre is turned over and the heatings and plungings applied to the other bali of the ring. The firat cooling produces a contraction of which thehalf notimmersed partakes, and thus undergoes a molecular retraction resulting in a reduction of diameter; of course the same is produced in the other balf during the second operation. In this way a tiro has been reduced 7 in 895 . Four immersionsinstead of two will double the shrinking. In the same manner, a ring of Bessemer steel, which had not only enlarged under the hammer but had also become conical in form in the interior, was brought to the exact diameter by means of heating and immersing thirteen times successively, first the side that was contracted, and afterwards that which had become enlarged. In this case the correction amounted to nearly four inchee, but the diameter of the steel ring is not given.

## The Wear of Car Axles

The standard car axle journals are $3 \frac{9}{4}$ inches in diameter by 7 inches long. The old style was $3 \frac{1}{4} \times 5 \frac{1}{2}$.
The sapariority of the standard axle is illustrated by Mr. C. E. Garey as follows: "Two pairs of wheels,one with 7x3 journals, and the other with $6 \frac{1}{2} \times 3 \frac{1}{2}$ journals, were left under the car in constant service, when I found it necessary to remove the wheeld, as they were worn out, having run 65,734 miles. On examination, I found that the large journals had been worn off $\frac{1}{32}$ of an inch in diameter and $\frac{1}{8}$ in length, but were perfectly straight, smootb, and equal in size, while of the smaller ones, namely, $6 \frac{1}{2} \times 3 \frac{1}{2}$, one was worn off $\frac{1}{16}$ in diameter and the other a little leas, and both were amaller in the center than at the shoulders; while the lateral wear was the same as that of the large jourrala. 1 find ky experiment
that bearings on $5 \frac{1}{2} \times 34$ journals will ran from 30,000 to 35,000 miles, while the standard bearings, judging from the past twelve montha' experience, will run with safety 100,00 miles or more, and with much less liability of heating, as we ave several cars running with standard axles, and have not had a hot box. These experiments were made with New Yorkand Harlem Railroad baggage car No. 10."

From 57 to 86 Miles an Hour by Rail.-Fast time wa ecently made by the " newspaper train," which left Jersey city nearly half an hour behind time, and made it all up be ore reaching Trenton. This distance-a fraction less than 57 miles-was run in 59 minutes, including a stoppage of ver a minute at Newark and a moderation of speed at New Brunswick. There were some portions where the speed was more than a mile and a quarter a minute. Just beyond New Brunswick, five miles were run in three and one half min utes, which is at the rate of nearly 86 miles an hour. About a dozen passengers enjoyed this extraordinary ride.

The Production of Precious Metals on the Pacific Sope reached, during the last quarter of a century $\$ 1,583,644,934$, of which California mines produced three fourthe, nearly all of which lat.ter was in gold. The amoun obtained is now increasing yearly. parily from the opening of new mines, but cbiefly from the introduction of improved methods of extracting the precious metals from the ores The yitld of the Pacific Slope, last year, was $\$ 80,287,436$ against $\$ 70,236,914$ in 1872 . The increase is mostly in sil er, a much more useful metal than gold, except for coinage.

## NEW BOOKS AND PUBLICATIONS

Earthwork Mensuration, on tife Basis of the Pris MOHDAL Formula, containing a Sinmple and Labor-Saving
Method of Obtaining Prismoidal Contents Directly from End Areas. By Conway K. Howard, Civil Engineer 23 Murray and $\stackrel{2}{ } 7$ Warren streets.
The autbor of this book has developed a new system of finding the con teuts of earthwork by prismoldal mensuration, and accompanied the treatise with tables and rules of application of admirable simplicity, so that
any one who can approxtmate cubic contents by the rough method of rage areas caz obtaina more exact result by the use of the method of
and ere given
efort of the Board of Officers on Gatling Guns of Large Caliber for flank Defense. Ordnance Mem oranda, No. 17. Washington: Government Printing Office
Gatling guu are fully accounts of very many tritalsare given, and the results, illustrated by target
diagrams, once more prove the terrible destructiveness of the weapon, and one more prove the termble derruchlo

A New Metiod of Amalgamating the Precious Metals, By Jchn Tunbridge. Newark, N. J.: Pierson, Brother \& Co , 188 Market street.
Mr. Tuabridge is an expert in metallargy, several of whose communicatons have appeared in our columns, and we refer our many readers who

The Electro-Astronomical atlas. By Rev. J. W. Spoor e Electro-Astronomical atlas. By Rev. J. W. Spoor,
A.M. Illustrated. Price $\$ 2$. Rochester, N. Y. The object of the author of thls work has been to present the elementary principles of astronomy in a simple, popular form, as readily comprehensi-
ble by children as the ordinary primary text books on geography. We think that his efforts have betn attended with excellent success. The vo-
lume before us is beautifully illustrated, written in a clear, conclse style, lume before us is beaatifully illustrated, written in a clear, conclse style, in questions and answers, and presents the newest and most authentic
information regarding the sclence. The diagrams are unusually complete information regarding the sclence. The diagrams are unusually complete
and accurate, one exhibiting, at a single view, the entire solar system while the other fllustrations, original and selected, some of which plates are colored, are well calculated to convey correct tdeas of the sclence of

## zecent Gurericay and forciqu teatents.

Stlles E. Maxon, Long Branch, N. J.-The pulley case is cast in one plece
Sd ts made oval, to fit in the oval end of a mortise. The lower end made concave to fit the fastening screw, which is tapered and has a smal beveled head to arrest it when it comes tlush to the stlle of the frame; also
to secure the lower end of the case. The screw being tapered, its thread will be pressed into the wood by the case when it comesinto position, so as to insure its holding firmly.

spring pulley (around which is Me.- The strap that relates to mounting icker stick) on a crotched stand having a slotted base to adapt it to be secured to a screm stud in a vertcal or horizontal position. It also relatea
to the means of securing the strap to the pulley case by a hook fastened fin the slut in the face of the pulley oy its bent portion and the straight exten sion, sald extension betig pressed in between the two coils of the spring, and kept in place by them. This arrangement allows of readily putting in he hook and
dily replaced.
Improved Watch Regulator.
Joseph W. Hurd, Grand Crossing. IIl.-The objest of this invention is to screw, so as to vary the hair spring, and consequently the running of the watch, in the most delicate and precise manner.

## Improved Apple Crib.

James M. Chaplin, Mlddleport, N. Y. - Гhls is an improved apple house or crib for use in the orchard, for the purpose of keeping or storing apples therenn as they are plcked from the trees untll they are to be sorted and
barreled for market. Hitherto it has been the custon with orchardists to barreled for market. Hitherto it has been the custon with orchardists barrels. In the latter case, the apples will sweat, mold, and mildeew, and, therefore, not keep as well, so that considerable loss is caused in both
cases. The present invention consists of a crib constructed of a rated cases. The present invention consists of a crib constructed of a raleed
bottom with detachable ends, and intermedate cross scections, and adjustbottom with detachable ends, and intermediate cross sections, and adjust-
able sides covered by a roof, the whole belng connected in suitable manable sldes covered by a roof, the whole betng connected
her, so as to be readily put up and stored away after use.

Improved Toy.
Mortimer C. Lee, New York city.-This is a toy cart with a figure of a horse's head and neck (one or more) attached to the axle thereof, propelled line changes the direction. and the effect is very similar to that of gulding a live horse, which makes the toy exceedingly interesting to the juvenile

## Improved Heating Apparatus

Gustavas Stevens, East Tawas, Mch.-This invention consists in a new ar from outdoors by means of a bellows actuated by a large clock gearing. and of forcting the same through heating colls enclosed In a cyllnder. Said cylinder is provided with a flue in its center, up which passes the flame of
a large lamp, by means of whioh the colls are heated, and is aloo enclosed in a large lamp, by means of whioh the colls are heated, and is aloo enclosed in
an cuter case which may contaln elther water or air. By means of this rrangement the airin a room is maintuined at a uniform temperature and a constant ventilation secured.
Jacob Haisb, De Kalb, Improved Fence. ence rall spirally twisted and provided with spikes excised from the body hereof, and turned on opposite sides; also in a fence post made of two
closely joined metallic rods bent outward at corresponding points near the closely joined metallic rods bent outward at corresponding
base.
Improved Hay and straw Cutter.
Improved Hay and Straw Cutter.
John A. Corutsh, Marshfield, Mo. This invention consists in improvite bay and straw cutters oy the epplication thereto of a grinding plate that takesup the wear on the knife as fast as it occurs, a pecullarsupport for the
cutter blade, and also novel means for operating the feed rolls. Thes. cutter blade, and also novel means for operating the feed rolls. Theso
cause the machine to operate with lees labor and to cut the hay or straw ause the machine to operate with le
more unfformly than is usually done.

Improved Piston Paching.
Stlllman E.Chubbuck and Isaac Y. Chubbuck, Boston, Mass.-This Inven ag, with the spring pressers that hold the cut rigg in place at thetr prope exansion, non-radial hub arms and overlapping ring st uds to prevent late 1 displacement, and also in the pecultar construction of the heads of prlng pressers, so that they may act at right angles to one ring and exer oint with each other belng thus held perfectly steamtight againgt plston cylinder.

Improved Circular Saw Planing Knife. Joseph r. Tunis, St. Mlchael's, Ma.-This invention consistsin a new aud
mproved method of planng down the kerf upon sawn matetial during
the operation of sawing, by inserting in grooved holes near the circumference of the saw detachable planing knives having symmetrical sldes aid projecting alternately on opposite sides of the saw just far euough to plan
down the kerf without wasting the material, the said kulves belug nade Wn the kerf without wasting the materlal, the sald knives belug mad one edge becomes dull or blunted.

## Improved Bed Lounge.

Frank Johnson, Omaha, Neb.-The seat is hinged at the front part. Th head part is hiuged to an inclined head plece of the lounge frame, and is to be swung in an out ward direction like the seat. The inside of lounge frame and seat are provided with sultable mattresses, the cushioned head and sea
betng at the under side when the lounge is used as a bed, and thereby no xposed to rapld wearing out. The hinged section is provided with folding legs. The face board Is detachable, andhas to be taken off when the loung isg. Tolded Into a bed. It closes the open part between the seat and frame nd is armly applited to lugswhich enter recesses, and pass along extensio grooves by sliding a board sidewife toward the head of the lounge. retain
ing it itrmly thereon till detached by ilding it in opposite direction fo opening the lounge. The lounge is quickly and easily changed into a bed and vice versa.
Improved Binder Attachment for Harvesters.
Wills Wheelock, Decorah, Iowa, assignor of one half hls tight to wil 'am T. Baker, same place. -This is an automatic rakling attachment fo arvesters, so constructed as to collect the cut grain into a gavel and ralse It to the binders' table. Sultable construction enables the binder to equalize the gavels by allowing the rake to operate only when a proper amount
of cut grand has fallen upoa the platform. The rake stands still for a shor time at each end of the platform and then moves across the plat form tn stralght line, sweeping the cut grain before it. As the ruke head moves back its forward part ts ratsed out of the falling grain. The forward par of the rake head, while sweeping the grain before it, is kept from risting,
To the inner edge of the platform Is pivoted an apron, which is connevted with the spring so as to be lowered as the spring is forced down by the ad vanctng rake, and allow the gavel to pass to the recetver. As the raks ead rises to return, the apron is raised by the spring to prevent the grati fromfal
gavel.
Improved Carriage Wrench.
Willour F. Rowe, Minneapolis, Minn.-The object of this invention is to Wilbur F. Rowe, Minneapolis, Minn.-The object of this invention is to
provide, for the removing and replacing of the axie nut of carrisRes, an improved wreneh by which the same can be done without soiling the finger
or letting the nut come in contact with dirt. A carriage wrench sildes on or letting the nut come in contact with dirt. A carriage wrench sildes on
the shank of an axle nut socket. The shank is partly polygonal, partly round.and is provided with a button or knob. by which the nut and socket may be turned, whille the starting or tinishing turns of the nut are given by the lever part of the wrench.

Improved Burial Case.
Jacob H. Forshay, Ne the lid may be applled and taken offin a few minutes without difficulty, the connection being made by fastening clamps which are provided with taper ing grooves, and placed over the dovetailed wedge strips at the sides and
ends of the body and cover of the case. The aijoining parts of the body and cover are provided with interlocking grooves and tooth shaped projec rectangular extension recesses, into whtch correspondIng contInuous strip of rubber are applied. By placlng the cover on the body of the case, the apexes of the projections embed themselves tightly into the rubber lining and form thereby a perfect and
Improved Mode of Connecting Pitmen to Fly Wheels. James M. G. Mouck, Drakevine, Iowa.-A wheel has curved arms, on ment of a pltman, by means of a wrist ptn which passes through the end of a bar that is plvoted to the rim of the wheel, and is clamped in any ad Justment by a screw nut. The slot is constructed upon a curve of a c:rcl
whose radius is the pivot of the bar. The object of the latter is to compen whose radius is the pivot of the bar. The object of the latter is to compen-
sateforthe loss, and prevent the breaklug or giving way of the slotted sateforthe loss, and prevent the breaklog or giving way of the slitted
arm, andalso to overbalance the wheel on one side, so that it has n) deat center.
Improved Toy Gun.
John c. Todd, Toronto, Can.-Thts invention consists of a disb-shaped plece of suttable material, provided with a groove along the circumference in which, by sultable fasteningi, an elastic band is placed. A dlametrical perforation of the disk serves as a gulde chamber for the dart, the disk
betng provided at one end thereof with a segmental recess for easily taklug beng provided at one end thereof with a segmental recess for easily taking
hold of the end of the dart and the clastic band, and thus, by suddenly extending and then freetng the latter, sending out the projectile.

## Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]
From June 12 to June Coobing, etc., by Liquid Fésl.-J. h. Thorp, New York city Courpound Engine.-W. Baxter, Jr., Newark, N. J. Distililing Extracts.-F. Walton et al., New York city Driss Patterns - E. Butterick \& Co., New York city Fire arm band Hook. - E. Gaylord, Chicopee, Mass. Making Ice, ric.-C. P. N. Weatterby (of New York city), London, Eng. Oxidizing Anthracene.-C. Rumpif, New York city, et al.
Protiction from Fire, btc.-J. A. Coleman. Providence, r. Protecition from Fire, etc.-J. A. Coleman. Providence,
RAILTAY CAB SPRLNGB. J. S. Barney, New York city, et al. Sewine Machine attachment.-J. J. Thompson, Goshen, n. y. Spire Machinery. -N. Tay, Medford, Masb.


## Fusiness aud eerwouak.

For Sale-The patent for the American For Sale-The patent for the American
school Back-board Rubber, not yetissued. Work light,
proftis large. Sample and particulars, by mail post paid, profts large. Sample and particulars, by mall post pald,
on recetpt of 25c. Joseph B. Walker, Inventor, Louison receipt or ventucky.
For 2d hand Boilers, \&c., see Logan's adv't No Keys, Key-seats, Set-screws, Bolts, or
Pins used in fastening the Taper-sleeve Belt-Pulley. Holds firmly; can't be thrown ort of balance; easily
moved; can't injure shafting. One pulley sent on trial moved; can't injure shafting. One pulley sent on trial
to any part of the U. S. See last issue Sclenulic American. Address A. B. Conk \& Co., Erie, Pa.
For Sale-One new side wheel Steamboat,
50 feet long-one propeller (new), 25 feet long, by S. E. Harthan, worcester, Mass.
The Pickering Governor, Portland, Conn. Tuck's Patent Piston Packing. Address
(futta Percha \& nubber M ${ }^{\prime} \mathrm{l}$ 'g Co.," 26 Warren St , N. $\mathbf{Y}$. Cobalt and Nickel Salts, and Anodes, the
best coating for all metals, with instructions for Elec-tro-plating. Chromlum negative plates for batterles,
three cents per square inch, and batteries for all purposes; the best known for power and const
Beardslee, 122 Plymouth St., Brooklyn, N. Y
Beardslee, 122 Plymouth St., Brooklyn, N. Y.
Portable Engines 2 d hand, thoroughly over-
nauled,at $\%$ Cost. I. H.Shearman, 45 Cortlandt St.,N.Y. The Haskins Machine Co. Boilers are all Babbitt Metals-For the very best, send to
Conard \& Murray, Iron and Brass Founders, 30th and Chestnut Sts., Philadelphta, Pa. Write for Circulars.
For Small sizes of Screw Cutting Engine Mechanical Expert in Patent Cases. T. D.
Stetson, 23 Murray St., New York. Sure cure for Slipping Belts-Sutton's pat-
ent Pulley Cover is warranted to do double the work ent Pulley Cover is warranted to do double the work
before the belt will silp See Scl. Am. June $2115 t$, 883 ,
P. s89.eCurculars free. J. W. Sution, 9 si Luberty st.. N.Y. Linseed Oil Presses and Machinery for
Sale. Perfect order. Very cheap. Wright \& Lawther, Gas and Water Pipe, Wrought Iron.
for price list to Balley, Farrell \& Co ., Pittsburgh, Pa. Forges-(Fan Blast), Portable and Station-
ary. Eeystone Portable Forge Co., Phlladelpha, Pa. Boilers and Engines, Eecond Hand. Egbert
P. Watson, 42 clift St. New York. Taft's Portable Baths. Address Portable
Bath Co., 156 South Street, New York clty. For Surface Planers, small size, and for
Box Corner Grooving, Machines, send to A. Davis, Low-
ell, Mass.
For economical Vertical Steam Fngines, go
to the Hasking Macnine Co., 46 Cortlandt St., New York. The "Scientific American" Office, New York, Is fitted with the Miniature Electric Telegraph. By
touching little buttons on the desks of the managers,
signals are sent to persons in the various departments signals are sent to persons in the various departments
of tho establifhment. Cheap and effective. Splendid for shops, offlees, dwellings. Works for any distance.
Prite *5. F. C. Beach \& Co., 263 Broadway, New York,

All Fruit-can Tools,Ferracute,Bridgeton,N.J. Brown's Coalyard Quarry \& Contractor's Ap-
paratus for hotsting and conveying materials by iron cable. W. D. Andrews \& Bro., 414 Water St., New York. For Solid Emery Wheels and Machinery, Lathes, Planers, Drills, Milling and Index
Machines. Geo. S. Lincoln \& Co., Bartord, Conn. For Solid Wrought-iron Beams, etc., see ad-
vertisement. Address Untou Iron M111s, Pittsburgh, Pa., or lithograph, etc.
Hydraulic Presses and Jacks, new and sec-
ond hand. E. Lyon, 470 Grand Street, New York. Peck's Patent Drop Press. For circulars,
address millo, Peck \& Co., New Haven, Conn Small Tools and Gear Wheels for Models.
List free. Goodnow \& Wightman,23 Cornh11, Boston,Ms. The French Files of Limet \& Co. are pro-
nounced superior to all other brands by ail who use them. Dectded excellence and moderate cost have made
these goods popular. Homer Foot \& Co., Sole Agents or Amertca, 20 Platt Street. New York.
Mining, Wrecking, Pumping, Drainage, or
Irrigating Machinery, for sale or rent. See advertisement. Andrew's Patent, inside page.
Automatic Wire Rope R. R. conveys Coal
Ore tre mithout Trestle Work. No. 34 Dey street, N.Y Automatic Wire Rope R. R. Conveys Coal
ore \&c.. Without Trestle Work. No. S4 Dey street, N.
A F. Havens Lights Towns, Factories, HoA F. Havens Lights Towns, Factories, Ho-
tels Beat Philadelphia Oak Belting and Monitor
stitched. C. W. Arny, Manufacturer, 301 \& 303 Cherry St.. Philadelphia, Pa. Send for circular.
Temples \& Oilcans. Draper, Hopedale, Mass Dean's Steam Pumps, for all purposes; Engines, Boilers, Iron and Wood Working Machinery ot
all descriptions. W. L. Chase \& Co., 93, 95, 97 Liberty Hand Fire Engines, Life and Force Pumps
for fire and all other purposes. Address Rumsey \& Co., for frea and all other purposes. Address Rumsey \& Co.,
Seneca Falls, N. Y.. S . S . A.
Pattern Letters and Figures, to put on pat-
terns of castings,all sizes. H.W. $\mathrm{Knight,Seneca}$ Falls,N. Diamonds and Carbon turned and shaped
for sclentific curposes ; also, Glaziers Diamonds manuBuy Boult's Paneling, Moulding, and Dove-
ailling Machine. Send for circular and sample of work.

## B. C. Mach'y Co., Battle Creek, Mich.. Box 2 h.

Engines, Boilers, Pumps, Portable Engines
Machinists Tools.I..H. Shearman, 45 Cortlandt St., N.Y. For best Presses, Dies and Fruit Can Tools,
Bliss \& Willame. cor.of Plymouth \& Jay, Brooklyn,N.Y. Iron Roofing-Scott \& Ce., Cincinnati, Ohio. Price only three dollars-The Tom Thumb
Electric Telegraph. A compact working Telegraph apparatus, for sending messages, making magnets, the
electric light Can be put in operation by any lad. Includes battery, key and wires. Neatly packed and sent to all parts of
the worid on recelpt of price. F. C. Beach \& Co., 263 Rue's "Little Giant" Injectors, Cheapest
and Best Botler Feeder in the market. W. L. Cnsse

 cipe for a good emement for leather on p. 119 , vol. $28 .-$
C. M. C. can repalr his rubber bladder by follow ing the

 machne for tndicating burled gold, silver. or other
treasure.-P. \& F B B are in formed that the tenie
 equation. -A . S . will find anexplanation of the revo VIng Wheel question on p . 27 , vol. $23 . \mathrm{T}$. W. W. S .,
qutres as to len eee and teleccopes, has omitted
 steel on p. 21, vol. 31.-C. B. L. L. will find recipes for
aquartum cement on p. 244. vol. so.- P. H. C. will find L. A. G. asks: Can you give me a good an
 Wlde and deep, 1 Inling bottom and stdes with a 4 nch
brick wail laying toebricks in mortar of sand and fire clag (in equal quantitites, mixed) with an arch on top, of
Ainch brick. A. A ciltern built in this manner would not stand; a a \&ide wall 4 tnches thlek and 10 feet high, if
bull tin a straight line, would be thrown down by the pressure of the earth on the exterior when the cistern is empty. A better wasy liqto bulld 1 ctircular , say of twen.
t -two feet dameter, erect a brick pillar in the center of two feet diameter, ana then throw the arch from the
pillar to the exterior wall.extending around in a clrcle ; In whtch case the span will be ongy ten feet, and the
outside wall will resist the pressure of the anth crown should be some distance down from the surface of the ground, In order that the sides of the arch may
be properly loaded. But even in thls case it will be bet. ter to lay the bottom in two courses of brick, one on G. C. R. asks how to remove ink stains
from paper? A. Try a solution of chloride of llme in water.
W. A. D. asks: 1 . Is there such a metal as
 In the manufacture of cheap Jewelry. 2. Will 1 t wear
equally as well as gold with the same care?
$\Delta$. We can



J. H. C. asks: 1. What would be the result
it the star Arcturus should strike the earth? A. The ir the star Arcturus should strike the earth? A. The
earth, as an earth, would probably be destroyed. 2. Can yourgre $m$ a a recipe for ar ararish for canvas which will
not be affected by the heat of the sun, or make the eannot be affected by the heat of the sun, or make the ean-
vas anff? A . We know of no varnish that will answer

 the cloth peellng off. A. Gum tragacanth might be used.
2. I also
WIfh to varnat h the glazed surface. What kind 2. I I Iaso wifh to rarnlsh the glazed surface. What kInd
of rarnish can be used? $I$ have tred white dammar varnish, and it does not dry. A. Mastic will probably
W. S. V. says: Can you tell me what the
nclosed substance is?
It was found floating in the wa terin large quantittes near Montauk, L. I., last sum. mer. Fire and actdo seem to have no particular effect
on it. Itried aclds, hot and cold, and left tit in a coos
 ittle more brittle than this spectmen which I send, bro. ken from the same spectmen before tring it. This
spectmen has not been tested. t . melts before the blow. pipe with hoda. A. It consists of a silliceous skeleton
which loses a certain amount of organtc matter on ig. nitlon. Distributed through the mase are particles of sand. It 18 likewise 1 mpregnated with salline matiers.
It appears to be the debris of marine organisms com. pacted together by the action of the waves.
D. O. C. asks: 1. How many ounces of blood
will gailon of rich fresh cow's mill make?
A. No ellable cemputation nas been made. 2. How can
祭ake the common sulphur match? I make the common sulphur match? A. Take phes,
phorus 4 parts, water 10 parts, fne $\operatorname{glue} 6$ parts, red ocher
 Water, and convert by a gentle heat into a smooth jelly;
putit into a allghtly warm porcel ain mortar tollqueff;
 the ocher or lead, and lastly the smalt, unt11 the whole
forms a uniform paste. The sulp hur match should be dipped into the mixture in the usual way.
W. J. S. asks: 1 . Which is the best way to
eexulste the temperature of an Incubator by means of balanced valves? I have tried to work them Dy mercury In a bottle, and a float up the neck connecting with the
valve but the mercury does not expand enough to mork it. A. A. Lenthen your tube of mercury ard the ere.
sult will probabily he more gatisfactory. 2 . What are eat thetr eg all. I think that they do not find enough lime in their
food to make shell. A. Take $\begin{aligned} & \text { quantity of bones, burn }\end{aligned}$ ood to mare shell. A. Take a quantlty of bones, burn
and pulverize them, and mix with the feed ; this will
B. T. A. asks: 1. Do candy manufacturers.
ase polsonous articles tin the coloring of candes?
A. thas been stated on goci authority that nearly A . the candy manufactured contains, in the form of color. tng matter and otherwise, really polsonous matter, and
this sis princtpally in what is called French confection. teas) adulterated in this country? A. Yes, but to a some arat limited extent. 3.II beet sug. Ar manuractured
to such an extent In the United States as to be called to such a nextent in the United States as to be called an artlcle of commerce? A. The manufacture of beet
sugarin this country is as yet comparatively in its in fancy, but It prom sees much. 4:Are there any manafac.
torites ot strup by tories of sirup by a chemical process, with murlatic or other accld, out of old rags, etc.? A. For many years chemstat have made sugar In the laboratory in ths way
as a curiosity, but we know of no onc who makes a business of manufacturing girap by this method. 5. Is it probable that an expert can invariably tell (by a de-

O. N. asks: Is not the grass left on lawn
cutby lawnmowers injurious io the lawns? Whereve

 1 s probably due to the a a mosphere of gases, heat, ete.
 A. asks: How can I make a cheap micros-
cone? A. Every convex len 3 it in the cope? A. Every convex lens is in itself a microscope,
the only difference between it and the lareer orco pound instrument ts that, Instead of viewing the tra Pormed 1 mage, a second and still more powerful lens ti
used, which recelves the 1 mage and stull further magnt used, whith recelves the tmage and stlll further magn-
feest. The cost of microsconesis due to the neceesary extreme perfection of the lenses use
 ture In your cellar will be to provide yourself with a
thermometer, a glass tumbler flled with water, and
and
 ture begtins to show itsele on the outside of the vessel
of cold water. The lower the temperature to which the hermometer has to sink before moisture is prectipita M.M. asks: In refiting the bearings of an plate in the right position to the bed plate? The tace four 1sthe head are to be Babbitted, as your questio indicates. set the lathe head in position by placiuga
parallel bar of iron between the centers of the lathe and apply a large square to the rod and the face plate

 of the poppet gitnille to the bed, and then mark them
Iddeways by menas of a suane placed across the fuce of the bed of the lathe, pliciog the edfe of the square
exactly even to the bearing of lathe bed wherta the exthe head fits. Or, in the latter case, you mas use the lathe head its. Or, in the latter case. you mas ase the
old drasses as a gulde for marking the new onfe, making
such allowances as practice or the lathe demonstrates to be necessary
W. S. W. asks: What is the principle of Bude lamp nvented by Be jamin Tixompson (Count
Rumford)? A. The Bude lamp te an argand lamp. through the center of the burner of which a current of pure oxy gen gas is passed,
the orilliancy of the flame
A. N. H. says: 1 . In plating with nickel, it it
sometimes chlps oft. What is the cuuse acd liow can remedy it? A. Extremn eare should be taken to tho
 perly prepared, you will prohably find no further trou
ole. 2 How ti the solution kept always neutral? A By keeping sufticient surfacee of the anode exposed in the solution. 3. How is ivory dyed bluc? By keeping
the ivory Immersed in a duate golution of sulphate of Indigo, parily saturated with potash, for some time.
W. B. V. says: Parties selling gasoline burners sell also a formula or rectipe for preparing the
gasoline, to render it fafer:


 No burning oilsare safe except those of high spectif
W. F. W. asks: Will a band saw take the
 of ship tim. ins, vol. 29.
 orms of this Instrument; the most usual consists of is deduced from the nnmber of turns made in a a 1 iven time. which 18 measured by an end less screw and wheel
work. 2 . How Work. 2. How can Iprepare paper which wwill be discol.
ored at any polnt by the smple pasaze of a moderate ored at any potnt by the simple passage of a moderate
current of electrictty through it?
A. Soak the paper
 you glive me a recine for making lemon sugar that will
not injure the health? A. Ure tartaric acld and pow. red sugarin the propotton of une to tor J. J. H. asks: Can you give me a good and (moderately fine powder, dried) 22 troy ozs., water and alconol each. 1 ptrt t; dinteded alochol sumicicent quant1.
ty. Macerate tne oplum for three days with the water ty. Macerate the opplum for three days with the water
with frequent agitation, then add the alcohol and con tinuc maceration for three days more. Introduce the mixture into a percolator, and, when liquid has cease
to pass, pour the diluted alcohol upon it unt11 2 pint have been obtained.
W. W. asks: What is the length of 8 cen-
 form (the type belng evenly planeed and impression
screws being evcnly adjusted). I Ret an impression ou screws being ercnly adjusted), I get an Impression ou only one side of the form, and the same 18 true when I
undertaks to print a small address card. 18 there a undertake to print a smailaderest ard. Th there a
simple method by which I can ascertain if the plate is perfectly parallel with the platen? A. The fact that
your form your form gives an Impresion on one side only is proof
that the platen is not set parallel with the bed, and the ault can only lie in the aduastment serews of the plat. en. The maker of the press can undoubtedly supply
ou witt a a age to set the platen, but proper adu uatment of the platen screws will (If the fraces of the ebed and
platen are true seet them perfectly parallel to eacho Daten are true) set them pert
and glve an even Impresion.
T. D. asks: Is there any market for sumac
 of this sarub, some of which are used tn tanning and dyeing, and some in medicine. It is used also Instead
of galls in the manufacture of ink. Rhus wine 18 also made from this. The market for it 1 s very llmited, and the eupply exceeds the demand.
G. M. asks: Is there any such thing as
 Descriptions of several such monsters were ancten, 1 ly
published, but sir
Bumphres Dasy


A San Francisco gentleman says (in com-
entiog on our reply to
it. M., moo asked :" Which 18 the healthlest State tin the Unton?" in which we sald:
That State in whlch the greatest rezard 18 pald to rellThat State in which the greatest regard 18 patd to reli
glone law, and education. In respect to p pissical adran. Tagees, most are in the iret rank): ". You bigoted asse日, A. Our correspondent will peruee for his enlighten.
ment he death rates of mindsters of the Gospel, of Qua. kers and of communittes professedly following a rell
 A. J. S. asks: Does the wind ever change
directil from the east to the north, or does it alwuys go around by fouth and west to the north? A. The wind may change from the east to the north, orfrom east
south and thus to the west. If it follows the latter course, the clearting of the weather 18 regarded as per-
manent. If it changes from east to oorth, the weather is regarded as uncerta1n.
W. H. W. .asks: To what uses is verdigris
aplled? A. Verdigris in in 1 Impure state is much used asa green plg
to medectine.
N. H. says, in reply to a correspondent who
asked how to take the drrt off a machninst's hanas, some

J. S.K. says: I cured a rusty tea kettle as
 my nst and slacked it in the tea kettle that evenng,
alling tue kette full of water and letting it stand on the erarin stove the next morning I emptled the lime used durling the day as usuali: at nipht the lume water
was poured bayk iato the kette and warmed, and the next morming agaln poured out, and so repeated, the next nigat making three nights in all, and that tealettle
wus cured : It has not shown symptom of rust in the watersince. l limpate that.
empted and let open to dry.
$\underset{\text { asked for }}{\text { C. Resplanatuon oif ". ierked" }}$
 by the Guachos and others to this day. The native name
for to s charqui, and charqui heef in English speech very Pon and easll, became "jerked" beef.
P. D. R. says that the spoon and tumbler experiment can be tried with the same tumbler ny irst
trying the tumbler with the spoon in tit, and then. If the

 F. C. R. says that poke root (phytolacca dle-
(andra), silicea thtu and laid about a house, will deatrog cockr
falls.
 placed you tin a dilcemma from which you might be ex.
rricated by trylng first the spoon tn the tumblerand ricited by trylng frrt the gpoon in the tumbler and
then pouring in the hot water: and if the glas did not break, then try the tumbler alone. If it broke, then
and out the resson why. This spoon and tumbler bualhess is an nnstance of how remarksbly prone men are to
toke up half an Idea without trying to fnd out the take up hair an deea without trying to thd out the
princlple tivolved. Why does hot water break a tumberat all? Answer: Because the glass heated at one
place expands too rapldy for the unbeated part and preaks. But If you atake a poon, or ang ththng else, and
prevent the sudden heatitg of the bottom of the tum.


Minerals, etc.-Specimens have been received irom the following correspondenta, and examined with the results stated:
A. says: Enclosed is a specimen of what seems to be
one rose growling out of the center of another there one rose growting out of the center of another. There
is another example of the same on the same bush. $A$ This abnormal rose is not of a character sumfelentiy undaual to rank t among monarosites. The eecond rose the second flower is found upon a shoot issuing from below the calyx. This is sometimes noticeable among
rhododendrons.-F. M. -One specimen conelsts of delt. cate crystals of carbonate of copper. The other con sists of a quartzoze rock, stained with sllicate of copper
and containtng a little magnetic oxide of fron $-\boldsymbol{J} . \mathrm{H}$.It is basanite or touchstone. It is a filnty jasper, u
on account of its hardness and black color for try1 he purty of the precious metals. The color lefto the stone after rubbing the metal across it indicates to
the experienced eye the amount of alloy.-M. F. F.the experienced eye the amount of alloy.-M. F. F.-
No. 1 is specular iron ore. No. 2 is blende or sulpbid
of zinc in quartz.-C. H. B.-It is a valety of prown matite, or thehydrated sesquioxide of fron.
 the suction bellows placed in a parlor reed organ? By What mechanism are the pedals kept in an upitight po.
siti on? How is the tremolo fan made, and where is it gren japan in use, or what is the green palnt hat will
tand baking?-G. F. L. asks: Whll some one tell me how to bud rosebusbes i-A. J. afks: How many equare

 met used by divers? How'is the
is fastened to the diver's head?

## communications received.

The Editor of the Scientific American cknowledges, with much pleasure, the reeipt of original papers and contributions upon the following subjects :
On a Boiler Explosion in Michigan. By M. A. K., and by K. P. C

On Electricity and Magnetism. By C. E A On Solar Attraction, etc. By S. W. R.
On an Arrow Head. By C. M. B.
On a Lunar Atmosphere. By W.F. Q.
On Light, considered Metaphysically
D. H. B. Jr

On Early Stermboats. By D. R. P.

Also enquiries and answers from the follow ing:
J.E.-D. E.
epeat themdents whose inquiries fall to appear should repeat them. If not then published, they may conclud
that, for good reasons, the Editor declines them. The addres 8 of the writershould always be given.
to their enquiries about the patentability of their in ventons, etc. Such enquitres will only be answered b Cor, Correspondents who write to ask the address of certa liso those having goods for sale, or who want to find mount sufficlent to cover the cost of publication unde he head of "Business and Personal," which is spectal
devoted to such enquirles.

## Index of Inventions

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Bale te, cotton, McClintock et al.
Balloons, guiding, C. F. McGlashan Barrel heater, A. E. Salisbury. Basket, peach, H. Carpenter (r)
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## candadian patents.

## ist of Patents Granted in Canada

June 10 to $15,1874$.
 regulating the pressure of gas and other fulds, called
"Horne's Press are Regulatorfor Gasand other Fluids." June 10, 1874.
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on a washing machlne, called "R. Flcker 's Washing Maon a washing machine, called "Ricker's Washing Ma-
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bination Tool for shoemakers' Use." June 10, 1874 . 544.-T. Hazard, Wilmingiton, Clinton county, O., U.S.
Extension of No. 2,598, frst period. "Hazard's straw and Hay Cutter." June 10, 1874.
E45.-T.Hazard, Wilmington, Clinton county, O., U. S.
Extension of No. 2,598 second perlod." "Hazard
Extension of No. 2,598, second perlo,
Straw and Hay Cutter." June 11, 1874
Sib.-I. P. Magoon, St. Johnsbury, Caledonia count
Vt., U. S., and H. Fairbanks, same rlace. Relisaue of No. 2,736, for "Magoon's Locomotive Feed Wate Heater." June 15, 1874. U. S. Improvements in portable ranges and cooking
stop Ing Stove." Juae 15, 1874.
3.548.- B. Jefferson, Toronto, York county, Ont. Com
positlon of matter to be used in the min artificial stone or marble, called "Patent Victoria Stone." June 15, 1874.
549.-c. H. Hutchingon,
provements on balanced valves for steam englne csiled "Hutc
June 15, 1874 .
J.
J50.-D. H. Packard, Brockton, Plymouth county, Mass
U.s. .S. Improvemen t on boxes for the toes of boots and shoes,
Improvements in treadles for sewing machines, calle $.552-$ J. Gould, Cllnton, Allegheny county, Pa., U. S. Trap." Trap." Jane 15, 1874.
 cum's Car Coupling." June 15, 1874. .554.-B. T. Babbltt, New York city, U. s. Improve "Babbitt's Prncess for Coating Canstic Alkalles. June 15, 1874.
,555.-B. T. Bab
men
ment in caustic alkall packages, called "Babbitt' . 556. - W. H. Bond, Syracuse, Onondaga county, N. Y
U. S. Impruvements on a not air furnace, call ‘Bond's Hot Atr Furnace." June 15, 1874.
3,557.-J. C. Waterhouse, Sherbrooke, P. Q. Improve ments on sewing machines, ca
ing Machine." June 15, 1874.



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