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## EAMES' AND BROADMEADOW'S MACHINE FOR MOLDING METAL CASTINGS

## maghine for molding metal castings.

The ramming of molds is an operation which not only requires care, but judgment. Care in the venting, in placing the bottom board, in the quality of the sand, is alike essenual, and to this is added the exercise of a judgment which is only attained by long and watchful experience, in ramming hard at one point or soft at another, according to the nature and style of the work to be produced, or in packing the sand with the absolute uniformity, at all points, which becomes necessary in many forms of casting. Ramming, therefore, is almost an art to which a man must educate himself, and certainly not one in which a few days' or a few weeks' practice will render a previously unskilled workman proficient.
It is unneeded here to enter into any discussion regardng the obvious utility of mechanical devices which fulfil the double purpose, of on one hand superseding the fallihility of hand labor by the certain accuracy of the machine, and on the other of saving the time which otherwise would be expended in acquiring the knowledge necessary to perform the work
We have recently returned from a visit to New Britain, Conn., -one of those thriving manufacturing towns of New England which have sprung from the dimensions of small villages almost within memory of the present generationwhere, at the factory of its manufacturers, we devoted some hours to the examination of a machine which excited in our mindsan interest which will doubtless be shared in by every metal worker.
The apparatus, of which we append an excellent engraving, is one for ramming molds, and in construction is extremely simple. There is a carriage composed of. a table,

A, which is supported on segmental wheels, B, the latter resting on ways, C , attached to the main standard. The same ans, $B$, are suitably connected and travel upon the or from the workman at will In the table is an aperture through which works the rod supporting the platen, D The upper end of the rod enters a socket in the bottom of the platen, while its lower extremity receives a projection on the vibrating cross pisce, E . To the right hand end of this cross piece is secured the lever, shown in the hand of the operator, by bearing down on which, as will be evident from the connection of parts, the platen can be raised. By this means, whatever may be placed between the platen and fixed head plate, F, can be compressed as desired An adjusting screw is arranged in the platen connecting rod, by which the length of the same and consequent throw of the lever before pressure begins can be regulated, andthere is also a simple latch by which the table is locked in proper position. The operation of molding consists in first swing ing the table outwards by pushing up the lever and so locking it. Then the match and pattern is laid upon the platen, and above the former, the lower half of the snap flask. Sand is first sifted upon the pattern and subsequently shoveled in until the receptacle is evenly filled. The back
board is then laid on top, the latch lifted, the table swung in and the then laid on top, the latch lifted, the table swong up against the head plate, forcing down the loose sand be neath it. The table is again carried outward ; on the pressure being relaxed, the match is removed, the flask reversed, and the cope adjusted, sand is placed in as before, another board laid above, and the whole brought again under compression. This is the position of the machine as shown in
the engraving. Again the table is swung forward, and on removing the upper board two shallow cavities, made by projections therein, are found in the sand. A hollow metal punch is forced down into these, forming the pouring holes, which, with the subsequent preparing of the mold, are finished in the usual way. The use of sprues by this means is done away with.
This sums up the construction of the machine and its working, and it now remains to point out what it will do Standing in the molding room, watch in hand, we noted the time taken by a first class molder to complete ten molds by the old process of ramming, and then to finish the same number by the aid of the apparatus. The snap flasks were 11 by 13 inches in size, and the castings $4 \frac{1}{2}$ inch iron rim locks. By hand, the ten molds were completed and deposited on the floor in 39 minutes; by the machine, the same work was done in 18 minutes. The hand made molds also were fully one third heavier than those made by the apparatus. A reference to the foreman's books also furnished us with other interesting points. A fair day's work in ramming the molds in the old way for lock castings averaged 163 pounds of metal, against 250 pounds from same patterns by the ma chine. Common butt hinges showed 397 pounds by machine against 260 by hand. The average saving in labor, on all kinds of work, is fully $33 \frac{1}{3}$ per cent. Perhaps more ptriking evidence will be found in the fact that an entirely unskilled workman, on the second day of his attempting the task, completed 110 molds of about the size above noted, and another man on the fourth day made 140 molds. In the casting of small work in brass, such as keys, etc., we were told that 1,752 pieces are made in a day through the machine, against 1,008 pieces through hand labor, the reason given being the possi-
bility of putting a larger number of pieces in a flask, of making more molds, and of getting out much better work. We may add that the specimens of castings exhibited to us, as coming directly from molds thus prepared, appeared fully as sharp and clear as those from the best hand-rammed molds. Nor does the intricacy of the pattern seem to cause any difficulty, as we were shown molds for very irregular blind hinges, and completed castings for bank locks, the latter weighing some 30 pounds each, and of considerable intricacy of form. We also remarked that, through the evenness of the ramming, the waste through imperfect casting of large numbers of keys, hooks, and similar small goods was very small, almost every object coming from the sand true in shape.
Our readers can draw their own conclusions from these simple facts, so that we forbear further comment. We examined the score or more machines which the manufacturers, Messrs. P. \& F. Corbin, of New Britain, Conn., had in use in their factory, noting in every instance the ease and rapidity with which they were handled by the workmen. The amount of pressure to be applied to the lever seems to be the only point requiring practice to judge; but that this knowledge is readily acquired, is proved by the work of the unskilled hands above detailed.
The patent granted to Albert Eames and John P. Broadmeadow, of Bridgeport, Conn., under which the device is manufactured, was extended November 25, 1873, and many essential improvements are covered by another patent dated August 4, 1874. Further particulars may be obtained by addressing the manufacturers as sbove, who are the sole licensees for the sale of the machines.

## Suxntifir Ammitan.

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## Contents :

(Illustrated articles are marked with an asterigi,


## OUR FEVER NESTS AND THEIR REMEDY.

Though blessed by nature with a situation unrivaled for sanitary advantages, New York has a death rate such as few cities in Cbristendom can equal. The appalling mortality of the past summer, especially among children, has given rise to a great amount of sorrow and indignation on the part of the daily prese, and not a little severe criticism of the action of the medical and police authorities, the common theory being that the enforcement of proper sanitary regulations would have prevented the larger part of the needless loss of life. That much might have been done to improve the health of the city by more rigid sanitary measures, there is
no doubt; but it is aseless to expect a Board of Health, however efficient, to achieve impossibilities. The great source of disease and death in the city is the tenement house system, whereby families are massed by the hundred in huge barracks, destitute of light, ventilation, the means of keeping clean-of every appliance, in short, for healthful living; and until wholesome dwellings can be substituted for thes dens of disease, New York must endure the shame of being one of the most unhealthy cities in the world. No other city, in its densest portions, crowds half as many inhabi cants to the acre as can be seen in some of our lower and eastern wards, and nowhere are the dwellings so poorly fit ted for a numerous occapancy. And not only are these huge hives, with narrow halls and lightless sleeping rooms, crowd ed from the roof to the pavement with poverty-stricken fa milies, but underground.in damp, unwholesome basements multitudes find miserable shelter. Says the Children's Physician to one of the largest dispensaries: "An experience dispensary physician can detect a patient who comes from a basement simply by the sense of smell"! Is it any wonder that the deaths of children in such a house number five or six a week? Or that a week of excessive heat may swell the weekly death list of children under five years of age by four or five hundred? About two thousand of these candidates for early death are born in our tenement houses every month.

- With high culture, scientific management, and abundant means, it may be possible for many families to dwell togeth er in health and safety under one roof; but where ignorance poverty, and filthy habits prevail, the massing of families is little short of pestilential. Only by the dispersion of the tenement house population can the now over crowded ward of the city be made tolerable, and the death rate reduced to reasonable limits; and we see no way by which such a desirable result can be effected humanely, save by providing means for carrying the poorer working people to and from country homes more rapidly and cheaply than is possible with surface roads
To some extent it may be necessary to do for this class o the community what Mr. Stewart is doing for the more for tunate in his Garden City (a description of which was given in the Scientific american about a month ago), and that is to build country cottages for them.
The success that has attended the operations of the Arti zans', Laborers', and General Dwellings Company, in providing cheap suburban homes for the working men of the large English cities, is proof that such enterprizes may be profita ble as well as philanthropic.
In connection with the recent inauguration of one of thei villages, the London Times gives a detailed account of the history of this company and of the work it is doing. The new village, called Shaftesbury Park, will illustrate its mode of proceeding. The site embraces forty acres. The founda tion stone was laid in August, 1872 ; and it is expected that by the opening of the coming winter, 749 of the intended 1,200 dwellings will be ready for occupation. The houses are engaged long in advance of their completion, while over 1,200 applications, for houses still to be built, are on the books. The dwellings are of four distinct classes: Class 1 contains eight rooms-a front parlor with bay window backroom for meals, a kitchen with dresser and kitchener, small larder, a scullery fitted with copper and sink, a closet, ash pit, and coal cellar; while on the floor above are thre bed rooms and a bath room. Class 2 are seven roomed houses, without the bath room. Class 3 have six rooms, and class 4 have five rooms, of which two are bed rooms. Gas and water are laid to every house. Ventilators are supplied to each room ; and the drainage (except surface water) is car ried back from the closet and sink in the rear, so that no drain passes under any house. The foundations are of conwith asphalt, and hade treas have be with asphalt, and shade trees have been set out. There i also a temporary lecture hall, now used as a school room School houses will soon be built, and baths and wash house are projected. A site is left for a cöoperative store, and to acres and a half have set apart for park and playground.
The houses have been built, to a great extent, on the coop erative system, the work being let out, under foremen in each branch, to the bricklayers, carpenters, painters, plaster ers, slaters, and plumbers employed, and it is reported, as matter of special satisfaction, that, under the piecework plan which has been adopted throughout, union and non-unio workmen have worked harmoniously together, and there has been no cause for the intervention of the appointed arbitra tors. Many of the workmen are shareholders in the compa ny, and not a few of them livein the houses they have helped to build. The resuls of this arrangement has been unusua care in the finishing of thair work. The houses built by the company, the directors say, are better than those usually erected, yet they can be sold at equally low prices, in conse quence of the materials saved by the workmen, who ar shareholders. It is further claimed that these interested workmen earned, by piecework, forty per cent more than their crdinary wages.
The growth of the company in popular favor is shown by the annual amount of stock taken. At the close of the first year, 1867 , the share capital in hand was only $\$ 2.500$; at the close of the next year it was $\$ 9,000$. In 1869 it rose to $\$ 15,000$. In 1870 it was $\$ 30,000$. In 1871 it increased to $\$ 92,500$. In 1872 it rose to $\$ 260,000$, and at the end of 1873 it was $\$ 560,980$. The last annual dividend was six per cent, and previously they had divided seven and a half per cent. Were our means for cheap and speedy transit equal to those of London, villages like this might be multiplied indefinitely along the Highlands, in Westchester, and on Long Island. The advantage, not only to those who would thus
be enabled to take their families into wholesome air, but to thousands who would of necessity remain within the city imits, would be incalculable.

MEASUREMENT OF A SCREW PROPELLER
A correspondent asks for a rule for measuring the pitch of a screw propeller. The process, though simple, requires con siderable explanation to make it understood, and as the sub ject will doubtless be interesting to many of our readers, we devote some little space to its corsideration. The surface of a screw propeller is the same as would be generated by a line revolving around a cylinder, through the axis of which it passes, and at the same time advancing along the axis. In this way the under or back surfaces of the blades may be upposed to be formed, and then the proper thickness is put n, so as to make the front or entering surfaces. All mea urements of a blade should of course be made on the back urface. It will be evident, from the explanation of the man ner in which the surface of a blade is formed, that by varying the shape of the generating line, or the rate of its motion along the axis, very different forms of blades can be pro duced. The pitch of a screw is the distance the generating line moves in the direction of the axis, while it is making ne revolution around the cylinder. It is evident from this hat the pitch of the screw may be constant throughout, or it t may vary from forward to after part of the blade, or from hub to periphery, according to the. rate of motion of the enerating line in an axial direction, and its angle of inclibation to the axis. Hence in measuring a screw propeller, it will be necessary to determine the pitch at a number of points, for the purpose of ascertaining whether it is variable or constant. Every point in the generating line describes a curve which is called a helix. If measurements are taken along one of these helices, they will show whether the pitch varies from forward to after part of the blade, and measurements on orresponding points of different helices will indicate wheher or not the pitch is constant from hub to periphery. As gencral thing, the hub of a screw propeller is faced off a he ends, and the blades do not overhang a plane paraing hrough this face. If necessary, however, a faced surface can be fitted to the hub, and made thick enough for its plane o clear the blades. Provide a straight edge a little longer han the radius of the propeller, and secure cleats for it, overy foot of its length for large wheels, and from nine to six inches apart for small wheels. These cleats are intendd to serve as guides for a rule, so that measurements can be made with accuracy at right angles to the straight edge. Se cure to the end of the hub a piece of paper on which the enter of the hub is marked, and the circumference is divided nto any number of equal parts. Then place the straight dge on the end of the hub, bringing a mark near $i^{t_{s}}$ end to the center of the hub, and making its direction coi ${ }^{n}$ cide with division of the circumference. Measure the per ${ }^{p}$ endicular distance from the straight edge to the surface of the blade, at each of the cleats; then move the straight edge to coin cide with the next division of the circumference, and again take measurements. The arrangement is represented in the accompanying engraving. the circumference of the hab being

divided into thirty-two equal parts. Suppose that, in the position represented, the measurements from the straigh dge to the blade, taken at each cleat, are each six inches. Then move the straight edge to the next position, and suppose that the measurements are each fourteen inches. This hows that the generatrix, in one thirty-second of a revolu ion, has advanced eight inches in an axial direction, conse quently the pitch is thirty-two times as much, or twenty-one feet and four inches. If measurements taken at successive divisions of the circumference give a successive increase of eight inches for each division, it shows that the propeller is a true screw, with a pitch of twenty-one feet and four inches. Of course, if the pitch varies, it will be shown by the varia tion in the difference of the measurements taken at successive divisions of the circumference. It will be observed that the measurements made at one cleat in different positions of the straight edge give determination for the pitch at different
points of the same helix, and therefore show whether the pitch varies from forward to after part of the blade. The measurements taken at different cleats, in successive positions of the straight edge, show the pitch at corresponding points of different helices, and indicate whether the pitch varies from hub to periphery. The method here described is one of the simplest and most accurate that can be given for determining the pitch of a screw propeller. The other measurements, the diameter of the screw, length of blade, dimensions of hub, and fraction of pitch employed, are so simple as to need no explanation.

## CRIME EPIDEMICS

The discussion of Professor Huxley's views, developing the idea of "conscious mechanism" as explaining the various forms of human action, coupled with that of Dr. Ham mond's theory of " morbid impulse," the kinship of which to the former hypothesis-indeed, the fact that it is but a corollary of the same-we have already pointed out, leads to some curious speculation relative to what extent the con scious machinery of one person may be set in motion, so to
speak, by the activity of that of another individual. In other words, we are led to regard not merely the direct infla ence which one being exerts over another, through sentiments of respect, through intimidation, or through a score of other easily suggested conditions, but that indirect influence which is termed "force of example," that power which impels one man to do as another does, although the compelling cause of, (to illustrate) gain, revenge, or desire to benefit may be totally absent-irrational imitation, if we may use the term.
Abundant instances of this are to be found in the actions of the lower animals-sheep blindly following the bell wether, parrots imitating speech,monkeys repeating motions, and mocking birds sounds, and the inclination of the horse to race, will readily suggest themselves as cases in point. More striking still is the development of the peculiarity in children, shown not only in their learning to talk, but in their every action, even their plays being but endless imitation; and thus we are led up to the faculty in the man, which may impel him, with equal facility, to the commission of every crime in the decalogue, or to the re-writing of somebody else's poetry, after the fashion of the multiple only original authors of "Betsey and I are out," and "Beautiful Snow."
The serious aspect of the phenomena to which we allude, however, is one which those who make a science of the prevention of crime must eventually take into earnest and thoughtful consideration. It certainly is a fact that crime propagates itself by infection as surely as does disease. "There is a large class of minds," says Dr. Charles Elam, in "A Physician"s Problems," on which great crimes exert a A Physicians Problems," on which great crimes exert a
kind of fascination; and these who have never trained themKind of fascination; and these who have never trained them-
selves to exercise the responsibilities of moral freedom ars liable to become victims of the strongest delusions, and catch easily at the moral infection which is always lurking, and sometimes raging, in the atmosphere of the world." Nor need wo seek long for illustration. The prevalence of the species of highway robbery known as garotting, in New Yoris some years since, may be recalled, and the cripe found plenty of imitators throughout the country. Not many months ago, murder appeared to be rife, and hardly a daily journal could be glanced over without the eye encoun. tering horrible details of the killing of some human being. It is a suggestive fact that the last census, compiled when the Ring in this city was in the full tide of its power, and when such a thing as honesty was rarely to be found in the persons of the ruling men, shows a ratio of crime in New York State far ahead of that in any otherState of the Union. Many will recall how common defalcations in banks and other institutions of trust have been during the last year or so, these crimes being, in the majority of cases, committed by men for whose action it was difficult even to assign a motive. Attempted frauds upon insurance companies have also found repeated occurrence of late; cases of suicide have happened, again and again, under conditions strangely similar; and thus we might go on, multiplying example after example,
The cause of this state of the mind, which renders it not only receptive to outside influence, but forces it to act in accordance with the same, is difficult to apprehend. If we attempt to trace a theory in accordance with Huxley's views, we must believe that the particles of brain matter are disarranged slightly by the individual's first impressions of the crime. A second impression causes more disarrangements,
influencing, besides, those faculties which impel us to recoil influencing, besides, those faculties which impel us to recoil
from such subjects-causing a dulling of the sensibilities, from such subjects-causing a dulling of the sensibilities,
or a familiarizing of one with the ghastly details; a third results in a still greater and similar effect, until finally the mechanism between brain and muscle is ret in motion, and the person commits the deed. The theory leads to morbid impulse again, and, besides, to another class of actions, defalcation, which, from the very period of time necessary for their development, preclude the idea of sudden or impul. sive performance. Whether the reader may choose to adopt so material a view as this, or may cling to the opinion that the mental and moral forces of the body are only taken from our self-control by some intrinsically perceptible foreign agent, such as intemperance or connection through evil counsel, and hence flatly deny the primary principle that body and mind may be so constituted as to negative the efforts of the unfortunate person to obey moral and civil law, matters little in the face of the fact that the crime epi-

We must look deeper, in short, for the causes of crime. If society makes murderers and thieves through its example, then should it punish them for its own misdeeds? Is the person who suggests the crime to be the avenger? Is a man menable to punishment because his brain is beyond his conrol, under one theory, or because he has not the moral vigor to repel the crime disease, under the other? How is discrimination to be made, on the other hand, between him who wilfully and maliciously sins, and him who falls through cerebral weakness? If education is a safeguard-and it doubtless is, in great measure-against crime, then if society fails to compel its members to assume that protection, who sbould be punished for the neglect? These are perplexing uestions, posed somewhat at random, it is true, but whic heless the legitimate offspring of psychological fact, which eaves us without a doubt that prevencure. "It is very evisought for rather than means for its cure. "It is very evi-
dent," says the last report of the New York Prison Associaion, now before us, " that society is wrong in its philosophy or practice, most likely in both. For if the theory be wrong, the practice is wrong. It is therefore clear that an intelligent application of remedies makes a knowledge of causes imperative. We have no well defined, accepted theories of the causes, degrees, and penalties for the violation of the civil code. Until we attain a true theory, our work must often blunder and often fail. How much is due to constitu tional organization, and how much to the influence o society, we have failed to determine, because of our ignor ance of causes.'

## THE COMMISSIONERSHIP OF PATENTS.

We learn that General M. D. Leggett, the present Commissioner of Patents, is about to resign the office, and that he is J. M. Thacher

## M. Thacher

Weneral lise country is to lose the services of General Leggetl, who has labored indefatigably, from the hour he took office, to improve the working of the depart ment. For the most part, his labors have been crowned with success.
But some of his rulings and decisions have been variable and peculiar, especially on questions of patentable novelty. At times, he has pronounced the most broad and liberal opinions in respect to the rights of inventors to receive patents, but they have been followed by recantations or reversals of these opinions. For example, in the case of the applicant for a patent for a knitted tobacco pouch, package, or aack, that is to say, merely a section of a stocking leg, he held, on the appeal to him in person from the Board of Appeals, that the Board was in error in deciding adversely to the appli cant, and ordered a patent to issue. He said: "That the sack, for the use contemplated, is a new and superior one is clear, and it is the object of the law to promote the production of new and improved articles, for the use of the public. Very little analogy appears between a stocking or purse and a sack for a tobacco package. The principles controlling the case were clearly stated by Justice Blatchford, in Strong vs. Noble"-whip case. After this clear and excellent decision, the applicant, having omitted payment of the second government fee, was obliged to renew his application, when the examiner again rejected the case, giving a new reference,
similar in character to those previously presented, which had bsen overruled by the Commissioner. But General Leggett instead of maintaining the excellent decision first given, now went back on himself, and denied the patent.
In the case of Professor Hedrick, so long and favorably knuwn as examiner-in-chief of chemical inventions, whose established policy was to grant patents where the case by any possibility admitted of the grant, Commissioner Legget long maintained and approved that policy. But he ha lately gone back on Professor Hedrick, removed him from his original position, and substituted an examiner whose policy in granting patents is diametrically opposed to the practice of Professor $H$. The new examiner has made some very stupid decisions, which, if continued, will be very likely to give so much dissatisfaction as to cause his removal. Both commissioners and examiners at the Patent Office should remember that the chief object of their employment is to grant patents, not to reject them. They should study out every possible way to encourage and assist novelty, however small. This is the true and reliable policy, and the only one that can give permanent or general satisfaction. It is far better to err in favor of the inventor than against him.
Should Mr. Thacher become the Commissioner, as we are led to expect, he will have an opportunity of carrying into practice some of the advanced views by him enunciated in He theress before the Vienna Patent Congress last year ice in the grant of the necessity of the most as in prac that they were to be considered as the simple recognitions of that right of property in the productions of the mind which God Almighty had himself bestowed upon man We hope that, during Mr. Thacher's official term, he will see to it that no narrowminded examincrissuffered to remain
who takes it upon himself to deprive an inventor of hi who takes it upon himself to doprive an inventor of his
heaven-born rights, no matter how small the degree of the nvention.
The foregoing comments upon one branch of Commissioner Leggett's administration are not made by us in any spirit of fault-finding, but simply for the benefit of his successor in office, whoever that person may be. It can be justly said of Commissioner Leggett's administration that, as a whole, it has been a splendid one. He has been an honest and faith-
ful officer. He has inaugurated many noble reforms, and he
will leave the Patent Office in a better condition of efficiency and usefulness than it ever before reached. At another time, we shall take occasion to particularize some of the many excellent improvements that are due to his assiduous production of the mention but two of them, namely, the the patents in popular form. The successful inauguration of this last named enterprize is an honor of which General of this last named enterprize is an honor of which Goneral
Leggett may well be proud, and it will always redound to Leggett may well be proud, and it will always redound to
his credit. It is a benefit to the country, of incalculable his cred
value.
INFLUENCE OF THE PRICE OF COAL ON SHIP BUILDING, Of late years, the competition between steamers and sailing vessels has threatened to end in a losing struggle for existence on the part of the latter. The sudden jump in the price of coal in Great Britain, however, seems to have turned the tide once more in their favor.
The change is specially shown in the ship yards of the Clyde. In 1868, the number of sailing veasels built at this center of the trade was 108, aggregating 79, 346 tuns, against 100 steamers of 87,000 tuns. In 1869, the sailing vessels numbered 104, of 89,150 tuns, while the steamers were 96 , of 85,600 tuns. The next year, 1870, marks the beginning of the decadence in the building of sailing vessels, the number launched falling to 62 , with a tunnage of $38,8 i 0$ tuns, the number of steam vessels rising to 121 , of 133,000 tuns.
The year 1871 showed a still further decline in the building of sailing vessels, the total being 25 , of 12,720 tuns, ing of sailing vessels, the total bein
In 1872 , the tunnage of new sailing vessels fell to one fif teenth of that of the steamers, the ratio being 24 , of 14,500 tuns, to 161 , of 215,000 tuns.
Last year, the number of sailing vessels launched was about the same, but the ships were of a larger class, twelve in all 25 , aggregating 21,050 tuns.
The price of coal went up toward the close of the year, and the effect on the character of the sbips called for has been remarkable. The returns for the first six months of he current year (1874) show that of 93 vessels launched, 25 of 30,000 tuns, were sailing vessels, and 68 , of 99,500 tuns, were steamers. In July, the launches were equal, 5 sailing vessels, of 6,800 tuns, and 5 steamers, of 8,580 tuns. Re turns are also in hand for the first half of August, and show 6 sailing vessels, of 7,010 tuns, against one small steamer, of 150 tuns, for the coasting trade.
The sailing vessels for this year are thus four times greater in tunnage than for the corresponding period during teh hree preceding years, while the steam vessels show a de three preceding years, while the steam vessel
crease, during the same period, of 40,000 tuns.

## PECULIAR PEOPLE.

Consistency is a jewel. The orthodox journals of England have scarcely ceased to denounce the "prayer test" sug gested by Dr.Thompson and introduced by Professor Tyndall, working themselves into a fever of pious horror at the bare suggestion of a doubt of the efficacy of prayer as a sanitary agent, when they join, with equal unanimity, in denouncing Baron Pigott for declining to condemn a man who sincerely trusted to prayer for the restoration of his sick child.
There is, in England, a religious sect calling themselves "the peculiar people," one of whose peculiarities is that, in a nation of Bible worshippers, they accept its teachings as their nation of Bible worshippers, they accept its teachings as their
rule of life. Nothing can be plainer, for example, than the rule of life. Nothing can be plainer, for example, than the
directions there given for the treatment of the sick-to call directions there given for the treatment of the sick-to cal
in the elders of the church and let them pray over him, anointing him with oil, "and the prayer of faith shall save the sick, and the Lord shall raise him up, and, if he have committed sins, they shall be forgiven bim."
It is the practice of " the peculiar people" to follow these directions literally, much to the scandal of their pious neigh bors, whose belief is tempered by a superior trust in the doctor A short time ago, the child of one Thomas Hines wa aken sick. He was prayed over and anointed, and the Lord did not raise him up. At the coroner's inquest it was testi fied that the child was nursed with great tenderness and fed with the besi of food; but no physician was called in, for which omission a verdict of culpable neglect was rendered, and the father was sent to the criminal court, to answer to the charge of manslaughter.
In view of the man's religious convictions and the fact that he had done everything for the good of the child according to his lights, the judge refused to let the case go tc the jury. Against this decision the popular protest is loud and severe the direst consequences being anticipated, if such literal applications of Scripture texts, by the ignorant and superstitious, are to be allowed.
It is instructive to turn over the files of the papers, now so indignant at the judge's ruling, and note the different tone of their utterances at the time when the efficacy of prayer was questioned. Then it was blasphemous to doubt the sure force of the believer's petition; now it is criminal to trust it!
Has Dr. Thompson's proposition wrought its logical effect? Or are these would be leaders of public opinion incompetent of feeling the forca of logic?

The boiler of a thrashing machine engine lately exploded at St. Paul, Minn., killing three persons instantly, and in juring three others. One of the latter was blown 400 feet from the spot, and subsequently died.
Mr. M. Flursheim requests us to state that the length of he boiler mentioned in his letter (published on page 120, Vol XXXI.) should be 3 or 4 feet, and not $\frac{8}{4}$ foot, as printed.

## THE AUTOMATIC COW MILKER.

A correspondent of ours, in making some researches in the Patent Office recently, stumbled across an old device among the forfeited applications, which appears to be an automatic cow milker. From sketches furnished us, we have prepared the annexed engravings, showing the invention as applied to the animal and, separately, in section.
About all that is necessary is to insert two tubes into the teats, through which the milk flows into a receptacle strapped under the udder. The vessel and the cow are to be permanent companions, for the present antique method of milking s no longer required. No longer will the horny palms of he aged agriculturist irritate the tender members of the paent brute, in vain endeavors to elicit milk which is not

there; no longer will his mellifluous accents be heard requesting her in winning tones to "come down," nor will the atmosphere of the barnyard vibrate with his wild imprecations when injured female dignity stirs up the well filled bucket with her hoof. When milking time arrives, a pail receives, from the opened faucet, the contents of the vessel, which is thus drawn off as easily as water from a cooler.

An irresponsible person, connected with this office, suggests that cows, provided. with the device, might be driven by milkmen to their customers' doors, and the milk removed as wanted; and further that, by setting a dog after the animal, she might be induced to get up sufficient motion to churn the milk into butter. We have called the attention of the health authorities to the dangerous ignorance of our employee; for should he ever embark in the milk business, his erroneous views might lead him to supply the lacteal fluid in an unchalked and undiluted state to his customers, and so to produce widespread disease. Any inventor, however, who will find a way of combining a neat water reservoir and pump with this apparatus, will doubtless find his invention

vastly appreciated by the average New York milkman. A little ingenuity, we think, could devise a kind of treadmill, to be worked by the cow, to operate a pump handle.

## ENAMELED AND EMBOSSED PHOTOGRAPHS

Take a piece of clear glass, free from bubbles or scratches, and clean it by immersing in a solution of concentrated potash over night. Wash thoroughly in clean water, and immerse for a few minutes in a mixture of nitric acid and water, one part of acid to three of water; let dry from the acid without washing. Now coat your plate with the following: Plain collodion one ounce, glycerin half a dram, and let dry. Then take sheet gelatin and soak it in cold water until it is soft; then putit in a cream pitcher or a widemouthed bottle, and cover with water. Dissolve the gelatin by heat, immerse your print in this warm gelatin, and lay it face downward on the collodionized plate, carefully
 pressing out all air bubbles; now cement with gelatin a piece of thin Bristol board, previously dampened to make it pliable, to the back of your print. Let dry thoroughly, and loosen the edges with a knife blade, by running around the glass between the print and the glass, when the whole thing will leave the glass with a very superior polish; it is now ready for pressing in Ormsby's cameo press, the simplest, most prac tical, and cheapest cameo press ever invented. Any carpenter will make
for the use of the fraternity. This process is superior to any. Where rubber is used in the collodion, they will never crack in the pressing; and where the rubber gives less polish than collodion alone, the addition of glycerin gives an extra polish. I enclose you a photograph of my press. It is made of maple wood, three quarter inch thick. The raised center for molding is glued on. The top and bottom are hinged together.-E. D. Ormsby, in Philadelphia Photographer.

## WORSWICK'S IMPROVED PUMP MECHANISM

We illustrate herewith an ingenious device for converting motion, arrarged in connection with a pump. It seems to do away with countershafting and other connections, thus materially decreasing the cost of the machinery, while it renders the latter easier to set up. It is adapted to almost any position, and is entirely free from any complication in its working parts. As applied to a pump, as will readily be perceived from the following description, it insures a nice adjustment of the stroke, so that a regular supply of water can always be obtained. This is an advantage of importance, as it is scarcely necessary for us to point out that an irregular feed is alike fatal to uniform pressure of steam and econ omy of fuel.


The entire machine is shown in perspective in Fig. 1; the sectional view, Fig. 2, will aid to obtaining a clear comprehension of the essential features of the mechanism. The pump plunger has a slotted cross arm or yoke, $A$, in the slot of which works the wrist pin, B. This, as the head, C (fixed axially on the driving shaft), frevolves, causes a reciprocating movement of the plunger. The wrist pin is attached to a slide which is adjusted in the diametrical slot, in head, C, by means of a screw, D, passing through it, so that the distance between the wrist pin and shaft or axis may be increased or diminished at pleasure and the throw of the plunger correspondingly regulated. A stop, E, is provided for the pin, B, which is adjustable by a nut screwed on a stem, project ing through a slot in the wrist pin plate. The position of this stop piece indicates the adjustment of the pin, $B$, for running the pump. The pin may, however, be adjusted out-

ward from the driving shaft to increase the throw of stroke of the plunger. When it is adjusted back in contact with the stop, the action goes on as before, so that the stop saves the time and labor which would be otherwise carelessly expended at every change of the adjustment of the wrist pin. Patented through the Scientific American Patent Agency June 9, 1874. For further particulars address the inventor, Mr. Thomas Worswick, Guelph, Ontario, Canada. Pumps thus fitted may be obtained of Messrs. W. L. Chase \& Co., 95 and 97 Liberty street, New York city, or of the Armstrong Heater Manufacturing Company, Toledo, Ohio.

THe total number of complete patents issued in England, during the last year, was 2,906 . In the United States, 12,864 uring the last year, was 2,906. In the United States,12,86

## MULLER'S NON-EXPLOSIVE SELF-LIGHTER.

The annexed diagram represents an improved form of the Döbereiner or hydrogen lamp, a well known and useful ap. paratus in every chemical laboratory. The reservoir is filled with water acidulated wich sulphuric acid, and a piece of zinc, inclosed in a bottomless tube, is lowered therein. The hydrogen thus generated rises through the tube, and, when the stopcock is pressed down, escapes from a small orifice above, and comes in contact with a fragment of spongy platinum held in the small bell shown. The platinum is thus caused to become highly heated and to ignite the gas jet. The improvements which this device offers over the ordinary lamp

consist in the vertical channel through which the hydrogen passes. When, as is usually the case, the gas is forced to turi into a horizontal outlet, the small particles of sulphuric acid, which are carried up, accumulate in the passage, corroding the metal and preventing a free escape of the gas. By having the whole channel in a vertical position, the acid will readily flow back to its reservoir.
By securing the spongy platinum within a suspended bell it is covered and protected from injury. A working model of this invention can be seen at the office of the American School Apparatus Company, No. 21 John street, N. Y. For further particulars address the owner of the patent, Mr. Joseph Hertford, P. O. Box 998, New York city.

## SHOEMAKERS' COMBINATION TOOL

By means of the ingenious con trivance represented in our illus tration, the shoemaker is enabled to draw the upper of his work into place, pierce a hole for the peg, and drive the latter home, all without once laying down the tool. This is accomplished as follows: The upper is grasped between the curved jaws of the pinchers, $A$ and pulled into position. The inpulled into position. The instrument is then reversed while
being raised, and, by a blow, as if with a hammer, the awl portion, $B$, is driven into the leather. A peg, taken from the mouth, is inserted in the hole, and the tool once more reversed. Lastly, a stroke from the hammer, C, forces the per into place In thia ) hoe may be finished with shoe may be finity whe considerable rapidity, and consequent economy of time and labor.


The device was recently patented through the Scientific American Patent Agency, by Mr. Joseph F. Ober, of Mount Desert, Maing.

## Surgical Freezing.

The successful employment of an anæsthetic which preThe successitul employment of an without destroying consciousness is a matter of vents pain without destroying consciousness is a matter of
interest and importance to medical people everywhere. Dr. B. W. Richardson, in the London Lancet,describes two operations of this kind, by him performed, for removal of cancerous tumors of the breast, both patients being ladies. A spray of common ether was directed upon the tumor until thoroughly chilled. The lighter fluid, a compound of ether with hydride of amyl, specific gravity 0720 , was then applied until the whole of the breast was frozen like a snowball. Instead of with a scalpel, the incisions and removal were ffected by mean of mall, strong sharp and curved scisgors. He fis in The use of this instrument is considered essential. The operations were successful, the
charge or trouble of any kind.

An Eighteen Inch Railway.-The narrow gage tramway, laid down along most of the avenues of the Royal Arsenal, Woolwich, has proved so completely successful that it has been decided to introduce the system at the new works at Chatham The gage is only 18 inches.
ater

The steam plow problem has, for many years, occupied the attention of farmers and makers of agricultural implements in England; and the various designs which have achieved success have more or less embodied the original John Fowler plan of a gang plow drawn from end to end of the field by an engine operating a hauling drum and a rope. We give herewith (extracted from The Engineer) two views of an improved plow, designed by Messrs. Greig and Eyth, to meet a difficulty found in using the first Fowler plow, which was unsteady in action except in subsoil plowing. Messrs. Grei
themselves by a long rod, F , working short levers, so that the relative position among themselves is always the same and that the turning round of one plow causes all the others to turn as well. There are, further, two horizontal pulling levers, $G$ G, connected by a rod, $H$, to which the two rope ends are attached. One of them works a toothed segment hidden by the framing in our engravings, above which a circular plain segment is fixed. The former gears into a corresponding segment, fixed to the nearest plow skife; thelatter corresponds to a peculiarly shaped disk, also firmly attached to this skife. In turning the pulling levers either
ground completely over towards the same side, whether it goes backwards or forwards. While at work the main frame ravels in a slanting position over the land, the front wheel unning in the preceding furrow, the hind wheel on the un plowed ground, the plowman steering the furrow wheel at $\mathrm{L}_{4}$ or K . This position is readily maintained, as the pull passes through the center of the resistance of the plows. A the headland the levers are turned by the second engine be ginning to work, and turn first the single plows at the same me as the two end wheels are turned square to the main frame. One end of the frame moves now along the head


GREIG AND EYTH'S STEAM PLOW.
and Eyth's model is claimed to be especially useful when |backward or forward, the toothed segment not only turns the |land, so that the slanting position of the whole is reversed, not deep cultivation but only competition with horse power is the object.

The longitudinal horizontal main frame, $A$, to which the plows are attached, stands on three wheels, of which the middle one, C , is a caster wheel, while the two end wheels revolve in turntables, D D. These turntables are so contrived that they lift or lower the main frame exactly by the depth of the furrow, according to the direction which is given to the wheel. The wrought iron plow skifes, E E, are fixed in sockets, in which they can turn, being connected among
plows completely round, but the disk causes them also to be firmly locked., while the levers in their two extreme positions are still free to swing about through a considerable angle. These levers are also connected, by wire ropes and other suitable tackle, to the turning rings of the turntables, which, among themselves, are connected in a similar manner, so that the turning of the levers turns also the two end wheels into suitable positions. The plows themselves are of a peculiar shape, the share being shaped so as to cut with
either end, while the short hollow moldboard, $E$, throws the
whereupon the implement proceeas on its back journey These plows are intended to work to a depth varying from 3 inches to 5 inches oniy, but will turn over eight to twelve furrows or a width of 8 feet to 12 feet at a time Never theless, in going from field to field, the implement will take no more space than a width of 4 feet to 5 feet. In turning round at the field ends, it is perfectly self-acting, giving no trouble whatever to the plowman, and producing very short headlands and clean straight ends, while, when at work, it headlands and clean straight ends, while, when at
rigidly keeps to the proper depth for which it is set.


THE SUTHERLAND STEAM PLOW

Another entirely different form of plow, also constructed by John Fowler \& Co., has lately been introduced on the Duke of Sutherland's vast reclamation works in his own country in the North of Scotland. A track of land was cleared (the roots of trees being dragged out by steam engines), plowed, and drained with stoneand pipedrains. The plow (of which we give a view, copied from Engineering), which has been broaght to its present state by successive improvements, may be described as an iron frame, about 10 feet long and 18 inches wide, supported upon sis wheels or rollers, and bestridden by the plowman who guides it. Two of the rollers are underneath or within the frame, two are outside of it towards the plowed land, and two are outside of it towards that which is still untouched: The plow is so constructed as to work in both directions, backwards and forwards, without turning, and all its parts are double, except the mold board, which is made to turn upon a hinge, and thas to face either way. Below the center is a strong flat coulter, presenting a sharp point and a concave cutting edge towards each end of the frame, and to the center of this coulter the mold board is hinged. Just beyond the coulter, both fore and aft, there is a flat iron diak, about a yard in di ameter, with a cutting edge, and turning freely on a horizontal axis transverse to the frame; and on either side of each disk there is a broad iron wheel or roller, 2 feet in diameter. On the side towards the land as yet unturned these rollers are 2 feet 6 inches broad, and are external to the frame; and on the side towards the furrow theyare 18 incbes broad, and, together with the diske, are contained within the sides of the frame. The disks rotate on the same axes as these internal rollers, but can be rendered more or less eccentric with regard to them; so that the depth of penetration of the disks can be regulated at will, and may vary from 4 inches to 15 inches. External to the frame on the other side, toward the plowed ground, are two broad wooden rollers, about 2 feet 6 inches in diameter. At each end of the frame its lateral pieces are united $\hat{b} y$ a atrong transverse iron bar, which also passes through, and serves as a pivot for, the end of an iron shaft about, 6 feet long, which terminates in a large, boldly curved hook, having its point shod with steel. To the nose of this hook is attached an iron ring, ànd a rod to serve as a traction bar, to which the wire rope of the engine is made fast; while on the top part of the shaft there are two collars to recsive one end of a long wooden lever, the other end of which is attached to the wire rops at the trailing end of the plow, and which depresses that hook and forces its point deeply into the soil, while the point of the leading hook is lifted out of the ground by the traction of the engine. Above the center of the frame there is a seat for the plowman, and a simple stearing apparatus by which any desired direction may be given to the axles of the disk and of the iron wheels, so as to guide the course of the plow. The traction force is supplied by two steam engines, each of 16 horse power nominal, and working up to about 40 . They are furnished with broad wheels, so as to be supported and to move easily on soft ground, and each carries the necessary length of wire rope on a horizontal drum situated beneath the boiler. They are found to work most advantageously when placed about 400 yards apart. Under ordinary circumstances, the plow completes its course of 400 yards in a quarter of an hour. When it reaches the hauling engine the lever is shifted to the other hook, a slight change is made in the steering wheel, and, in about a minute, the other engine takes up the work, and the plow is dragged back again. It traverses both sudden hollows and sharp ascents without losing its hold of the soil, which it penetrates to a depth of from 13 inches to 20 inches; and, although it rolls and flounders over the many hidden obstacles in its way, and gives an uneasy seat to its rider, it seems incapable of being upset. When any impediment is encountered, such as a huge stone or firmly bedded root, the disk acts the part of a wheel, and, no longer cutting its way, lifts the plow bodily over the obstacle, while the trailing hook, in most cases, gets its point underneath it, and tears the stone or root out of the ground.
When the leading disk rises over a stone or other impediment, the point of the trailing hook is buried more deeply than before, and thus very large roots, and masses of stone measuring a cubic foot and sometimes much more, are dragged out and left upon the surface by the action of the plow alone. If the hook does not obtain sufficient hold, the stone or root is somewhat cleared by hand, and a chain is cast around it. When the plow next passes, the chain is made fast to the rope, and in this manner very considerable boulders have been dragged out of the ground and carried sway. Sometimes, however, a stone or root is too large, or too firmly fixed, to be so dislodged, and then recourse is had to blasting by dynamite, which has been employed with perfect safety, and has never been found to fail.
Both these plows were exhibited at the recent Royal Agricultural Show at Bodford, England, and attracted much attention.

AMONG the recently parented novelties is a method of mending cracked church bells, so as perfectly to restore their tone. It is done by introducing a furnace within the bell, to warm up and fuse the edges of the crack, at the same time pouring in new metal enough to fill out the crack, the sides of the bell being covered with plates to prevent escape of molten metal.

A boat race between E, Morrie, of Pittsburgh, Pa, and G. Brown, of Haiifax, N. S , took place at St. John's, N. B., on Soptember 26. The course was five milas long, on the Kennebscasis. Brown was the victor by only two lengths. Time, 37 minates.



A Practical Mechanic at the American Institute To the Editor of the Scientific American:
In the machinery department, in which there is a much arger and finer display than usual, one is at once surprised at the din caused by the numerous practical operations being carried on, and especially so at the clang and jar caused by a large gear wheel on one of the air compressors, which wheel has two rows of teeth in the one casting, the teeth of one row being opposite to those of the other instead of the one opposite to the spaces of the other, as should be the case In addition to this defect, there is considerable backlash or play between the teeth of the driving pinion and the wheel producing a rumbleand an occasional "pound" only equale by the Blake stone crusher. One would have thought that inserted wooden teeth would have been employed rather than that such a clatter should be made by an exhibited machine. The compressor, it is true, is not doing any duty, and is doubtless more noisy than it would be under its load; but creditable as a piece of workmanship it never can be, under the most favorable circumstances,
moved and a better one substituted.
The two engines driving the ma
The two engines driving the machinery are very credita ble specimens of workmanship, although there are wide va riations between the two in matters of detail. The Wright engine has the lugs of its eccentric straps open a quarter of an inch, so that they are not locked together by the bolts at all, and merely hang, as it were, on the eccentric; they are the only ones in the Fair possessing this defect. The connectng rod of this engine has rolid boxes instead of straps, being in this respect similar to the side rods used on English locomotives; such rods are not only less expensive to make, but re easier to repair and less liable to suffer from wear. The joint faces of the brasses are, however, left open, instead of being fitted "brass and brass," as they should be; this de fect exists in nearly every connecting rod exhibited, the
Baxter and the Shapley engines being honorable exceptions. f one asks why such joints are left open, the reply is "wel it don't ought to be, I know, but-but they all seem to do t." The movement of a small connecting rod on this engine cannot fail to attract attention; it is about ten inches long and connects one end of the rocker arm to the arm of the shaft working the cut-off, the movement of each end of the rod being part of the circumference of a circle, the plane of one circle being at right angles to the plane of the other, and said rod having the bore of its brasses at each end trumpetshaped from the center to each face of the brass, so that the rod has a right-about-face and "slantindicular" movement, in all directions, merely hanging on its journals, since its aces will be free, and unconfined by flanges, collars, or ther guides common to a respectable connecting rod.
The Hampson and Whitehill engine is an elaborate piece mought arising: "Are cannot look upen it without the off engines traveling in the direction of complicated move of engines, traveling in the direction of complicated movesurfaces, which, though very perfect in their movements while the engine is new, will, after becoming in a compara tively short time worn, cause so much lost motion as to destroy the relations of the various movements one to the other, and thus seriously impair the action and value of the whole?" The quality of engineer co existent with the com such engines are to become the rule. Tbis engine also has its connecting rod brass joints open, and has a thump in its muvement (as has also the Wright engine) when the connec ting rod passes each dead center, the thump when the rod pasises the dead center nearest the cylinder baing in each engine the greatest, just as it might be expected to be it imperfect adjustment of the connecting rod brasses is partly the cause. Both engines work expansively to a high degree, and will give, no doubt, very economical results. A Bement axle lathe, exhibited by Geo. Place \& Co., is a very superior tool. It is so geared that one pound on the cone is about 40 lbs. on the lathe centers, and it has a $3 \frac{1}{2}$ inch driving belt. That part of the bed on which the slide rest travels is raised so that the turnings do not fall upon the slides. The wearing urfaces are broad; the lock nut for the tailstock spindle act upon the extreme end of the spindle guide close to the dead
center, and clamps the spindle all around, avoiding the center, and clamps the spindle all around, avoiding the
spring usual in such spindles; in fact the whole lathe evidences that its designer has provided a tool fit for a piece work turner (who generally puts a tool to its utmost capacity). On the tool post, however, is a taper washer, by means of which to regulate the hight of the turning tool. With such a washer, it is impossible to put this lathe to the full duty it will perform, because, the face of the washer not being par allel or level with the face of the holding screw, the tool i
not so firmly clamped as a heavy duty will require. The cen not so firmly clamped as a heavy duty will require. The cento putany work on the lathe, which is an omission to be re gretted.

Esor.

## Leaf and Flower Impressions.

## To the Eiditor of the Scientific American:

In less than five minutes after reading the article in the Scientific American of September 12, I culled, inked, and printed the four impressions herewith sent.
Take a small quantity of printer's ink, thinly put it on glass, or on the lid of a blacking box, as I did, evenly distributed. The end of the index finger will serve as the printer's ball, to cover one side of the leaf uniformly; then lay it to the exact place where you wish the print to be; lay
over it a piece of thin, soft paper large enough to cover it ; then, without moving the leaf, press all parts of it with the end of the thumb firmly, and you will have a perfect impression, that no engraver can excel; and by adjusting the leaves at the proper points, accurate prints can be taken, and, aided with the brush or pen, the stem and whole plant can be shown. I have excellent specimens of impressions of barks of trees, made by slicing the bark; and with a little care, the tems can also be taken, as well as flowers. I have many such ; and when colored with the aniline colors, they are like colored engravings.

Jacob Stauffer.
Lancaster, Pa.

## [For the Sctentitic Amertcan

COAL BURNING LOCOMOTIVES IN THE SOUTH.
Burning coal in the locomotives on the railroads in the Southern States is an improvement of recent date. The plan was first tried by the Nashville and Chattanooga Railroad, which has specially good facilities for use of that fuel, there being a number of mines directly on its line. Later 'it was ried by the Atlantic and Western Railroad (from Atlanta to Chattanooga) with marked success. This road has no coal on its line, but gets its supply from the Dade Company's Mines, thirty miles up the Nashville and Chattanooga road. The company have adapted twenty locomotives for the purpose of using coal,and intend changing them all. As soon as an engine is brought into the shop for any important repairs, it is changed to a coal burner. They consume at this time about 50 tuns of coal per day; it is supplied to them at 9 cents per bushel, and 25 bushels are counted to make a tun, Aside from the time and labor saved, the actual econo my is about $\$ 5$ per day to the locomotive. The coal they use is as good a steam coal as any in the United States.
Stimulated by the operations of others and the absolute need to make better time with their trains, the Eastern Tennessee, Virginia, and Georgia Railrosd has also tried the coal burners, and the report to the company at its ate meeting says: During the month of July, the coal burners ran 17,600 miles and consumed 6,600 bushels of coal which cost $\$ 660$, making cost per mile of $3 \frac{3}{4}$ cents. Wood burners running the same number of miles burned $569 \frac{1}{2}$ cords of wood at a cost in tenders of $\$ 2.50$ per cord, making $\$ 1,423.75$ or $81^{10}$ cents per mile run. The saving will make fair dividend on many of the Southern roads. The cost of changing to coal burners, they show to be $\$ 190$ each engine, and they have now changed fourteen. The coal issued by his road is not so good a steam coal as the Dade coal used by the Western and Atlantic Railroad, and costs them 10 ents per bushel; while the latter road gets the Dade cosl 9 cents. The mines are little over 20 miles from Knoxville, aud the coal shonld be cheaper
The East Tennessee, Virginia, and Georgia Railroad has ust finished its business year; and, as an instance of its ood management and the prosperity of this section of the South, has declared a six per cent dividend from actual earnings. The summary of shipments from this point shows that, during the past 12 months, 468,469 lbs. bacon and lard, $1,122,174$ lbs. flour, $4,809,882 \mathrm{lbs}$. corn, $1,602,781 \mathrm{lbs}$. wheat, and $327,348 \mathrm{lbs}$. hay were transported. Of coal and coke $59,142,000 \mathrm{lbs}$., of manufactured iron $1,608,187$ lbs., of nails and spikes $723,077 \mathrm{lbs}$., and of marble $312,216 \mathrm{lbs}$., wore shipped. From the shipments of articles, manufactured or produced in and around this place, the road received as freight $\$ 103,471.70$.
The region of couniry through which the road runs is one of the finest grass, grain, and fruit sections to be found any where; and ample manufacturing facilities are found in the abundance of good water power and cheap coal.
Knoxville, Tenn.
H. E. C.

Several thousand specimens have been quarried from the erpenine and trap Ridges in New Jersey, under the direc. tion of Professor Leeds of the Stevens Institute. They conist of nemalites, occurring in translucent masses made up f long, silky fibers; marmolites of beautiful colors and pol. shed surfaces; exquisitely tufted aggregates of crystals of of hydromagnesite; globular masses of delicately tinted prehnite; clusters of sparkling datholite crystals; star-like aggregations of pectolite,apophyllites, molybdites, natrolites, and other species too numerous to mention. They have bren collected both with a view of developing the mineral treasures of the district in which the Institute is located, and oobtain, by exchange with the cabinets of other colleges, a much enlarged cabinet for the Institute itself.

## New and Powerful Iron-Clad.

The Brazilian iron-clad Independencia, of which we recent y gave an engraving, has been successfully launched on the Thames. The vessel has sustained no injury and will probably be in the possession of the Brazilian Government by the end of the year. She is one of the most powerful ron-clads in the world; is of 5,200 tuns burden; will be fitted with Penn's expanding trunk engines of 1,200 indicated horse power, working up to about 8,000 horse power; has a
prominent gun metal stem, forming a ram; will draw 24 prominent gun metal stem, forming a ram; will draw 24
feet 6 inches forward and 25 feet aft, when fully armed and in sea-going trim; is 300 feet in length between perpendicu lars, and has 63 feet of extreme breadth. Her armament, which is to be partly in two turrets and partly in bow and stern batteries. will consiet of 35 tun Whitworth guns, and he will be bark-rigged. She is expected to make fifteen or sixteen knots an hour with a single screw.
Effect of Soap Water on Incandescent Metals_-a red hot copper ball, plunged beneath the surface of water containing soap, remains quiet, being surrounded with a

DENTISTRY IN THE UNITED STATES, number 5.
the dental laboratory.
Though the operating department of the dentist's establishment makes a brilliant display, with its multitudinous and variously shaped instruments, the laboratory has, per haps, equal mechanical merits. Its tools are almost as varied as those for operating, equally useful, but not quite as numerous. They make up in size what they lack in numbers. In the laboratory, the dentist uses his lathe, furnace, vulcanizer, forge, rolling mill, steam blowpipe, and gas generator and reservoir, with all their appurtenances, also such small tools as files, scrapers, saws, chisels, plate benders, cutters, punches, hammers, shears, and so on : a few hundred more articles complete the list; and of each of these there are various patterns, sizes, and styles. A first class practitioner usually has in his laboratory, besides these mechanical tools, a miniature chemist's shop, as in his practice he frequently has to use chloroform, ether, acids, tinctures, solutions, elixirs, tonics, chlorides, sulphates, a hundred different chemical preparations, not including the perfumery which he uses for flavoring tooth powder, soaps, and mouth washes. The mechanical department varies in quality and value like the others. A well appointed laboratory costs about six hundred dollars; but there are many dentists whose complete outfit, operative and mechanical, did not cost, originally, two hundred dollars. In the laboratory, the work of making the sets, of false teeth is done. As the mechanical tools are continually getting dull and wearing down in sharpening, and the materials are bsing used up, the workman has to keep replenishing his stock; and when there is a great deal of mechanical work going on, the outlay is considerable: lathe burrs breaking, furnace muffles cracking, vulcanizers exploding, flasks bursting under too much pressure, retorts breaking, and other such accidents continually occur ring. I was once seated in the laboratory of a dentist in the West. He had two "cases" in his vulcanizer, undergoing the process. He had examined the thermometer to note the degree of heat, and turned toward'me to make a remark about the amount of pressure which the boiler was sustaining: he had not finished his remark, when we heard a noise like the report of a six pounder loaded to the muzzle without ramming; and the room was instantly filled with steam. When, in a few moments, it settled, it appeared that the boiler had burat. The top had bsen blown off, and was buried in the ceiling. Had the accident occurred thirty sec onds sooner, the practitioner would have been killed. I have witnessed other accidents equally dangerous, though it does not seem as if the business was a hazardous one. In the mechsnical department, a moderate practice requires an outlay of three hundred dollars per annum, after having a good start. The receipts of one firm for sales of laboratory tools and material were $\$ 62,650$; about three fifths of the goods being used in the Western division, one quarter in the Eastern, and the remaining three twentieths in the Southern.

## dental office furniture.

The principal piece of furniture in the operating room is the dental chair, on the left of which generally stands the spittoon, with the dental operating case forward, to the right. This is what I term the "Torturing Trinity." These few pieces are about all that come under the head of furniture. Of each of these there are various patterns and dollars each, spittoons from fifteen to one hundred dollars each; and the case, as is previously stated, almost any price the dentist wants to pay. There are sther pieces of furniture, such as the extension bracket table, footstools, and the stands used exclusively by dentists; but they are of minor importance. Nevertheless, all these separate pieces of furniture have to be kept in repair, which adds to the
expenses of the office. The chair is so constructed that the seat rises, the back falls, and the head rest can be raised and moved to the right or left. As all these movements are independent of each other, it is easy to see that a considerable mass of machinery is contained among the upholstering, in order to do all this manœuvring. When this machinery gets out of order, the whole has to be taken to pieces before it can be adjusted. The spittoon meets with the greatest amount of mishaps. A patient will drop the tumbler into the glass bowl : at least two dollars is required to replace it. Another, in a fit of agonized abstraction, catches hold of the spittoon top, instead of the chair arm, and pulls it off its balance. The marble top smashes on the floor; the pieces, along with the remnants of the glass bowl and tumbler, are thrown into the dirt barrel; and the operator smiles, says " of no consequence," and puts down ten dollars to expense account. The operating case, being out of the patient's reach, is tolerably safe. But the color in the velvet of the chair will fade. Sometimes the veneer peels; the polish grows dull; the looking glass in the top gets cracked by the wood work warping; all these mishaps have to be remedied, and on such fine workmanship it is expensive. In one city in the Western division, eight dentists kept one dental cabinet maker constantly at work in repairing their furniture. The best furniture is used in the Western division; the next best, in the Southern; and the Eastern uses the poorest. The greater proportionate number of piecose is, however, ufed in the Eastern division, se there are mors permanent dentiate in proportion to population.
The uninitiated may imagine thesestatements exaggerated. Not only is every item mentioned to be found in actual use by dentists, but the enumeration is confined to articles that are commonly ued.

The number of dentists in the United States exceeds five thousand; and allowing their gross receipts to be only one thousand dollars a year each, which is a low estimate, the grand total amount of money paid out by the people each year for tooth in and tooth out purposes (to pillage a recent pun) will not fall short of five million dollars.

## ARSENIC IN AGRICULTURAL AND TECHNICAL

 PRODUCTS.by professor adeust vogel.
It is an interesting fact that mineral substances which are poisonous to animals do not always exert a poisnnous action on vegetation. Litharge and red oxide of mercury are known to be active poisons for animals, while seeds moistened and planted in either of these poisons germinate as soon as if planted in a fertile soil. This shows that vegetable organ isms are not very sensitive to poisons. On the other hand, it is almost impossible to sprout seed in magnesia, a sub stance which is administered internally in large quantities as a medicine. The injurious influence exerted upon the germination of seed and the growth of the plant, by this apparently innocent substance, was made known in England through an unintentional experiment made on a large scale some years ago: A farmer there had a whole field sown some years ago: A farmer there had a whole field sown
with white earth which he supposed to be calcareous marl. The seed came up very sparingly in this field, and a chemical analysis of the fertilizer showed that it contained a large quantity of magnesia.
There are some poisons which exert the same powerful influence on vegetable and animal life. To these belong the salts of copper and, above all, arsenic with its numerous compounds. A strong, healthy plant can soon be killed by wetting it with a diluted solution of a salt of copper or of arsenious acid. The poisonous action of arsenic on vegetation is all the more striking because it is a substance very
widely disseminated throughout the inorganic world; it has widely disseminated throughout the inorganic world; it has
been found in many iron ores previously considered free, and in mineral springs, in bones, and even in garden soil. It confirms the statement of a talented cbemist, that the ana lytical chemist of to-day can find everything everywhere if he earnestly hunts for it. Moreover, in the famous Lafarge poison case the celebrated toxicologist, Orfila, not without reason, pledged himself to prove the presence of arsenic the chairs of the judge and jury at the Palace of Justice Without earnestly hunting for it, but rather by accident we not long since found arsenic in the Munich street gas, which is now generally employed instead of alcohol lamps in chemical laboratories. The occurrence of arsenic in coal gas is not surprising, for it is known that coal always contains considerable quantities of sulphur, which is generally accompanied by traces of arsenic. In a shale, found at Linz on the Rhine, which is largely employed in the manufacture of photogen and paraffin, some not inconsiderable quantities of this poisonous substance were found. When distilled in
large quantities, the collecting pipe, where it joins the distillation retort, often contains a brilliant crystaline crust, which is only partially soluble in water, and consists, for the which is only partially soluble in water, and consists, for the
greater part, of arsenious acid along with sulphuret of arsenic greater part, of arsenious acidalong with sulphuret of arsenic
and arsenic. In drawing out the contents of the retort, the peculiar garlic odor of arsenic is perceptible. The workmen who charge the retorts frequently complain of colic, and also suffer from inflammation of the skin or ulcers at the root of the nose and in the joints. The inhalation of arsenious vapors must be supposed to be the cause of it. These arsenarsenical pyrites, which always accompany sulphur pyrites, either distributed in a fine state of division throughout the mass of the shale or present in single perfect crystals.
Since arsenic, as we have said, always accompanies sulphur, all the oil of vitriol made from it must contain arsenic; and through the oil of vitriol, the arsenic finds its way into a
great many agricultural and technical products, in the manugreat many agricultural and technical products, in the manu
facture of which this acid is employed. The acid phosphate of lime, known as superphosphate or prepared bone dust, and now so frequently employed as a fertilizer, is manufactured by the aid of crude sulphuric acid. The arsenic in the acid all goes into those artificial fertilizers. The ordinary analytical test
The question naturally presents itself, whether the plants which grow upon soil manured with such substances will not take up the arsenic. Davy undertook to answer this question. For this purpose he set some cabbage plants, in a mixture of one part of bone dust containing arsenic and four parts of garden soil. At the end of four weeks he tested the grown plants for arsenic. The perceptible quantity of arsenic found in the plants proved, what was easy to foresee, that the arsenic of the fertilizer actually goes into the plant. A no less important question is, whether such plants are able to exert an injurious effect upon the animal economy. With regard to this, Davy made the observation that sheep, fed upon Swedish turnips which were raised with prepared bone dust and hence contained arsenic, would not eat enough of them to fatten. It must not be overlooked that this is but a singleobservation. It still remains to be proved whether the arsenic contained in the plant is in such a form as to be dangerous to animals and men, and also whether the quantity is sufficient to be injurious. In a judicial-medical point of view these observations are very important, since it followe that the finding of a trace of arsenic in the viacera doas not permit us

## The poironed.

The traces of arsenic found in street gas and in articicial ertilizers are so small that, according to my opinion at least, it is scarcely possible to suppose that a casa of direct or indi-
rect poisoning could arise from it. It is, however, to be regretted that the undeniable fact of these fertilizers containing לraces of arsenic will injure the confidence in artifi. cial fertilizers which had begun to be so important to the griculturist.
To set at ease the anxious minds of our farmers, it should here be remarked that a certain quantity of arsenic agrees very well with the animal economy. The expression "poison" is in general only a relative one, for under certain circumstances everything is a poison; and on the other hand, a substance which will kill when taken in large quantities may be employed as a medicine in moderate doses. The most common examples show that the administration of a medicine which is not usually considered a poison, under some circumstances, will become such, if given to a sick person. A teaspoonful of alcohol is evidently a poison in cases of inflammation; and, on the contrary, prussic acid or belladonna, in such quantities as a physician would give it to a person having dropsy, is not poisonous, while the same quantity administered to a healthy person would produce dangerous symptoms. The quantity of opium which a Turkish opium eater consumes is no poison for him, as bis body is not in a normal condition. Moreover, Nature can accustom itself to poisons; we know that the workmen in arsenic mines, inhal ing an arsenious atmosphere, frequently enjoy the best of health and reach a good old age. Horses fed upon two grains of arsenic, or more, per day, thrive and grow fat on it.

New Process for Estimating the Alcoholic Value of wines.
M. Duclaux states that, when alcohol is added to water, tbe density and superficial tension of the liquid are diminished, and consequently the number of drops yielded by a given volume from a determined orifice is augmented. The dimensions of the orifice being constant, the number of drops coresponding to each alcoholic mixture is constant alro, and the variations between one mixture and another are great enough for a very sensitive alcoholometric process to be founded upon them, in the limits within which the ordinary alcoholometer does not move freely, and is uncertain in its indications.
The instrument proposed is a simple pipette of 0.3 cubic inch volume. It is filled with the alcohol under examination, and the drops are counted. The alcoholic value is then determined from tables which have been calculated for various temperatures. The alcoholic value of wines may be thus estimated with considerable accuracy without previous distilation. In these liquids the density varies very little, and is always near that of water; and as their superficial tension depends solely upon the alcohol which they contain, it is but necessary to count the drops which they yield, and refer to the tables for the result.
If to alcohol or water slight traces of a substance with a high organic equivalent, and consequently a feeble superficial tension, be added, such as acetic ether, butylic or amylic alcohol, etc., the number of drops yielded by the alcohol or water rises very sensibly. A measurable effect can be produced with $\frac{10}{4000}$ th part of acetic ether. This process is thus available for detecting and approximately estimating certain substances when present in such small proportions as would not be indicated by any other method. By the aid of this instrument, it may be seen that the distilate from wines contains more or less of other matters besides ordinary alcohol, probably alcohols of a higher series.
M. Salleron has proved that the weight of a drop of a mixture of alcohol and water is the smaller the more alcohol it contains; and as the following table shows, the difference becomes larger if the quantity of alcohol be small:
 This shows that a drop counter may be used for determinng the quantity of alcohol in wines, and in the administration of Paris such an instrument is used in order to determine whether a wine entering Paris contains more or less than 15 per cent of alcohol.-Comptes Rendus.

## Doing Much.

Dr. Hall, in the September issue of his Journal of Healtha most excellent family magrzine, by the way-truthfully says that many persons seem to be always in a hurry, and yet never accomplish much; others never to be hurried, and
yet do a very great deal. If you have fifty letters to answer, don't waste time in looking over to find which one should be noticed first; answer the one you first lay your hands on and then go through the whole pile. Some begin a thing and leave it partially completed, and hurry off to something else. A better plan is to complete whatever you undertake before you leave it, and be thorough in everything; it is the going back from one thing to another that wastes valuable time. Deliberate workers are those who accomplish the the day than many who have not accomplished half as much; the hurried worker has often to do his work twice over, and even then it is seldom done in the best manner, either as to neatness or durability. It is the deltberate and measured expenditure of strength which invigorates the constitution and builds up the health; multitudes of firemen have found an early death, while the plow boy lives healthily and lives long, going down to his grave beyond three score and ten.

Indian Tea Exports. -The Bengal Chamber of Commerce remark, in their last report, that the growth of the tea industry of India has been almort unexampled in the history of its trade. The value of tea exported from Calcutta bas increased from $\$ 1,150,060$ in $1863-64$ to $\$ 8,500,000$ in 1873-74. The economic effects of
been faily examined,

## IMPROVED STEAM BOILER.

For marine use, and in localities where economy of weight as well as of space is of importance, the steam boiler represented in our illustrations will doubtless be found especially suitable. It can be put up without mason work, thus saving the cost of frequent repairing with fire brick, besides the handling and removing of much ponderous material in making other alterations or renewals; while, for the same making other alterations or renewals; while, for the same
reason, it is necessarily much lighter than the ordinary double flue generator. An equally important feature is the novel arrangement of a water jacket to form the sides of the fire box, back of the bridge wall and of the boiler, with which the mud drum is connected. In this arrangement the feed water is pumped into the jack et and not directly into the boiler so that, before it enters the main portion of the latter, it becomes heated to the boiling temperature, depositing its sediment in the inclined portion of the jacket, whence the impurities find their way readily to the mud drum. The feed water is thus rendered comparatively pure, scale prevented, and the generation of steam facilitated, while it is further claimed that a saving of fuel is effected of from 20 to 45 per cent, according to the size of the boiler.
Fig. 1 represents a battery of three boilers; Fig. 2 is a transverse sectional view of the same; Fig. 3 shows the single boiler in perspective, and Fig. 4 is a longitudinal section.- The peculiar feature of the construction is the water jacket, A, which forms the water legs, and then extends back to the other end of the boiler and and then extends back to the other end of as and The plates of across the extremity, as acket are connected by stays, C, and the inner plate is riveted to the boiler shell, at D, Fig. 2. The outer plate extends nearly to the top of the shell, and also connects with the frame by a steamtight joint. A series of holes, E, Figs. 2 and 4, establish communication between the jacket and steam space. The mud drum, F, Figs. 1, 3, and 4, is connected

## Tig. 2


at the top with the shell, and its ends are riveted to the in ner plate of the jacket. This is shown more clearly in Fig. 1. The bridge wall is also a water back, connecting with the water space of the boiler by the tube, G, Fig. 4. It will be observed, in Figs. 2 and 4, that the jacket extends down on each side from the inclined bridge wall to the end of the boiler, thus making the side of the fire flue to be steam generating surface, while the bottom of the jacket slopes both from front and rear toward the mud drum, so as to facilitate the deposit of sediment in the latter. In the battery, shown in Fig. 1, two mud drums are used, and the jacket bottom is made to incline toward both. It will be observed that the boiler is almost entirely enveloped in its water jacket, the stays and indeed all parts of which are easily accessible for repairs. The lower side of the fire flue is, besides, provided with a suitable covering, which may be readily removed for the like purpose, so that there readily removed for the likepurpose, so that there
is no portion of the generator that cannot be conveniently reached.
Patented through the Scientific American Pa-
tent Agency, April 7, 1874. For further particulars relative to sale of patent, etc., address the inventor, Mr. Nicolas D Harvey, 55 Prytania street, New Orleans, La.

Safety Device for Railway Cars.
A practical trial was lately made on the Eistern Railway, Mass., of the safety shoe patented March 8, 1872, by Emery and Doyden. The invention consists of a longitudinal plate of iron, placed under the car track, and suspended an inch or so above the rails. The car wheels pass through openings made in the plate. The latter has side flanges which project down below each side of the rail; and if the wheels leave the rail in either direction, the flanges catch on the rail and the car slides on the shoe, bringing the car quickly to rest. The utility of the invention appears to be fully demonstrated by practice, and its employment very greatly reducea the liability of damage by derailment of cars. The reducea the liability of damage by der
following were among the trial tests
The first test was to open a switch, or set it wrong, as a The first test was to open a switch, or set it wrong, as a
misplaced switch would be, so that a train must inevitably
run off the track. The engine then got up a speed of about twelve miles an hour; the car was detached before reaching the switch. The wheels ran off as soon as the switch was reached, but the shoe immediately caught the rails and the car slid along about three rods, and stopped. By means of a switch rope, the car was then got on the track by again leaving the switch open, the wheels striking the rails, the distance from the edge of the shoe to the center of the wheel being exactly that of the distance between two rails when a switch is opened.
The second test was at a greater rate of speed and was equally successful, the car sliding on the track by means of the shoes only a short distance further than before. The
handed over to chemical treatment, which works marvels; for from the old scraps new leather, ready to enter once more the hands of the shoemaker, is evolved. This is "pancake leather," however, unfit for anything gave insoling medium shoes. It is employed, however, by conscienceless Israelites in Chatham street, with unblushing audacity, for making outer soles, and its durability will probably withstand a half mile walk or thereabouts. "Dose vasn't shoes made to valk in," an aggrieved Hebrew is reported to have remarked to an irate customer, who threatened dire vengeance because the soles of his new purchase wore out before he had got around the block, "dose vas gavalry boots!" This delectable material is made by cutting the leather into small bits, mixingit with ce ment, and then squeezing the whole into a compact mass. A similar article is produced from Manilla rope, which is said to answer better for ineole purposes.
There are quite a number of patented processes for the utilization of waste leather, which convert it into leather board, valuable for a variety of employments. One way consists in grinding the mate ial to a meal-like powder mixing it with gums and cements, and applying steam. The compound is then kneaded and rolled into sheets. Another plan is to mix old leather, hemp fiber, and sheepskin cuttings, and boil with soda ash. Sulphuric acid and coloring matter are subsequent ly added, and the substance, molded into sheets, forms a good quality of leather board.

HARVEY'S IMPROVED STEAM BOILER.
third time the engine went back a long distance from the witch and put on a speed of from thirty to forty miles an ho ur, and the car came at a fearful rate. The result was exactly the same, the shoes hol ding the car on the track and sliding a distance of about 300 feet before it stopped. The next test was to take out one rail entirely from the track The car was then sent along the track at a speed of nearly twenty miles an hour. As soon as the open space left by taking up the rail was reached, the wheels were thrown from the opposite rail, but the shoe on that side caught and held the car on that rail untilthe open space was crossed, when the shoe on the other side also caught and the car stopped within three rods. The shoe can be applied to any trucks with but slight change, and at an expense for a pas songer car of about $\$ 115$, and of a freight car about $\$ 90$. In addition to its being a preventive to trains running off the addition to its being a preventive to trains running off the
track, it acts as a brake, stopping a train as quickly as a Westinghouse brake or any steam brake.

Old Boots.
If any body imagines, because an American boot has, as an irreverent humorist expresses it, become " more holy than righteous," because the sole and the upper show an irreaistible desire to part company, and because the heelis all on one side and the leather rusty and red, that such things are proofs that its term of usefulness to the human race is ended then somebody is seriously mistaken. Let it be considered that a medium sized pair of boots packed closely together measure about 36 cubic inches, and that every person in this country casts aside at least one pair per year. The result would

Ety. ${ }^{2}$
 Oerting's process makes a grod waterproof article, which is usefut for making buckets and similar objects. It consists in dissolving rubber in benzine, to which a quantity of ammonia is afterward added. The leather in the form of pulp is next

## ity. 3


put in, and the whole worked into a plastic dough. Slaugh erhouse cuttings are worked up into glue, raw hide whips, and small fancy articles in immense variety.

We had almost forgotten one valuable employ ment of old boots-the manufacture of jelly. The reader may stare, but Science smiles superior and asserts very emphatically that a toothsome delicacy can be made from a dilapidated foot covering. Some time ago, Dr. Vander Weyde, of this city, regaled some friends not merely with boot jelly, but with shirt coffee, and the repast was pronounced by all partakers excellent. The doctor tells us that he made the jelly by first cleaning the boot, and subsequently boiling it with soda, under a pressure of about two atmospheres. The tannic acid in the leather, combined with salt, made tannate of soda, and the gelatin rose to the top, whence it was removed and dried. From this last, with it was removed and dried. From this last, with
suitable flavoring material, the jelly was readily
be a small mountain of shoe leather, 95 feet in every direction, an amount amply sufficient to
interest as to what becomes of it all.
A large percentage of the old boots undergo a second wearing out" before their treatment as waste. The rag picker who may fish them out of the ash barrel, or the shoemaker on whose floor we may leave them when we purchase new pair, will sell them to a second hand dealer for some rifling pittance. This last individual, if the uppers be not hopelessly gone, will carefully cut away the ragged edges, and remodel them for entrance into new shoes of smaller
ize; the legs he will remove from the feet, oil them, and size; the legs he will remove from the feet, oil them, and attach them to a new sole and vamp, so that it would puzzle a philosopher to discover the remains of our former well worn coverings in the two pair of spruce-looking and apparently brand new boots and shoes, in the composition of which they play the largest part.
When these wear out, the old leather is too decrepit to be again rejuvenated in the ordinary way, so that finally it again rejuvenated in the ordinary way, so that finally it,
together with the dilapidated soles and demoralized heels, is
concocted. The shirt coffee, which we incidentally mentioned above, was sweetened with cuff and collar sugar, both coffee and sugar being produced in the same way. The linen (after, of course, washing) was treated with nitric acid, which, acting on the lignite contained in the fiber, produced glucose, or grape sugar. This, roasted, made an excellent imitation coffee, which an addition of unroasted glucose readily sweetened.
By way of conclusion, let us "nail" a paragraph which still crops out occasionally among "scientific items" in country jourvals, and has reference to the synthesis of leather in tea, affirming that the addition of milk to the infusion of the herb acts upon the tannin therein, to form the leather.
The only difficulty about this statement is that milk does not contain a particle of gelatin, and hence cannot possibly form leather with trinnin; so the neat calculation of the number of pairs of ahoes which every human being drinks yearly is like the ownese of the subject of this article-without súbstantial foundation

THE GUERNSEY BREED OF CATTLE
From time immemorial the island of Guernsey has been famous for its breed of cattle, and a very just reputation it is, for there are few localities in Europe, and certainly none in Great Britain, where a more jealous care has been observed to prevent the mixture of foreign element. Of course, the isolated position of the island has greatly aided the inhabitants in their endeavors; in fact, we doubt if any but a locality so situated could, for so long a period, have preserved a breed so intact. The cattle are larger and more valued than throughout the world. They are exquisitely delicate in form colors varying from light red to fawn and dun, with a few black, each generally with white intermixed. The head is

## CAN WE MAKE DIAMONDS?

Mr. W. Symons makes ferric ether by mingling a soution of zinc chloride in alcohol and ether with liquor ferri perchlor. fort. (B. P.). In this ferric ether, oils, bisulphide of carbon, and other non conducting liquids may be brought under the influence of weak galvanic currents for many days. In many experiments, bisulphide of carbon was decomposed, resulting in a substance resembling spermaceti The question is asked whether pure carbon might not be crystalized out by some similar process.
mOLECULAR CHANGES OF MAGNETIZATION.
Professor Barrett finds that, just before an iron wire passes
a red heat, a momentary contraction occurs, and subse quently the expansion proceeds regularly. A momentary
what can be perceived by one sense at one instant, while the higher orders can comprise in one act of thought a series of successions in time. The highest animal can comprise in one act of thought an entire class of co-existents or uccessions, so far as to combine with a particular fact the common element of co-existence or succession belonging to the class.

NEW THEORIES OF VOLCANOES aND EARTHQUAKES
Dr. Vaughan endeavors to show that the terrestrial crust, if reposing on lava of a declining temperature, would receive accessions of buoyant solid material, chiefly on such points as extend deep into the fiery menstruum, and that the consequent growth of internal mountains would be inter rupted only by the occasional movements of this light mat


## GUERNSEY CATTLE

long and handsome. eye large and prominent, horns gracefully formed. For flesh giving qualities they are profitable, and for dairy stock they are truly excellent, yielding, on the average (if properly fed and'cared for), one pound of the finest butter per day throughout the year. The size is a fair average, and doubtless the breed would be much larger were it not for the peculiar treatment they have ever been subjected to. The farms of the island being limited in size, it is found necessary to tether the cattle, whereby they lose much of that exercise and freedom which would tend to larger growth. They are also, by this means, too frequently exposed to excessive heat or cold, being without the possibility of choosing then ecessary shelter. Notwithstanding these drawbacks, it is really remarkable how well the animals have always thriven. So great is the demand for this breed that, on an average, seven hundred cows and heifers, with about a dozen bulls, are annually exported.

We give herewith portraits of two fine specimens of this breed, from the pencil of Mr. Harrison Weir, a renowned painter of animal life, for which engraving we are indebted to The Field.

THE PROCEEDINGS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.
We continue below our brief abstracts of the papers read before this body at its recent meeting at Belfast, Ireland. deep sea currents.
Under this heading, Dr. Carpenter refutes the common idea that the Gulf Stream exercises an effect upon the cli mate of the British Isles. That current, he thinks, has nothing to do with the warmth of the winters. The bottom of the Atlantic is covered to a vast depth with icy cold water, caused by the melting of the polar snows. This cold water has a tendency to surge up on certain portions of the North American coast. A slow warm current travels up the western shores of Europe and Africa.
days a month long.
Professor Purser believes that the moon, in revolvin around the earth and drawing the tides behind her, cause the latter to act as a brake on the revolution of the glober, and he considers that it may be mathematically shown that this action is slowly but surely checking the earth's speed of rotation, so that the days and nights are gradually lengthening. In a thousand million years or so, they may become each a month long.
elongation happens if the wire is first raised to a white and then cooled to a dull red heat. If in the dark, at this moment the wire becomes invisible and ceases to glow, although the sources of heat continue unchanged; it glows again with a bright red heat. The same phenomenon takes place in nitrogen and carbonic acid. The greater the tension of the wire, the more marked is the elongation and contraction, and a very auible click, such as would be emitted by an iron bar when magnetized, is emitted by the wire. underground temperatures.
This subject is treated in a report by Professor Everett, in which it is pointed out that the average result thus far is that the temperature increases at the rate of $1^{\circ} \mathrm{Fah}$. in every 50 or 60 feet in depth. A very valuable set of observations has been received from a mine, 1,900 feet deep, in Prague, $\mathrm{B}_{0}$ hemia. The depths and corresponding temperatures are as follows:

| Feet. | Deg. Fah. | Feet. | Deg. Fah. |
| :---: | :---: | :---: | :---: |
| 68 | $47 \cdot 9$ | 1,290 | $58 \cdot 3$ |
| 299 | $48 \cdot 8$ | 1,414 | $59 \cdot 4$ |
| 621 | $50 \cdot 7$ | 1,652 | $61 \cdot 2$ |
| 939 | $57 \cdot 8$ | 1,900 | $61 \cdot 4$ |

indian and chinese tea.
Of these two productions, Professor Hodges considers that analysis shows the former to be the superior. . He also finds that with Indian tea fully 68 per cent of the mineral matter and 58 per cent of the nitrogen is removed in the infusion.

SPECTRA WITH THE OXYHYDROGEN FLAME.
Mr. P. Braham obtains good results by using a vertical oxyhydrogen jet and introducing the salt of a metal rolled up in thin paper. The length of time that the spectra lasts depends upon the length of paper used.

UTILIZATION OF SEWAGE.
The chief point of interest in Professor Corfield's report is that, during the year ending. March last, at a sewage farm, 37.7 per cent of the nitrogen brought to the farm in the sewage was recovered in the crop, the amounts during previous years having been 26.0 and 41.76 per cent. The differences were chiefly due to the fact that very different quantities of the crops were left standing at the end of each year.

POWER OF THOUGHT IN VERTEBRATES.
Dr. James Byrne considers that the difference between the mental action of the lower order of vertebrate animals and that of the higher orders consists essentially in the fact that the lower orders can comprise in one act of thought only
ter to positions much higher than those at which they wer first deposited. 'To the collision of such masses against the weaker parts of the earth's crust, earthquakes are ascribed Volcanoes are explained by quantities of silicious rock rising and eroding channels. The same spots of the earth's crust, being thus exposed to repeated inroads of intensely heated matter, would be reduced in thickness by the frequent fusion, and would present a weaker barrier to subterranean violence.
the science of education.
This was a paper replete with sound common sense, and received with marked attention, since it came from Mrs. Grey. It concludes with a plea for more experienced teachers, and an appeal for system in the art of imparting instruction. What is wanted is that teachers, like practical navigators, shall be furnished with the principles of a science they have not had to discover for themselves, and with charts to guide their general course, leaving to their individual acumen the adaptations required by special circumstances.
The meeting of the Association closed with a brief valedictory from Professor Tyndall, after which Sir John Hawk. shaw was chosen President for 1875, and the place of meeting for that year fixed at Bristol.

A Model City.-A curious piece of mechanism has been produced by an Amsterdam jeweler, called the "Great Mechanical City," and is twenty feet long by fifteen feet wide. There are houses, castles, churches, and stores in it, just as they appear in-almost any European city. People walk and ride about. Horses and wagons and railway cars pass through the streets. Boats pass up and down the river, while some are loading and others unloading at the docks Mills are in motion. A fountain plays in the public park, and a band of music fills the air with melody. There are also forts with soldiers parading about them, blacksmith shops with artisans at work in them, and pleasure gardens with people dancing in them.
M. Giffard, of injector fame, has invented a method of fitting railway carriages which eliminates oscillation. The carriage is suspended by powerful springs at each end; and at the trials recently made in the presence of some members of the French Association for the Advancement of Science, the carriage was found to be so steady that reading and writing could be easily carried on. It will shortly be exwriting could be easily carrie
hibited to the English public.
the fair of the american institute. Among
Fair is a

## hair heading machine,

the object of which is to straighten out the tangled combings of ladies' hair, arranging the roots all one way. The hair is placed on a rubber pad under a vibrating dull blade which has a kind of drawing motion. The edge of the blade engages against the scales or nap of the hair and forces such as it catches in one direction or the other, to meet endless canvas belts. Upright pins on the latter encounter the hair as it is pushed from under the blade, and, catching it, carry it along, thus straightening it with the roots outward.
One of the neatest little machines exhibited is a

## miniature knitting machine

made by Messrs. Tiffany \& Cooper, of Bennington, Vt. It is clamped to a table and operated by turning a crank which, rotating a little cylinder, causes a spiral cam slot therein to give to the five or six needles the required motion. The cost of the device is a trifle, and it knits such articles as watch guards, curtain cord, and dress trimmings rapidly, and produces a good article.
Another small invention of merit is a
self.lighting aas burner.
In this there is a little chamber beside the burner in which is placed a roll of paper, along which are dots of a harmless compound which will take fire by percussion. The end of this roll is carried up near the orifice of the burner; and by turning the cock, the uppermost match is lighted well
a slight blow, thus igniting the gas. The device works well a slight blow, thus igniting the gas. and remains operative as long as any of the roll of paper,
the end of which is constantly brought into position by very simple mechanism, remains. The cost of the apparatus is said not to exceed that of the matches ordinarily employed. mexers' rotary engine
of 50 horse power is exhibited, driven by compressed air. The working portions of this machine are remarkable for simplicity and fewness of parts as well as strength. There are in fact but three moving parts. The ring revolves on its own center in the cylinder, the piston arm is attached directly to the sbaft and passes through the ring in a movable bear. ing; and it terminates in two flukes resting against the inner periphery of cylinder, or one fluke if the engine be singleacting. There are no eccentrics, no springs, and no cams in the engine, and the wearing pieces are all heavy and sub stantial. The ring is merely a secondary part, as the power goes directly through the piston to the shaft. The machine at the Fair runs readily with an air pressure of $\frac{1}{2}$ pound. This engine will soon be illustrated in this paper.

## mcchesney's scroll saw

is a novelty in this form of machine. The frame is made something of an elliptical or flattened C shape. At points corresponding to the ends and middle of the C are pulleys over which pass a belt, the ends of which connect with the
ends of the saw, that is, the saw and the belt together form a triangle. To the middle wheel, mechanism is attached which gives it a to-and fro turning motion so that a reciprocating movement is thus imparted to the saw. The facility with which the latter can be stopped, and the ease with which it can be removed or tightened, render the machine a useful improvement.
Of the
new metal working tools,
there is such a great variety that we can do no more than point out the especial novelties in those which strike us as of merit, leaving to the reader, should he visit the Fair, to make more elaborate examination for himself.
There is a bolt cutter from Messrs. Sellers \& Co., in which the oil is pumped directly through the spindle. A drill grinder by the same firm has a neat device for clamping the tool, and an arrangement resembling an index wheel by which the lathe may be turned exactly over one half a revolution.
In the large collection of Messrs. George Place \& Co. is a 12 inch slotting machine, which has a new cam motion and in which, instead of the ordinary wheel on top, a rod is provided connecting with a bevel gear at that point. The rod has a handle which is convenient to the workman in front of the machine. In a car wheel borer, we notice a friction arrangement for the feed, the mere turning of a hand wheel throwing the latter on or off at once. There is also a conical bearing for the table, which will doubtless give a truer wear. In a 15 inch shaper, the novelty is a quick return motion, a cam being ueed, instead of an eccentric, which gives return and drops immediately. An adjustable table which can be placed at any angle is the feature of a new radial drill. It is pivoted to the bed by lugs, and a turn of the pivot bolt with a wrench holds it in proper position. It turns on a circular rack in which suitable gearing operate other side of the tool, to which the drill is easily swung other side of the tool, to whing
around in doing heavy work.
There is also a three-spindle bolt cutter which opens and closes its dies automatically. The bolts are merely started in and left to themselves; when they are cut to the required depth, they atrike previously adjusted mechanism which throws open the dies. This machine has also a new arrangement for the oil, so that the latter is alwsys drawn from the top and hence is pure, not requiring frequent changing. A six-spindle nut tapping machine has its taps so held that they are self-centering, this being effected by a very short squared portion and the holding mechanism acting upon a recess cut near the upper extremity. In using the machine
it is only necessary to keep feeding nuts under the taps until the latter are full. Then, by pulling down collars, the tools are instantly released and the nuts may be readily dropped off. A new axle lathe has two changes of feed, and the clutch instead, of being at the tail of the lathe, is between the two gears. The handle is so arranged as to be always convenient to the workman wherever about the tool he may ba, and there is a friction attachment acting on an expansion
box, which, enclosing the tail spindle, allows the latter to be readily and quickly set. We reserve mention of other machine tools for a subsequent article.
Among the entries which merit passing mention is a very fine display of

## WOODWORKING IMPLEMENTS

by D. R. Barton, of Rochester, N. Y., and a case of bolts from Hoopes \& Townsend, of Philadelphia. These exhibits are alike conspicuous for their intrinsic merit and for the exceptional taste shown in arranging them for show. We notice also that President Morton, of the Stevens Institute, contributes several fine mathematical and scientific instruments from the collection of that college, and that Professor Thurston is exhibiting his machine for testing the metals. Those of our readers who have profited by the Professor's very able articles on testing, strains, and similar topics, which we have lately published, will doubtless inspect with much intere this machine,now for the first time publicly displayed.

## THE INTERNATIONAL RIFLE CONTEST.

The trial of skill between six riflemen of America and six from Ireland, ended in a victory for America, the shooting on both sides being marvelous for accuracy. Two hundred and seventy shots (fifteen for each man at 800, 900, and 1,000 yards respectively) were fired on each side; and 4 points being given for each bullseye, the possible total was 1,080 to each competing team. The Irish party marked 931, and the Americans, previous to the last man's last shot, exactly tied them. Colonel Bodine was firing, and on him depended the result. He scored a center, 3 points, making a total of 934. We believe this total has never been exceeded. But the equality of the two scores was even more remarkable than this, as the Irish side lost 4 points by one marksman firing the wrong target, on which he made a bullseye.
We give herewith diagrams of the four most remarkable cores:
H. Fulton (American), 800 yards.

J. B. Hamiliton (Imisit), 800 yains.

J. K. Milafer (Iristi), 800 ratos

H. Fultox (Americas), 1000 yards


DECISIONS OF THE COURTS.
United States Circuit Courtw--Southern District of New York.
rbdreting apparatus.-the gilbert \& barier manu

## facturing company $v 8$. oakes tirrell.

Wooproff, Circuit Judge:
The bil heretn is flued to restrain the infringement of a patent granted to
J. Farkiter and
para




 Tne most 1mportant inventions ever made eonsist in subordinating
natural elements or controlling natural laws to the production of useful
resuits.

The complainant must have a decree for an
the usualturm.
Stanleev, Brown \& Clarke, for complainant.
Wetmore \& Jenner, for defendant.

## NEW BOOKS AND PUBLICATIONS.

The American Garden. Edited by James Hogg. Published monthly. $\$ 2$ a year
The October number is the second of a new sertes, which renders the present a favorable time to subscribe. The number before us contains a raising, and kindred subjects, accompanied with a descriptive catalogue of
and Dutch bulbs, illies, etc... appropriste to the season. Among these are many new varieties, with practical hints in their cuiture and management. In English Garden, that its namesake does in England. The information is adapted to our soll and climate, which renders it of special value to all lovers of flowe culture. It contalns the names and description of all new varieties of
plants and:bulbs, and occupies a place in floral literature opened by the plants and bulbs, and occuples a place in floral literature opened by the
sdvancement of American taste.
Elements of Descriptive Geometri. By S. Edward Warren, C. E., Professor of Descriptive Geometry in the Sassachusetts Institute of Technology, and Author of Series of or on York : John Wiley \& Son, 15 Astor Place. Professor Warren's books are recognized throughout the country as the
highest authorittes on all branches of practical geometry. His method of classifying the problems by which the whole science is elucidated is excellent, and shows the hand of a master in the difficult art of imparting instruction. Such books are needed now more than ever, when there is a
worldwide a wakentng as to the importance of technical instruction as a worldwide awakening as to the importance of technical instruction as a
branch of common school education. The book is admirably fllustrated ith num orous folding plates.
Politics and Mysteries of Life Insurance. By Elizur Price $\$ 1.50$. New York: Lee, Shepard, and Dillingham. The author of this excellent treatise has added to his great reputation a an authority on this important subject. It is stated that more than 500,000 persons, chiefly heads of families, have insured their lives in the Unite States, depositing their money periodically in the hands of corporation Who are alleged to be nearly irrespensible, while their constitutions and regulations are so complicated that persons wishing to discontinue the
insurances or to surrender thetr policies are nearly always victimized.
The Mother's Hraienic Hand Book, for the Normal De velopment and Training of Women and Children, and By R T Trall, M D au Diseases by Hygienic Agencies By R. T. Tralt, M. P., author
clopædia." etc. Price $\$ 1$. New York : S. R. Wells, 389 Broadway.
Dr. Trall is well known as the author of various excellent works on
hyalene. His views on diet, regimen, and dress are sound and generally cceptable.
On the Strengtif, Elasticity, Doctility, \& Resilience of Materials of Machine Construction, a Paper By Professor R. H. Thurston, Stevens Institute of Tech nology, Hoboken, N. J. New York: D. Van Nostrand, 23 Murray street.
A reproduction of several articles, of the highest interest and value whtch have already appeared in our columns.
The Western Photographic News, a Monthly Magazin of Photographic Art. Vol. I., Nos. 1, 2, 3. Chicago, Ill. Charles W. Stevens, 158 State street
This pertodical contains much news, domestic and forelgn, as to the pho tographer's art, and so ne valuable recipes and practicaldirections.
Cincinnati Industrial Exposition Catalogue (German Edition). M. \& R. Burgheim, Cincinnati.
Eighth Annual Report of the Master Car Builders' Association. New York: S. W. Green, 16 Jacob street
Inventions Patented in England by Americans. [Complled from the Commissioners of Patents' Journal.] From September 8 to September
.
button Hole Sewing Machine.-H. E. Townsend, Boston, Mass. Car Wheel.-E. B. Meatyard, Geneva Lake, Miss.
Cleaning Grain, etc.-G. E. Throop, Syracuse, n. Y. designs on Fabrics.-W. Engetsdorff (of Chicago, IIl.) London, Eng. Driving Sewing Machines.-J. Proctor, lioston, Mas
Governor.-C. C. Jenkins, Philadelphia, Pa., et al. Ironing Hats.-R. E. Brand, Plainfield, N. J.
Leather Rounding Machine.-H. F. Osborne, Newarl, N. J. Maching Giun.-W. b. Farwell, New York city
Material for Wilding Irox, etc.- - . Schiorloh, Jerssy City, N. J. Portable Gas apparatus. - W. F. Browne, New Yoft city. Printing Telegbape-G. W. Howe, Stevenson, Ala,
Propulsion of Vessels.-P. G. Devlan, New Yerk city Raising Coal, etc.-J.l. Bates, New York city. Sewing Machine.-H. P. Garland, San Francisco, Cal Sewing Machine.-W. S. Guinness (of New York city), London, England Surfacing Metale.-L. Bollman, Vifnia, Austria.
Wabing Macifin.-W. Scott et al., Chicago, ill.

## 

Henry Stimpson, St. Louls, Mo, Lathe Dog. Jogs in wheh are combied two rylng a jaw, and clamped togeth bolt. It consists in the application to the plates of serrations of such con-
struction as to cause the jaws at all times, when force is forced toward each other, and an improved construction and relative arrangement of the psrts by which all torsional or twisting strain is obviated, by directing the force applied to close the jaws in planes that pass

Improved Drill Joint.
John H. Bauser, Parker's City, Pa. - By this device, the connection of the drill joint is strengthened without increasing the size of the coupling or joint, and also the breaking of the joint and consequent expense in removing the shaft is to some degree prevented. The adjacent ends of both
parts are suffictently enlarged for greater strength of the jolnt, and one part is provided with a threaded screw ptn and a screw extension of smaller diameter. The socket of the adjointng part is recessed, threaded, and fitted for screws, securing, by means of the shoulders, a strong and intima
ce parts.

Improved Smoke Stack and Spark Arrester. spark arrester for coal-burning locomotives, which will not only prevent the escape of sparks, but economize fuel. There is an inverted pot over
the top of the flue, confined in any substantial manner. Attached thereto is a serles of concentric flanges. forming (together) an open pyramid, surmounted by a cap, and the smoke stack has a damond-shaped head. The into the inverted pot, and from that downward; the sparks falling, and the smoke, steam, and gases ristn g .
Harrison E. Smith, Portland, Oregon.-Th1s car
drawhead with weighted horizontal jaws swinging coupling consists of a connected to the drawhead by a vertical fastening pin. The paws are
recessed for the enlarged contcal head of the coupling recessed for the enlarged contcal head of the coupling link, and lock over
the same by the action of a diametrical cam on shoulders of the rear parts of the jaws. The cam 1 s keyed to a lateral shaft, turned into horizontal and held in position for uncoupling by the hook end of a weighted pivoted lever, which catches over a lug of the cam shaft, releasing the lug by the concussion of the drawhead, and producing the instant coupling of the pins to the link head.

## Improved Wagon Body

Benjamin Rankin, Jeffersonville, o.- This is a strong and durable wagon body, which may be readlly taken apart for unloading, or for the purpose of storage, while it is easily put up by any person, and forms a secure and
rigid connection of the stdes, end gates, and bottom parts. The detachable sides and end gates are firmly bound to the lateral bottom pleces by hinged hook bars of the same, swung in upward direction, and by stationary hook
bars of the sides, in connection with a longitudinal side chain applied by screw bolts and cranks. For the purpose of discharging any load at once, without the use of a scoop, the cranks are released from the screw bolts,
and the chains detached from the hook bars. The end gates are then taken and the chains detached from the hook bar
off, and the sldes ralsed out of their socket.

Improved Molding Machine.
Holldaysburg, Pa.-This invention
William F. Wolf, Hollidaysburg, Pa - This invention relates to an improvement in the means of connection between the treadle and the flanged which the molding cutter is attached. On the lowerpart of the mandrel is a griping clutch, which is carried forward or backward by a flanged pulleyfor turning the mandrel continuously in one direction by griping the flange of the balance wheel when it goes forward, and letting it go when it moves
hackward. This griping action is eflected by the form of the clutch, which shaped or triangular, for engaging the notched inner stde of the flange shaped or triangular, for engaging the notched inner side of the flange
when the clutch moves in one difection, but not when moving oppositely, and the other projection, which is round or smooth, serving to hold the

## Improved Printing Roll.

Franklin E. James, New York clty.-This invention relates to fastentng the figures of paper-printing rolls upon them, the rolls being made of lead figures upon the surface of the roll, and driving the brass pleces used to project sald outlines above the surface sharply into the cuts. Sald plecees
are prevacusly drawn down to a feather edge, to be caused to burr out on one or both the sides by being driven to the bottom of the cats, so as to be forced into the walls of the cuts to secure them in the rolls without the

Improved Lamp Bracket.
Charles H. King. Ond may be fastened by the base clamp to tion of the circle, and may be fastened by the base clamp to any object and
under any inclination, while adjustable upper arms and basket regulate the under any inclination, whire adjustabie upper arms and basket regulate the
hight and produce the horizontal position of the lamp. The flexibility of the bracket admits of its unlimitted and useful application for the vario

## Improved Flood Fence

David T. Deffen baugh, Lilly Chapel, O.-This invention is an improve-
ment in the class of flood gates whose lower fastenings are disengaged or ment in the class of flood gates whose lower fastenings are disengaged or
loosened as the water rises, thus allowing the gates to swing out with the which allo Which allow the gate to swing down with the current. Should, however
the panel not rise with the water, the pressure of the water against the the panel not rise with the water, the pressure of the water against the
upper part of sald panel will cause sald upper part to swing forward, which
will draw the latches out of the catches, when the panel will swing down with the current
Lemen J. Birgler, Cincinnati, Ohio.-This is a ment, for ment, for drawing off liquors from the barrel without the ald of a vent in
the bung or other part of the barrel. The vent works automatically in con tubeand sliding vent tube, and is provided at the inner end with a flextble rubber tube and floating valve, and with a second valve at the outer end,
through which air is drawn into the barrel when the faucet is opened.

## Improved Rein Holder.

John Royse, Dodd City, Tex.-This rein-holding device consists of a piv-
oted, vertically swinging camior locking jaw and a frame constructed oted, vertically swinging cam or locking jaw and a frame constructed
suitably for attachment to the dash board of a carriage. The two jaws are suitably for attachment to the dash board of a carriage. The two jaws are
carved on correspondlng or parallel lines, so that they bite the relns at the movable jaw economizes space, and conduces to strength.

## Willam S. Clapp, Carmel, N. Y.-This inventio

spout, composed of a tapering entrance spout, with a censists of a double at some distance below the slit. A supplementary tapering spout incases the former, and the whole is formed of a blank of sheet metal made of one oblong plece with triangular side extensions and lateral silt, to be bent
into shape aud soldered at the connecting edges, and then applied to a into shape avd soldered a
fare, letter, or other box.

## Improved Dle for Making Nuts.

James Hervey Sternbergh, Reading Pa.-The plece of metal is placed, in order to be compressed into shape, In a centrally perforated female die. A
centrally perforated male die is made to fit the cavity, their perforations registering, so that the holing punch may pass freely through both. The nut has an angle-sided projection on the bottom, so as to lock to the
washer which wul be used with it. In order to accomplish this, the male die is made with an angular internal cavity, corresponding to the form of

Improved Compound Railroad Rail. parts or sections, which are confined together by keys. A beveled surface
gives the head of the rall a good bearing, while the key holds the fol Sives the head of the rall a good bearing, while the key holds the foot In the parts of the web at suitable distances from each other, and stands at an angle of about forty-five degrees with the base, with its maln bearings on the outside of the web, and on the top of the foot plece.
Improved Hydraulic Jack.
Edward Blddle, Carlin, Nev.-This is a conventent implement by whtch
cross heads may be forced out of plston rods, bolts out of engine frames cross heads may be forced out of piston rods, bolts out of engine frames and cylinders, and similar work be done where only a small space is avalla-
ble for the application of the tool. The Invention consists of a hydraulic jack, constructed of a piston or ram, with packed end sllding in a tube, betng forced forward by the action of the liquid, which is compressed by a tightly packed piston fed forward by means of its screw bolt and a ratchet
wrench in a tube, under right angles to the ram tube and connected there with.
Improved Hemp Brake.
Thomas J. Dean and Montgomery W. Forward, Lawrence, Kan.-A car hus continually $\begin{gathered}\text { a ser } \\ \text { a }\end{gathered}$ the revolving beaters, so that they have a more efflcient action in the way
of striping the broken stalk from the fiber. The standards for the crushof stripping the broken stalk from the fiber. The standards for the crushing rollers and the revolving beater are pivoted to the bed frame, and they
areiconnected together by adjustable bars and braced, so that the revolving beaters and the stationary beaters can be adjusted relatively to each other

Improved lron Bridge.
fastened together at the edges by riveting them to angle same size, are or without a flat plate between them. They are arranged in the bridge with the corners of the chord thus formed lying in a horizontal plane, resting the end agatnst the vertical plate of the shoe, and on the bottom plate The suspending rods are attached by a yoke, embracing the lower stde, and bolted to another yoke on the top, and are thus connected without bolting
through the chords, except at the flanges. A top chordis composed of two angle plates, secured together by angle bars and a flat plate. The suspenangle plates, secured together by angle bars and a fat plate. The suspen-
slon rods are secured to the flange of the chord by a yoke and yoke-shaped

Improved Screen for Coal, Ores, etc.
Peter Hayden, New York city, and William B. Hayden, Columbus, Ohto.-
This Invention relates to a screen which is formed of parallel bars, rests on This invention relates to a screen which is formed of parallel bars, rests on and is revolved by a series of rollers having stationary bearings in a sultable frame. The bars are secured to the rims by stud pins on each slde,
which enter notches in the side of some of the rims, whtle the bars enter insideradial longitudinal notches in the rims, and are held in place by a ring bolted on against the bars at one end. The rims are connected together by long rods with tubes on them, extending longitudinally between to
keep them the requisite distance apart. This is a simple and economical mode of constructing the screen frame in sections, so that it can be length longltudinal screen bir or ongitudinal screen bars are constructed with beveled inner edges, and so
arranged that they will arrest thin pleces of slate as the screen rotates.

## Improved Middlings Purifer

lsts of a series of horizonta crrcular sleves, one above another, on a hollow shaft, with a hopper or funnel below each sieve. A discharge gutter is placed at the periphery, and a
fan blower ts connected with lower end of the hollow shaft. All parts are fan blower is connected with lower end of the hollow shaft. All parts are
so contrived that the sir blows up through the steves from below, and, together with the centrifugal action of the sleves, which have an oscillating the gutter, while light matters to pass off over the edges of the sleves ducted by the hopper to the center of the next sieve below, in a manner calculated to be very efficient in separating the impure matters from those sutable for regrinding.
Thomas J. Massic, Arrington, Va. - This inven
suspending a cylindrington, va.-This invention relates to mounting hell, and to providigrical trunk on trunntons so sis to revolve within a when removed from the shell or trunk case

Improved Throttle Valve.
Ethan A. Gates, Burlingame, Kan., assignor of one half his right to Sanford R. Leonard.-The packing is an elastic ring cut longitudinally, and
confined between the shoulder of the valve and below the nut at the top, and is made to snugly fit the valve cylinder. This packing ring is expanded fided with three ports on the sides of the valve. When the valve is on it eat these ports are closed, and when the valve is raised the steam passes through the ports into the chamber, and is discharged into the steam pipe
attached to the shell. An oil tube passes down through the shell delivers oil to lubricate the valve. This valve is balanced by the pressure of steam upon its sides, so that it works up and down with out undue fric tion, and always works steam tight.
Improved Water Wheel.
Frederick W. Tuerk, Jr., Berlin, Can. This is an improved water wheel
which may be run with a very low head of water, which shall be free from wheh may be run with a very low head of water, which shall be free from water. The invention consists in curved and pivoted buckets, having water. The inventor whed wedge-shaped recesses in its iso formed in the rim of the wheel beneath the upper part of the buckets. There are curved slots in the partition plate and two sets of openings. With this construction, when the water is admitted through the chute, it flows through the one set of openings, being gulded by a ring flange, and enters the wedge
shaped recesses. It thus forces the buckets outward, so that the wate haped recesses. It thus forces the buckets outward, so that the wate
that enters through the other set of openings may strike against the buckr that enters through the other set of openings may strike against the buck
ets and drive the wheel forward. As each bucket enters an enlargement of the case, the water flows past them and strikes against the rear sides of buckets, closing them before they can strike against the sald flanges chutes.

## Henry A. Gouge, Nmproved Ventilator Register.

enter the ventlle streams, so that tt mag fue in a body, instead of belng broken up into small ported on posts in front of the register, and its distance therefrom may be and suded as desired. Inside the register is a valve hinged at its lower side which it is placed.

Improved Car Step.
José Medina,Cordova, Spain, at present residing in New York city. Office 62 Water street.- Each step is so arranged that by moving a hand lever the conductor can ralse it or turn it on hinges so as to cap over the edge of
the platform. On the entrance or exit of the passenger the step the platform. On the entrance or exit of the passenger, the step is lowered, and the weight of the person, acting on suitable levers, moves apring
pawls and through them a ratchet wheel governing a dial above the car door, which registers the fact. In addition to their office of operatirg the
registering apparatus, the steps prevent passengers getting on or off the cars at will, whereby many accidents are avolded. They are also a check
chen on the conductor, since a fallure to raise the steps while the car is in mo-
tion would be considered equivalent to an attempt to defraud the railtion would be c
road company.

## Improvement in Mounting and Setting Guns.

James L. A very, Madison Court Hoase, Fla., assignor to Walter E, Avery same place.-This invention is a spring gan for setting to be discharged by
game or by burglars; and it comprises a stand for holding the gan, with holder and clamp for attaching the gun to the stand. There is a breech plece of a peculiar construction, whereon the lock is mounted, adapted
forattaching to any gan; and a batting trigger for causing the game to fire the gun by its efforts to get the bait. The lock is provided with means for

ring tor which letter patent were rranted to to amoment on the carrage pen elliptic spring are connected by yokes around which on the yokes, and to one end of eachis attached a block for the other end on the yokes, and to one end of eachis a attached a block for the other end attached to the centers of the upper and lower parts of the elliptic spring,
and the ends of which rest upon the arms of the oval springs. These are and the ends of which rest upon the arms of the oval springs. These are
slotted to recelve bolts, by which they are kept in place laterally, while slotted to recelve bolts, by whtch they are kept in place laterally, while
being allowed to slide longitudinally when the spring is put under.pres-

## Cevedra B, Shproved Furniture Caster

 struction of the socket for fitting in the furniture leg to recelve the spin-die of the caster wheel. It consists of the lower part of the socket, particularly the flange or collar which fits against the furniture leg, and having the chamber or channel for the anti-friction balls formed of a disk of sheet metal stamped in the shape required. The upper portion is formed of a
plate of metal bent up in a tube and connected to the disk. This socket 1s are required than canwell be made in one plece of sheet metal by stamp. Ing or pressing the flange and the socket in one.
William W. Crawford, Delaware, O.-Tbis is constructed in a strong and neat manner, and made more comfortable hy giving greater play to the
feet. The arms are supported, back of the front legs, by separate supportfeet. The arms are supported, back of the front legs, by sepa
ing pleces connecting the side rounds or stretchers and seat.
Improved Horseshoe.
Luther W. Griswold, Marshalltown, Iowa.-The object of this invention the horse's he horse's hoof without nalling or resorting to the blacksmith; and it conof dovetalls at the heel and a screw at the toe. By turning down the
screw the shoe is securely fastened, and may be tightened at any time by screw the shoe is securely fastened, and may be tightened at any time hy
putting a cloth or rubber cushon beneath the foot. By loosening the crew the shoe is readily removed
$\underset{\text {, Newton, Mass. }- \text { A hollow ca }}{\text { Improved }}$
Samuel W. Johnson, Newton, Mass.-A hollow cavityis made with a file路 the sight opening, or above or below, or on two opposite sides of it. The end of a match or
other phosphorescent compound is revolved in the cavity, with sufficient pressure to scrape off enough of the phosphorus to partlally illuminate the

## Improved Windmill.

 Jacob L. Rust, Millersburg, Ill., assignor to himself and Oliver A. Bridgford, same place.-Th1s invention is provided with a regulating device
which begins to operate when the wind strikes the face of the wheel and ide vane with such force that the action of the weight on the same is over throwing thereby the wheel back the main vane. The great and the mer of the wind, the smaller dscomes the angle between the wheel wheel. The wheel turns thereby more and more the outer edge of its Wings toward the wind, so that its effect on the wheel is not increased, but
the speed of the wheel kept up at a regular rate. When the wind dimin. the speed of the wheel sept up at a regular rate. When the wind diminregulating thus the speed of the wheel in a simple and effective manner.
Philip Oswald, Smithsburg, Md.-Thts invention relates to certatn im.
Pared provements in car couplings, and is a new and improved arraingement that s adapted to the construction of any of the ordinary cars, is simple in de-
sign, substantial in its construction, and possesses, in consequence of the ame, great durability. It cansists of a drawbar having upon its front end passes when the coupling is effected, and upon Its rear end a downwardly extending lug. Sald abutment has behind it a cushton of rubber held be-
tween the same and the bumping sill of the cars and the sald lug of the tween the same and the bumping sill of the car, and the sald lug of the
drawbar presses against a rubber cushion in front of it, the same being disposed inside a clevis-shaped plece just in the rear of the bumping sil ${ }^{1}$ and securely bolted to the framework of the car upon the sides. Said draw-
bar has upon each side a flange, upon white rest longitudinal plates at tached to the framework, by means of which the drawbar is fastened to the same.
Horace S. Breeden, Barry, Ill.-A double shouldered catch 1 splvoted in a recess of one blade so that it may readily turn around in a small arc. On catch, on one when the blades are closed and on the other when they are open. In order to hold the catch and projection locked, elther when the
blades are closed or open, a mall spring is attached to the inslde of the power arm of the lever blade, and caused to rest against the surface of the catch.

## Willam Flynn, Scotland, Mo.-Thed Gate.

onnected together and move simultaneously, one to the right and the otherto the left. These are provided with truck wheels, on which they applying power to etther part of the gate, the parts will move to either open or close.

Improved Sun Dial.
George Mehr, Philadelphia, Pa.-This invention relates to a novel con
truction and notation of dial by which the correct time of day may be hibited by the sun in a position ficlined toward and conventent to the passer-by on the streets and thoroughfares of cttes and towns, enabling all without difficulty or delay to perceive the solar time

Improved Car Brake.
Mobile, Ala.-This Anvention
John E. Worthman, Mobie, Ala. Canism on the tender view if the brakes of a train witha mechanism on the tender or on the truck locks the brakes, so that the latter will be at once allowed to assume a position out of contact with the wheels. It also consists in a novel mode
of automatically ungearing a drum-winding worm wheel or pinion with of automatically ungearing a drum-winding worm wheel or pinion with
an endless worm or screw which rotates it, so that the brake lever will be an endless worm or screw which rotates $1 t$, so that the brake lever will be
locked at a given point and the brakes operated with a given pressure. Improved Saw Swage.
Alonzo G. Rouse, Jacksonville, Fla.-Through the stock at the bottom is perfectly round. The other pin has one flat side, and ts so acranged that the same may be at such an angle with the inclined end of the recess as the inclination or taper of the tooth may require. The point of the
saw tooth is placed between the pins, and blows with the hammer upon he stock will cause the pins to form small transverse grooves in the Ides of the tooth. The swage is then adjusted to bring the point of the ooth between the Inclined side of the flat ended pin and the inclined end
of the recess, when one or more blows will bring the point of said tooth to the proper form, obliterating the grooves formed by the pins and finish Improved Goda Water Bottle Stopper.
Horace S. Carley, New Fork city, assignor to himself and
Horace $s$. Carley, New York city, assignor to himself and Samuel w Saxton, same place.-This is an elliptical nozzle of a bottle for soda water
with a seatat the inner end of the inside for a valve and a stopper of equi valent form, made of light material which will float on the liquid. A selt cosing stopper is thus obtalned that can readlly be put in and taken out
 bar hung over the canal, for carrying a sliding clutch and pawl. It is con-
nected, by a lever rod, with a crank of the driving shaft of an engine placed n a boat, so that the forward part of the crank shaft rotstion moves the sliding clutch, whlle, by the rear part of the crank shaft rotation, together
with the action of the pawl, the boat is propelled in a forward direction.

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ry. Keystone Portable Forge Co., Phlladelpha, Pa.

## 




 can lacquer brass by followipg the directions on p.409, vol. 30. -W. G. B. Will find that the calctination of plas:
ter is deseribed on p . 399 , vol. $29 .-$ E. H . will ind excel-
 firlng a moving gun has often been discussed in our col.
umns. $-J$. . . should consult a manuacturer of tur-

 gineer.-J. W. H. WIll find on reference that we have
frequently yven rules for the areas of steam ports,
which have been determined by extensive practice., W. R. WIll tna a description of the process of enamelge Iron vessels on p. 199, vol. 28.-W. T. H. will find a
rectpe for ink on p. 106, vol. 27. .L. N. E. will find directions formaking a cheap telescope on p. 7 , vol. $30 .-$
F. B., who asks as to backing a train up an incline, does
 for making root beer on p . 138 , vol. 31 .
(1) W. H. S. asks: Is there any material
 cast metal in in or 1s there any way of preparing plaster
of Parts os that tit will be hard and smooth enough for Trat purpose? A. We do not think of anythnng that Will answer your purpose as well as plaster of Pafis,
vhich is commonly used. Try solution of alum In place
 $188 u e$. . What size of wheel is sultable for an engine
2x12, for a tug boat and what size of boat would ixili, for a tug boat, and what size of boat would be
best for such an engine? 4 . Wheel 4 or $4 \%$ feet in d1. mout To feet long
(3) H. C. W. Says: I recently saw a lumiHow was it constructed, and does it need the electric
lght to produce the effect? A . The apparatus Is what 18 known as a vertical lantern, and may be constructed
s follows : Into a small metallic box. open as follows: Into a small metalile box. open at one side,
18 placed a mirror at an angle of exactly $455^{\circ}$. The mir-
ror should exactly eft hand side to the lower right hand side, and facing the open side of the box. Into the top of the box 18
fitted a plano-convex condensing lens. The lantern 18 tited a plano-convex condensing lens. The lantern
place in the fountann, and the light from outside is
trown upon the mirror, which refiects it up throug the cosdenser and soorlumines the fountañ. It ts not necessary to use the electric light, as the lime light will fully answer the purpose, though the illumination will
not be quite so brilliant, still 1 t will be much more
(4) J. B. G. asks: How can I make music by rubbing the fingers on the top edges of goblets?
Will common glass do tit? A. To produce tne sounds you describe, select a large goblet, uniform in thick-
vess and as thin as possible. FIll it, say, one thrd cull
 ean and free from grease. Dip the eecond finger in
the water and dmmediately apply the under surface of he last jonnt to the upper edge of the glass, moving
lowly around or to and fro with a somewhat flem
 a continuous monotonous sound, which may be varied
y incress by increasing or diminishing the quantity of water in
the goblet.
(5) L. . S. Says: The entrance door of my
dwelling is flanked by two cast ron columns 13 feet dwenilg 18 hanked by two cast fron columns in feet
high and of foot diameter; and flnding that my two
compases andmy compasses and my galvanometer were inaccurate, I ap.
proached these columns with the compass and immediproached hiese coumns wint tre compass and imedi-
ately the compass turned in such a way that tt teritied
Oersted Oersted do sam, showing the columns to be north at the
base and south at the top. Then I found that the three base and south at the top. Then I found that the three
hinges inside of the door were permanent magnets,and also that the large ron stove in the midale of the room
alt
vithe vertical plpes) was a magnet would it (With the vertical plpes) was a magnet. Would it be
possible to use the large magnets for experiments, and would they be strengthened by connecting them with battery? A. The pillars, standing perpendicular to the
earth, become polarized by tis Inductive ninfuence.
Tis Their magnetism, however, 18 extremely feeble, in not an exception. We would not recommend the u of a battery in connection with the pillars, for the rea-
son that such pillars (cast Iron) when once magnetized son that such pillars (cast tron) when once magnetized
could not be readily demagnetized, retaining tora time sunficent restuan mannetism to endanger dellicate
pieces of mehalsm (such as watches etc.) by inducive thnfuence.
Ihate
Inave made a magnet of nine plates of sheet Iron Inches long and $1 /$ Inch broad, bent in the form of $a$ hors
shoe. The plates are covered with a thick wire. Thit magnet has only half the e owwer of a a solid m magne..How
could I make it more e owrful? A. By the passage of he current through the wires, every plate is converte Into an individual magnet; and, as in this case, ilike poles
are opposed to each other, the effect, if the plates were
(6) S. J. C. asks: What is your opinion in (6) S. J. C. asks : What is your opinion in frutt, parttcularly berries, on sandy soil! I have muck
nnd land plaster. Would it be advifable to compost and land plaster. Would it be advieable to compost
the bone dust with either or both of these articles, or would snperphosphate be better? A. If you use muc
and land plaster it would be better to use with then
 be drawn out in the fall and allowed to stand In a heap
one witterbef ore using. The proportion of superphos-
 ume of year, etc., A good wo
tural Chemistry,", by Johnson.
(7) J. B. T. . says:
eagle that had been winged. ception answered fully the naturallst's description of the gray eagle. The next year, one white feather ap.
peared where beak and feathers unite. The white has ontinued to increase each year, and for several years the brrd was an unmistakable Amertican or bald eagle
The time of transformation occupled perhaps elght o nine years, during which I frequently called attention
to the subject. Are naturalists not a littie at sea in
to tuls matter? ant in never been found In any more southern locality on
han
thns sontinent. Your specimen 1 s undoubtedy the bald th1s continent. Your specimen 1s undoubtedly the bald
eagle (halictus leevococphaulus) which, when young, has

 one foot in a minute of time. Will you be k nd enough
to inform me what 1 s thest result acomplished tin practice with pliston engtnes and pumps, and whether a greater percentage is obtained by rotary engines or
not? A. The best results obtained with direct acting steam pump, , at a test made at the American In nttitute
Fatr in 1867 , was an efflicency of a litte more per cent of the power applited. A test of centrifugal pumps at the same place, in 1872, gave, as the best re
sult, an eflieiency $681 /$ per cent. The tests of the two sult, an effleiency of $63 /$ per cent. The tests of the $t w o$
kinds of pumps, however, were conducted in such a (9) J. H. B. akks: Is there any known pre njury to the skin? A. There are several varletes of
reckles. Your best plan would be to consulta a physician, who can determine what is the best method and
 nown asser ted by vo.A. that a suppositious ball dropene ter of the earth, provided that frictional or retardng media, such as arir. etc.,. be eeccluded.", A friend, with
whom . A interchanged speculation, contended that "the ball, on arriving at the earth's center and losing est without passing the earth's center." You "thclline to V. A.'s oplnino." If we suppose the earth to be a
hollow sphere, and admitt V . A .'s conjecture that the all'smomentum will carry. it beyond the earth's cen ter, the ball would de acted on by two forces, namely,
its welght, or disposition to return to the earth's cen. ter, and its inertia, or tendency to keep on moving
rom tit. Havig pased the earth's center, a potnt might be reached where the two forces are equal, and the rexust then would be the rotation of the ball about
ts axis and its revolution around the earth's center; petal forces, which keeps the planets tn thelr appont nted
orbits, would operate on the bal!. we know that the endency of the earth to fall toward the sun 18 coun. teracted by its rotation, which 1s the tendency to fy
from the sun. Is it not analogical to suppose that the disposition of the ball to 'liy from the earth's center, tically operate to produce rotation:and revolution? A. he velocity acquired by the body in falling to the center of the earth, under the supposed conditlong, would
be just sufficlent to carry it through to the other vercoming the attraction towards the center. When It reached the other side, It would come to rest,and then the atraction would cause 1 t to return to the center.
This is not an analogous case to that of the motions of he planets in their orbits.
(11) F. D. X. asks: In a cellar under a feet from the corner of the house. I want to conuct the water from the well to back part or house,
pump. Pump is about 40 feet from well. How can it be done? A. Use a good house pump, with pipe sult.
able for its connections, and be careful to make all the able for tits connections, and be careful to make all the
joints of the suction pipe tight, and lay tit with as few
(12) W. C. asks: Is the forward eccentric in which the back ecentric is placed? A. No.
Is the cylinder of a Baxter engine placed within the smoke box or within the boller? A. In the boller. Can I enter a machne shop as a machinist after two
or three years' study at Cornell Universtity? A. Proba first.
(13) C. H. M. asks: What composition is used in metallic cartriages, to make them take ire when
truck? A. A mixture of equal parts by weight black sulphuret of antimony and ch
 Chts purpose also a mixture of amorphous phosphorus
and chlorate of potassa is used. The neeale gun cart Idge contalns a mixture of chlorate of potassa and Ing fulminate of mercury. The following is a good pre.
paration: 16 parts of chlorate potassa, 8 black sul paration: 16 parts of chlorate potassa, 8 black sul-
phuret of: antimony, 4 flowers of sulphur, 1 charcoal powder, are molstened with either gum or sugar water try either the a bove or a mixture of chlorate of potassa and amorphons phosphorus are used.
(14) G. M. Says: 1. In looking over the no common difference bet ween the varlous numbers of tgnally? Were they just fixed on by hąhazard, or 18
in
 The gages appear to have been fixed at random, as you suggest, and the extensive use of the Eng lish gage in
this country 1 no doubt due to to ts earller introduction 2. Would it not be better to have a wire gage with a
ommon difterence between the numbers say the 10oth
 mechantc could comprehend? With the gages now
nuse, thereare few men who kno nuse, thereare few men who know exactly what any A. There would be many advantages from the use of a egular system, such as you mention. One such plan 1s
liready adopted by many of the manufacturers in this Country, who use vernier callipers, and measure thelr
Work by inches and decimals, frequently working to
(15) N. L. asks: Which runs with the least Does the friction double if the size of the bearing is in-
creasea to twice the diameter? Two of us have a little dispute; one claims that if the size of the journal is
increased, the friction is also increased; the other says his ss not so, and quotes your article e (extracted from the National Car Builecer) on p. 258, vol. 30, betng a test
f car axles, one having 314 inches bearing, the other earing beting $3 \%$. The one with the largest bearing Dok the least power to propel. A. If the pressure on he two bearings is the same, and is not excessive tn either case, and both are equally well lubricated and
un at the same speed, the work of friction of the
arger journal will be wice that of the other. In the experiment referred to, it is not improbable that, with the larger journal, the lubrication was so nauch more than in the case of the $31 / 4$ journal.
(16) A. B. W. asks: How can asthma be lan in your vicinity. There is nothing in the treatment (17) E. C. B.says: It was lately stated, in a dally paper, that a goblet, perfectily sound in appear-
nnce, full of water, was placed on a table about two eet under a gas burner, by a girl who came in to light
保 gas. With one hand still resting on the goblet, she turned the stopcock with the other, allowing the gas to
escape for an instant. Then, touching the match, the as flashed, and the goblet instantly flew to pieces. Can ence of beingmo
(18) F. W. M. asks: In bringing water from tire distance, weuld anything be gained by starting
from the spring and running a few rods with a larger rom the spring and running a few rods with a larger
ine than would be used in the remainder of the disance? Would any more water come through a half ach plpe if the first few rods were 3 . inch pipe, than
ould come through if the entire course were only ch? A. There would be a slightly increased delivery y be very slight. (19) F. S. C. asks:
350 Fah.? A. Slightly. : Is water compressible Are there any jig saws which move the board being ann, automatically, to cut out the patterns? A. No.
Are there any engines with more than two cylinders? Are
Of wha tuents are: Nicotine, nicotianine, restn, atbumen luten, gum, nitr
What is the size of the largest engine in the world?
A. Cylinder about 108 inches by 14 feet stroke (20) S. H. R. says: I have some old gold, ith soft solder. What will take it off? A. Hold it ove hot gas or alcohol flame, suffictent to melt the sof
older but not to affect the gold. When the solder bout melted, give the head of the cane a quick jerk, (21) T. O. Z. asks: Is the gas frem a gasoas? A. It would be necessary to have the gases ana-
yzed, and see which contalned the greatest amount of

(22) F. E. says: In your patent law book it usually done by means of a piston), the pressure
he atmosphere will cause the water to rise in the tube a hight of 30 feet." 1 . Would another arrangement mething like a blacksmith's bellows, fixed on the top
the tube, withdraw the alr out of the tube and con the tly raise the water? If so, what should be the size of the bellows in proportion to the tube? A. Yes that of a common pump. 2. What forse (given 1 ounds) would be required to withdraw the air out o er thus raised? A. Tue work would be the same a ar thus raised? A. Tue work would be the same a the required hight. 3. Does the water rise as quickly
the air is exhausted? A. Yes. 4. Would there be ny difference.In regard to the size of the pump tubes? xhaust the larger of two tubes.
(23) B. says: I have a cloth awning which pots began to appear on it and holes appeared in the enter of each one, making the a wning look as if a scattering shot had been put through it. The spot
seem to be caused by a rotting of the cloth, which seem to be caused by a rotting of the cloth, which
breaks away easily. How can I stop it? A. If not too
late to save it, try the plan of soaking it in strong




(25) E. H. M. says: Spirits, such as Hol mant in the oritinal cask for 6 or 12 months, becomes
tinged or coloreat trom the wood, which deterilorates
 hue. What, if anything, will remove the objectionabl
color without deteriorating its value? A. The color an a mber tint obtained from the cask, which we were
not before a ware affected the value of the spirits. The astringent propertles arealso increased by the same
means, but we know of no method to make the liquo means, but we know of no met
colorless, except re-distillation
(26) M. F. M. asks. Is there any instru means, equally
tion? A. No.
(27) J. J. S. asks: Can I use a portable en
gine. of a smallsize, for heating a store room 30 fee square by steam, and also run the engine for half a not usually very efficient, except with the forced draft ue to the blast. A boller made especially for heating
purposes would probably answer better. Subscription o the Scientitic ameroan
(28) I. T. H. asks: Will the United States Are there anylines of ships (Irading to England) built ar England, owned in America by Americans, and regis tered in America? A. No foreign built vessel can be
registered in the United States. There aresome steam stip lines that are largely owned in this country, but
(29) J. asks: How can I build an ice house
o hold eight tuns of ice? A. Erect a bullding above ground 17 feet square on the exterior; make an interi-
or compartment in the center of the same 6 feet square on the inside thereof; make both the interior and ex terior walls 12 inches thick, by setting up 2 by 10 inch
studs, about 2 feat apart in the interior walls and 3 feet apart in those of the exterior, and then cover the exterior and interior of each wall with one inch boards
with tight joints, if tongued and grooved so much the better. The outside frame will require a foundation
feet deep in the ground; therefore excavate the interirand make the floor of the ice house say' $21 /$ feet be or the surface of the ground. Make the hight on the
ont
interior 8 feet in the clear above said fioor, and coninterior 8 feet in the clear above sald floor, and con-
truct a strong level celling of boards secured to prop truct a strong level celling of boards secured to prop
er cross bearers. Then fill in the two frames with dry saw dust between the interior and exterior boarding, and lay simillar filling upon the celling boards to a hight
of 12 inches. Pave the floor with cement concrete raded lowest at the center, and provide a good drain ocarry off the water. Put a high pitehed ordinary to exterior of roof for ventilation of interior of ice room. Make exterior and interior doors in these walls,
lined with canvas and filled with sawdust. Fill the inerior chamber with the ice, laid upon a few ralls to weather, and throw water upon it occasionally to freeze it together. You will then bave a cube of ice of 7 feet,
which will contain something more than 8 tuns, and which will have the protection of a 3 feet air chamber
or passage all around it. This 3 feet chamber will be r passage all around it. This 3 feet chamber will be etc., in summer, care being taken to have the door to
it opened as little as possible. This also answers E. S
(30) J. A. H. asks: What will save cloth
ing from moths better than gum camphor or cedar wood? A. There is nothing better
What will remove (without
mall worms or black heads in a person's face? A."'The treatment requires the employment of such meansa areatment requires the employment of such means ate
are calculated otimulate the skingentiy, and excite
it to the due performance of its proper functions. The it to the due performance of its proper functions. The
parts affected should be saturated with soap and thor-
oughly washed; they should then with a rough towel, until the skin be felt to glow, and this should be repeated twice in the day. The immedi ate effect of this treatment may possibly be a red and patchystate of the skin, whith will speedilly pass a way
It would be well also to extend the ablutions and disease in one part is indicative of a generally torpi disease in one part is indicative of a generally torpia beneficial. In severe cases,bichloride of mercury in an Skulsion of bi
(31) A. L.
tarh curable? D. asks: Is chronic nasal ca tarrh curable? A. Sometimes it is cured. Consult
Ntemeyer's " Practical Medicine," vol. $1, \mathrm{pp}$. 286-282. (32) A. P. asks: How can I look at the sun
with a commonspy glass without hurting the eye? A. Place a disk of dark or smoked gl.
per rings inside the eyepiece cap.
(33) C. A. S. asks: What kind of machine and should I go into in order to become a master me
chante? Ought to go to college first? A. Go to the nathat
ege.
(34) V. A. asks: Is the moon's orbit round
the earth in the same plane as the orbit of the earth round the sun ; and if not, what is its greatest diver gence, expressed in degrees?
inclined to the ecliptic $5^{\circ} 8^{\prime \prime} 48^{\prime \prime}$. . The moon's orbit is
. I have heard it as serted that the moon shines with great brilliancy dur ing the arctic winters, but fail to account for it other
wise than by a departure of at least twenty degrees in the lunar orbit from the plane of that of the earth A. The moon's greatest distance is 253,263 miles, least
221,436 , mean 233,885 . The polar winter alternates with fortnight of 8 . The por wher or six months.
(35) J. C. H. asks: What is the best non
conductor for filling the walls of a refrigerator? $A$
(36) E. L. M. asks: How is spermaceti puing large cavities in the'head of the sperm whale. The onl
dilute removecion of potassa, and the spermaceti is ob tained as a white solid, which fuses at $120^{\circ}$ and cry
izes on cooling, in beautiful, broad, pearly plates.
(37) J. M. asks: What do actual and nom-
nal horse power of a steam enfine mean? A. Nominal horse power is calculated fom assumed conditions, generally very different frorn the real
(38) A. B. C. asks: Is there a book that
ives instructions on casting toys, figures, etc., in plaster of Paris? A. We do not know of any such work.
Whatis Parian marble? A. Parian marble is an unglazed statuary porcelain, similar to English porcelain, more silica. The color is a very slight yellow; the sur ore is waxlike
(39) G.T. O. SRys: I ask your opinion in
agard to the construction of a water filter, and would ill hold about 3 best possible form. I want one tha ow shall I place it? A. The engraving represents very good filtering apparatus, manufactured in Eng

and; you can have one like this made of any desirable ze. The best material for the box would be soapston
he next best material, iron. Mott's cast iron tan plates come of a converfent size-18x18 inches and 9x18 nches-these may be galvanized or coated with slate paint. But Passaic water cannot be purfifed by filter-
ing alone; the following (which we wrote in 1866 in anng alone; the following (which we wrote in 1866 in an-
wer to a correspondent in reference to the water sup. pled to, Phtladelphia) will also apply in this case: "If ur correspondent is willing to take the trouble, he may obtain pure water by distilling, filtering, and aerating. Get a simple still to set on a cooking stove, and distil eshly burned charcoal to remove the volatile odors that come over, and finally agitate it in the atmosphere so that it may reabsorb its supply of air to make it parkling and palatable. A simpler process for obtaing pure water is to melt ice. This process is employed heir own familles, to avoid the danger of lead poison om their water pipes
(40) J. S. B. asks: Can nitric acid of a spe hort of anhydrous nitric acid? Books of reference lace the specific gravity, obtained by evaporating the
cid to its greatest density, at 1.521 . A. To our know ledge there is no nitric acid of so high a specific grav
(41) B. A. S. says: I wish to make a teled what sized lens shall I putin, to see at the distance of 15 or 17 milles? What kind of material shouid it be
made of? My object lens will be about $21 / 2$ Inches. A der to chase screw threads properly in thin bra ubes. See previous answers to correspondents for (42) A. D. C. B. says : 1. A friend of mine this so? A. Yes. 2. Is it more unwholesome than
he other sorts? A. No. All are equally deleterious (43) D. McD. says : I send you a plan for pumps, founded on the theory that if an air pump tha nll exhaust a receiver to $1-100$ of the density of com on air be placed under a receiver,already similarly e ity of the common air. A. We do not see that an
dvantage is obtained by this multiplicity of pumps.
(44) S. Says: A segmental brick arched rected over a creek at Pougbkeepsie, N. Y.; It crosse the same at an angle of $52^{\circ} 10^{\prime}$, making the distance o he skew about 34 feet. Do you know of any brick or
tone bridges placed at or near the above angle to be bult in horizontal courses or as you would build a rect ngular bridge? Is it possible to bulld one in horizonta courses at that angle with any certainty iof the arch
sustaining itself for an indefinite periud? A. We do sustaining itself for an indefinite periud? A. We do
not know of any skew bridges built in horizontal uch conanence. Edward Dobson, c. E., in his " Treaticer Masonry and Stone Cutting," pubils hed by Weale, has xemplified fully the nature of the twist required in
uch arches. A brick arch, when oblique, as you reuire, would be best bullt by laying the courses at right angles to the sides of the centering, depending upon
the latter entirely for the shape of the sottit ; the strains he latter entirely for the shape of the sottit; the strains would then be properly recelved upon the abutments
and the bridge would be secure.
(45) J. P. \& Co. ask: What cement will do
thl a corn burr? A. Try a mixture of dust from pow. dered French burr stone, alum, and water. Back up
he stone with plaster of Paris. Your cheapest plan, the stone with plaster of Paris. Your cheapest plan,
owever, may be to send the stone to a manufacturer
(46) A. R. asks: Will coal tar applied to ence posts before setting render them much moredu-
rable? A. Yes. It will render them insect and damp
(47) L. M. says: I have a hop vine which
cimbs around the pole from east to west; and near by are pole beans which turn from west to east. What
the cause of the difference? A. It is a principle is the cause of the difference? A. It is a principle of
plant life for plants to wind themselves upon the first plant life for plants to wind, themselves upon the first pons of support,
my face? A. We know of no preparation espectally What do the terms "speciffc gravity" and "equiva
(48) A.F. C. Says : I have a 3 inch achroma-
tic object glass of 48 inches focus, and am desirous of constructing a celestial eyeplece of as high a power as
will stand for use in a telescope. How must $I$ arrange ? A. Rule for Huyghenian eyeptece of any power: D1Ide the focal length of object glass by the power re-
quired. Quotient doubled $=$ focus of field lens. One third of focus of field lens = focus of eye lens. The two lenses are separated two thirds the focus of field ens. Both should be plano-convex, with curved slde to meter of fleld lens. A diaphragm is placed at the fo
cus of the eye lens. Your previous enquiry was and cus of the eye lens.
swered on August 1 .
(49) H. B. C. asks: What food gives the
most nutriment to the brain? most nutriment to the brain? A. No one material cai
beconsidered best ; that tuiting at one time may not beconstereat best ; that tuitting at one time may not
at another. That food tis best for the brain which is
best for the bods, prodtcing best for
sano.
If he If heavy cannonadtng causes ralnfall, what is the op
eration of tit A. It has bees rest eration of it? A. It has been proved an absurdity. Is the expression "the cold is too grat for snow"
true or not? A. The expression is not true, some of the heaviest snowstorms in this latitude having taken lace in the very coldest weathe.
 crank tn the middle of 1 of 4 fuches throw. Our fore man says the key seat for the driving wheel or pninon
on the shaft should be upon the same side of the shaft with the crank, asit would give advantage of leverage and less stress upon the key. Ithink it makes no
difference. Who is right? A. It makes no difference where the key is. The key seat, however, Is generally
cut in such position as ls most conventent to chuck the教 to
(51) J. J. S. asks: What book would you ordinary common school education? I wish to study
the use of steam, especially applied to marine engines. the use of steam, especially applied to marine engines.
A. Get Bourne's "Catechism" and "Recent Improve-

## onts of the

(52) G. B. Q. says: I append the principal
dimensions of two pairs of compound surface condensing engines, which I will call No. 1 and No. 2. Engine
No. 1 is rightly proportioned, and engine No 21 to to be buitt in the same proportions, with a reduction of nches in diameter of high pressure cyllinder, and nches in the stroke; but it Should all the parts of No. 2 be reduced in proportion st the cylinders are reduced, and do you consider th No.1, the steam ber for No. 2 sufficientin proportion t n condenser of No. 1, and on inside of tubes in con in coner of No. 2? No. 1 has the advantage of sea water r for condenser, thedffe, whe No. 2 hat 80 highe

Dtam. of high pressure cylinder...33 inches $\begin{gathered}\text { Engine No. } 2 \\ \text { 30inche }\end{gathered}$ Diam. of high pressure cylinde
Diam. of low pressure
 1,500
Tubes in surface condense.................200
Length of each tube in surface con-
 Steam cut-off at..................... 25 Inches 25 nches
A. From stmple examination, we should say that the roportions of No. 2 condenser are rather small, if No. of No. engine could be improved. Of course, if you
think of building an engine of this size, you should en think of building an engine of this size, you should en-
$\underset{\text { lass, so as to stand blood heat? }}{\text { (53) }}$. Try damond ce (54) H. C. N. F. and F. G. IH. call attention to an error in our answer No. $28, \mathrm{p}$. 202 , current volume, The speed of the bo
(55) C. I. asks: Why is not the power of and safer? A. Atr engines of any conside
Why is not electricity used as a motor? A. It is
What has become of the one rall project for rall roads? A. The inventor is, by last advices, trying to
(56) A. F. L. W. asks: 1. How can I tell a re ordinarily used, a low pressure engine has a con air. 2. How can I tell the horse power of any engine A. It can only be ascertained with perfect accuracy by
means of experiments. We have frequently given les for experiments. We have fre
(57) C. F. T. asks: How hot can water be ing point of ; water is $212^{\circ}$ Fan. But as the pressure de

Which will freeza in the shortest time, hot or col
Wer, and
(58) W. L. asks: A friend and I had a dis
(te on the cause of the different seasons. He say that they are caused by an eccentric motion of the
earth, ard I claim that they are caused by the axis of the earth belng inclined $2311^{\circ}$
Who is right? A. You are right.
(59) E. B. W. asks: Into how many orders re the various curves divided, and upon what princi-
le is the division made? Do the conic sections contitute a distinct order? What curves belong to each of the various orders? A. You will find this matte try. It would occupy too much space, and is too strictly mathematical to justify its consideration in these
(60) R. O. B. asks: Who saved the Great Eastern during her first outward voyage? A. Mr.Ham-
iton E. Towle recovered a claim against the company Great Eastern.
What is the best work on geometrica drawings? Is Rhelm's book a good one
and Miniffe's books are good.
guire sufficlent know ing room? A. Yes, in an humble position at first. then the arc and which a person can ind the radiug
(61) A. R. asks: What machinery is needed is no such machinery in the market. If you write to a
naker of philosophical apparatus, or advertise, you may possibly be able to have a machine constructed. (62) J. P. P. asks: Where can I get draw-
ings of engines, low and high pressure and compound, with the details in full? A. N. P. Bergh's. work on the marine engine, with appendix on compound engines, gives detalls of many English engines. Weissenborn's
works give detalls of American engines, condensing and
$\underset{\text { (63) J. S. P. asks: What is the best mode }}{\text { or manner of improving the acoustics of }}$
 they be, in a room 79950 feet, with a celling 19 feet verhead. There are 21 feet of risng seats and no
pulpt; the speaker stamds upon the tloor., The sound of his voice echoes and feverberates to that extent ays. What is the scientific remedy? A. Try the wires on the vertical wall opposite the speaker; place them run horizontally 6 luches out from the wall and 6 ches apart. If this does not sufficiently break the
orce of the echo, place a similar series in the two side walls extending from the back of the church where the walls extending from the back of the church where the speaker
ing. Yo
room.
(64) W. C. Says : I have a cistern in which the water smells so badly that it is impossible to wash
with it or to use it in any way. My house is surround d by water maple and horse chestnut trees. The cisdern has lately been thoroughly cleaned, and has also sually covered the mouth of it, making it airtight to y, but still the water is unfit for use. Can you give ere is remedy for the trouble? A. Are you sure that efective cover or runs near it or leaks the drainage of surface water into it? Are your roofs clean and pe, and may not surface water enter by some break ure of; because, if you have a clean, tight cistern (65) J. A. C. asks: In a steam hammer,
bhat would be the diameter and stroke of cylinder, dithe welght of hammer on end of piston rod, for
dinary ship work? Could I elevate the hammer by a spi!gg pole, and use steam on top only ? A. Cylinder 4
nches diameter and 12 inches stroke. Weight of haminches diameter and 12 Inches stroke. Weight of ham-
mer, 250 lbs . It would be best to raise the hammer by steam.
$\underset{\text { (66) C. W. W. McC.—Try a weak solution of }}{ }$ (67) P. F. D. asks: How is the dull black, sachm bichloride of platinum in one ounce of water nd add a grain nitrate of silver. Clean, polish, and
warm the brass. Apply the solution with cotton wool ubbing until dry.
(68) G. W. C. says: I would like to ask
L. M. how he could straighten a rifle barrel from the outside if the bore was not in the center? Riffe barrels are usually welded up from a flat bar with a small hole in the center, or as near the centeras can be but never
xactly in it. After a barrel is forged, bored, and polshed, it is straightened from the inside (not outside) hen a circle is struck on each end, and it is fintshed from
hosecircles from end to end. Before a barrel is straight ened the bore has many short crooks, some not over 3
nches long, and perhaps some less. Those crooks canot be taken out with the wooden blocks and vise hoot co shoot correctly, must be perfect for a footat the muz
le, but it is not so important for the balance of the warrelperfectly straight to make a good shooter. There iffle. The best of gunsmiths cannot make a good shot

Minerals, etc. ceived from the following correspondente, and examined with the results stated:
A. K.-No mineral has been received under this name
C. I. Only one parasite was found in the box. By use f the microscope, it wasfound to resemble a common an scale bug, devora of legs; but whether these were anting naturally or were broken off, we cannot say. ibly it is unknown. The con tents of the box were in a
ery poor condition when recelved. When Kansas and be adjacent States and Territories become as thickly ettled as the Eastern States, there will be no more
danger of locusts there than here.-W. A. S.-The plant orvine sent by you ts the climbing wild hemp (mikania scandens), very common in the middle portion of the
Southern States. We know of no law or rule for the southern States. We know of no law or
direction of the spiral of a climbing plant.
N. S. asks: How can I put solder up in -A.D. asks: How can Imake soda water?-O. C. H. lack, and green after a little exposure to the weather. How can I prevent $t$ t
lack ink powder?

## COMMUNICATIONS RECEIVED.

The Editor of the ScIE cknowledges, with much pleasure, the reeipt of original papers and contributions pon the following subjects :
On Aniline Black. By M. B. C. G
On the Texan Stinging Lizard: By T.L.W On Type Setting Machines. By On the Recent Rifle Match. By - B. On Cross Cut Saws. By A. H. I.
Also enquiries and answers from the follow ing:

HINTS TO CORRESPONDENTS.
Correspondents whose inquiries fail to apear should repeat them. If not then pub ished, they may conclude that, for good rea ons, the Editor declines them. The address of the writer should always be given.
Enquiries relating to patents, or to the patanility of inventions, assignments, etc. will not be published here. All such ques tions, when initials only are given, are thrown into the waste basket, as it would fill half of ur paper to print them all; but we generally ke pleasure in answering briefly by mail the writer's address is given.

Hundreds of enquiries analogous to the following are sent: "Who sells the Leeds heater? Where is the cheapest and best shop to get small metallic articles manufactured? Who buys gold, silver, or copper coins? Who publishes books on tanning? tained? Where can artesian well machinery be ob horse power well drill? All such personal enquiries are printed, as will be observed in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

## Index of Inventions

 NOR WHICELetters Patent of the United States September 15, 1874,
and each bearing that date.

## Alarm.grist, G. H. Eastman.

 Axle boxes, die for making, W. S. Ward..Bale tie, cotton, O. D. \& E. C. Woodbury
Barrela, dressing Bee hive, T. \& G. W. Robinson Blader, temporary, W. H. Bennett..
Boat, steam canal, W. \&. Waxter, Boats, propelling, W. H.
Boiler, T. W. Weathered
Boiler feeder, P. T. Brownell
Boller, steam, J. L. Knowto Boller, steam, J. L. Knowton.....
Boller tubes, cleaning, W. S. Von
Book case partition, J. P. Adams. Book holder, Furr \& Knaus ..........
Boot and shoe heel, M. H. Prescott Boots, forming stiffeners for, L. Cote.............. Boring machinery, earth, W. H. Salyer.
Brick machine, J. Goodman. Brick machiue, J. Good
Bucket ear, A. Sperry..
Car brake, rallway, L. T. Pyott
Car coupling, c. L. Horack.
Car coupling, M. Jarrett.
Car spring, A. Bridges (r)
Carbureter, J. McHenry
Carriage, Thompson \& Grie
Carriage and wagon brake, W. H. H. Snelli......
Carriage step. Keene \& Sawyer
Chatr, opera, J. Richardson...
Chairs, foot rest for, M. Eberhard
Chandelier, drop light. Buc
Churn, H. G. Hall.
Clgar making machine. F. Haebnel..
Clay retoris, maklag, W. D. Clift Coal chute, J. W. U
Cock, gage, J. Smith
Coftee cleaner and grader
Current wheel, M. Mecarty
Cutter stock, manufacture of, A. M. Howe.
Desk, J. D. Mcrtimer...
Drawing protractor, etc.,., S. M. York...
Edible compound or apple honey, L. Hur Effervescent liquids, crawing, F. W. Wie
Eugine snd motor, water. S. Wilmarth..
Engine, electro-magnetic, Bastet \& Gaum
Engine rotary, Gibsch
Enge, rotary, Ginson d Cheney.............
Eyene, compound condensing, J. Houpt Fatr box, C. M. Cooledge...
Feather duster, G. W. Hibb Feather duster, G. W. Hibbard
Fence, flood, A. C. Burner
Fertllizer distributer, etc., M. Coope
Fertilizing machine, Dexter \& Pond. Fire arms, breech-loading, L.C. Rod Fire arm, re volving, W. Mason.
Fork, horse hay, E. Harrison.
Furnace for roasting ores, S. M. Wesse
Gage, iron ship builders', J. McPhall.... Game apparatus, G. H. ITeland...
Gate, sutomatic, H. P. Haskins. Gute, automatic, J. A. Treat.
Gate, farm, J. S. Hughes.........
Gear-cutting machine, G.M. Ho
Gear-cutting machine, G. M. Holmes...
Generator, carbonic acid gas, Glove fastening, J. F. Fleld
Grain binder, J. H. Morse .......
Grain binder, J. L. \& W. Skell Grooving mackine, A. Davis...
Harness indings, M. E. Zeller. Harro w, M. McNitt...............
Harvester, corn, R. B. Robbins
Hatchway, self -clo
Hinge for gates, etc., spring, C. A. Warre
Hinge for safe doors, etc., H. B. Tripp.
Hook, check, J. Thornton
Hook, check, J. Thor
Horse power, J. S. Schofield..
Horse protector. R. P. Lawton
Hose anchor, J. B. Farrier.
Hose nozzle, Gassett and Bels
Indicator, station, H. Shaw...
Jack, liftug, J.O. Joyce
Lantern, kaleddoscopic, F. Hartmann
Lath machine for sawing,
Letter box, P. Acquadro.

Lime, preserving, W. s. Sampson.......
Lock for doors of jall cells, P. J. Paul Loom for weaving hatr cloth, J. Turple Millstones, dressing, Johnson \& Terr Millstones, dressing, W. P. Uhing
Mitering machine, s. Willams Mustc leaf turner, Cohen \& Die Musical instrument insulator, W. R. Miller. Nozzle, C. G. Wheeler
Oar lock, G. L. Stack............
Pan forming sheet metal, w.
Paper bags, making, E. J. Howle
Paper pulp regulator, R. Hutton Paper pulp regulator, R. Hutton ..........
Paper pulp,cuttIng wood for, T. N. Egery Pen, R. H. Chinn.
Pen and pencll case, R. M. Collard.
Penctl sharpener, J. S. Hall.
Picture frames, mat for, H. S. Hale. Pipe joint, P. Ball (c)
pes, cast Iron, W. Smith.
 Plow, carriage, s. B. Peugh ...............
Plow for covering corn, w. H. Grant.... Plow, wheel, C. B. Stevens

Press, cotton,J. T. Burr...
 Propeller, screw, P. M. Blatchley..
runing implement, W Millspaugh Pump, s. c. Midlam..
Punching sheets of metal, T. H. Drury Raft, life, B. Almonte.
Rallway switch, street, A. L. Johnson. Rallways, removing snow from, J. Mullaly.. Rake, horse hay, H. Myers.
Refrigerator, W. Clevelan
Rofrigerator, w. metallic, M. Wiles
Sash holder, H. A. Blake.
sah holder, F. E. Brown
Sash holder, P. G. Wright.
Saw set, O. Newton (r)...
Sawing laths, machine for, T. N. Eger
Scaffold, French \& McFadden
Seed dropper, C. W. Haucke.
Seed1ng machine, S. G. Randal
Separator, grain,F. M. Fish..
Settee, folding, J. G. Bliss
Sewing machine, R. H. St. John.........
Sewng machine treadie, R. F. Willcox...
haftings, bearing for upright, B. E. O. Orton Shoe-brushing ma
Skate, R. H. Earle
kints, machne for printing, H.J. Davies.
 Stair rod, H. I Iversen......
Steering wheels, brake for, Stoves, safety water back for, J. E. Robinson Sugar mold, G. B. Ockershausen位ting machine, R. H. Thurston. Tebacco pipe, J. Mackintosh
Tobacco press, J. M. Gaston.
Towel rack, R. B. Taylor.......
Transplanter, N. McLeon..........................
russ, hernial, N. Jones........
Tmbrella tip holder, D. Elkan
alve, H. D. Lockwood..............
Vhicles, neck yoke for, L. Biddle
Vessels, plating for, J. McLaugh
Watch, stem-winding, MeNaughton et al.......... Watches, lever escapement for, w.
Water wheel, turbine, J. E. Safford
Water wheels, preventing freezing,H.S.Akins. Weather strip, W. D. Knox..
Wheelbarrow, J.G. Harrison... indow screen frame clasp,J. W.D.and H. Kelle Wood-planing machine, A. Davis................. 151, 1547

APPLICATIONS FOR EXTENSION.
Applications have been dulyfled and are now pending
for the extension of the following Letters Patent. Heartor the extension of the following Letters Patent. Hear-
ingsupon the respective applications are appointed for Ingsupon the respective applicat
30.910.-P1APER Folder.-C. Chambers, Jr. Dec. 2.
30,955.-Cuting Button Holes.-F.C.Leypoldt. Dec. 2 30,929.-Tobacco Cutter. - W. H. Pease. Dec. 2 .
30,931.-Spinning Frame Cyinder.-R. Plews. Dec. 0,993.-Wood Planing Machine.-H.D.Stover. Dec.

EXTENSION GRANTED DISCLAIMER

## 070.W

 DESIGNS PATENTED 7.757-B Burial Casket.-G. H.Rinehart, Allegheny,Pa.
$7,588 .-$ Table Glass.-L. Stoehr, Pittsburgh, Pa. 7,758.-Table Glass.-L. Stoehr, Pittsburgh, Pa.
, $759 . \sim$ Spoon Handles.-G. W.Hull, Wallingford, Conn.
$7,760 .-$ HARNEs Rosette.-F.Reynold etall.,Newark,N.J. 7, $760 .-$ Harness Rosette.-F.Reynold et al.,.New
7,761.-Grocer's CAN.-C. C. Warren, Toledo.
7.762.-OMNIBUs.-A، Wright,St. Louls, Mo.

TRADE MARKS REGISTERED. 1,978.-Catarri Remedy.-N. S. Coon, San F'clsco, Cal.
1,999.-CANNEd Fruit, etc.-G.M.Howell, Trenton,. .J. 1930.-Sugar.-Matthtessen \& Wlechers Refining $\mathrm{C}_{0}$ Jersey City, N. J.
1,981\& 1,982.-BREAST PUMPs.-O.H.Needham, N.Y. clty.
1,983 - GLoves.-Wirbel et al., New York clty. 1,983. - Gloves.-Wirbel et al., New York city ,984.-Arratrd Beviragr.-J.R.Champlin,Laconia,N.H



## 155,043 SCHEDULE OF PATENT FEES.

 On each Caveat....On each Trade Mar On fllng each application for.......................... On 1asuing each original Patent...
On appeal to Examiners-1n-Chief. On appeal to Examiners-1n-Chief........
On appeal to Commissioner of Patenta. On application for Relssue................
On application for Ertension of Patent. On application for Extensio Ongranting the Extens. On filing a Disclaimer.....................
On an application for Design (3\%/ years) Onapplication for Design (7 years).
On application for Destgn (14 years).

## CANADIAN PATENTS.

## Libt of Patents Grantied in Canada

 SEPTEMBER 21 to 25, 1874.3,820.-W. G. Entrekin, Yhiladelphta,Philadelphia coun ty, Pa., U. S. Improvements in machine for burnishng photographs, called "M
tographs."
Sept. 21,1874
3821.-J, T. Waring Yo. Win N. Y., U.S. Improvement in the treatment of felted woven, and spun fabrics, called "Waring's Improve Treatment of Felted, Woven, and Spun Fabrics.' Sept. 21,1874 .
3,822.-J. H. L. Wllson, Sherbrooke, P. Q. Improve ments on crib actachnt for Bedsteads,", Sept. 21,1874 3,823.-D. Dodge, Keeseville, Essex county, N. Y, U.S. Improvements on machine for cold-finishing horse
 Nall Machine." Sept. 21, 1874
Mass., U. S. Improvements on tri Mass., U. S. Improvements on trimming or cutting Trimming or Cutting attachments for Sewing Ma chines. street cars by compressed air, called "Bowers" Apparatus for Propelling Street Cars." Sept. 21, 1874. ,886.-J. L. Clark and J. Stanfild, 5 Westminste provements on floating docks and pontoons, called "Clark \& Stanfield's Improved Floating Dock." Sept. 21, 1874.
s,827.-T. P. Ford, Brooklyn, Kings county, N. Y., U. S.
Improvements on shlps' berths, called "Ford's Self Improvements on shlps' berths,
Balanced Berth." Sept. 21, 1874.
3,828-M. L. Barclay, township of Willtamsburgh, Dundas county, Ont. Improvements on washing machines, called "Barclay's Washer." Sept. 21, 1874.
3,829.-J. R. Whittemore, Chicopee, Hampden county 3,829.-J. R. Whittemore, Chicopee, Hampden county,
Mass., U. S. Improvements on horse hay rakes, called Mass.,
"Whittemore's Horse Hay Rake." Sept. $21,1874$.
3830 . U. S. Improvement on electric signals and stgnai lamp locks, called "Rousseau's Improved Electric Railway Signal." Sept. 21, 1874.
3,831.-J. Lawrence, Palermo, Halt
provement in reaping and mowing county, Ont. Im "Lawrence's Improved Shoe for Reapers and Mowers." Sept. 21, 1874.
3,832.-W. C. Stone, Almonte, Lanark county, Ont.
Improvements on brush dusters, called "Stone's Duster." Sept. 21, 1374 .
on gridirons, called "Walker's Dominion Double Grid 1ron." Sept. 21, 1874.
3,834.-O.W.Taft, New York clty, U. S. Improvement
on steels for sharpentng knives for Sharpening Knives." Sept. 21,1874.
for Sharpening Knives. Sept. 11,1874 .
3,835.-W. Foulis, Glasgow, Lanark county, Scotland
Improvements on machinery fur charging retorts Improvements on machinery fur charging retorts,
called Foulis' "Retort Charging Apparatus."
Sept. 21 , called
1774.-
$3,836 .-\mathrm{G}$
prov. S. Walker, Erle, Erie county, Pa., U. S. Im provements on washing machines,
"Washing Machine." Sept. 21, 1774 .
Improvements Improvements on exhaust regulators, cal
gory's Exhaust Regulator." Sept. 21, 1874 .
gory's Exhaust Regulator." Sept. 21,
B838.-J. N. Lander, Concord, N. H., U. S
T.M. Farrington, same place. Mechantsm for ralsing and revolving the driving wheels of a locomotive steam engine, called "Farrington's Locomotive Ec
centric and Valve Adjuster." Sept. 21,1871 centric and Valve Adjuster." Sept. 21, 184,
provements on a machine for breaking ice, called "McMicken's Improved Ice Pick." Sept. 21, 1874 . 3,840.-C. H. Farley, Portland, Cumberland county, Me., "Farley's Locomotive Fire Box." Sept. 21,1871 . 841.-S. Hoyt,Magog,Stanstead county, P. Q., àssignee
of S. Rexford, same place. Improvements on stag. Egs, called "Rexford's In proved Staging." Sept. 21

provements on welghing scales, called "The Compensating Compound Beam scale." Sept. 21, 1874 . 3,843.-H.Pry or, Woodstock, Oxford county, Ont. Im. provements in milk cans,
Milk Can." Sept. $21,1874$.
 of matter for cleansing or purging bollers from the coating or scale whtch collects on the inside thereof
called "The Britanna Scale Purgative." Sept. 21,1874. U. S. Improvement in flower pots, called "Improve ments in Flower Pots." Sepc. $21,1874$.
s,846.-C. C. Wolcott and W.W. W. Wood, Washington,
D. C., U. S. Improvements on generating and apply ing Moti ve Power," called "Wolcott's Motlve Power." Sept. 21, 1874
ker's Dominger, Oakville, Hatton county, Ont. "BaNo. 16.) Sept. 21, 1874. Improvements on land rollers, called "Shafer's Im proved Land Roller." Sept. 21, 1874.
clothes. Scotine puller and fastener, called"Scott's Clothe Line Lock Pulley." Sept. 21, 1874.
3,850.-J. P. MacLean, Brooklyn, Kings county, N. Y.
U.S. Improvements on clasps for uniting the fronts of corsets, corselets, or stays, called "MacLean's Im proved Corset Clasp." Sept. 21, 1874.
,851.-D.Lockhead, Hochelaga, Hochelaga county,P.Q Improvements on mowing machines, reaping macalled "Lockhead's Combined Mowing and Reaping Machine." Sept. 21, 1874 .
,852.-T. Haynes, Kansas, Jackson county, Mo., U. s Improvement on lubrieators for rallway car and othe
axles and journals of shafts, called "Thomas Haynea axles and journals of shafts, called
Lubricating onl Box." Sept. $21,1875$.

 ments in hydrocarbon burners, called "Wellug ton" B.855.J. Currie, st. Thomas,




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 tng wheat, called " Gordonts combined Wheat Grad






W63.-G. R. Shepardson, La Crosse, La Crosse county
W1s., U. S. Improvements in machine for laths, called "Shepardson's Lath Bundling Machine. Sept. 25, 1874.
$864 .-$ P. Huff, East Gwillimburg, York county, Ont Improvements on a machic for restraining breech ,865.-J. Parker, Toronto, York county, Ont. Machine for heating and applying wax to thread, called "Parker's Improved Wax Thread Heater." Sept.25, 1874.
B,866.-W. P. Tenny, Boston, Suffolk county, Mas . im provements on distnfect and granulng ant Package." Sept. 25, 1874
U. S. Improvements on combined walking andy, O.,
U. S. M. Gustin, plows, called "Gustin's Combined Sulky and Walking plows, called "Gust1n"
Plow." Sept. 25, 1874

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