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## NEW YORK, JULY 4, 1874.

[ 83 per Annum.

## IMPROVED DOVETAILING MACHINE.

In 1839 Ari Davis obtained a patent for a machine for ma king a miter dovetail joint. Upon that device, within a few $y \in a r s$, improvements were made and also patented. These were followed by other modifications, added by Mr. Asahel Davis, the brotber of the inventor, each augmenting the capacity of the apparatus, and all ultimately uniting in the production, at the prosent tim9, of thə machine which forms tbe subject of our engraving and of the following descrip. tion.
are actuated by the pulley, $P$, which is arranged to slide freely along while revolving with its shaft.
The bjard bsing placed as we have described, is carried over the machine in the direction from left to right in the engraving; and during its passage both of its ends encounter certain cutters and saws, which form it in the shape represented in the portion, X, shown to the left, on the floor To understand this operation, it is necessary to consider the action upon each end separately, and therefore we will begin
proper miter. A tool at K next forms the upper half of th female dovetail, and anotber saw, at L , finishes by making the lower half of the same. If now the piece, $X$, be cut diagonally in two, in the direction of the spiral dotted line, and its dovetailed ends fitted together, a third piece, $Y$ slipped into the inside dovetail, formed by 1 and 4, com pletes the joint, which appears as in the second sample piece, $Z$.
All the various heads belonging to the cutters which we have described are arranged with set screws, so as to be ad


In briefly summing up the capabilities of the device, we may state that it cuts to length and squares and dovetails both ends of the boards operated upon, at onse, requiring them to be paseed through buta single time. It can be cl anged for different length of stock while running, as easily as the guide on a saw bench. The dovetailing is accom. plished on any bevel, angle, or flare, with great accuracy, and a rabbet or groove is aloo cut for an inside corner. It is claimed that the machine will prepare boards so as to make from six hundred to one thoueand cheap boxes per day of ten hours, doing its work in cross-grained or knotty lumber as well as upon clear stuff, and with very little more expenditure of time. It is well a dapted for casket and coffin work, ornamental box work, and for the manufacture of trays, hoppers, moldings, picture frames, cornices, patterns, and, in short, of all flared and many-sided objects.
Roferring to our illustration, Fig. 1, at A are feet which serve to hold the board to be operated upon firmly in place. These are connected with levers which pass through standards, and the play of which is regulated by the stt screws, B. In order to raise or lower the feet, so as to place or release a board, the outer lever arms are connected with a can bar, C, to which a bandle is secured. By carrying the latter from a vertical to a horizontal position, the bar, C , is turned, thus raising the lever arms, and so forcing the feet firmly down upon the work.
The bcard rests upon traveling ways, one of which, $D$, moves upon the outer portion of the frame of the machine. The otber moves upon the frame, E, which is arranged upon a support haviog a motion transveree to the apparatue, eo that the waye may be adjusted to suit varying lengthe of boards to be cut. This adjustment is effected by means of a horizontal rack connected to the moving frame, in the teeth of which engages a pinion rotated by the crank, F: Upon the bar of the fiame, to which the pinion is recured, is marked a suitable index, by means of which accurate adjustmente may be made. The cutters and tools upon the moving frame
ide the machine This, it will be observed, has the male jugtable to cut the dovetailadeeper or wider, and in order to portion of the dovetail, which, when being cut, rests upon the traveling piece on the frame, E . As the stuff is carried along, it is first met by the cutter, $G$, which forms half the insidedovetail, which is marked 1 , in the sample piece, $X$. A second cutter on the arbor, $H$, then makes the lower hali of the male dovetail of the miter joint, marked 2. At I, a saw and cutter are so arranged that the former cuts off the

board and thus determines the length of the male portion of the dovetail, while the latter, a thick tool, forms the other e entering portion, 3 , thus finishing the end.
The other extremity of the board is first met, as before, hy cutter similar to $G$, which makes the other half of the in side dovetail, 4, then by a saw, J, which cuts the end to the
justable to cut the dovetails deeper or wider, and in order to compensate for wear.
In Figs. 2 and 3 is shown an attachment for guiding boards at suitable inclinations to the same, so as to be mitered to any desired angle. This consists in a table, $N$, hinged in the middle, the angle formed by the parts of which becomes greater or less as the movable way is carricd further from or nearer to the stationary one. The board laid upon the in clined surface is presented to the tool at the angle to which the table is adjusted. In order to cut the edge for flaring work, such as hoppere, caskets, etc., after the table, N , is placed in position, the location of the board may be altered so that the miter is made diagonally instead of straightalong the end, by resting the piece against a guide, O, Fig. 3, which the end, by resting the piece against a guide, O, Fig. 3, which
is locked in place by a set screw, which passes through a is locked in plac
alot in the table.
alot in the table.
The machine represented is c!aimed to be well adapted fo
then the joinery of flasks, ordnance boxes, feet for furniture, and ice chests. For samples of the joint which it makes, the in ventor refers to the refrigerators made by Mespre. L. H. Mace \& Co., of this city, which may be found in the stock of almost every bardware dealer. The principal improvements of the machine were patented May 19, 1874. For further particulars, address Mr. Asahel Davis, 16 Middlesex atreet Lo well, Mass.

A Power Supplying Company.-The Rochester (N. Y) Ay Power Supplying Company.-The Rochester (N. Y) more than half a million of dollars' worth of real estate ; it car ries on no manufacture, but rents its buidings to various manufacturers, supplying the power to them frcm the water flowing in the river beside the shops. A short time ago the rock was cat so as to make a deep well, and two of the largest water wheelf, yielding over 1,000 horse power, were placed therein. It is the intention of the owners to add avother wheel, which will swell the power attained to over 1,500 horse power.-Commercial Bulletin.

## Srientifir gemerican.

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## TETRINE.

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## HOT WEATHER AND HYDROPHOBIA

Dog days are sorry days for dogs. Not that the sultry season brings any distemper to them, least of all hydrophobia; but it does to Dogberry. As surely as warm weathe returns, so surely are petty magistrates all but universally amitten with a sort of caniphobia, which knows no remedy but that instrument of canine torture, the muzzle. How the delusion originated, there is no telling. It is equally hard to tell how it survives in the face of experience, statis-
tics, the protests of the intelligent, everything, in fact, that tics, the protests of the intelligent,
ought to influence the official mind

The canny juryman had twenty-three good and sufficien reasons to offer for the non-attendance of a brother juror.
The first was: "The mon's dead, y'r honor." Reasons as nu merous if not as cogent may be given for opposing the law that dogs shall not be suffered at large without a strap over the nose or some similar device for closing their mouths, at the time when an open mouth is most essential to their health and comfort. It is enough to say that the enactment is useless as a precaution against danger from canine madness.
Dogs do not go mad in public places. For hours, perhaps days, before the outbreak of the disease, the victim skulk within doors, hiding in dark places, under furniture, in mangers, and the like. Unless the muzzle is insisted on as a permanent fixture, therefore, it is no safeguard whatever The distemper is developed at home, where the muzzle i not worn, and the rabid animal escapes to run amuck at a stage when muzzling is impossible. Besides, the dogs which do the most mischief are commonly pets, house dogs, and table dogs, not allowed at large, and therefore seldom or never subject to municipal supervision.
To make the regulation really effective, it would be neces sary, as already intimated, to require all dogs to be muzzled at all times, night and day, in doors and out, the year round As a matter of mercy to the poor brutes under such circum stances, as well as to ensure perfect security from dog bites, we should recommend that the muzzle be riveted to the of frontis, or, better, to a steel disk three or four inches in di ameter passed between the cervical vertebræ. This would necessitate the throwing away of the larger part of the dog, we admit; still as a precaution against hydrophobia it would be absolute, and the animals would be free from the useless torture incident to the common method of muzzling.
Seriously, while it would be a blessing to the community if four out of five of the canine population were thus effectually muzzled, we have no hope that so practical a measure will ever be carried out. To the end of the chapter the complaint will be heard-too many dogs. And so long as there are dogs there will be mad dogs, and dogs that will bite without going mad, with equally bad consequences to the ictims. Not until common sense and knowledge take the place of ignorance and superstition in the treatment of dogs and dog bites, will the risks of hydrophobia in man and beast be measurably abated. The precautions adopted must be o the right kind, and taken at the right time, else they are use less or worse; and above all, people must cease to trust to measures of prevention and relief which are demonstrably of
no effect.

First of all, it is needful to overcome the popular belie that there is any necessary connection between hot weather and hydrophobia. The fact is that canine madness, technically abies, is more prevalent in winter than in summer, in col countries than in warm. Readers of Dr. Kane and othe arctic explorers will remember the frequency of the disease
among sledge dogs in the depths of arctic winter. On the among sledge dogs in the depths of arctic winter. On the
other hand, in the West Indies, where the climate is hot and dogs are abundant, the malady is rare. The Southern State and the countries of Southern Europe are notably exemp from it; while it is very common in Northern Europe, in Canada, and throughout our Northern States. Statistic show also that more animals go mad in January, February and March than during any other season, the fewest case ccurring in summer time
It is also a mistake to suppose that hydrophobia always fllows the bite of a mad animal, or is necessarily caused by uch a bite. Between 1863 and 1868, there were 320 person itten by rabid animals in France, and hydrophobia ensued only 129 cases, less than half. According to Faber's stat istics, out of 143 persons bitten by rabid animals in Würtem berg, only 28 had hydrophobia. Hertwig inoculated a large
number of animals with the saliva of rabid specimens, and number of animals with the saliva of rabid specimens, and
succeeded in communicating the disease in but 23 per cent of the animals operated on, 77 in the hundred escaping.
In view of these facts, it is impossible to come to any abso lute conclusions in regard either to the conditions of the dis ease or the adequacy of measures adopted for its preventio or cure, since there is always a degree of uncertainty as to what the result would be were nothing done. Still we ar ppear that wounds in the face and throat are most danger ous, nearly all those reported terminating fatally. From bites in the hands, hydrophobia ensued in two cases out o bites in the hands, hydrophobia ensued in two cases out of
every three: while of those bitten in the legs, two out of three escaped the disease.
So far the statistics seem to favor the common belief tha he greater immunity in case of wounds in the legs is due to the protecting effect of clothing; but the fact that bites on he body, which is always clad, result in hydrophobia as fre quently as bites in the hands, which are commonly bare, puts different face on the matter.
Possibly clothing may serve somewhat to prevent the flow of saliva into the wound, and the saliva seems to be the bearer of the virus; but the circumstance that five thick nesses of cloth have been bitten through with fatal effect should
Nor should speedy action be neglected from any doubt a the health of the biting animal. Hydrophobia has fre quently resulted from the bite of animals showing no symp ms of rabies. Dr. S. G. Cook described a case of this sor in the Journal of Psychological Medicine, January, 1871, and called attention to another fatal case of the same kind which occurred some years earlier. In these cases, both of which occurred in this city, the biting animal was a bitch, in "heat" but otherwise in normal health; and Dr. Cook raises the question whether the bite of an animal in that condition may not always be specially virulent. Further observation mus determine the justness of the suspicion; meantime extra caution would be advisable in such cases, even to the extent of preventing any licking of the hands or face by such ani male, hydrophobia having been communicated by such seem ingly innocent means, when the skin happened to be roken.
It is well to be extremely cautious also of dogs (or cats) which are unusually irritable, or which manifest othe unusual symptoms, especially in regard to eating. Long before the dread of water appears, the approach of rabies is shown by a morbid appetite, which impels the ailing animal o devour filth and other obnoxious substances
If valuable, the suspected animal should be promptly and ecurely chained in a place convenient for its execution should rabies be developed; if worthless, killing cannot be too peedy, whether a disposition to snap at persons or thing has shown itself or not. In all cases of doubt, the animal' hensions of the bitten, should the witell to relieve the appre as to ensure thorough treatment of the wound in case hydro as to ensure thorough
The following substances were found in the stomach of a uspected dog, and were held to be strong indications of the nimal's madness: Hair, mud, two bumblebees, a large but terfly, a small white mushroom, straw, grass, and a smal iece of the victim's cheek!
The bitten child was treated by Dr. de Marmon, of Kings ridge, New York, apparently with perfect success. The reatment consisted chiefly in the prompt cauterization of the wounds with a saturated solution of carbolic acid, after wards keeping them wet with a weaker solution, accom panied by internal doses of liauor ammonice.
In all cases of dog bite, cautery should be resorted to im mediately. If possible, a ligature should also be applied and the surrounding tissues drained of blood by means of cup ping glasses or otherwise. Of the French cases alread mentioned, 134 were cauterized, more or less promptly, and
92 escaped. Of 66 who neglected the precaution only 10 es 32 escaped. Of 66 who neglected the precaution only 10 escaped. Sometimes simple excision of the wound appears to be effective, an operation which Dr. Hammond of this city has performed half a dozen times for wounds received from nimals certainly rabid, and always with success so far as heard from. In four other cases he used caustic, with ap parently the same effect. Mr. Youatt (author of so many works on dogs and other animals) relied entirely on the caustic action of nitrate of silver. As he treated as many
with success, his experience is certainly worth considering Four times he had occasion to perform the operation on him self; but there is a probability of its failure at last, since he committed suicide while suffering from what were sup osed to be the initial symptoms of hydrophobia. Niemeye dvised both excision and cautery, in addition to cupping as the mosi promising means of removing or destroying he virus ; and in view of the Lorrible and fatal characte of the disease, these precautions, however heroic, would eem to be justifiable. This is one of the cases in whic prevention is not merely better than cure, it is the only cure. Once the disease has declared itself, there is little hope save that its more horrid symptoms may be mitigated, and the patient allowed to die in something less than agony Cure there is none, though the resources of medicine hav been exhausted to find one. True, every now and then some one proclaims a specific, but unhappily the first genuine case of hydrophobia usually proves its inadequacy. Hot air is the latest remedy proposed; it appears, however, to be a de usion, since we recall at least one case in which the Turkish bath seemed only to aggravate the victim's agonies. Nevertheless, in his work on the diseases of the nervous system Dr. Hammond says that, in the present state of knowledge e would be more disposed to rely on the hot air bath at emperature of about $200^{\circ}$ Fah., with the administration of hydrate of chloral in large doses frequently repeated, than on any other plan of treatment, apparently for the reaso that the plan had never been tried, and therefore might pos ibly succeed. At least he cites no cases of such treatment hough he refers to the case treated by Dr. Cook, alread mentioned, in which the Turkish bath was proposed, but owing to the parent's objections, was not tried. The only remedy employed was chloral, hypodermically injected which, though tardily used, greatly mitigated the severity and frequency of the spasms. The child died, but remained conscious to the last, and showed no disposition to injure imself or others.
Perhaps the most encouraging case of mitigative treatment n record is one reported not long since by Professor Polli of Milan. The subject was a man who had been bitten by a mad dog about a month before, the symptoms of hydropho bia being fully developed when the experiment began,twelve hours after the patient's admission to hospital. The remedy employed was hachish, in 8 grain doses of the solid extract repeated every four or five hours. The effect was immedi ate and happy. Convulsive madness and fury gave place te good humor, even gaiety, and for forty-eight howns the patient lay on his bed free and tranquil, then died calmly. The horrid symptoms of the disease were thus almost entirely removed; a result accomplished neither by opium nor mor phine, nor by daturine. "Hachish," concludes Professo Polli, "is therefore the best palliative and sedative in by drophobia. It changes a raving, urmanageable, suspicious orgressive maniac, who bites and curses, into a poor in valid, content and tranquil, who blesses you.
A very recent and somewhat remarkable case is that of the late Dr. Francis Butler, of Brooklyn, N. Y., who died of hydrophobia June 16. He was an educated man, the author of a book upon the breeding and diseases of dogs, and of late years had made the training of these pets his especial occupation. He was almost a total disbeliever in the reality of the transmission of any poison or disease from animals to mankind. He entertained the view, promulgated by Dr. Brown-Séquard and others, that hydrophobia in man is simply a nervous disorder, brought about by the imaginaion. In his various publications, Dr. Butler has given many directions about the proper treatment of sick and mad dogs, nd has shown how easily all persens when bitten might cure themselves. His sad death proves the fallacy of his principal theories upon the subject. About six weeks ago he re ceived a sick dog for treatment, and, in an attempt to admin ster his favorite remedy to the animal-salt-was bitten upon the thumb; the wound was slight and soon forgotten. On the day preceding bis death, when in the act of placing a cup of tea to his lips, he was seized with dreadful spasms, which, with intervals of calmness, increased in intensity. He rushed about his house, he barked like a dog, while streams of foaming saliva spurted from his mouth across the apartment, propelled as if with the force of an engine. It required the efforts of several strong men to hold him. He was attended by skillful physicians, whom he implored to take his life and release him from agony. Every effort was made for his relief, but neither by the stomach nor the hypodermic method was it possible to apply medication. During the last hours Dr. Lorette succeeded in forming a blister on his breast with mustard, and on this abraded surface of the skin he dusted sulpbate of morphine. In ten minutes the drug acted on the patient's system, the opium delirium came on, and he died without further suffering, exclaiming toward the last: " Oh! I am in heaven!"
Dr. Carnochan, one of our most eminent physicians, in a recent case of this awful malady, recommended the use of the tincture of Calabar bean. Its good effect was immediataly seen, and the doctor thought there might have been a recovery had it been sooner applied.

## THE NEW COMET. COGGIA.

Our new celestial visitor, which may be now discerned in the northern heavens, is daily increasing in brilliancy, and will soon be a very conspicuous object. The discovery of this body, known as Somet II., 1874, was made by M. Cog. gia, at Marseilles, on April 17 last. It is wholly without the earth's orbit, but is gradually drawing nearer to our sphere. The circumstances under which the comet appears are very favorable for spectroscopic examination, and hence the scientific world will look eagerly for results which will
give us a further insight into the physical nature of these celestial vagrants.
Rating the light of the new comet at 1 at the time of its discovery, its progressive increase in brilliancy will be as follows:
July 2.

From the investigations of Secchi and Huggins upon Tempel's comet, it was found that the nucleus is partially selfluminous and composed of gas in a luminous condition, containing carbon. Nuclei, beside emitting their own light, reflect, with the coma and the stars, the light of the sun. Hence the latest theory is that the comets are composed of minute solid bodies, like a cloud of smoke or dust; and as the mass approaches the sun, the most easily fusible constituents become wholly or partially vaporized and in a condition of white heat, overtake the remaining solid particles, and surround the nucleus in a self-luminous cloud of glowing vapor. It should be remembered, however, that our positive knowledge on the subject is very limited, and that the above is merely a hypothesis which, to a certain degree, accounts for observed phenomena. Tyndall has put forward another theory of great ingenuity, founded on physical experiment, in which he regards the tails of comets as resulting from the formation of a species of actinic cloud by the action of the solar rays after their character has been altered during their passage through the comet's head. Zöllner considers that the small comots are masses of vapor consisting of water or perbaps of liquid hydrocarbons, an idea which is fortified by the character of certain nebulx. He also believes that the electricity developed by the solar rays, either in the process of evaporation or by the molecular disturbances they pro duce, is amply sufficient to cause the luminosity and also to form the train.
The length of comets' tails is rarely less than 500,000 and often reaches $150.000,000$ miles. The breadth of that of the comet of 1811 was $14,000,000$ miles, and the comet of 1828 had a nucleus 528,000 miles in diameter.

## PROTECTION FROM FIRE.

A recent amendment to the building laws of New Yoris city provides that every dwelling occupied by more than one family above the first floor, including all hotels, lodging and boarding houses, shall bs provided with fire escapes, doors, and alarms. Stores, warehouses, or other buildings, except dwelling houses, schools, and churches, shall be pro vided, above the first story, with fireproof shutters, capable of being opened and closed upon the outside. The occupant is required to close the shutters before leaving the premises at night.
We welcome all enactments like the foregoing, which make it inconvenient and vexatious for people to own or build inflammable structures. The tendency of such laws is to hasten the good time when nothing but fireproof materials will be permitted in the erection of buildings. This is the only sure and practical method of averting the dangers of general conflagrations, to which all of our towns and cities are now constantly exposed. We are confident that, if laws were passed to encourage the erection of dwellings and other buildings wholly fireproof, our architects and builders would soon invent the methods and means of accomplishing the work at costs not greatly exceeding those of the struc tures now commonly put up, in which wood is so largely a component
Until a clean sweep out is made of everything of a com-
bustible nature in our building materials, we bustible nature in our building materials, we must submit to be saddled with the expenses and annoyances of special laws, fire insurances, fire brigades, police, private watchmen, steam and hand engines, water tanks, chemical extinguishers, fire escape apparatus, and other paraphernalia.
The losses by fire in New York city in 18'73 are put down at $\$ 2,650,000$. The expenses for running the fire depart ment of the city during the same period amounted to over $\$ 1,500,000$, requiring the employment of 600 men and 150 horses, 40 steam engines, 18 hook and ladder machines, and 4 chemical engines. In addition to the foregoing, the indirect losses and expenditures due to the use of combustible building materials in New York city may be safely estimated
at $\$ 2,000,000$ per annum, making a grand annual total of at $\$ 2,000,000$
$\$ 6,000,000$.

## SCIENCE READS AN ORACLE RELATING TO THE CETALLURGY OF THE FUTURE

One of the most interesting incidents of the visit of the American Society of Civil Engineers to the Stevens Insti tute of Technology, at Hoboken, suggested the above title for our article. After witnessing the beautiful experiments exhibited by President Morton, inspecting the multitude of interesting objects in the lecture room of the Department of Engineering, and spending a pleasant quarter of an hour with Dr. Mayer among the mysterious physical apparatus of his laboratory, the party crowded into the little lecture room of Professor Leeds. The professor had thrown upon the screen the images of several contorted and rather uninter esting looking specimens of mineral. These, he states, were pieces of a "fulgurite," or thunderbolt, as it is often called,
sent him from North Carolina. When a heavy flash of sent him from North Carolina. When a heary flash of track, and, on solidification, it becomes a solid bar or rod, which may be, and often ie, dug out of its bed. In this case the lightning had penetrated a bed of pure white sand, meltng the silex and forming a hollow shaft two or three inches n diameter and four feet long, filled within and surrounded
without by the white sand of the locality. The shaft, how-
ever, was not white. Its color varied from a dark to a ligh
pearly gray. Chemical analysis showed it to contain iron and so accurate was the work that, on estimating it as usual, as oxide, the figures proved some orror to have occurred. Estimating it as metallic iron, the figures were correct. Apparently, therefore, the fulgurite was discolored by finely parently, therefore, the fulgurite was discolored by finely
divided metallic iron, and this deduction was confirmed by divided metallic iron, and this deduction was conirmed by
other and direct experiment. This would explain the pecuother and direct experiment. This would explain the pecu-
liarity of color, since the oxide would have colored the silex green. But metallic iron does not exist in Nature on the earth's surface, and the chemist was compelled to seek some explanation of its existence here by an examination of the eculiar conditions under which it was produced.
The final conclusion seemed necessarily to be that, at the immensely high temperature at which silica melts (the extreme limit attainable with the oxyhydrogen blowpipe), iron ": dissociates" from oxygen, and that here, dissociation having occurred, the metallic iron, transported by the electric flash from some subterranean deposit, became encased in molten sand, and was preserved unoxidized within the ful gurite. The melting of that immensely refractory material, silex, the dissociation of iron from oxygen, and the transportation of such an amount by electrical action, were cir cumstances at once remarkable and interesting. After de scribing this interesting research, Professor Leeds called upon his colleague, Professor Thurston, whose frequent con ributions to the Scientific American have made his name familiar to-our readers; and that gentleman then gave his fellow members of the society and of his profession an outline of the possible bearing of this curious instance of nat ural metallurgy upon the future of the art. He stated that while it could hardly yet be considered as probable, it certainly did not appear impossible that at some future time the processes of art might imitate what was here seen ac complished by Nature, and that this interesting phenomenon might be a strong intimation of the direction in which met allurgical changes might lead. Could a material be obtained of which to build furnaces which should be capable of resisting the temperature at which silex melts, and could such a temperature be attained in the furnace, we need but throw our ore upon the bed of the furnace and allow it to reach the temperature of dissociation, when the oxygen would pass
off up the chimney, without the use of carbon or other deoff up the chimney, without the use of carbon or other de-
oxidizing agent, and the metal would flow down upon the oxidizing agent, and the metal would flow down upon the
hearth. The requirement of a new refractory material may not improbably be fulfilled. Equally remarkable discoveries are frequently made. The attainment of so high a temperature necessitates probably the invention of a method of preventing the dissociation of oxygen and hydrogen by high temperature. As we also have stated, in an editorial article in our last issue, the limit of combination of these gases, or their temperature of dissociation, is stated by Deville at about $4,500^{\circ}$ Fah., and this is, therefore, the limit of temperaboure attainable by their combustion. Oxygen and carbon dissociate at a lower temperature.
The speaker referred to the possibility that this elevation of the limit may be attainable by carrying on combustion under pressure, as already proposed by Bessemer, and as
probably illustrated in some slight degree by the elevation of pressure within the converter, and the extraordinary tem peratures there observed. This interesting subject and the novel ideas suggested by it were evidently looked upon as important as well as entertaining by the visitors, one of whom expressed the idea which is fmbodied in the title which we have assumed for our article, and nearly all of whom forgot professional dignity so far as to applaud heartily. Many of our readers, by the character of their pursuits, are also interested in this subject. We hope that some may be so for tunate as to be able to aid i
cated as possibly attainable.

## THE ABTOR LIBRARY.

By the munificent endowment of the late John Jacob Astor and of his son William B. Astor, the splendid insti tution known as the Astor Library was founded in this city Its doors are open free of charge to all comers, and here the reader may call for any books on $\tau \dot{t}$ catalogue and spend as long a timein their study in the alcoves of the library as he desires. There are 147,640 books and pamphlets now upon the helves, which, with the building, have cost something over $\$ 700,000$. The twenty. fifth annual report shows that during he past year 116.694 volumes were given out to readers, of Which about one half were books relating to the department Science and Art; and of the twenty divisions of this de partment, by far the largest number of books called for by slruve readers were those relating to patents. This is an in
strewing the useful influence of our patent laws in leading people to study up the recorded know edge of subjects which have specially engaged their minds.

## PHILOSOPHERS ON SOUND.

The phenomena of sound and light are, as every student knows, closely analogous.
In media of uniform density, luminous impulses travel in straight lines. In media of various or varying density, the ines are broken or curved. A rod wholly in water or wholly in air appears straight; if partly immersed, it seems to be broken at the surface of the water. The rays of the rising and setting sun come to us through miles of atmosphere in creasing in density, and are so curved in their pas
we see the sun when it is really below the horizon.
As sonorous impulses are refracted according to substantially the same laws, sjmilar acoustic phenomena must occur under corresponding conditions: in other words, sound waves passing through atmospheric strata or other media of differ-
falling, or
These are elementary principles, taught and illustrated in every textbook of physics, though the phenomena are less studied in the case of sounds than in the sister department of optics. It happens, too, in our ordinary thinking, that we seldom take them into account, probably because the sounds we have to do with rarely come to us through media greatly varying in density; or if they do, the precise direc tion of the sounding body is seldom a matter of serious im portance. The ear measures angles very rudely, and usu ally a rough approximation to a correct estimate of the course of a eound wave is quite sufficient for our needs.
This fact is of little moment in itself; but in view of the conflict of opinion between Professor Tyndall and Professor Osborne Reynolds, as to the proper explanation of the irregu larities observed in the transmission of sounds under vary ing conditions of the atmosphere, it rises to some degree of dignity. At least it serves as a striking illustration of the tendency of philosophers to overlook simple and familiar laws in seeking the causes of unfamiliar phenomena.
The reader will remember that Professor Tyndall lately investigated the variable sonorous power of fog horns, whis. tles, artillery, and other sound producers, and arrived at the conclusion that the unequal range of the sound of a given instrument on different occasions must be wing to the greater or less "acoustic transparency" of the atmosphere, due to the presence or absence of streaks of vapor or unequally rarefied air. At night and during cloudy, rainy, or foggy days, the atmosphere is to a great degree homogeneous; consequently, sound travels reely and reaches its maximum distance. On the contrary on clear days the sun rays produce unequal effects on differ ent substances, giving rise to columns of vapor or heated air and the sound is quenched, Professor Tyndall asserts, by re flections and partial echoes from their surfaces.
The theory is a pretty one, but unfortunately it does not tally with fact. The sound waves, which Professor Tyndall tally with fact. The sound waves, which Professor Tyndall
assumed to be quenched, are shown by the observations of assumed to be quenched, are shown by the observations of
Professor Osborne Reynolds to have been simply deflected Professor Osborne Reynolds to have been simply deflected
upward and carried over the listener's head. Thus, in one upward and carried over the listener's head. Thus, in one
instance the sound of a bell, which was inaudible thirty yards distant on the ground,could be plainly heard at seventy ards when the observer stood up. At one hundred an sixty yards, the deflection was so great that the bell could not be heard at an elevation of thirty feet, though it wa distinctly audible a few feet higher.
Professor Tyndall's columnar reflectors would therefore seem to be only figuratively "in the air." Such things might cause the stoppage of sounds, but the evidence is rather that they do not: and Professor Tyndall is fairly convicted of unscientific haste in coming to his very decided conclusions.
On the other hand, Professor Reynolds appears to have overlooked the familiar laws of refraction. According to his mode of accounting for the facts, the lifting of sound is due o the increasing velocity of air currents as the elevation in creases, and is in direct proportion to the upward diminu tion of the temperature. The reasoning by which this posi tion is supported, however, seems to be rather the conse-
quence than the antecedent of the conclusion. Undoubtedly quence than the antecedent of the conclusion. Undoubtedly
both wind and temperature are modifying elements, Professor Tyndall's reflecting columns sometimes entering the problem in like manner; still the effects of these conditions are accidental, and probably small in comparison with the refracting influence of atmospheric columns of varying density, and more especially the diminishing density of the atmosphere upward. One of Professor Reynolds' observations suggests a course of experiment which students may find attractive. We quote his fifth general conclusion:
"In all cases where the sound was lifted, there was evidence of diverging rays. Thus, although on one occasion the full intensity was lost when standing up at 40 yards, the ound could be faintly and discontinuously heard up to 70 yards. And on raising the head,sound did not at once strike the ear with its full intensity nor yet increase quite gradually, but by a series of stops and fluctuations in which the different notes of sound were variously represented, showing that the diverging sound proceeds in rays separated by rays of interference.
Trusting to Professor Tyndall's somewhat "treacherous imagination," we should interpret the facts very differently, accounting for the observed fluctuations by difference of refrangibility between high notes and low notes rather than by "interference," the conditions of which do not seem to be present. As a matter of prudence, however, we prefer erely to suggest that the matter be tested by experiment
Recurring to the analogy of light, and remembering that the refrangibility of light rays increases with their rate of motion-red rays, for example, being less refracted than the more rapid green and blue rays-and bearing in mind the fact that sound notes differ, as colors do, simply in speed of
v ibration, we should naturally expect a corresponding dif$\checkmark$ ibration, we should naturally expect a corresponding dif-
ference in their refrangibility, producing under suitable conditions the effects observed by Professor Reynolds. It would be an easy matter to teat this conclusion by means of a prism of gas, after the fashion of the gaseous lenses sometimes used in acoustic experiments. The analysis of sounds is no new thing; but its prismatic analysis has not, to our knowledge, been attempted. The experiment would therefore be novel, and, we think, sufficiently interesting to repay the trouble involved.

QUICEsILVER has been discovered in the mountains back
Boralitos, Santa Cruz county, Cal. Claime have been located and a company has been formed to work one of them.

ELECTRIC PHENOMENA OF THE LEAVES OF THE FLY CATCHER.
The dioncea muscipula or fly catcher is one of the mos curious examples known of a vegetable gifted with motion The leaves of this plant, which are shown in the an nexed engraving, for wbich we are indebted to La Nuture, are terminated by a limb which carries two concave plates or valves united by a kind of hioge. If an imprudent fly venture to rest upon the inner surface of this trap, the plates, the minute bristles upon which brcome irritated by the presence of a foreign body, auddenly snap together like the covers of a book quickly closed. If the insect struggles, the portions adhere more closely, holding him prisoner until he dies or until, tired out, he remains motionless. Then the plates elowly open, ready to close sain, how. ever, on the least movement of the fly. If this does not take place, the trap allows its victim to fall out and remains set for new prey

Professor Burdon Sanderson, of the Royal Society, has recently made someinteresting investigations into the electric condition of this singulir plant, proving that its movements are due almost entirely to electrical circumstances. By connecting sometimes the limb and some. times the petiole of a living leaf with the circuit of a galvanometer, two permanent currents have been discovertd, acting in contrary directions, one passing through the limb from base to apex, and the other diracted from the base of the limb to the base of the petiole. The erperiments of Pro. base of the petiole. The experiments of Prophenomena heretofore very obecure. The pephenomena heretofore very obscure. The pe culiar movements of vegetables, it may be considered as established, result from changes in tension produced in the tissues,either spontaneously or accidentally. The tensions are due to the unequal turgescence of the cellules, the surfaces of which either absorb the water which surrounds them or else abandon it, by virtue of a special property of their substance under the influence of physical forces, such as light, heat, and without doubt electricity. The most recent researches, for example, show that the drooping and the erection of the leaves of the sensitive plant result from a displacement of the water which swells alternately the superior and inferior vessels of the base of the petioles.

## The Samuel Owen Centenary.

The bundredth anniversary of the birthday of Samuel 0 ven, May 13 last, was made the occasion of a public celebration in Stockbolm. To O wen is due the credit of first instructing the $S$ wedes in the use of their native iron, and he is now termed the fatber of Swedish steam navigation.
Leaving England with but one hundred pounds sterling, Owen established a manufactory at Kungsholmen and devoted himself to teaching his workmen not only to improve their labor but their lives. Hearing of Fulton's successer with sttam navigation in America, he begav researches into the same subject, which,it is said, led him in 1815 to the discovery of the screw propeller. He did not, however, prosecute his experiments in that direction, baoing neither time n or money, but continued labor in his factory, from whicb, uot to 1843, when the works wore closed, thirty steamboats, two of which were of iron, were produced. He died on Fcb ru iry 15, 1854.
Profersor Edlund, of the Stockbolm Academy of Scierces, read an account of his life and services and pronounced a fitting eulogy, and subsequently a monument, bearing a fine bust of Owen, erected by the ironmasters of Sweden, was unveiled.

## The Fort St. Phillp Canal.

A bill has lately passed the House of Representatives which provides for a canal two hundred feet deep at the bottom, and twenty.five feet deep, to form a permanent highway from the Mississippi river to the Gulf of Mexico. The work is to be constructed by the United States, to be free to all nations, to be completed within three years, and to cost not more than eight millions of dollars.
For many years past, all the efforts which have been made to keep open the channels through which the great river emptics into the Gulf have been attended with failura. As far back as 1837, extensive dredging was attempted but abandoned as unavailing, and in 1852 jetties were put down at the mouth of Southwest Paes, and another trial of deeponing made, the results of which work, however, completely ening made, the results of which work, however, completely
disappeared within the four years subsequent. Latterly steam dredging boats have been employed, ren dering the river mouthe practicable at times for large vessels, but not effecting the opening of the $p$ rmanent channels for which the large commerce of New Orleans is now suffering. The present proposed canal, which is to extend a distance of six acd a half miles, from the left bank of the Miasissippi below Fort St. Pbilip to a point four miles south of Breton Island, was projicted by Benjamin Buiseon some forty years ago. The plan was favorably regarded by Congress and several surseys were made of the route, up to the be ginning of the war, which put a stop to further procesdings. At the prosent time, the orgent necemsity for the work has

THE FLY-CATCHING PLANT.
greatly to the speedy development of the commerce of Ne Orleans and the adjoining country.

BONSER'S PATENT STEAM TRAP.
Absence of floats, disks, and levers, thus avoiding lost mo tion, a positive operation, simplicity, and durability, are the advantages claimed for the improved steam trap represented in vertical section, horizontal section, and in perspective, in the ann $x \in d$ engravings.

At the top of the instrument is a
 triangular head, $A$, and a similar tri angular plate, $B$, is screwed to the cglinder, C, by the dut, c. These plates are held together by means of three rods, D, which are provided with screw nuts. Within the cylinder, C, is a tube, E, to which is at tached a second tube, F, screwed in the triangular head. These tubes are of copper or other suitable metal. His a tubular epindle, held in cylin der,C, by the thimble nut, $G$, and its upper end with the lower extremity of tube, E ,both being flat equare sur faces, form a joint, J, surrounded by the chamber, I, which cbamberis in communication with the outlet pipe, K .

The water of condensation enters tubes, $E$ and $F$, and is discharged between the ends of tube and spindle and thence out of the pipe, $K$, Steam then enters and takes the place of the water, when the tubes, E and $F$, will expand downward in length from the head piece, A, sufficiently to close the aperture in joint. . When water again accumulates ad becomes cold, the tubes (or one of them) contract and a diseharge ce more takes place, and so on indefinitely
The thimble nut, $G$, allows the tubular spindle, $H$, to be ad

justed with great nicety, so that the joint, J, will close when he tube contains steam and open when it contains water or It will temperature falls.
be seen that the instrument, when properly ad ion will be the same if steam enters only tube, $F$
For further particulars address the invonter,Mr. M. Bonser, death. butter in tha
tractiveness.

Dover, N. H. The patent is offered for sale on reasonable
terms. terms.

The King or Slam's Dinner Service.
A superb farvice of silver plate, of the total value of $\$ 50,000$, and we'ghing $15, \mathrm{c} 0$ ouncer, bas just been manufactured by the eminent firm of Messrs. Elkington \& Co., Birmingham, England, and which exemplifies, in a bigh degree, the grest perfecion in taste, deaign, and workmanehip to which the art of the silversmith is carried. It is a state dinner service, made to order for the King of Siam, and is, in every respect, well fitted to grace a royal table. It is, of course, solid silver throughnut, and consists of a large number of pieces, being intended to dive about sixly persole in state. Conspicuous among the others is the principal centerpiece, a plendid and mas sive piece of workmonehip. It is nearly four feet high, and the deaign is that of a three headed elephant-a aymbol of the Siamese reli-gion-standing upon a plat:au, and bearing on its back a castle, above which is a double rase with a tower-sbaptd stem. The trappinge of the elephant are of delicate gold work, and gold tas. sels dtpend from the earr. Though the idea of gracefulnese, in conjunction with a three beaded monster, might seem rather difficult to conceive the heads are so arranged as to detract in no de gree from the appearance of the figure. Stand ing in front, just urder the beads, are two keep ers in martial attire, each with a long staff, from the top of which projects the national flag of Siam. This piece, which weighs 700 ounces, bears in three places the coat of arms of the bears in three places the coat of arms of the
King, in high relief and ricbly molded and chased. There are fourteen other centerpiece of amaller size, bat all of the same design as the principal one. Six four light candelabra, of palm tree design, with a three headed eleptant stand ing under each, will belp to illumine the roya banquet whenever the service is used; and among the other pieces which compose the set are six wine coolers, six large hot water dishes and coverp, six rice dishef, six oval entrée dishes, twelve bread baskets, eight sauce tureens, aix cruet frames, four large oval trays 28 inches long, and four salvers of amaller size, and about 150 dozen of spoons and forks.
The design is Oriental, and an elephant with one head forms the handle of each of the dish one head forms the and other covers. Every piece has also carved upon the King's coat of arms and his name in monogram.-Ironmonger.

## Hydrophobia

The Board of Health of this city, referring to an ordnance requiring dogs to be muzzled dutiog the bot montbe, state that hydrophobia is imparted only by inoculation and that a rabid animal may give the disease tbrough a metallic muz zle as easily as if the obstruction did not exist. Hydropho bia occurs in the coldest as well as in the hottest weather ard with perhaps greatest frequency doring the spring months. Male dogs are more apt to be affected than females, and the condition of the animal, whether housebold pet or vagrant, has no influence on the taking of the malady Owing to a portion of the deadly saliva being retained by che clothes of the person bitten, it is found that only five to twenty per cent of those thus injured become inoculated An eminent veterniary surgeon, of this city, gives the fol lowing symptoms by which the approach of rabies in the dog may be recognized. When the period of inoculation is passed (three to seven weeke), the animal becomes restlees and watchful. It shuns the light and its bark changes to a kind of a bowl. The ekin shrinks and tightens, the head is depressed, and mucus appears at the mouth and nostrils. Nervous eymptoms are very prowinent, and the whole aspec of the animal denotes an unusual condition. Dogs or cat thus suffering should be immediately destroyed.
In the wholesale crusade against the dogs which has just begun in this city, carbonic acid gas is for the frat time used as a means of destruction. The old plan was to place the unclaimed animals in a huge vat and pump in water the unclaimed animals in a huge vat and pump in water
until they were drowned. The present idea is a large cham. until they were drowned. The present idea is a large cham-
ber, into which forty curs at once are placed, and there kept ber, into which forty curs at once are placed, and there kept
until a plentiful supply of the deadly gas ensures their

Evaporation Instead of Ice.
Ice threatens to be an expensive luxury this summer, and many persons will doubtless be obliged to dippense with its use. In the country, where water may be drawn cold from the well or the epring, and a clean cool cellar or dairy pre serves the food fresb, it is not so much miesed, but even there water and butter cannot remain finany minutes, in the temperature of the eating room, without losing their agreeable qualit'es. Several thicknerses of wet cloths, wrapped about tbe pitch. er, will, by evaporation, keep the water tolerable. A common flower pot, inverted over a plate of butter, and kept covered in the same way, with wet clotbs, will keep
butter in that state of solidity which is essential to its at

If proper provieion is made for expansion, portable enginea
ean be made quite as durable as stationary engines.

## BLOODLESS SURGERY.

We have already briesy alluded to the Esmarch process for perfurming surgical operations without provoking the usual bæmorrhage. The ann xed engraving, extracted from with by the inventor. These consist in an elastic bandage measuring 26 feet in length by 18 inches in breadth, and a tube or cone of strong vulcanized rubber, having a hook a one end and a chain and bar at the other.


The application of the apparatus is very simple. Supposing that an arm is to be amputated, the bandage is tightly wourd around the member from the extremities of the fingers up to a little above the point at which the division is to be made. By this uniform compression, the blond is forced back and out of the versels. At the upper limit of the bandage, the rubber end is passed three or four times around the arm as closely as possible, and fastened in place by the book and cbain, thus preventing the return of the circulation to the member after the bandage is unwound. The latter, on being removed, leaves the arm white and free from blood and hence ready for the operation, which is accomplished with a very tritvial effusion.

A Specimen Book Catalogue.
Mr. E. Steiger, of 22 Franktort street, New York city, has circulated a apecimen of a $p$ oposed catalngue of the whole American literature, and desires the opioion of the press on the system. A wo:k, similar in ite object but far less complete in its details and not so well arranged, is used in Eng. land, and is foand especially valuable to librarians and readers as well as to the publishing trade. When we state readers as well as to the publishing trade. When we state that the specimen pages now belore us give the titles of books and names of authors in full, the dates of the editions, number of pages, size, binding, price, and publisher's name of each volume, our readers will understand the thorough. ness of the scheme, and will believe the author when he says that the undertaking is not remunerative.

## A Public Beneractor.

The splendid cbarities of Peter Cooper and George Peabody have been overshadowed in extent, though not in spirit, by the extraordinary munificence of Mr. James Lick, of San Francisco. This gentleman, the poseessor of enormous wealth, bas recently, in a single instrument, deeded away the sum of two million dollars for the establishment of in stitutions for the public benefit, preferring to superintend the disposition of bis fortune and enjoy the fruits of his beneficence during bis lifetime, rather than to follow the ueual course of bestowing his bounty by will. The deed, which is a lengtby document, containing some eighteen artiWhich is a lengthy document, containing some eighteen articles, is dated the 2 d of June, 187t, and conveys to seven trustees, for a nominal consideration, an in Out of the of property, wbich they are instrueted to seli. Out of the sum obtained, $\$ 700,000$ is set aside for the placing on land, on the borders of Lake Tahoe, Placer county, Cal., "a telescope superior to and more powerful than any telescope ever yet made, with all the machinery appertaining thereto." If the above site is fuund to be unsuitable, provision is made for the selection of a more appropriate locality. The announcement of Mr. Lick's intention thus to provide for the "million dollar teleecope" appeared in our columne, it will be remem. bered, some montbs ago, and with the delivery of the present detd, the piactical establiehment of the great observatorythe greatest the world has ever seen-begins.
Atter this donation, which commences the reries, follow gifts of $\$ 25,000$ in gold to the Protestant Orphan Anylum of


Cal. ; a like aum to the Ladies' Protection and Relief Societ of San Francipco ; $\$ 10,000$ to the Mecbalics' Library Apsoci tion, $\$ 10,000$ to the Society for the Prevention of Cruelty to Animals, both of same city; $\$ 5,000$ for a monument for the donor's mother, and a like a mount for memorials of two other relatives: $\$ 100,000$ for an Old Ladies' Bome; $\$ 150,000$ for pablic bath, $\$ 150,000$ for a ptatue of Fracie puther bat $\$$ \$250,000 the song of the Siar Spaugled Banner "; and of California in education, mechanical arts, and mining, for designs for which sums of $\$ 10.000$ and $\$ 5,000$ ar offired. $\$ 3 C 0,000$ is devoted to the foundation of the "California School of Mecbanical Arts," for the educa tion of both sexes "in the practical arts of life, and in whatever industry to which mechanical skill now is or can hereafter be applied.'
The residue of the proceeds is divided between the California Academy of Scienses and the Society of Cali fornia Pioneers, to be expended for buildinga, library, apparsius, etc. The doror provides for all his living relatives and reserves a handsome income for himself
Mr. Lick is the son of a farmer and was born in the town of Lebanon, Pa. His early life was spent wotk ing on the farm. While quite a young man, he went to South America and there became a large cattle raiser, supplying horses to the Governments of Brazi and Buenos Ayres. At the breaking out of the gold excitement in California in 1849, Mr. Lick was in busi ness in Valparaino; but turning over his affairs to a friend, he took $\$ 20,000$ in doubloons and started for the new country. With great sagarity he immediately invested his funds in r:al estate in San Francisco,hold ing fast to his bargains, and building slowly and care fully. The rapid rise in value of his property resulted in immense profits, out of which he erected the Lick House in San Francisco, one of the finest hotels in the world. It is a portion of the colossal fortune, thus made, which Mr. Lick has devoted to the uses above detailed, thus placing himseif in the front rank of philanthropists.

A Lecture Experiment with Potasainm. To show the green color of gaseous potassium, it is volatilized in wide horizontal tubes through which bydrugen passes, which becomes spontaneously inflammable, and burns with a brilliant violet flame, while the hot part of the tube becomes filled with green vapor, condensing in the colder parts as a mirror. When the experiment is finished and air gradually admitted, the potase sium is first oxidised to the blue quadrant-oxide.

## FEATHERING ARROW HEADS.

Our engraving ebows an arrow bead from the collection of L. G. Olnstead, LL D., of Fort Edward, N. Y., fouvd near Peoria, Ill. It is believe d to be unique, not existing in any ather collection in this country or Europe. Its peculiarity

consists in the beveled edges, as shown in our illustration, which give rotation to the arrow when it flies through the air, thas improving the accuracy of the missile. This is believed to be the earliest example of the feathering projcetile extant.

## Correspondeuce.

## Explosion of the Fireleas Locomotive

## To the Editor of the Scientific American:

The New York and Brooklyn papers recently gave the history of the Thermo-Specific Motor Company's new engine, which has just bf en built at the Grant Locomotive Works at Paterson, N. J. This engine was brought to the South Ferry, Brooklyn, and thence taken to East New York. On May 22 a large party of editors and reporters were invited to attend the trial trip. The englso was illed with balling, wether

## $80^{\circ}$ Fah., with the following results

"An explosion, which might hare resulted disatrous occurred yesterday afternoon at East New York. One of he new engines wbich it is propesed to introduce on Atlan ic avenue was hauled out for inspection and testing. The ogines are built on a novel principle, having no gererating oiler, but taking steam from a "service taok"at the end f the road. The engine drew up to the tank, and was in course of obtaining its supply of steam, when an explorion ccurred wh ch threw the tank nearly a hundred yards up he track, the lid being blown ajout fifty feet further and roken to pieces.
Several of the bystanders had very narrow escapes, but for unattly, nobody was injured; everybody was badly scared, and the excitement in the village was intense fo ome time."
None of the reporters present publifhed an account in any paper. This account was obtained by a repotter of The Argus meeting a pirson who saw the explosion. The débri was immediatrly cleaned off, as I am informed, and a visit o the oticers of the company gave the reporter no farthe information. I have not as yet heard of any investigation it possible that the press can be so quieted, and that a new team boiler, with steam at $380^{\circ}$ pounds pressure.* can explode he first time it is used, and no investigations be made? I recollect rightly, your paper, in about March or A pril, 1873 pablished a full account of the thermo-specific that was to upersede borses on the street cars. I hope the opportunity will not be lost, and that a full and impartial investigation will be made.
240 Atlantic avenue, Brooklyn.
Boiler Explosion near Geddes, N. Y.
To theElditor of the Sciencific American:
A disastrous boiler explosion occurred this morning a shton Mills, Geddes, N. Y., killing two men outight, and two more are not expected to live. How many moreare in jured I have, as yet, been unable to ascertain. Some men here are making or attempting to make a mystery of the af fair; others are trying to find fault with the boiler, the engi neer making the statement usual in such caser, namely, plen of water, not much steam, explosion incomprehensible, etc The cause will be obvious to you, in view of the idiotic manner in which the convections between the exploded boil or and its mate were made, which the engraving will lain. A is the globe valre, of which there was ore to each boiler, B the rafety valve, and Cthe preseure gage.


The boilers were both rui together by day, and only one at night, the latter being shut off by its globe valve, A, which it will bo seen, shut it off both from the saffety valve, B, and it will be seen, shut it off both from tue sufrty valve, $B$, and
the steam gege, $C$, it being left to the night watcbman to open the steam gege, C , boiler in the mrraing. Nrglect to open
it and fire up the it and fire up the boiler in the mrrning. Nrglect to open
that valve is the unmistakable cause of the disaster, as it is that valve io the unmistakable cause of the disaster. as it if
of many others which have happenfd to boilers eo connect ed. That it could have been no fault of the boiler is certain as it is not broken in ary place by tbe steam. But the heads are forced out, by a gradually increasing pressure, until the sheet left the tubes, when the reaction of issuing stcam caused the boiler to fly end over end, doing great damage In my opinion the excellence of the boiler is manifeat by its condition. Opera Mundi.
Syracuse, N. Y. Bullets Impacted in the Air.
To the Editor of the Scientific American:
Having seen a atatement in one of your ci'y papers tbat a woaderful curiosity, in the shape of a rebel and a Union bul-

let impacted in the air, was soon to be placed in the Musean of the Ordnance Department, at Washington, I inc'ose you a ballet which I found on the rebel earthworks in front of Petersburgh, on thesabbath after the surrender of that city, Petkekill, N. Y.
H. Anderson.

Chromic acid Solution for Batteries - An improved cirepe, by which a stronger current is produced, is as follow 12 parts by weipht potassium bichromate in 150 parts water, with addition of 25 parts of sulphuric hydrate.


## A NOVEL MECHANICAL MOVEMENT.

Mr. Bernard Frese, of Gilman, Ill., has patented, January 6, 1874, an ingenious device for converting rotary into recti linear reciprocating motion, or vice versû. Its object is to transmit an even and uniform power to a wheel, for exam ple, and, when used in connection with a single cylinder en gine, it obviates the possibility of a dead center. It is hardly necessary to point out the many applications of which the invention is surceptible, as there will be readily apparen from the following description of its operation
Our engravings show the apparatus in two views, the first of which, Fig. 1, may be termed the working side, and the second, Fig. 2, the governing side. A is a frame uonn guides in which travels the reciprocating head, $B$, to which is at tached a rod, $C$, passing through one end of the frame. Journaled in the central portion of the latter, and passing through the long slot shown in the head, is a shaft which, at

one extremity, carries the belt wheel, D. At the same end of the shaft, but on the other fide of the journal, are two arme, E F, at right angles to each other, formed from a single piece and rigidly attached, at their angle, to the shaft. The for tour, Lae on its edges four joining these last are four fixed stude, K, firmly secured to the head. The rear sides of the blocks are shown correspondlogly lettered in Fig 2, and upon each is a pio, against which springs, $L$, act so as to hold the blocks against the inner ende of their elots.
Pivoted at each end of the lead are V-shaped pieces, M, in each arm of which is a notch, which, when engaged with the pins on the back of the blocks, tend to hold the latter to the outer portions of their slots, or, in other words, to act against the aprings, $L$. It will be observed that, in our evgravinge, the blocke, G and H, are thus immovably held, while the blocks, I and J, are free to travel forward and back in their alots, pushing, of course, in one direction against their springs.
We can now follow the operation of the device under the conditions represented. The head, being at the extremity of its stroke to the leff, begins its motion to the right. The arm, E, of the pair secured to the shaft, is first struck by the block, $I$, which impinges against a friction roller on the end of the same. The block, traveling to the right, carries the arm with it, so turoing the latter into a lever to rotate the shaft. The arm, F, being unobstructed, for the corresponding block, H , is held back out of the way, is necessarily carried upward, so that the two arms, being placed at the proper distance apart, arm, F, after the head has traveled half its stroke, enters between the block, $G$, and the stud on the left of the pame, and takes against said stud. We have now the arm, E, between the block, I, and its stud, and the arm, $F$, between the block, $G$, and its corresponding portion. This arm, F, is next acted upon, and being cansed to turn to the right, by the pushing against it of the stud, rotates the shaft, and in eo doing brings the arm, E, so that its extremi ty takes against the right hand inclined edge of the blo $k, \mathrm{~J}$. The latter ie, however, merely held forward by its spring, so that it readily yirlds to the preseure of the arm, which slips behind it. The head is now at the end of its stroke, the cnds of the arms are once more in a vertical line, and the shaft has made half a revolution. The return movement being begun, the sume operstion is repeated. The arm, F, travels over from the outside of block, $G$, to the inside of block, $H$, and the arm, E, over agains' the block, I, which, in turn, yields, so that at the conclusion of the stroke the various poritions are onca more as represented in the engraving. In order to reverse the movoinent or cause it to stop, the
$l_{\text {ever, }}$ N, Fig. 2, working loose on the shaft, engages with a projection, 0 , which passes through a curved slot in the frame. This projection is formed upon a bar, not shown, which also works upon the shaft. It either side of the latter and formed on the under portion of the bar, are two projec tions which, by turning the lever so as to throw either end of the bar at an angle to the vertical, may be placed one in ad vance of the other in respect to either end of the head. Nea the curved portions of the $V$.shaped bars, M, are notches, $P$ into which the lugs on the governing bar may enter. As placed in Fig. 2, it is clear that the upper lug on the bar is hrown in edvance or to the right, and the lower one to the left. Now suppose the lever to be thrown over the other way, and the stroke of the head to begin. The lower lug is now in advance, to the right. Consequently, as the head finishes its stroke, the lower lug will strike the lower side of the forward bar, M, enter the notch, and, by tilting the V downward, disengage the hook in the upper bar from the pin on the upper block, causing the latter to be thrown inward by its spring, while, at the same time, causing the hook on the lower bar to catch the pin on the lower block, holding the latter immorably, as we have already explained. The return latter immovably, as we have already explained. The return
atroke does the same with regard to the other $V$ bar and the atroke does the same with regard to the other $V$ bar and the
other pair of blocke, so that the result is that, instead of blocks, $G$ and H, being held, as in Fig. 1, they are left free and $I$ and $J$ fastened. A little consideration will show that the result, on moving the head, will be a reverse motion of the arms to that aiready described. If now the lever, $N$, be placed exactly in the center, the effect is to throw all the hooks of the V bars off the pins on the block, and the arms, pressing equally on both blocks nearest them, are unable to move in either way, and thus the motion is arrested.
It is claimed that this device will be of considerable utili ty as applied to hoisting engines, as it allows the motion of the machine to be quickly altered or arrested, while using almost the full power. For further particulars address the inventor, as above.

## IMPROVED GRAPPLING TOOLS.

We illustrate herewith tbree forms of grappling tools pa ented March 18 and 25, 1873, through the Scientific American Patent Agedcy, by Mr. Simon B. Dexter, of Mason City, Iowa. In Fig. 1 is shown a device which may be used as a wrencb, pincers, or grapple for raising and carrying weights. The jaws, $A$, by means of a series of holes, are made adjust able to adapt them to articles of different sizes. A shank rod, $B$, is connected by means of a fork on its end with the fulcrum pin, and extends back into the handle. Upon it is fulcrum pin, and extends back into the handle. Upon it is
a wedge,shaped slide, consisting of two rods, $C$, which pass a wedge,shaped slide, consisting of two rods, C, which pass
through eyes on the pincer handles. When any object is secured between the jaws, it is griped by pulling upon the han de, causing the arms of the pincers to come together, and is loosened by a contrary movement. This feature adapts the tool for grappling for articles under water, as well as for car rying heavy articles in founderies.
Fig. 3 is an improvement on the above mentioned device in which, by turning the handles, a swivel band, D , is also turned. The shank rod, E, is provided with a screw thread, asses through the swivel band, so that, by the above mentioned motion, the slide, $F$, is moved up or down on the

rod. The long ends of levers, $G$, are thus spread apart or brought together. In this manner the jaws may be adjusted with great nicety and with sufficient power to make the in Thent valuable as a hand vise.
The device shown in Fig. 2 is intended for raising or turn ing stones for buildings, etc., by means of derricks or cranes, It has adaptable jaws, the upper ends of the levers of which are turnfd towards each other to receive the bars, $H$, confined
in forks therein by rollers, $I$, and bolts. It will be seen that
these bars incline from the vertical guide rod, and together form a wedge shaped slide for each of the levers. In draw. ing upwards, the bars bear against the rollers, I, and so close the jaws, and by pushing downwards the reverse takes close
place.

## POND'S PATENT SPANNER.

It is unnecessary for us to dwell upon the importance of ny invention which will facilitate the extinguishment of fires. A sories of disastrous conflagrations bas fully in formed the public mind upon this point. Pond's patent spaner, which we illustrate herewith, is an invention of the character referred to. This instrument is, essentially, a pair of tongs, with an eye at the end of each jaw, and a hook a he end of each handle. The advantages claimed over the common spanner are as follows: It cannot be put on wrong will turn the coupling either way without being removed it will not drop off; it can be used in carrying the hose, the oint of lifting being at the heaviest portion thereof, name $y$, at the coupling, instead of one or two feet from the same The hook handles may be instantly inserted in rings or straps n the hose, which may thus be the more easily dragged or arried. The device also enables the hoseman, by hooking the handles into a ring in his belt, to carry the hose up a adder or elsewhere while he has botls hands free, and also

o fasten the hose to any projecting point or to a ladder. For his latter purpose a pin is furnished, which passes through the eyes at the ends of the jaws of the instrument. One point of excellence which will recommend this spanner to the firemen, especially on cold winter nights. is the fact that by its uee hose can be handled without touching the wet ex terior with the bands. In short, it is claimed that, by the use of this invention, hose can be handled more easily quickly, and advantageously than by any other method. Pond's patent spanners are made of malleable steel, finiahed in best English japan, weighing one pound each, and of sizes to fit different kinds of hose
Patented in the United States November 25, 1873, and in the Dominion of Canada, May 19, 1874 . For further parti culars address Lewis Pond, patentee and manufacturer, Foxboro', Mass

Restoration of Burnt Steel.
J. L. Davies, Landore, near S wansea, Wales, writing to Iron, says: "I have found that resin oil, with which is intimate ly mixed one fourth (more or lees) its weight of the re sidue of paraffin stills, has a wonderful effect upon burn steel.
"Chisels which have been burnt and rendered useless may be, by means of this fluid, restored and made as valuable as ever. This fluid, which was many months ago christened re stitutor chalybis, may be used as follows:Burnt steel must be heated red hot, then plunged into the restitutor for a few be heated red hot, then plunged into the restitutor for a few
seconds; then re.heated and cooled in the ordinary way. The seconds; then re-heated and cooled in the ord
steel after this process is perfectly restored.
"Esperience in the use of the restitutor will quickly enabl persons to give any desired temper to their tools, but it ma be stated that tools can be made especially hard by heating them red hot, dipping into the restitutor, then reheating to a slightly white heat, and immediately cooling in pure water."

Incombustible Paper and Ink.-An English inventor has secured letters patent for an incombustible and fireproof ink. The pulp for the paper is composed of vegetable fiber one part; asbestos, two parts; borax, one tenth part ; and alum, two tenth parts. Theink can be used either in writ ing or painting, and is made according to the following recipe Graphite, finely ground, twenty-two drachms; copal or oth er resinous gam, twelve grains; sulphate of iron, two drachms: tincture of nut galls, two drachms; and sul phate of indigo, eight drachms. These substances are thor oughly mixed and boiled in water. The graphite can be re placed by an earthy mineral pigment of any desired color.

## THE JUBEA sPECTABILIS PALM.

This very handsome palm, known also as the coquito palm, of Chili, is the only species of the genus, and is one of the most southern of American palms. It has a stout trunk, wollen in the middle, which, in its native country, some times attains a hight of nearly 40 feet. The summit is surmounted by a crown of large, spreading, pinnate leaves, of a full deep green color, and from 6 to 12 feet long, the leaflets being from 1 to $1 \frac{1}{2}$ feet long and about an inch wide, springing in pairs from nearly the same spot, and standing out in different directions. The leaf stalks are very thick at the base, where they are inclosed in a dense mass of rough brown fibers, which grow upon their lower edges. In an account of the Royal Gardens, at Lisbon, mention is made of a specimen growing these in the open air, which has attained a hight of 32 feet, and the trunk of which measures 13 feet 8 inches in circumference at its base. "In Chili," gays the "Treasury of Botany," "a sweet sirup, called miel de palm, or palm honey, is prepared by boiling the sap of bis tree to the consistence of treacle, and it forms a considerable article of trade, being much esteemed for domestic use as sugar. The sap is obtained by the very wasteful method of felling the trees and cutting off the crown of leaves, when it immediately begins to flow, and continues to do so for several months, until the tree is exhausted, providing a thin slice is shaved off the top every morning, each tree yielding about 90 gallons. The nuts are ueed by the Chilian confectioners in the preparation of sweermeats, and by the loys as marbles."
The soil for this plant, says The Garden, from which we extract the engraving, should be a mixture of one half rich loam and one half a com post of peat.-leaf mold, and sand. It withstands the winters in the open air near London, in a poor condition; but if grown in tubs in the conserva tory in winter, and plased in the open air insum mer, it will prove an excellent subject for asso mer, it will prove an 9xcellent
ciation with the hardier palms.

## Gurjun oll in Skin Diseases.

At a late meeting of the Medical Society of London, Profeseor Erasmus Wilson showed some of this new remedy, and stated that this mate rial, which was also called wood oil, was an oleo resin, obtained from several species of the dip terocarpus, an immense tree growing on the Ma terocarpus, an ime growing on the Ma layan coast of the Bay of Bengal, where it was
so common as to be used instead of paint, for so common as to
houses and ships.
In March, 1873, Dr. Dongall, of the Indian Me dical Service, took charge of the convict estab lishment of the Andaman Islacde, when he found twenty four of the prisoners suffering from le prosy. He was deeply impressed with the mise ry of these poor people; and realizing the im practicability of availing himself of all known methods of treatment, he hit upon the idea of trying the gurjun oil, both as an internal and ex ternal remedy, and determined upon giving it a six months' trial. Dr. Dougall's method was to have the patients washed thoroughly in a neigh boring stream, using dry earth instead of soap They were then made to rub themselves for two Theyrs with a liniment composed of gurjun oil and lime water, one part to three, and to swallow two drachms of the balsam, also combined with lime water. After this they had their breakfast, and were set to any work they were capable of doing. In the evening the same process was repeated, except the washing. The effects of this treatment, at the end of six months, were marvelous. Neuralgic pains were allayed, sensibility was restored to the ansesthetic akin, tubercles subsided, and ulcers healed. Dr. Dougall was astonished at the energy of these formerly helpless ones.
Mr. Erasmus Wilson remarked that he had used a liniment composed of equal parts of the gurjun oil and lime water, in cases of painful eczema, in lupus, and in cancer, with very encouraging results, and stated that Mr. Hancock had ap. plied it in a case of cancer of the skin, with the effect of dispersing tubercles and healing ulcerations; but its most useful property was that of relieving pain. A lady in constant pain from cancer of the integument, who had been unable to sleep without narcotics for weeks, was relieved of all suffer ing, and enabled to sleep, by means of this liniment. Mr. Wilson suggested that this very simple remedy deserved a trial at the hands of the profession, and believed that it would be found a valuable agent of cure in many affections where the skin was painfully attacked.

## A Vehicle Dynamometer

The Royal Agricultural Society of England has recently employed a new instrument for determining the amount of work done in hauling vehicles along a circuitous course, the maximum, minimum, and mean pulls exerted, and the irregularity of strains arising from the varying rigidity of the load. The device is in brief a skeleton horse mounted on wheels and drawn by horses. It is harnessed in the shafts, and the body contains the necessary apparatus. It is believed that the figures obtained will give accurate results regarding the vexed questions of broad and narrow. large and small,wheels, hight of load, weight on horse's back, etc.
From a deecription of the invention published in the Em -
gineer, we learn that it consists of a pair of parabolic steel springs, 4 feet long and connected together by a single joint at one end and a double one at the other. The front blade of these springs is attached at the middle of its length to a horizontal cast iron bed plate which forms a rigid foundation. The back spring plate is attached to a horizontal spindle, supported at its front end in an iron pedestal and at its back end in an oil cylinder. Between the bearing and cylinder, a cast iron swiveling draft plate is loosely jointed to the spindle. This swivel plate is designed to represent the shoulder and collar of a horse, and is fitted with draft chains and hooks, similar to those on collar hames. Beneath the draft plate are castors arranged to run upon the bed plate. The draft plate, with its joints and castors, will


## THE JUB压A SPECTABILIS PALM.

transmit the direct, horizontal components only, of the pull on any vehicle, to the main spindle, and will eliminate the tranaverse components of angular pulla, whether in a vertical or horizontal direction. A lever is jointed to the spindle to multiply any movement of the spindle three times on the horizontal counter bar above it, which carries in bearings upon it a small integrating disk, which touches and is set in motion by a large disk, which in its turn is driven at the rate of one revolution to the yard by a suitable beveled gear from one of the hindermost traveling wheels of the instrament. The driving gear to the large disk registers distances traveled in yards upon another counter. The moving counter bar has a pointer which indicates the draft at any time in pounds on an adjustable scale attached to the frame and also a suitable arm, having a metallic pencil at its end, which will describe the variations of draft on a sheet of me tallic paper wound round a cylinder, which is set in motion at will, at a speed proportional to the distance traveled. The ordinary saddle chain, usually attached to one of the shafte of the cart, is passed over a light wrought iron saddle suspended from one end of a lever; the load resting on the sad dle, representing that on a horse's back, is registered on a spring balance at the other end of the lever. If found ne cessary for going down hill, "breeching" chains may be at tached to the back end of the instrument, and in hauling cartsa belly band may be passed beneath the instrument to avoid any risk of tilting backwards. For quickly testing the springs in the field, a bell crank lever is provided, having arms, one of which is connected with the main spindle, and the other can be loaded by known weignts. The instrument is mounted upon a timber framed carriage, having four broad cast iron wheels. The carriage can be raised or lowred between moderate limits.
With this, as in other instruments, the actual number of foot pounds of work done in any experiment is determined by aimply multiplying the register of the integrating coun ter by a constant depending on the spring in use. The pro duct so obrained, divided by the number of feet run as in
dicated by the distance counter, gives the mean draft during the experiment. The actual draft at any time is indicated by the pointer, and also on the metallic card, if it is put into gear. It is obvious that this apparatus will have a very wide application, especially in the trial of reaping and mow ing machines, portable engines, artillery, and in fact all vehicles drawn by shafts, and also in ascertaining the com parative resistances of roads for any given vehicle

## Dog Dentistry.

It is well known that the bites of rabid herbivorous ani mals are rarely dangerous, because their teeth are made flat faced, for grinding their food without penetrating or tearing Hence their bite is little more tban a severe ruise, differing from that of a carnivorous an mal, which pierces immediately through the skin. A veterinary surgeon of Paris, M Bourrel, recently captured three mad dogsand tightly securing them, proceeded to file down
the teeth. These animals he let loose with six other dogs. The latter were immediately furiously attacked and frequently bitten, but in no case did the pointless teeth inflict more than a bruise. Not content with this, M. Bourrel put on a thin kid glove and then worried the mad dogs with his hand until they bit him severa times. Although pinching quite hard, the glove was not broken in a single instance while the skin beneath was uninjured.
As to whether we had better substitute a city dog dentist for the prosent pound master we leave the question to the humanitarian who are endeavoring to abolish carbonic acid and the muzzle.

Now Process of Determining the Alcohol in wines.
If to a known volume of water larger and larger quantities of alcohol are added, the density and the superficial tension of the mix tures obtained are simultaneously diminished and consequently there is an increase in the number of drops which they form if allowed to flow slowly from a given aperture. If this aperture has constant dimensions, the number of drops corresponding to each alcoholic mix ture is constant also. The difference between the numbers thus found is large enough to furnish a basis for a very sensitive alcoholo metric method. The instrument proposed is pipette holding 03 cubicinch. It is filled with the alcoholic liquid under examination, and the number of drops escaping is counted From this number the proportion of alcohol is calculated by the aid of tables which the au thor has drawn up. Slight traces of liquide more diffusible than alcohol, such as aceti ether, greatly increase the number of drops -M. Ducleaux.-Chemical Nevos.

Theory of Dissociation or Thermolysis The theory of dissociation may be summed up in the following propositions: 1. Dissocia tion is the opposite process to chemical combi nation, the gaseous body resuming its molecu lar motion which it lost on combination a heat, and converting it into a new form of mo tion. The amount of heat which the disso ciated bodies take up is exactly equal to that which they ose on combination. 3. The temperature of separation is higher than the temperature of combination. 4. Compound whose constituents are not volatile cannot be separated by heat.-Frr. Mohr.

## A New Double Ship.

Some years ago there were employed on what was then ormed the Nary Yard Ferry, between New York and Brook yn, a set of steam ferry boats having double hulls, pro elled by hulls. The two vessels were coupled together by strong eams, and covered by a broad deck. These boats wer roomy, and gave satisfaction exce,pt that they were slow.
Recently, in England, they have launched a new ferry boat, built on the above general plan, intended to ply acros the English Channel, between Dover and Calais, 22 miles. At present they run very small boats, and passengers ar reatly troubled with sea sickness. The new boat has two hulls, each 17 feet wide and 290 feet long, separated 26 feet and united by a deck or superstructure 60 feet wide and 18 feet lang. This mater a comfortable boat fo feet long. is ill be are the assengers, ng vessels. The new ship has been christened the Castalia She will be propelled by a central wheel, with engines of
great power. Each hull has a rudder at the bow and stern, great power. Each hull ha
making four rudders in all.

## Palm Paper,

Mr. James P. Herron, of Washington, D. C., has invented a process of making paper from varieties of the palm The material is cut or torn into pieces of suitable size, then cooked in a close digester, with thorough agitation and un der steam pressure, in a weak solution of alkali, naphtha benzine, or soap; then it is completely ground, while steam passes freely through the grinder and intermingles with thestock, reducing, bleaching, and finally washing it.

THE CONVENTION OF THE CIVIL ENGINEERS. We continue our abstract of the proceedings of this association.
ciation.
Mr. G. W. R. Bayley, of New Orlaans, La., followed, with an exhaustive communication on the subjoct of

## the teredo

or ship worm, well known for its ravages upon timber under water. It belongs to the first subclass of mollusca, known as acephala. Although having no head, the animal feeds itself aad reproduces its kind. The body is surrounded by folds of the mantle, and it has a shell consisting of two valves. The animal secretes calcareous matter and deposits it upon the extreme edge of the shell, when the secreticn hardens and besomes converted into a layer of solid testaceous substance. Every newly formed layer enlarges the diameter of the shell. The ship worm moves by means of an extensive fleshy organ cailed a foot. It is a muscular mass, capable of being pusbed out from between the mantle lobes and the valves, and of adhering, by the exhaustion of the air and water under it, firmly to the front end of the
The long bridges across Bay St. Louis, 10,055 feet, and Bay Biloxi, 6,136 feet, built (on heavy, yellow pine piles from 15 to 20 inches and more in diameter) in 1869 and 1870, had to be reconstructed in the winter and spring of 1871 by driving an entire new set of piles in the place of those destroyed by the teredo. The Bay St. Louis bridge piles-the new ones-were covered with felt and copper, and the Beloxi bottom, the depth of Bay St. Louis being from 10 to 12 gen: erally, and at Biloxi Bay from 10 to 15 feet. In 1872 the writer found that many of the piles in the Bay St. Louis writer found that many of the piles in the Bay St. Louis
bridge had been damaged by the teredo below the coppering. bridge had been damaged by the teredo below the coppering.
To remedy the evil, sand and clay were hauled and dumped To remedy the evil, sand and clay were hauled and dumped
round the new pilesin sufficient quantities to cover the ex. round the new pilesin sufficient quantities to cover the ex.
posed posts, thus cutting off the teredos' connection with posed posts, thus cutting of the teredos connection with piles much injured were replaced with new ones, previously charred, with coal of tar poured on them, washed with clear oil, and coated with coal tar varnish; and all loose or broken sheets of copper were renailed under water. It was estimated that this coppering, already considerably thinned by decomposition, was good for perhaps three or four years.
The teredo, cannot penetrate any soft, fibrous, or apongy substance, as felting, thick paper, or the bark of pine tim. ber, and this is the reason why the spongy, fibrous wood of ber, and this is the reason why the spongy, fibrous wood of water upon copper or zinc sheets $i_{s}$ very destructive, and water upon copper or zinc sheets in very destructive, and
tarred felt is even a better protection than metal for submerged timber; with metal only, the sea water can penetrate under the sheets,especially when lovse or broken; and when under the sheets,especially when lovse or broken; and when
sea water ebbs and flows with the tides, so can the ship sea water ebbs and flows with the tides, so can the ship
worm enter and work. If felt, saturated with the dead oil of coal tar and well coated with thickened coal tar, can be secured to and maintained on the outside of submerged timber, it may be considered safe from the ravages of the teredo.

## The partial report of the committee on the

## maNUFACTURE OF RAILS

was next submitted. The English system of rails is not applicable to this country, as it requires strength, while the American system demands endurance and wear. Where there is the most wear of rail, strength should be the first consideration, and the rails should contain the greatest amount of metal; but where there is less wear, the rails should be as light as experience shows to be safe. As there is the most wear on the head of the rail, there should also be at that point the greatest amount of metal. There was no theory more erroneous than that a head of 24 inches wide was more endurable than one three inches wide. Will not last as long as the low wide rails. An inflexible or rigid rail is as long as the low wide rails. An inflexible or rigid rail is
more sure to break than one moderately flexible. If the more sure to break than one moderately flexible. If the
rails were laid on a better foundation, and there were no frost, rails were laid on a better foundation, and there were no frost,
the rails might be made stiffer. In answer to the question the rails might be made stiffer. In answer to the question
why rails should not be made square, the committee believed that it would be too flexible, especially when of iron, and that rails with stem and base were much better. It would be even advisuble to place 60 per cent of the metal in the head; but a double headed rail wears out faster than a single. The average wear of an iron rail is equal to a pressure of $4,000,000$ tuns of dead weight, or $10,000,000$ tuns of gross weight. The stone ballast of the American roads has been too large; and on a good road a rail would last fully 25 per cent longer than on a bad one. In cold weather, the metal is more brittle than in sunmer; consequently the breakage of rails in winter is greater in proportion. No definite figures had been received as to the comparative
values of iron and steel rails, but the committee were of values of iron and steel rails, but the committee were of
opinion that a steel rail was 20 per cent better than a good opinion that a steel rail was 20 per cent better than a good
iron rail, 40 per cent better than á fair iron rail, and 100 per iron rail, 40 per cent better than a fair iron rail, and 100 per
cent superior to the ordinary rail used on many railroads.

## FIRE in the coal fields.

Mr. Martin Coryell, of Wilkesbarre, recited the particulars of the conflagration now existing in the coal at the Kidder slope. At first water was pumped out of the mines by locomotives; but subsequently, this proving unsuccessful, a new plan was adopted. Steam boilers were erected at various points, and the work of forcing steam into the mines was
begun. This appears to be working with great success. At one time during the bight of the fire, the thermometer at the mouth of the air shaft registered 212 degrees. When 50 pounds of steam pressure were forced into the mine, the thermometer fell to $120^{\circ}$; and when 70 pounds pressure was in-
troduced, the thermometer fell to $100^{\circ}$. The men are now at work boring a nine inch hole with a diamond drill, so as to be enabled to put in, at a different point, another stream of be enabled to put in, at a different point, another stream of
steam to aid the others. The work is apparent going on suc. steam to aid the others. The work is apparent going on suc-
cessfully. The steam has evidently created a great amount cessfully. The steam has evidently created a great amount
of carbonic acid gas; but as yet there have been no means of carbonic acid gas; but as yet there have been no means
of ascertaining the quantity thus created, or whether it was aiding the steam in doing the work of extinguishing the fire. The mines are at least 600 feet below the surface, and therefore very dificult to reach.
An interesting history of the

## DOCK SYSTEM OF NEW YORK CITY

was given by Mr. John D. Van Buren. The speaker, after eketching the past dock facilities of the port and pointing out the advantages as a harbor, referred to the operations at present in progress.
The river wall, recommended by General McClellan and
dopted by the present $d_{\text {e partment, is composed of }}$ béton blocks weighing present department, is composed of béton ound weighing trom 25 to 50 tuns each, extending from the this level, concrithin two feet of low water mark, and, above masonry. The idea of using béton blocks for this arch is due, he said, entirely to General McClellan, and the lave opera. tions of the department show that the plan is an exceedingly expeditious and cheap one. On the Cbristopber street section, now being built by the department, 14 blocks, weighing about 450 tuns, were laid in one day, and 109 blocks, weighing 3,560 tuns, were loaded, traneported, and laid in 18 days of from 10 to 12 hours each. The crew consists of 10 men, including captain and engineer. The total cost of loading, transporting, and laying, in 14 feet of water, will not exceed $\$ 1.50$ per cubic yard. The cost of the blocks, ex clusive of the rent of yards, is about $\$ 12.50$ with cement at $\$ 5$ per barrel, this material alone costing about $\$ 8.50$ per cubic yard. It does not cost the city, considering all ex. penses, over $\$ 16$ per cubic yard laid. This wall is being built considerably within the estimate, made by General McClellan, of $\$ 2,500,000$ per mile,including the cost of filling.
The departments are now building four large wharves of wood on the Christopher street section, of an improved quali. ty, and have nearly completed three of them. Another is built at Canal street, North river. In these structures they bave not found it possible to allow the engineers to intro duce any artificial preservatives, except external coatings of fish oil and paint: but in the general character and strength of the woodwork and fastenings, every care has been taken to make them complete and of the very best quality. TLe pile heads are the only novel features of these piers; they
are constructed of built-up columns $20 \times 20$ in section and 75 are constructed of built-up columns $20 \times 20$ in section and 75 feet length. placed in rows $12 \frac{1}{\frac{1}{2}}$ feet apart, and about $9 \frac{1}{2}$ feet apart in rows. The rows are sheathed for low water up to he girders on both sides with 5 inch planking, the ends of which are protected with boiler plates. The heads of the columns are securely passed into the caps and girders. The driven in in the pier, some of which are 94 feet long, are square timber is $12 \times 12$ in section.
The plan of construction, then, which seems to commend itself as the proper one for the innprovement of the water front of New York is: To construct a quay wall along the main street of granite masonry, increasing the width of the
street considerably, and from the wall to throw out piers of street considerably, and from the wall to throw out piers of
the very best quality of wood, preserved against decay by all possible means, and at once establish a broad main street and have good piers built and taksn care of accordirg to a settled plan; and it will shortly follow that all known means of facilitating the bandling and transportation of freight will be introduced by the interested persons then under certain general restrictions.
These public works should go slowly on, say at the rate of half a mile per annum. If in 10 years the wall could be completed on the East river and to West 11th street on the North river, ite progress would be all that could be desired. The city would then possess the finest dock facilities in the world.

THE EDUCATION OF CTVIL ENGINEERS
was the topic of a paper by Mr. Thomas C. Clarke, of Clarke,
Reeves \& Co., the well known iron bridge constructors. Mr Clarke conc., the well known iron bridge constructors. Mr. professional education, and pointed out tbat the former was mainly practical, while the latter required the student to be thoroughly versed in theory before entering upon actua work. He believed in combining the advantages of both systems, and advocated a thorough training in the natural sciences. Too much time, the speaker said, was now wasted in studying the higher mathematica, which rarely are
brougbt into practical use. The student should be limited brougbt into practical use. The student should be limited
to ordioary analysis, and the time thus gained devoted to to ordioary analysis, and the time thus gained devoted to
the study of Nature. After graduating from college, practice in the field should be immediately begun, and then, after an insight had been obtained into the actual labor of the profession, the young engineer might profitably attend a technological achool for the purpose of devoting himself to some specialty. In conclusion, reference was made to the late John Edgar Thompson, and his life was held up as an example of the value of concentration of energies upon busienabled to conduct the great operations under his control.

EXCURSIONS, ETC., OF THE CONVENTION.
The reading of papers being concluded, on the following day the delegates made visits to the Stevens Institute at
Hoboken, where they inspected the Stevens Battery, and subsequently to the East river bridge, Hell Gate exca vations, and Fourth avenue improvements. An excursion
was also made to Ashley, Pan, the ascont of Wilksberre Moun
tain accomplished, and the mines of the Wilkesbarre Coal and Iron Cemproy examineil. Toejourney terminated with a visit to Mauch Chunk, a ride over the Switch Back railway and an inspection of tbe works of the Bathlehem Iron Com pany and the Lehigh Zinc Company at Bethlebem, Pa.

## New Remedy for Dysentery.

In a recent issue of the Archives de Médicine Nrvale is pub lished an official note, addressed by Dr. Robert, who is the medical chief of thenaval division of Chida and Japan, to the Inspector General of the Health Service in the Frevch navy, calling attention to a drug used by Cbinese pbysicians in the treatoment of dysentery. It consists of the root bark of the ailanth.us, very common in China, also cultivated in France and in this country.
The bark of the root is the only part exployed. An infusion of the bark, however, exhales a slightiy nausecus odor ard possesses an excessive bitterness, resembling that of sulphate of quinia. The Chinese physicians employ the rost in the fresh state only; but Dr. Robert, baving been compslled to use some that lad becomodry, found no sensible difference in its action in the two states.
For administration, $1 \frac{1}{2}$ ounces weight of the root is cut into very small pieces and triturated with 2 ouncts of hot water for a few minutes in a mortar, in order to affen the bark, and then strained. A teaspoonful of this strong infusion is administered as a dose morning and evening, alone or in a cup of tea. Taken in this form, it provokes vomiting. cup of tea. Taken in this form, it provokes vomiting.
Tha medicine is administered in this manner during three days, the patient being kept upon full diet. After that time days, the patient being kept upon full diet. After that time
the ailanthus is omitted and the diet is altered to broths unthe ailanthus is omitted and the diet is altered to broths un
testored. If after eight days' treatment the patient is not cured, the Cbinese plysicians recommence the use of the ailanthus; but Dr. Robert slates that he has not met with a single case in which this resumption has befn neces sary, although he had under his notice some where the dis ease had lasted several months, as well as others of more recent origin.
The principal symptoms which follow the administration of the ailanthus are said to be nausea, and sometices romiting, followed by a temporary lowering of the pulse. The disappearance of blood from the evacuations commences on the firs day and is completed on the second; the colic ceases a little later. The effect of the drug upon the color of the evacuations is variable. Dr. Robert sums up by expressing his opinion that the administration of the ailanthus gave superio results to those of ipecacuanha, astringenta, alone or com bined with opiates, or calomel.
French Improvements in Manaiacturing Steel. Those who have followed for the last dozen years the progressivesteps in the manufacture of steel know the difficalties which surrounded the first efforts in the Bessfmer procisas whese were not thoroughly surmount d, nor the process rendered thorougbly practical, until the idea was struck of pushing the refining process to complete decarburation, and then adding to the bath a cortain proportion of iron rich in manganere, called spiegelesen. The object of this seem+d to be to add again to the metal the necessary quantity of car bon to make it steel, and also to give it, at the fame time, certain mysterious virtues, which were known as a ateely propensity. It was soon recogniz॰d that the importance of this addition was more considerable than at first supposed. The best gray irons were not suitable to replace the spiegeleis $n$. It follows, then, that the manganese must affect the iron in a It follows, then, that the manganese must affect the iron in a
useful manner. A more minuteinvestigation of the process useful manner. A more minute investigation of the process
shows that, under complete reduction of the carbon, the shows that, under complete reduction of the carbon, the
iron becomes oxidized and brittle, and the action of the maniron becomes oxidized and brittle, and the action of the man-
ganese is to destroy this excessive oxidation, and torestore ganese is to destroy this excessive oxid
to the metal its original good qualities.
In the Martin Siemens process, also, the addition of a mun ganesic iron was recognized from the firet as prac ical and ne-
cessary. This method answered all requirements for rolled rails and sucb goods; but a demand arose for a metal milder and softer, for plates and parts of machines. Here this addition of spiegeleisen involved a serious dilemma. For with the necespary quantity of manganese must be introduced so large a quantity of cal bon that the hardness was product d, which was precisely the thing wished $t$, be avoided. There was then no other resource than to push the seduction of the carbon further still, so as to be perfectly sure of total removal of the carbon, and then, by the addition of a quantity of epiegeleisen as rich as possible, to get a minimum of carbon in the result ing steel. This is, at best, but an uncertain and danger ous method, though much in use at present, and is very liable to give a result too hard, or still very oxidized and brit tle.
The company of Terre Noire sets itself to produce alloys of iron and manganese, and claims to be able to make alloys of
iron with manganese having forty to seventy per cant of the latter, and that, so to hapeak in forly to seventy per cable quantity. This gives a meral very mild, but with all the tenacity of steel. Another great field for the use of ferro-manganese has ber $n$ unexpec edly discovered, both by the company at Terre Noire and, independently, elsewhere. A series of experiments had been made, upon ores of inferior quality and with large admisture of phosphorus. In seeking to purify or use these ores in some way, it was found, most unexpectedly, that the pbosphorus was no detriment to the laminability and tenacity of the metal, provided that the carbon, combined with the manganese was very small indeed. Here is a great field for the use of ferro manganese-to produce mild steel from many second
rate brands of iron. This renders the working up of all the old rate brands of iron. This renders the working up of all the old
material of wrought iron rails into steel, which opens a most valuable market for the old permanent way of many railways.
The above details give sufficient grounds for supposing that
ferro manganese will become quite in large demand, and hence give ample employ to any company undertaking the special manufacture and application of it. The following is what this French company proposes to undertake :

1. The sale and manufacture of alloys of iron and manganese. 2. The application of those alloys to the production of metal with all the properties of mild steel. 3. The application of these alloys to the production of steel more or less phosphoric, either by the Bessemer or the Martin-Siemens process. 4. The fixing and making of all plant suitable for these productions and applications.

## SCIENTIFIC AND PRACTICAL INFORMATION.

the newly discovered crater of madi.
Mr. T. M. Alexander, in a letter to the Havaiian Gazette, gives an interesting account of his discovery of very remarkable volcanic phenomena on West Maui, one of the markable volcanic phenomena on
Sandwich Irlands. He found a crater in which were nearly a scors of volcanic pits, not cones, from fifteen to fifty feet broad, and ten to twenty feet deep, with sbrubbery wi hin concealing the chasms below. From six of the pits columns of steam or amoke were rising, which were destitute of sulphurous fumes and had very little warmth. It is believed that these pits are connected with subterranean chambers heated by volcanic action, and that the air arising from the warm depths on a cold morning becomes changed to fumes of steam. No similar instance is found on any of the islands except Hawaii.

## PROGRESS OF THE EAST RIVER BRIDGE.

Work upon the great suspension bridge between Brooklyn and New York, which has been temporarily suspended, is now resumed. The Brooklyn tower has reached an elevation of 222 feet above high water mark, are engaged upon masonry yet to be laid. The workmen are ines, several courses of which are in position. The keystones will weigh ten tuns each, and constitute the heaviest blocks in the structure, the ordinary stones weighing some three tuns. It is expected that before winter the "saddles" or castings over which the cables' will pass will be in position.
The New York tower is now 123 feet high, and wil probably reach 200 feet during the present season. The anchorage on the Brooklyn side is 6 feet high, and contains 8,334 cubic fett of masonry. Its total elevation will be 66 feet. On the New York anchorage, or on the approaches, work has not yet been begun.

## THE GERM THEORY OF DISEASE.

That hay fever, a disease quite prevalent during the pres ent month, is traceable to vegetable organisms, is a curious discovery, tending toward the confirmation of the theory that disease is originated and propagated by ind 4 pendent organic germs, recently made by Professor Binz, of Bonn. The in vestigator has been himself subject to the malady, and has pursued his researches over a number of years.
On examining the nasal secretions with a powerful immersion lens, he found tbe organisms to be absent except when the disease attacked him during epring. Then the paraeitical bodies were clearly seen in motion, vibrating on the slide and increasing in size after several days. By using a neutral solution of sulphate of quinine, applied by th nasal douche, Professor Binz found that the animaicu' were completely destroyed, and that subsequane
tion failed to show their existence in the secretions.

## a smple analysis of arable earth.

M. Schlösing gives the following simple process for separating the clay in soils from other constituents, and consequently for determining the quanity of the former present. The earlh is tbrown in water and the calcareous matter is eliminated by means of bydrochloric or other suitable acid. The carbonate of lime and humic acid, found in nearly all vegetable earth, hinders the clay from remaining in suspen sion in the water, and it is hence precipitated. By treating the liquor with ammonia, the humic acid is removed. The residue is composed of sandy matter and clay; but the former falls to the bottom, leaving the clay in suspension in the liquid, from which it may be separated by decantation. This method, though almost mechanical, it is said, will prove of much value to agriculturists. M. Schlösing has found that earths, considered argillaceous, in some cases contained little over 2 or 3 per cent of clay, while others, supposed
composed almost entirely of that substance, contained but 30 per cent.

## CORROSION OF TIN

Tin is generally regarded as the least liable to change of il our common metals; but a case, recently reported to the American Academy of Arts and Sciences by Mr. S. R. Sharples, S:ate Asssyer of Massachusetts, cites a circumstance which appears to be wholly contradictory to such a theory. A taok, belonging to an hotel in Collinsville, Conn. impurities. Some time after the constraction of the recepimpurities. Some time after the constraction of the recep-
tacle, white deposits were noticed upon the lining, and the tacle, white deposits were noticed upon the lining, and the
owners, fearing that the water might be rendered deleterious, sent specimens of the powder and of the water to Mr. Sharples for analysis. The white powder proved to be ox ide of tin with a mere trace of iron, and the water, which was led to the tank through 100 feet of lead pipe, was entirely free from the latter metal.
During the month of March last, an interval of nearly two years haring elapsed since the above examination and the tank lining being some five years old, the proprietors called Mr. Sharples' attention to the fact that the lining had become perfectly riddied by correrion, and this although there
had been a free and constant circulation of fresh water, an
analysis of which showed even better results than bofore. analysis of which enowed even better results than bofore.
There were 4.20 parts of inorganic matter and 0.80 parts of organic matter in 100,000, and no nitrates were present.
This extensive corrosion can hardly be accounted for, as the weight of present authority points strongly to the unal erability of tin under similar circumstances.

## Sir Charles Fox.

Sir Charles Fox, the distinguished civil engineer, died re cently in Eogland, aged 64 years. He was an assistant to the celebrated Robert Stepbenson, by whom he was ap pointed assistant engineer of the London and Birmingham railway when that work was begun. Mr. Fox's greatest en gineering work was the construction of the bailding for the
Great Exhibition in Hyde Park, London, in 1851. He received the honor of knighthood in recognition of the genius and skill exhibited in this magnificent structure. He also re-constructed the same building for the Crystal Palace at Sydenbam, and executed many extensive railway and other engineering works. He was the senior partner in the firm of Sir Charles Fox \& Sods, civil engineers.

Hospital Hygiene
Dr. Alphonse Guérin, an eminent surgeon of the Hote Dieu in Paris, has recently preeented to the French Academy of Sciences a remarkable memoir on the influence of atmos pheric germs on surgical maladies, in which he strongly advocates tow dressings for wounds. He states that, when this materisl is packed upon the injured part,the pus is complete ly preserved from putrid fermentation. He uses the tow in brief as a filter for the air, which circulates freely through
it, and in fact produces an arrangement precisely analogous it, and in fact produces an arrangement precisely analogous
to the cotton wool respirator mentioned by Professor Tyndall to the cotton wool respirator me
in his paper on haze and dust.

DECIBIONS OF THE COURTS.
United Staten Circuit Court---Southern District of at hatr met.
[in equity.- beft--joskph dalton ve. abraina g. jrinninas. LIn equity.-Bef
Blatchford, Judge:




original research and discovery. The e author descrithes his hook as "a is effected, errors eliminated, a probable mean result atta'ned, and the probable error of that mesn ascertalued." He illuscrates the conditions precantions requisite for accurate observation, for successful expert ment, and for the sure detection of the quantifative laws of Nature. In a
word, he tells us how to question Nature in order to obtain those responses thogs are alone infallible.
A Universal Table for Excavations and Embank MENTS, applicable to any Base or Slope Whatever; and the Calculations of All Sol'ds to which the Prismoida
Formula is Applicable. By William Zimmerman, C. E This is a very elaborately calculated table of the measurement of earth
work, applicable to every possible configuration of cross section of cut ings and embankmentr. It is well tlluastrated with diagrams, showing it aniversal use for the work for which it is intende
and contractors will find it espectally valuanle.
The sixth volume of the new edition of the amprican Crclopedia,
cubilished by Messrs. D. Appleton \& Co of this city, has recentiy apceared We know of no work in which there ts a more coplous supoly of informa ion, brought down to the latest dates, or in which the possessor can b more truly salc to have placed at his disposal a digest of everything tha as been written upon almost every concetvable subj ct. The volum before ns is particularly rich in its scleatific department. There are four
astronomical papers by Professor Proctor, and a number of exhaustive chemical articles by Proftessor Joy; While the treatises on physical an medical toples are from the pens of Drs. Hogeboom, Clarke, Flint, Dalto and Kdes, and Professors abbe, Hunt, Kueeland and others. Count Your ales, of the Cosst Survey, contributes a valuable accoint of deep sea dredging, In which is contained a resume of the most recent investigation the ocean bed and its odd inhabitants. Volume VI., ilike ifs predeces. ralue, and tending to give additional interest to the subjects treated of in e text.
The Jaly number of that admirable children's magazine, ST. Nicholas, is
aperlatively good. The literature for the youth of this country ts, as inerlatively good. The ilterature for the youth of this country 1s, as a
eneral rule, so much of the morbdily mawkish order-we know of no bet er term to express its nature-treats so mach of those intensely well be aved chlldren who are always dolog such exasperatligly charita ble an over the pages of a work that tells the youngsters storles which we know they will read and reread untll the very paper becomes worn and limp with innumerable fingermarks. Whlle none believe in making plety and upitgh Fing more attractive to the chlldren than ourselves, we have no patlex c nto an inciplent theologlan or a pocket model of sanctity whose foys ar not of this world, asd whose existence is mainly spent in "getting licked" and thereapon tearfally forglving his agrressor. The issue of Sr. Nicho as before us has an excellent story, by Bret Harte, about a juvc nile bea Which will provoke many a hearty laugh, and to which Beard, the artis ontributes a sketch of the hero, drawn as only he can draw bears. The
here ts a table of contents and a lot of pletures, which we cannot preten to describe, but which are sure to dellght the young ones, and the old one ior that matter, too. Besides, as if all this were not enough, Sr. Nichola proudly announces that. not content with swallowing "Our Young Folks some time since, he has exercised his cannibalistic prepensitles on the
"Children's Hour." and, in the future, will have a three-fold clatm upon netice of his juventle readers. If we were a youngster, we think we hould tease hard for the necessary three dollars for a year's subscription and lose not a moment in fo
at 654 Broad way, New York.
Soribners Montily, for July, opens with a continuation of Edgar
King's Papers on the Great South, in which the history, resources, and enterprise of Missourl are described with constderable detall. Pro'esso Hartt contributes a valuable article on "The Shakspeare Death Madk," eparding the existing and mach disa More ingtalments of the serlal storles, includiog Jules Verne's fancital acconnt of the Mysterions Island, a few chotee poems, and other in eres ing matter, besides the usual Editorlal Miscellany, complete a varled an
excellent table of contents. Subscriptiun 84 a year. Pubilshed by Scrlbner \& Co., 654 Broadway, New Fork.
Soribner's Magazine for July contains an excellent varlety of con tente, among themilluatrations of the Beart of the Republic. witch refe espectally to the city of St. Louls, and Include a view of the new bildge a that place.
Godif's Magazing for July is as attractive as ever. This number is the

## Inventions Patented in England by Americann.

[Complied from the Commissioners of Patents' Journal.] arburetting Air, fto.-J. M. Cayce, Frankilin, Tenn. Car Couplinge.-W. Todd, Portland, Me. Irox amd Strel Manupacture.-E. Peckham, A
Mower and Reapiz.-W. a. Wood, Albany. N. Mower and reapir.-W. A. Wood, Albany. N. Y.
Redtcing Ibon Ores, eto.-N. w. Whe ler, New York cty Redtcing iron Oris, itc.-N. W. Whe ler, New York c'ty.
Spinning and Winding Fibers, eto -G. Draper etal., Hopedale, Mass STril Shovels, rTo.-T. J. B ake, Pittiburgh, Pa. Straw Fabrios, sto.-N.A. Bald
Tot.-W. W. Rose, New York ctty.
Yeast Powdre, ETC.-E. P. East wick, New York eits.
Wool Card Evener.-F. F. Burlock, Birmingham, Conn.

## Bectut Gumticau aud faxtigu Fatents.

Improved Building Block.
Thomas B. Rhodes, Leetonis, 0 . - This invention rel
pullding block formed of concrete or other material th to an improved ondition may be molded into the required form, and will becom pump ares. Hollow durable for making permanent freproof walls or struc Hollow spaces extend through the blocks from bottom to top, to make hollow walle. The parts oy which the two sides of the blocks are Cherein, to which tongues on other blocks will th to ends to form groove theretn, to which tongues on other blocks will at 10 lock the blocks firmly together. A groove may be formed in one end of a block and a tongue in
the other. These grooves and tongues mar be in dovetall form. Long the other. These grooves and tongues may be in dovetall form. Long
binders of wood or tron, extending from end to end of a wall at the top, or from bottom to top, are used. The openings in the top blocks may be a ranged so that hot air admitted to them may circulate throuzhout the
spaces in all outside walls, and in partitions, if preferred, for beating the paces in all outside walls, and in partitions, if preferrec, for hesting the roons. In laying ap a wall, it is proposed to enclose each layer tempora. silces and fill them upand untte the blocks.
Charles A. Brownroved Electrical Condenser.
Cbaries A. Browne and Ibaac S. Browne, North Adams, Mass.-This
avention relates to to osed of indise to the construction of Leyden jars or condensers, com so constracting thates whe embedded tin fon sheets; and it coosista ruptured by a spark, the damage can be repaitred by simply readiusiliag the raptured by a spariz, the damage can be repaired by simply readius'ing th
sections, or, at most, by the loss of a section only instead of the whole jar as when all the plates are valcanized together.

## Improved Trunk.

William J. Large, South Brooklyn, N. Y.-To the till of the trunk are at.
tached bars, which slide ap and down in ways tn the trank body. By suit tached bars, which side ap and down in ways in the trank body. By sult-
able mechaulem, by raising the idd to open the trunk, the till will aliso be ralsed, pliving conventent access to the interior. When the lid is raised, slotted bar drops over a screw to support the sald lid and the till. Arrange
ments are coaneoted with the till to adapt the same for una as a writing ments
conk.
 roride an Improved awning tor the end platurorma a troe tis object to


 ended, and rewound thereon when the trame tie reteractea or

Improved Folding chair.
Worceter, Mase. - Tnut inventor
Eppratm Tucker, Worecester, Mase. This invention conastst in combin.


Improved Base Burning Stove.
Howard Greentree, Baltimore, Md.-This invention consists in a firebox hearth made of two imperforate parts, the lower made in silding sections,
and in a correspondingly perforated flange and ring to admit air to the and in a correspondingly perforated flange and ring to admit air to the fuel for su
chamber.

## Improved Egg Carrier.

Willam 0 . Strong, Ypsilantl, Mich.-This invention relates to forming the carrier of a siltted paper strip in such a manner that it is rendered more durable than other carriers of its class, the ends of the several interlocked
parts or sectlons of the strip betng jotned together on the sides of the body parts or sections of the strip being jolned together on the sides of the body concussion.

Improved Upright Drilling Machine.
Frederick E. Reed, Worcester, Mass.-This invention is an improvement in the class of upright drilling machines in whith a wetght 1 s employed to ion of backlash by.means, chtefly, of a chain, a roll or cyllinder, and adustag screws; also to the arrangement for enabing the drilispindie to be uutckly removed from or retinserted in the hole made by it, part of the same devices being e

Improved Hay and Cotton Press. place. This invention relates to the combination of locking and releasing operated. To lever, the inner end of which strikes against the other stirrup, raising said
stirrup away from the teeth of the bar. As the stirrup is raised it atrikes galnat the stopatt the sald lever to ralse the other stirrup, in which position the lever, stir. rup, and stop lock themselves so that the follower may be ralsed freely. As the follower rises, a pin attached to the inner end of the lever strikes
against a stop attached to the framework of the press, which disengages against a stop attached to the framework of the press, which disengages
the lever and allows the stirrups to drop, ready to take hold of the teath of lever and allows the stirrups to drop, rea

Improved Stove Pipe Elbow
Samuel Smith, Brooklyn, N.Y.-This. Invention Is an adjustable stovepipe elbow constructed of central and outermost rectangular sections, with overlappling intermediate sections, of which the outer sections are riveted tral strip.
mproved Girder for Iron Bridges
Cyrus W. Wheeler, Brownsville, Neb. -The object of this invention is to The invention consists of a tubular girder produced of two quadring. langed sections, riveted to a longitudinal strengthening plece and connected by a stiffening chord, and a quadrantal lower section of wrought

## John Peter Schmitz, San Franclsco. Cal.-This invention

John Peter be readlly closed after the vacuum has been created by the consumption of oxygen in the other or contiguous department, thas permanently exluding air. The burner to which the fintd is supplied is ignited by a taper or elect
lmproved Car Coupling
lmproved Car Coupling.
Henry D. Goldsmith, New York city.-The adjacent drawheads of two contiguous cars have long transverse notchesformed in them to recelve the cross bars which are bolted to the framework of the cars, and with
which the said drawheads are connected by rods which pass through the aid bars, so as to support the drawheads and allow them to have a longl-
udinal play. One drawhead is sloted longitudinally to recelve a plvoted udinal play. One drawhead is slot ted longitudinally to receive a plrote in its upper side to catch upon the catch plate of the other drawhead. The
inner end of the coupling bar is made the heavier, so as to hold its outer nd raised. The hight to which the outer end of the coupling bar rises is egulated by a set screw. The rear end of a lever is plvoted to the draw. head, and to its middle part is attached a chain which passes up through
the platform and around gulde pulless. Its upper end is attached to the lower end of a pin attached to said platform. The chain is made of such length as to prevent the forward end of the lever from dropping too low. The forward end of the lever is supported below the inner end of the couping bar, so that, by pulling apon the chain, the sald coapilng bar 18 low. ered to detach it from the catch plate of the drawhead. The chain is con
nected with a rod, that suldes in keepers attached to the forward edge he platform, so that, by palling upon the rod, the cars may be uncouple from the side of the track. The forward end of the second drawhead is beveled, and upon its lower side is formed a recess to recelve the notched outer end of the coupling bar. To the inclined forward end of the same drawhead is secured a steel plate, the lower end of which is notched to re-
eetive the notched end of the coupling bar. A spring projects beneath the end of the coupling bar to prevent it from jarring off the catch plate.

Improved Beer Cooler.
Wenzel Toepfer, Milwaukee, Wis.- The Hoor and ends of the cooling pan are composed of metal plates with beveled edges and other plates with a
beveled strip. The strips are arranged with their beveled edges reversely to the edges of the first plates, so that, when the latter are placed on the apper side of the second plates and pressed against the strips, they lock ends, where they extend the whole length of the pan to form the two stde They are clamped together by a cleat fastened at one end to one plate, passing under the other plate to the other side, and entering a cllp at ached to the first plate, which holds it from springing away, while a key is

Improved Car Coupling.
James Letth, RIdgway, Pa., assignor to himself and Willam T. Burdett, ars in the ordinary way. To theinner surface of one side of each of the bumper heads is attached a bar which enters the mouth of the opposite bumper head. The forward ends of the bars are beveled off, and have hooks which catch upon square pins held out by springs. The pins pass
down between two pairs of short cross bars formed upon the drawheads. To the pins are attached chains which pass through holes in the opposite Ides of the drawheads, and with the middle part of which is connected the end of a lever. The latter is plvoted to the side of sald drawhead, and its ree end projects so as to pass along the side of the opposite drawhead as the cars are run together. Other levers are plvoted to the drawheads oppo. ite the hooks, and are so arranged that, as the cars are run together, the he second levers are attached arms whtch, as the sald levers are drawn inward, strike against the loops, the arms of which pass in through holes n the sides of thedrawheads, so that the pins may be forced away from the hooks, uncoupling the cars. The same inward movement of the second
ever of elther drawhead also operates the first lever of the other draw ever of elther drawhead also operates the irst hever or the other draw may be uncoupled by operating the second lever of elther drawhead.

Improved Feed Pump for Steam Boilers.
Thomas Warswick, Guelph, Can.-This invention relates to Thomas Warswick, Guelph, Can.-Thls invention relates to means of shaft or planger, whereby the length of stroke of the latter may be varied Improv

## Improved Bridle Bit

Andrew Jackson Slaughter, Okolona, Miss.-This invention relates to construsting a bridle bit with lever, so that great pressure can be exerted on the tongueand jaw of the animal withoat the power on his part of vading the pressure by opening his mouth. The invention consists in $\mathrm{t}^{0}$ ngue, and the upright levers of such a shape that a great advantage of everage is secured.
Improved Wheelwright Machine.
William R. Perry, Gaines, Pa.- Au eccentric lever is connected with the Wheel by means of two straps, a central bolt, and a fulcrump in. The straps are provided with a series of holes, so that the device may be applitd to
Wheels of different diameters. The straps turn on the plvot bolt, and the ever is carried around from one spoke to another. The felly is thus pressed to the spokes without br
a rapid and permanent manner.

Improved Mode of and Tool for Capping Cans.
Richard H. Smith, Baltimore, Md.-This invention is based in part on the principle of the compound blowpipe, air and gas betng conducted to the
device in separate tubes and commingled at a point contiguous to the device in separate tabes and commingled at a point contiguous to the
copper. The latter is in the form of a sheet or thin plate, which is readily heated by the flame that impinges on it through a slotin the back of the holder, and it 18 adjusted downward and clamped as required by means of ascrew. The copper holder is secured in a socket which is provided with trunnions, and may be clamped in any desired adjustment to hold the copThe brace is of the form of that used by carpenters for holding boring bits, and is rèvolved to carry the copper over the seam or joint in which bits of solder have been previously placed.

Improved Machine for Grinding Lenses
Frederick R. Sutton and William O. Sutton, Wellington, Ill.-The holder or the lens to be ground revolves in a horizontal piane on a vertical axis, and the grinder revolves in a vertical plane on a horizontal axis. The inner grinding convex lenses.

## Improved Curtain Fastening.

Aaron T. Rice, Reavilie, N. J.-This rastening is formed of annular me tallic plates and a slitted elastic disk. Sald plates have semi-circular
 on, and assists in preventing the fastening from getting detached.

## Improved Railway Car Wheel. timore, Janespille, wis.-This invention

George ${ }^{\mathrm{W}}$ locking the bushing or journal box and its collar the he hub of the whee

Improved Photographic Printing Frame
Van Wagner, Nyack, N.Y.,and Ezra P. Griswold, Ne
Isaac M. Van Wagner, Nyack, N. Y.,and Ezra P. Griswold,New York city. -This invention relates to apparatus for printing photographic plctures, nd consists in an adjustable vignettling attachment to the ordinary printlongltudinal and transverse or other movable sildes, 18 adjusted to the picture on the negative. It also consists in a device for varying the distance and position of the light opening from the negative. It also consists in a
contracting and expanding diaphragm for varying the form and size of the contracting an
light opening.
George L. Robinson, Waterbury, Conn. - This buckle consists of a staple
George L. Robinson, Waterbury, Conn.-Thls buckle consists of a staple-
shaped wire, having two parallel bars made zigzag, which pass through a cross bar. This croes bar slides back and forth on the bars, and ts held in position by the angles, and to it is attached a pin having a loop handie. The pln and handie revolve loosely on the cross bar. The bars are attached
to a bail shaped wire. The pin hasshos bends in it, which fit over the wire to a ball shaped wire. The pln has shons
when the buckle 18 attached to the fabric.
Improved Lawn Mower.
Sldney D. King, middletown, $\mathbf{N}$. T.-This invention relates to a machine espectally adapted for cutting high grass, and consists in two sets of re volving cutters, arranged in a frame in such a way that one set severs the
apper portion of the high grass, and the second or rear set works close to he ground. The machine is also adapted for cutting short grass, like other its cla

Improved Loom Picker stick Check.
Benjamin Bury, Fall River, Mass,-This invention relates to looms for
weaving cotton, and consists in a new and improved device for checking and stopping the plcker staff. The check bar is passed between two cords, and the cord is twisted to any desired degree of tension, thereby forming a spring, the action of which is imparted to the pleker staff by the bar

Improved Sash Fastener.
Waterloo, Iowa.-This consists of
Shepherd W. Reed, Waterloo, Iowa.-Th!s consists of a sllding bolt which locks intu recesses of the window frame, being operated by a plivoted latch with notches and a projecting pin or lug, and fastened to a slotted gulde

Improved Fire Alarm.
andion is an improve nent in self-acting fire slarms, in which adjustable fuseb are arranged to plosive cartildge or alarm bell, which will be exploded or rung to indicate the existence of a fire in any portion of the building. The invention relates speciflcally to so connecting a sertes of branch fuses with a maln fuse that, while any one of the former may ignte the latter, the latter can not ignte the former. Hence, when a fre breaks out, the contiguou branchruses will unite the main
not Igntte any other branch fuse.

Improved Temporary Binder.
ood, Brooklyn, N.Y.-This is a little $\mathbf{c}$
of sheet meta for temporarily holding one or more paper fasteners to receive the papers.
There is a spring presser ou the top, for pressing down and holding the
papers on the fasteners. The device is so contrived that the papers to be died will be secured at the left hand corner only, whereby the separation of the papers for inspection in the file, also in the package when removed
from the fle and secured together by the fasteners, mas be readlly eftected

Improved Calinary Vessel
Laurence P. Bodkin. Brooklyn, N. Y.-Upon the edge of the vessel it a single serew. The cover has a loose flap which closes the spout aperture but swings open when the vessel is tllted. The maln portion of the cove is held in place by spring catches.

## Improved Bed Bottom.

Jonathan V. Taylor, La Cygne, Kan.-This is a fexible bed bottom, which
onsists in cords attached to head and foot frames, composed of transvers bars connected by longltudinal arms. The end bars of sald frames are proWided with projecting journals, which are itted in Inclined grooves, so tha
when the bed bottom is depressed the end frames will turn or oscllate causing the pressure to bear against the under side of the bottom. The
central portion of the latter will thas be elevated, obtaining a tau surface.
Improved Lomm Shuttle.
Norman A. Williams, Utica, N. $\mathrm{F} .-\mathrm{This}$ is an improved spring mechan ism for holding the spindle elther in the elevated position for recelving the bobbin or cop, or in the position for delivering the yarn in weaving, and at
the same time allowing of moving the spindlereadily from one position to the same
the other.

James Timms, Malta, assignor to himself, Hugh M. Cochran, and Joseph James Timms, Maita, assignor to himself, Hugh M. Cociran, and Josep
F. Sonnastine, McConnellisvile, Ohio.-This is an mproved device for tak ing up wear and the consequent lost motion. The invention consists in the combination of the sleeve or tearing and the lock nuts with the head or
lug of the sickle bar, and the pitman having a screw thread cut upon it. A sickle bar has a lug to recelve a hook on the end of the pitman. Upon the
lower part of the latter is placed a sleeve, upon which is formed a toe which is recessed to fit upon the sickle bar head. The sleeve is held down by lock nuts, placed upon a screw thread cut upon the pitman. By this construction, by turning down the nuts, the wear will be taken up to pre-
vent lost motion caused by the wear, so that the hook can be used until vent lost m
worn out.

Improved Sewing Machine Caster.
Willam J.C.Gaar, Whitesburgh. Ga.- There is a rock shaft on each end frame of the stand, near the bottom, at right angles to the treadle shaf
carrying a castor in the outer end of an arm near each end. This roc baft is connected by another arm and a rod with a lever pivoted on the treadle next to the standard, so as to force the casters down and ralse the stand upon them when the free end 1s pressed down by the foot or hand o
the operator. When forced down, the lever drops under a stud catch on the standard, whtch holds down and keeps the standard mounted on th casters.
Improved Vehicle Spring.
Ambrose L. Davis and Levi A. Davis, Port Crane, N. Y.-Springs are and bars, to which the fifth wheel tis attached, and upon whtch the wagon
body reste, beling conflined by the king bolt. The springs act tin connection th the other springs of the running gear, and add materially to the ela ticity of the wagon body. The cllp block, by means of which the ordinar
springs are conflned to the axle, has a clip which passes around the latte through the block, and through the spring. The ends of the block exten rom this clip in each direction, and each receives a clip for giving add tional support to the spring.

Improved Strainer for Milk Pails.
mbra, Wheeling, W . Va.-This invention
Conrad Schambra, Wheeling, w. Va.. This invention conststs of a
strainer attachment to milk cans, adapted to serve in comblnation with a small cap for the cover for the pall, and also adapted for the attachment small neck. By this device the milk can be stralned at the same time that It is recelved from the cow into the pall.
Improved Combined Blacking Box, Blacker and Polisher. Anson L. Sonn, Baltinfore, Md. -This invention consists in a pecultar
ode of covering the blacking box and supporting the blacker upon th olisher, so that the whole may be conventently carrited in their trunke by ravelers, and without the possibility of solling their clothes.

Improved Fruit Box
stertown, Md.-This
Aven
Edward Wilkins, Chestertown, Md.-This iavention relates to modes of to bear the jars and jolts of transportation, the welght of the frult, and the varlous manipulations through which they must neceessarily pass, but, a the ssme time, be suffclently cheap to admitt or their transfer to the con
at extra charge.
Processing Hermetically Sealed Cans of Fruit, etc.
andrew K. Shriver, Baltimore, Md.-This invention relates to method of processing hermetically sealed cans of fruit, fish, or vegetables, so zs to
preserve their peculiar flavors, and consists in inmer In water, and then applying superheated steam to the inside of the vessel. Improved Bale Tie.
finis L. Bates. Winona, Miss has legs arranged in diagonal position to the base that the He resta thereby on the lower corners of the same. The upper diagonall pposite corner of each leg has a spur. The ends of the roop bund ar
ilpped over the legs of the tie by belng placed parallel to the sides of the same, by whtch no resistance is offered. The end projections keep the
bands in position on the tie, and prevent thereby the detaching of th
lmas.
lmproved Scraper Attachment to Blacking Brushes.
Johu M. Stamps, Washington, D. C.-This invention relates to means hereby an ordinary brush for blacking and pollshing boots or shoes ma be mademore useful and desirable to the public. The invention consists
In the pecullar shape of the scraper and the mode of applying it to the as as as to enable it to conventently and readily ellminate every par

Improved Cooking Utensil.
Ira Dunham, Plattsbur, Mo.-This is a cooking utensil for brolling
meats, roasting coffee, and other purposes, which is readily thrown open meats, roasting coffee, and other purposes, which is readily thrown open
and held tightly closed during use. Two pans of ecual size are pivoted ogether, factng each other. and closed by a longer handle with spring ex ton by a sllding clasp link.

Improved Car Coupling.
William H. Hopper, Saginaw City, Mich.-This invention consists of bumper head, to which 1s plivoted at one eside a strong spring dog; at the
ther side is a vertical loop. with wedge-staped or pointed front edge other side is a vertical loop. with wedge-shaped or pointed front edge
bitc enters between the rounded off side of the bumper head and th Which enters between the rounded of side of the bumper head and the
spring dog of the adjotning car, so as to be frmly locked between them. For the purpose of coapling with the common drawhead and link, the
bumper head is provided with a horizontal slot for admitting the link, hile the pivoted clevis is detached and thrown back in sideward positio. and its pin fastening made avallable for coupling the entering link.

Improved Rope
Drum for Windlasses. riction fange at each end, and arranged loosely on the shaft, so that th ent. A friction disk is keyed fast to the shaft. For clutching the drum the shatt, suitable mechanism presses a loose disk agatnst the drum the later against the friction disk.
Improved Sugpension Lamp.
Riverius Marsh, New York city. -This invention is a plate made in an Porm to serve as a reflector to throw the rays of light downward. The
plate is fasteaed to one shade by means of screws whtch pass through a plate is fastened to he shade by means or screws which pass through a
vertical flange and enter a corrugation in the shade. The plate is sus ended from lamp chaina, so as to serve both as a reflector and connection

Improved Car Starter.
Carl Ludwig Praeger, Niles, Mich.-The draw rod, when stratn is applied ulls forward a traveling carriage which moves on the drawbar. Friction ollers on the side of the carriage pass under the Inclined portion of the
orizontal arn of a bell crank lever, to the vertical part of which arms ar ecured, which are thereby forced at an angle into the ground, so pushing ecar ahead.

Improved Molder's Flask.
bany, N. Y.-The apper flask sec
Isaac Ma Guire, Albany, N. Y. The apper flask section or cope is pro ope plates, so as to project when ramming the sand, separating cop e mold he molded sand. The bottom flask is rammed and prepared in the usua pushed forward, so as to project to the insice of the cope. The sand 18 the sammed to over the cope section, then detached from the bottom section, and turned over for taking the follower board. The molded sand is sup ported on the projecting part of the sllde. The cope is then reset on the etached from the mold.
Improved Whiffetree Staple.
Manson Hinman, Hallock, m
cast of malleable, iron, in one plece. In the end parts of the strap are
boles to recelve the bolts by which the staple is secured to the whifletre

## Fusimess and tectsonal.

The Charvo for Ineertion under mins nead is 81 a Line.


 The best Bench centering machine in the on reent
Orenale the past
Manufacturers lease send curcurrsars of to Shoe Peg Machines will zakee, wisconst
A frrst class Machinist and Toolmaker wants






 For Small sizes of Screw Cuting Engine A horough Machinist and Draunhtsman,
en experiencef toreman , destres emplosment. $A$ dafres .. r. Wilson, Luduligton, Mlech


 Mechanicall Expert in Pa

 Salingeed oil Presses and. Machinery for

 Forges-(Fan Blast), Portable and Station-

 Tatt's, Portable Bath. Adraess Portable
 For Surface Planers, small size, and for
 The "Scientific American" Oifice New Nork

 Matera. Send for free illustrated CGatalogue.
 For Solid Emery Wheols and Machinery Lathes, Planers, Drillis, inling nad Index
 er ilithograph, ele.
 Peck's Patent Drop Prese. For circulars Small Tooll and Gear Wheile for Models. The French Files of Limet co. are pro, hem. Dectied excellence e ena moiert




 tt. Puladedipha, Pa. Bend for circular
 Temples \& Oilcans. Draper. Hopedale, Mase Dean's Bteam Pumps, for all purposes; En -

Emerson's. ${ }^{\text {Patent }}$ Insert tod Toothed Saws,
 merson, Ford \& Co., Beaver Falle, Pa
Iron Roofing-Scott \& Ca.,Cincinnati, Ohio, Price only three dollara-The Tom Thumb paratua, oro sending measageee, masting magneta, the Can be put in operation by any lad. Includes battery the world on recelpt of price. F. C. Beach \& Co., 268 Broadway,New York.
Millstone Dressing Diamond Machines-
stmple, effective, economical and darable, giving un
cersal satistaction. J. Dickinson, 64 Nassau St., N.Y.

Keuffil EEEser, largegt Importers of DrawPortable Engines $2 \mathrm{~d} \mathrm{hand}$,




Pattern LLetrors and Figures, to ppot on pat Engines, Boilers, Pumpp, Portable Engine Rue's "Little diant" Injectors, Chappest
and Beat Boller Feeder in the martet.
w. L. Chase $\&$

 R. S. can obtain Faraday's "Experimental
Researches "y applying to the booksellers who ander
ise in our columng, -F. w. M. wlll find directions for dilding on p. 90, vol. 30 . Woples of patents can be on anned at this offlce.-R. Y. M. will find a description o
J. W. had better send us his instrument for finding
lead, silver, and gold beneath the surface of the earth -J. L. S. Fill find a description of pollsh for shirtt o
p. 27 , vol. 30 . We do not answer business questions in bls column.-B. D. T. will find the statisties of English atents on p. 272 , vol. 29.-D. B. will find directions fo
aking paper boast on p. 163 . vol. 27.-C. C. A. can pre rve eggs by the recipe given on p. 378, vol. 30.-C. C. 1 formed that one of the ebest practical
team engine is Bourne's "Catechism. wishes to become a mechanical englneer, should read
Mr. Clarke's paper on p. 8 of this tssue.-C. E. D. will nd a description of the dynamometer he requires on
7. vol. 31.-J. R. Wwll find a rectpe for a cement fo labaster (which will serve for glass and ehina) on $p$. 18, vol. 26.-J. C. C. Is informed that wood rollers can be kept from checking by the process detalled on p. 283 ,
vol. 30 .-S. R. H. can prevent rust on steel tools by the cipe on $p .234$, vol.27.-H. W. can blue a gan barrel b
ollowing the directions on p .10 , vol. $25,-\mathrm{F}$. J. D. ca drive away cockroaches by the means described on $p$.
107, vol. $30 .-$ R. W. WW1 find full directions for case ardening on p. 122, vol. 30 . - O. P. Will find a rectipe fo
quarium cement on p. 90 vol. $30 .-\mathrm{J}$. H. T. should no aquarium cement on p. 90, vol. s0,-J. H. T. should no
belleve the mineral rod men. There tis no truth in an
of thetr the horseand man problem, which we had antlclpate W.T. R. asks: 1. How are the battery We armature vibrate as long as the current continues? fastened to a brass rod, as in a telegraph relay; thit arm or lever, with the ald of a apring, serves to hold the
armature a short distance from the cores of the magnet hen the current is not passing. The wire, as it leave this lever; the wire from the other pole of the battery
ts attached to a small brass standard, which is placed in uch a position that when the current 1s not passing the
pring attached to the small lever draws it back againg
 reaking the circuit, when the whole operation is agal ad again repeated. 2. How many feet of No. 15 cop electromagnetic machine for medical purposes? What
umber of wire and what length is best for the primary number of wire and what le
coll? A. See p. 379, vol. 30
A. W. says: Can I make cook stove pat laster of Paris and wood? A. Try white metal as fol
ows: 86 parts by welght of tin, 10 antimony, 3 zinc,

## F. T. says: A gentleman having a spring ome 60 rods from his house wlished me to lay a plpe

 rom it to supply his house and barn. I I commenced at water untll I had made all connections, and running 1 to the house with some 30 feet fall. I then carrledit in o the kitchen over the sink, 5 feet high, bendingit in a or it to discharge into after running through the house. On the plpe, 16 Inches from the circle or bend, I put ock todraw for the ase of the kitchen, this belng onthe side next to the spring. But to my aurprise, when ould run past the cock which I had inserted below the end, rise 16 Inches higher, and run down the other side of the barn. This I could only remedy by placing a stop every time I wished to draw from the faucet. Not one drop of water would come out of the faucet withou
his. A. Such an occurrence is very common. Yo ave got a siphon there. You can readily fita two-wa cock for the house raucet, which will shut off the dit
charge into the barn, when opened into the kitchen.
A. B. asks : How is black copperplate print
ng ink made? A. Take llnseed oll 1 pint, boll out of doors in a dry saucepan till it will ignite on applying
lghted paper, let it burn 10 minutes, then put the lid


W
H. S. asks: I. How can I make a white nnen or cotcon waterproo? Without covering the tex
ure ordiscoloring the linen? What kind of varnish or
and other transparent substance will give linen adurable fin
shing pollsh after belng thus treated ? A A good eol orless varnish is made by dissolving 2 \% ozs. shellac in a pint of;rectifed spirits of wine; boll for a few min tetes with 5.0z8. well burnt and recently heated animal
charcoal. Add more charcoal if necessary to make the
Ver can I makean adhesive substance that will not discolo whte linen? Try gum trugacanth, mucllage, add
few drops oll of cloves to prevent putrefaction.
C. D. R. asks: What are " bastard cut," smooth cut," "superfine cat," and "dead smooth
fles? A. Bastard cut fles are coarse ones nsed for
oughing work out. Second cut sre for roughng hardmetal. Superfine cut are for making very smoot surfaces. Fine cut are for ordinary smooth surface
Dead smooth are forvery fine surfaces to be highly po
 Can it be so prepared that it will bear transportation
without fermentation? We notice that clder will fer eent in a short time,even in freezing weather, when ag ented by the motion of the cars. A. Perhaps the beat
E. A. B. says: Some four years ago th A. A. B. says: Some four years ago the rsix strong tow boats tried for three days to tow he hen took her in tow, as she was going up the current ad, uasided, walked her along without the slightes (which runs at 10 knots) at half speed. The question 1 , Was not the extra weight of the steamship a power e case? I should state that the aggregate steam
ower of the tugs was greater than that of the steam hip. To simplify the case, cannot a man in a boat o $25 \times 5$ feet tow a boat of $12 \times 4$ feet with greater ease than
he can in a $12 \times 4$ boat tow one of 2555 ?
I know by expe tence that he can do so, but I should like to kaow wha law of force in motion governs the case. I want to
know if inherent welght is not a power in the towage o nom hink that the sole advantage possessed by the larg teamer was in the fact that her screw, belng mor deeplylmmersed, was not working in such a swift cur ent as the smaller ones, and acted more
A. D. D. asks: How can I repolish surgica four of emery? A. Nothing pollishes any metal better
han crocus cloth, used on the article unt11 it is covered itha face of the metal itself. The more the crocus ed, the betterit is for poilshing.
G. A. A. A. aks: In my lightning rod is paint
W. W. asks: 1. Is there any loss in recip Cating motion as compared with rotary motion? 1 ame time with the same power that another can run a lease explatn how it ts? A. We do not understand what you mean. 2 . Is it not possible that we may have a 11 iquid fuel that will be as cheap and much more con-
venient than coal, even is it has to be procured from
H. E. S. says: I have a fish net made o muddy water for two or three months at a time; what
should it be immersedin (so as not to lose its fexibility) best preserve
G. R. E. asks: How can I melt white vul
anized rubberin order to make castings 2 not melt such rubber satisfactorily.
naphtha or else use the pure gum rubber.
J. M. E. asks: What is the commercial importance of
facture of cr
pollsh, etc.

| C. C. M. I. asks : 1 . Do you know of a ma |
| :--- |
| ure or ferillizer which is soluble in water and which | ore advantage in growing tobacco? A. We have used alphate of ammonia to stimulate growlog planis, and oyment for tobacco. Othar soluble salte of ammonit ould answer, but this has the advantage that it ts con annedin the ammoniacal liquor of gas works and ca

eobtained in large quantity if needed. 2 . Can yo ive mea recipe for making an amalgam for an electric nachine? A. Melt together in a cructble 2 drams o
tncand one of tin; when fused, paur Incand one of tin; when fused, pour them into a cold
ructole containing 5 drams of mercury. The cushions cruchle bentabbed with a mixture of tallow and beeswax before applying the amalgam. 3. Is it also necessary to
have the plate for the machise entirely smooth around have the plate for the machine enirely smooth aroun
he edge? A. Not absolutely necessary. 4. What th the
4. older than the temperature of the body.
J. W. P. asks: Why is it that an explosion the vent is not closed? A. Explosions of this kind
tin are due to particles of ignited carbon remaining in the
gun. The closing of the vent partially stops the sup. ply of oxyken, and this hastens the extingalshing of the carbon. In cases where the firing is continuous an asty, these premature explosion
ven though the vent be closed
T. J. H. says: 1. We have a tree, the first meter of that tree increasea year after year, will the istance between the ground and satd fork also increase
r not? A. The increase is only by fnterstitial latera rowth. The distance from the ground remains pre rish potatoes in the pantaloons pocket eures rheuma lism. Why is this? Why do sald potatoes, when so
worn, become as hard as stones instead of decaying? . Curtous if true. Warmth withont dampness wil radually desiccate a tuber like a potato, until it be cames very hard. Warmth and molsture will cause d not conspire in the case mentioned.
G. S. B. says : I have tried the recipe, give
your No. olving shellac and sandarac in naphtha, and I find tha aphtha does not have the least effect on elther.
Take the best pure white shellac and dissolve in alcoh (fourth proof); add a little gum sandarac. The fineness
of the polish depends entirely upon the manner and ktll with which it 18 applied.
G. H.M. asks : 1. How can I prevent a tea Keep an oyster shell in the bottom of the kettle; and essel. Be careful aliso not to let the water stand he vessel when not in use. 2. What is the wetght o s of alr, at $60^{\circ}$ Fah. and 30 inches barometric pressure (which may be taken as expresing the mean average
condition of the atmosphere at the earth's surface), 1 , 31074 grains. Hence a cuble foot under the samectr
$\underset{\text { F. E. C. asks: What metal with which hy- }}{\text { Foge }}$ ol ignte gas? A. Platinum in a state of Ane divisto

 He qaalty of trass reaure, butt thas the appearance

H. H. . . A. asks: 1 . What is a simple way

 ponge. Let it dry th the atr, and repeat the operatio


 L. says: In your issue of March 28, you

 aphtha and benzinc
C. S. asks: 1. How is milk brought into a add powdered chalk until all the lactic actd is taken up nd repeal the operation as the fermentation proceed ry powdered alum
G. R. asks: How can I dissolve boracic acid
that it will remain in solution? I tried 1 part accd to bolling water, but it prect pitated on coolling. A 3 of boillng water. but it precipitated on cooling. A
100 ozs. of water at $75^{\circ} \mathrm{Fah}$. will dissolve 138 ozs. of bo
cacte actd. Your other quertes wele answered lagt $\underset{\substack{\text { nececter } \\ \text { mex. }}}{ }$
T. C. H. asks: In doing fine work such as gr. C. H. asks. willt be more injuritous to the eyes to use
pectacles of tolerably strong magnifylag power, than
 powers are used, the eyes require
eriods of repose to prevent injury.
A. T. B. asks: How is phosphorus dissolved
revious to belng applied to the match? How are the atches dipped? Is there any danger in the process? . The preparation is diferent according as they ar put 40 grains of phosphorus in a wide-mouthed bottle, hen mix in 10 grains of flowers of sulphur. Put the ottle fato hot water until the phosphorus is entirel well shake the whole until it has become cold ; after
Wards pour off the supernatani oll of turpentlie. Int Wards pour off the supernatant ofl of turpentine. Int
the mixture of phosphorus which rematns in the bottle the mixture of phosphorus which remsins in the bottie
dip the extremittes of the matches ; and after some tme, when they have become dried, arop them into th ollowing mixture: Dissolve 30 graing gum arablc in
mall quantity of water; add to it 20 grains of chlorate potash, and mix them intimately fogether: then ad grains of soot prevousily mixed the a few drops perfectly dry, when they will ignite on rubbtng them
over a rough surfaee. For luclfer matches, uee one ver a rough surfaee. For lucifer matches, use one ix in a water bath and muller carefully. The dipotin performed in the following manner: The melted com position is spread upon a board covered with cloth or
eather, and the workman alternately dips the two ends
H. L. E. says. in reply to P.S. S. who asked hether CorneliI Universty is a qood schoolfor mechan ical engineering: There is connected with Cornell a o be found in any sbop in the country, and where in
struction in practical mechanics is given by the mos efflclent professors. The study forms an important part
of the course required of the student, and gives a pro of the course required of the student, and gives a pro
actent an opportunity to earn something towards hit

## COMMUNICATIONS RECEIVED

The Editor of the Scientific America cknowledges, with much pleasure, the re eipt of original papers and contributions pon the following subjects
On the Color of Light. By M. O. N
On Veaucellier's Parallel Motion. By N. M

On the Transit of Venus. By R. D. W
On Screw Propellers. By J. E. W
On the Sun's Attraction. By C. T
On the Scientific American. By K. M. J
so enquiries and answers from the follow
ing
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|  | s,422.-W. H. Beckwth, ottawa, carleton, Ont. Im. |
| Rallroad switch, street, C. B. Barlow............... 151,555 |  |
|  | May 28 , |
| Refrrgerator building, A. Zoller................. 151,645 | 3,439.-3. s. P. Putnam, Boston, Saffolk county, Mas8., |
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|  | nalipe, called "Putnam's Wrought Nall Machine." May |
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|  | 3,478.-M. Wainman, South Orillis, Simcoe county, Ont |
|  | Churning Machine, called "Wetnman's Churning Ma- |
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| fog, G. C. Pattizon .......................... 151,518 | 3,4i9. J. W. Elliot, Toronto, York county, Ont. Improvements in heating stoves, called "Ellint's Fuel |
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|  | 3,480-J. Taylor, Hamilton, Wentworth ceunty, On |
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| Stove, E. P. Hldeorand................................ 15151589 |  |
| ${ }^{15}$ | fanning mill jand separator, called "Bennett's improved Ockerman Fanning Mill and Separator." Mas |
| Stove, heating. W. Doyle............................. 151,479 | 28.1 |
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|  | and other articles of wearing apparel, called "The |
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|  | Flume, with Power sifting." May 28, 1874. |
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