A WEEKLY JOURNAL 0F PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

|  | NEW | ORK | APRIL 12, 1884. | [Postage Prepaid] |
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## INCREASING THE BRIDGE FACILITIES.

In our issue of October 13, 1883, we described and fully illustrated the arrangements for switching cars at the New York terminus of the bridge. It will be remembered that motion was transmitted to two grip cars permanently attached to two auxiliary ropes passed around drums which were actuated by the main cable. These drums were provided with friction clutches that were operated by levers located upon a platform in the center of the building. One grip car passed up to the end of the incoming track; the other crossed the switch, and passed to the end of the out going track. By either of these grips the passenger cars were hauled to the end of the station, whence they were al lowed to run to the platform alongside of the outgoing track.
This system has now been in operation since last Sep tember, and has proved adequate and reliable, transferring the cars from one track to the other quickly and with a most gratifying freedom from noise. But, although the method gave most satisfactory results, it soon became ap parent that much more extended track room was necessary for switching purposes, in order that more cars could be shifted simultaneously during the periods of greatest travel As the tracks are now laid out, only two cars can be switched at the same time. On the south, or down town, track, the distance from the end of the switch to the end of the track s 107 feet; on the north track the distance between the same pointsis 101 feet; the difference being due to the angle which the bridge makes with Chatham Street. The large cars are 48 feet long, the small oues 36 feet, and the grip cars $81 / 2$ feet, so that a train made up of a long and short car and the grip is $921 / 2$ feet in length.

NEW YORK, APRIL 12, 1884.

plans for a structure co extend from the end of the bridge across the space formed by the junction of Chatham and Center Streets to the building line on the latter street; and rom these plans the accompanying engraving was made, representing the extension as it will appear when viewed from a point just south of the Hall of Records. Under the conditions governing an undertaking like this it is impossible to make a system of tracks, girders, and columns a thing peauty and a welcome ornament to a neighborhood; but these plans contemplate a structure which, while serving all the purposes for which it was designed, will be as unobtrusive as possible, and which is one of the best, if oot the best, that could be built when considered simply ad solely from a utilitarian point.
There will be four cross girders: one at the curb line of Cbatham Street, one at. the curb and one at the building line of Center Street, and one near the center of the crossing. The latter will be perpendicular to the line of the bridge, while the others will be parallel to the streets on which they will be located. Each girder will be supported by two end columns. Upon these will rest eight lines of longitudinal latticed girders, placed 5 feet $77 / 8$ inches between centers; he distance between the centers of the outside girders will be 39 feet 7 inches. The girders will be 4 feet deep; flange plates, 12 " $x 1 / 2 " x 5 / 8^{\prime \prime}$; chord angles, 4 "x $31 / 2^{\prime \prime} x_{16}^{9}{ }^{9}$ "; web plates, $11 / 2^{\prime \prime} x 5 / 8^{\prime \prime}$; diameter of rivets, $7 / 8^{\prime \prime}$. The top chord will be made up of two angles, with a plate between, and on top of which, for the entire length, will be two plates, increased to hree in the middle section. The girders will be tied together and braced. The distance from the end of the car platform of the bridge station to the first row of columns will be 26
the center row, will be 45 feet long; the north girder 64 feet $51 / 4$ inches; the south and north girders from the center to the Center Street curb will be 56 and 63 feet; the girders over Center Street sidewalk will be 18 feet. The height from the street to the bottom of the lower chord will be 15 feet.
Two flights of stairs, one upon each side, will lead from the Center Street sidewalk to this platform, thereby allowing passengers from the west of the City Hall to enter the bridge without passing through the moving crowds of cars, wagons, and people in the street. These walks will be covered by an umbrella work similar to those over the platform extensions at the Brooklyn station.

This plan will necessitate cutting off one corner of the elevated railroad station. The stairway leading to the station will be moved from its present position up to a point about on the center line of the bridge, thereby relieving the southern carriageway. The stairway in the center of the street will be turned around so as to approach the station from the down town side. Platforms will connect the bridge with the railroad station, so that passengers going in either direction will not be compelled to descend to the street.
At present it is the design to extend the bridge tracks only the center row of columns; the increased switching room thus obtained will be about 80 feet. This will give tracks about 190 feet long from the switches to the bumpers, and will allow trains of four cars to be easily bandled. The auxiliary ropes can be arranged to do this work, but it is probable that a method (by engines) similar to the one now used at the Brooklyn terminus will be adopted.
The structure will be of ample strength to sustain travel if, at any future time, the bridge should be connected with At a recent meeting, the trustees of the bridge adopted feet; the south girder, extending from this row of columns a west side system of railroads.


VIEW SHOWING THE PROPOSED IMPROVEMENT AT THE NEW YORK TERMINUS OF THE BROOKLYN BRIDGE.

# Serientifit Ammerican. 

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## REMOVAL.

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table of contents of

## the scientific american supplement

## NO. 432,

For the Week ending April 12, 1884.

## Price $\mathbf{1 0}$ cents. For sale by all newsdealers.

I. ENGINEERING, mECHANICS, ETC.-Testing Chlled Armor Plates.-With engraving............................................... The Armament Question.-Extracts of a lecture by Capt. C. O. Speed Experiments with Ships Models.-The power required,

The New American War Steamers Dolphin, Atlanta, and icago-Description ofther constin large engravings.
The New War Ships. - A letter to the editor.........................................
The New War Ships.-A letter to the editor ......................... 6892
Furopean Navies.-By M. P. HAYes. .
European Navies.-By M. P. Haycs.
The Atlantic and Pacific Ship Rallway .... ........................... ticut, in the Senate of the $U$. S. on the bill providing for the reor ganization of the Patent Office into an Independent Department and for giving it the exclusive control of the building known as nd for the Patent Office, and of the fund pertaining to the Omce. Show-
ing the relation invention bears to the progress of our country ng the relation invention bears to the progress of our country in all the different branches of industry, etc.; also showing wh more room and more help are needed by the Patent Offce, and
giving many tables and statistics.....................................

## patents in congress.

The most interesting incident of the past few days relating to the patent agitation bas been the delivery before the Senate, on the 31st of March, of a most remarkable oration on the "Reorganizationsf the Patent Office," by the Hon. Orville H. Platt, Senator from Connecticut, and Chairman of the Committee on Patents. We look upon this discourse as one of the most able, eloquent, and profound expositions ever pronounced concerning the nature of patents and the marvelous influence upon the country of new inventions. It is a wonderful essay, powerful in its reasoning, a great honor to its author; entitling bim to the gratitude and respect of the nation.
Senator Platt begins at the very beginning of our patent system. He reproduces from the government archives records showing the gradual unfolding of the system, and tells us of the deep interest our fathers took in new inventions and new industries. He proceeds:
" Mr. President, to my mind the passage of the act of 1836 creating the Patent Office marks the most important epoch in the history of our development-I think the most import ant event in the history of our Government from the Constitution until the war of the rebellion. The establishment of the Patent Office marked the commencement of the marvel ous development of the resources of the country which is the admiration and wonder of the world, a development which challenges all history for a parallel; and it is not too much to say that this unexampled progress has been not only dependent upon but has been coincident with the growth and development of the patent system of this country.
Words fail in attempting, to portray the advancement of
this country for the last fifty years. We have had fifty years this country for the last fifty years. We have had fifty years day wants of life, fifty years of patent encouragement, and fifty years of a development in wealth, resources, grandeur, culture, power, which is little short of miraculous. Population, production, business, wealth, comfort, culture, power, grandeur, these bave all kept step with the expansion of the inventive genius of this country; and this progress has been made possible only by the inventions of its citizens. All history confirms us in the conclusion that it is the development by the mecbanic arts, of the industries of a country, which brings to it greatness and power and glory.
No purely agricultural, pastoral people ever achieved any high standing among the nations of the earth. It is only when the brain evolves and the cunning hand fashions laborsaving machines that a nation begins to throb with new energy and life, and expands with a new growth. It is only when thought wrings from nature her untold secret resources that solid wealth and strength are accumulated by a people. Concede all you claim-free institutions, Cbristian civilization, industrious habits; grant respect for law; acknowledge all our vast natural resources; and then deduct patents and patented inventions from the causes which have led to this development, and you have subtracted from material, yes, from moral, prosperity nearly all that is worth enjoying. Subtract invention from the causes which have led to our growth and our grandeur, and you remit us, you remit our people, to the condition of the people of Italy, of Switzerland, of Russia. If "knowledge is power," invenSwitzerland, of $R$
tion is prosperity.
I am not a very old man, but recollection carries me back fifty years, when there was no railroad, no coal used, no steam power used; no woolen factories except of the rudest sort; no telegraph in Connecticut. Possibly there were on hundred tons of coal consumed in the State annually.
There was no carpet; no piano; few books; hand sewing only; band knitting; the tallow candle; the unwarmed, unlighted church; the school house with its hard, rough benches; and the slow post route, the mail once a week; a weekly paper ouly. It was a week's journey from Connecticut to Washington; six weeks' journey from Connecticut to Ohio. Five thousand dollars in those days was a competence, and $\$ 10,000$ was a fortune. What has accomplished all the transformation which we witness as we compare the condition of the country fifty years ago with its condition at the present day?
I insist, Mr. President, that it is traceable directly to invention. The railroad, the child of patented inventions, the production of cotton, silk, broadcloth, and linen, is due absolutely and entirely to the perfection of machinery for their manufacture. The daily press, the teeming books, are part of our civilization. They are all dependent upon patented inventions. The carpet, the piano, and the carriage conduce to our comfort and our convenience, and they are also children of patents. Every comfort which we have, every convenience which we enjoy, every element of wealth which we acquire, has its root and development in the patent system of this country. They are born of patents, and they live only by permission of patents.
The author then traces the growth of population, of imports and exports, of railways, production of coal, wool, values of agricultural lands, and the same lands where manufactures are carried on; he gives multitudes of statistics and tables; he presents proofs for all his statements.
Every department of business, every pursuit of organ ized life, has been fed, nourished, and enabled to keep step in this wonderful march of progress by the patented inventions of the age. . . . Imagine, if you can, how we should reach our agricultural regions, the great wheat fields of the West, without railroads; and I may say here that a railroad -from the steel rail to the top of the smoke stack, from it
of the last car-is but one aggregation of patents. 'Think of the crops raised without improved plows, without seeders, without cultivators, without mowers, without harvesters, without thrasbing machines! Think of the crops hauled to market by horses! Think, if it be possible, of the wheat converted into flour without patented milling processes ! and say what proportion of profitable agriculture in this country is not due directly to patents and to the patent sysem of the country. The truth is, and there is no avoiding it, that you cannot disconnect in this country invention, manufactures, and agriculture. The triumph and the success of the one is the triumph and the success of all. They re interdependent, coequal factors, as it were, in producing our prosperity and our happiness; and so with regard to the other industries of the country, patents are directly connected with them all, and absolutely necessary to their sucessful pursuit.
We are a nation of $50,000,000$ people, but we have the productive capacity of many more millions, how many more no man can estimate. Coal and water are now performing the work of human bands. What agents will perform them in the near future it is impossible to tell.
The steam power used in the manufactories of the United States, by the census of 1880 , was equal to $2,183,488$ horse nower ; the water power was equal to $1,225,379 \mathrm{~h}$ hrse power ; making in all the borse power of the United States $3,408,867$. Counting one horse power to be equal to that of six men, we have in the power used in the driving of our factories alone in this country the equivalent of the power of $20,453,202$ men. The steam power used in driving our factories, not including the water power, is equivalent to he labor of $13,100,928 \mathrm{men}$; and of our $50,000,000$ people only 35 per cent are supposed to be capable of labor--in round numbers, $17,500,000$ laborers, persons capable of pur suing gainful avocations, in the country; and yet it would nearly take these $17,500,000$ men to furnish the force that is exercised by steam in driving the engines of our factories, he wheels, the spindles, and the machinery of this country; and we do not begin to touch even then upon the saving of power by the use of the machines which are manufactured in these factories.
Take the capacity of locomotive engines as compared with the capacity of horses. We find that the locomotives in the entire country are doing the work of $29,676,960$ horses u common roads
Remember that cight-tenths of the manufacturing of the country is dependent on patented processès. Takethe statement cited the other day by the Senator from Florida Mr. Call], in which he quotes from Mulhall's Progress of the World, a book from which I have already quoted, as to the capacity of the sewing-machine:

In effect, the adoption of machinery and steam bas given mankind an accession of power beyond calculation. The United States, for example, make a million sewing-machines yearly, which can do as much work as formerly required $12,000,000$ women working by band. . A single shoe factory in Massachusetts turns out as many pairs of boots as 30,000 boot-makers in Paris.'
Mulhall here gives the total horse power in comparison with steam as $13,071,000$, the horse power of the world dependent upon the use of steam, equivalent to about $78,000,000$ men.
Take the loom and see what it has done in adding to the productive capacity of the country.
In one of our manufactories you will see a girl of fifteen minding a machine that spins 2,100 miles of thread in a day -a thread that would reach from Washington to California.
Take the figures which I have given of the wool production and consumption of this country. In 1880 the wool grown was $290,000,000$ pounds; that imported was $70,575,478$ pounds. We exported $4,074,517$ pounds, which left for home consumption in the United States $356,500,961$ pounds of wool. Now, imagine for a moment what kind of a figure the mothers and daughters of the land would make in carding it with the old hand cards, or spinning it with the old spin-ing-wheel, or weaving it with the old hand loom. Take the single matter of cleaning cotton.
Under the old process of cleaning cotton, before the in ention of the Whitney gin, a man could clean four pounds a day. The gins now in use clean 4,000 pounds a day.
Whenever a machine is invented which does the work of en men with one attendant, nine men are released from that occupation in which they have theretofore engaged to engage in other productive operation. The men so released do not remain idle, nor do they descend in the grade of labor.
I know the argument is often used that inventions are oppased to the labor interests of the country. It is not true. There is a redistribution of labor whenever a new laborsaving machine is invented, but there is no destruction of labor. There is no degradation of labor in invention. The man released from a particular kind of labor by the introduction of a labor-saving machine does not go down in the grade and scale of labor, but be ascends. He engages in some higher employment, in some more productive vocaion, for patents elevate the laborer. New inventions open new fields of labor. The laborer who lives and breathes the air of invention produces more, man for man, than he who does not live in such an atmosphere, for patents are educators.

Property in patents is a property which contains within itself the principle of the reproduction of property, and that
is a characteristic which attaches to no other species of property. Every patent has in it the germ of a new patent, which in turn is property. Like that marvelous creation of God, 'the tree, in the which is the fruit of a tree yielding seed,' every patented invention contains the fruit of an invention yielding seed. For instauce, the telegraph generated the telephone, and other motors are to be the progeny of the steam-engine. The children of the steam-engine are already born that shall grow up to perform their work more easily, more expeditiously, more cheaply than the paren invention.
Nature is one vast storehouse of wealth, but it is a locked storehouse, and the human brain alone can unlock it. Invention is the magic key. Men seek gold in the bowels of the earth, but it lies in the air, in light, in the gases, in electricity. It needs no enchanter's wand, no talismanic words, to set it free-only the processes of thought.
Let me give you an illustration of the saving of patents. I take perhaps as the most marked instance of the saving made by the use of patented inventions the Bessemer steel plant.
In 1868 the average price of steel rails was $\$ 165$ per ton. The pricesince the commencement of 1884 is $\$ 34$ per ton. The production of steel rails in 1883 was $1,295,740$ tons. The same quantity made in 1868 would have cost more than they cost in 1884 by $\$ 168,446,200$. That is the saving of a single year as the result of this invention.
But when we have thus considered the saving in the cost of production we have just begun to consider the saving which is effected by tbis patent. The entire transportation $q$ restion of the country has been affected by it. The life of a Bessemer steel rail is double the life of an iron rail; it is more than double, and it is capable of very much harder usage. Now take a single fact as suggesting the saving, aside from that of cost of the production of the steel rail which has been effected by this patent. In 1868 the freight charge per bushel from Chicago to New York was by lake and canal $25 \cdot 3$ cents, by all rail 426 cents. In 1884 by lake and canal it is 9 cents only, and by all rail 17 cents ouly. Now take the 119,000 miles of railroad in the United States which are used in the transportation of merchandise. Apply that fact, to the reduction of the cost of transportation, a large portion of which has resulted directly from the use of the Bessemer steel rail, and tell me if you can estimate, see if you can find the figures which will represent the saving to this nation by reason of the use of this one patented invention.

This leads me to speak of the value of patents as measured by their effect in enhancing the value of their products. Here we have no data, and every one-must judge from his own standpoint and from his own opinion as to how much has been added to the wealtb of this country which would not have been added to it except for our inventions and our patent system. How much has been added to the value of land which otherwise would not have been fenced, how much to the value of urban property consequent upon the improvement and development of farms; how many cities owe their existence to the
production of the Bessemer steel rail; how much, to come home to our own city, of the $\$ 5$ per square foot of land near the outskirts of Washington is due to patented inventions? These are suggestive inquiries.
For my part, I believe that two-thirds of the aggregate wealth of the United States is due to patented inventions. Two-thirds of the $\$ 43,000,000,000$ which represents the aggregate wealth of the United States, in my judgment, rests solely upon the inventions, past and present, of this country. The only way to test the opinion is by imagining the effect upon values which would follow a prohibition of the use of patented inventions.
Take the expired and unexpired patents; probibit the application of steam to the creation of power; prohibit the use of patents relating to agriculture and the production of the cereals and of cotton; prohibit the use of the inventions relating to electricity in all its uses; prohibit the use of inventions relating to printing, and tell me how much you have subtracted from the value of the property of this country? Tell me what the property of the country would be worth with such a prohibition? Then banish the knowledge of them, and tell me how this wealth is to be reproduced.

I would gladly speak here of the addition to our comforts and our enjoyments by the use of patented inventions, but I forbear. If we can conceive a situation in which we should live in a home in the building or fitting up of which no patent was employed; eat our family meal in the provision or preparation of which there was no invention; be clothed in apparel into the making of which no patent entered; ride to our business in a conveyance in the construction of which all patents were prohibitory; read only such books and papers as were produced without theintervention of patented macbinery, we may realize partially how much of our social and domestic bappiness is derived from patents.
We protect all our personal property by patents, we lock it up with patented locks, and if anybody breaks through and steals our treasures we overtake the thief by a patented telegraph. We defend our national honor by patents. We
heard only yesterday that an unfortunate riot occurred in


THE NEW OFFICES OF THE SCIENTIFIC AMERICAN, 361 BROADWAY, CORNER FRANKLIN STREET.

## MALARIAL FEVERS.

In an article in the Scientific American of March 22, in which the spread of malaria was traced into many regions formerly exempt from the disease, the town of Litchfield, Conn., " a city set on a hill," was instanced as having succumbed to the mysterious invader. It is gratifying to be able to present the evidence of the principal physicians of that favored locality showing that malaria has no babitation there. May her peaceful hills and vales be forever salubrious!
To the Editor of the Scientific American
An editorial in your paper of March 22, states that " Litchfield, a city set on a hill," which has always boasted its healtlifulness, acknowledged the tread of the invader in 1880, and he had come to stay, to their disgust.

The undersigned, practicing physicians for many years past, desire hereby to contradict the above statement in the most positive and unqualified manner, and to state that we have not, either in 1880 or any other year, known of a single case of malarial fever originating in this village, or its immediate vicinity.

> Henry W. Buel, M.D. Howad E. Gates, M.D. Wm. Deming, M.D. Wilis J. Beach.

Litchfield, Conn., March 28, 1884.

## NEW SCIENTIFIC AMERICAN OFFICES,

The growth of the business connected with the Scientific American is such that we have been compelled to change our headquarters; and we have now removed to the new and splendid fireproof building No. 361 Broadway, corner of Franklin Street, a few steps from our old place. Our engraving shows the exterior appearance of the building. Here in the third and fourth lofts the Scientific American, the Scientific American Supplement, the Scientific American Export Edition, and the world-renowned Scientific American Patent Agency, are now located. Taking the elevator at the street door, 361, our friends will land on the main floor of the principal office, a beautifully lighted, airy apartment, more than fifty feet wide and one hundred and sixty feet long. It is furnished with everything needful for the prompt and efficient execution of business, and forms un doubtedly the finest patent office in the world. We cordially invite our many friends in town and country to call in and take a look. Remember the number and tell everybodyMunn \& Co., 361 Broadway.

## UNEVEN SHRINKING.

Much loss is occasioned in the foundry by uneven shrinking of castings, causing distortions and fractures. "Some of these may be avoided by previous preparation in the construction of the patterns. Rimmed wheels with arms, like pulleys and gears, are particularly liable to these shrinkage losses. This is because the continuous rim and the solid hub retain their heat longer than the separated and comparatively light arms. The remedy that suggests itself is to make these arms

> The universal testimony of all inventors is that it is the eward which they hope to secure which stimulates their efforts. Is it so that an inventor, of all the men in the world, has no right to his reward? Is it so that he has no right to e protected in his property? It is the security to an in ventor of his invention which makes it valuable, and whic timulates him in his effort to make new inventions.
Mr. President, every round of the ladder on which we have climbed to national pre-eminence is a patented invention, and every sign-board which points to a greater future of achievement and progress shows that the path continues to lead through the field of invention. We are nearing the end of the contest to which our fathers invited us, when they gave to our Government the power to promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries. That contest was for the supremacy of the world, and the prize is now in full

Shall we forget, shall we neglect, the system which bas enabled us to outstrip our competitors in the race, or shall we the rather perfect and develop it, that through its perfection and development we may attain still grander reults?
We stand to-day in the gateway of a most marvelous future. Let us hope that eyes may be given us to see that the inscription over the gate reads, 'Protection to the American patent system and all that it comprehends and involves.' "
Our limited space forbids further quotations. For the full text of the oration, the reader is referred to our this week's Supplement, in which it fills nearly ten pages.

The Dose of Quinine.-Professors Bartholow and Da Costa agree that the antipyretic dose of quinine is not less than five grains every two hours until four doses are taken, or else thirty grains in two or three doses close together. The former believed a small dose of morphine given with quinine is the best thing to counteract the unpleasant cerebral symptoms of the latter.
longer, so as to allow them more shrinkage. Obviously the only way to lengthen the arms is to make them dishing; instead of having them run on a straight line from rim, hrough the hub, to rim, deflect them out of a right line, having the result of making a dished wheel, the hub being out of line with the edges of the rim, and the arms on a cor responding slant. The amount of this "dish" or drop of the hub should be about that of the estimated shrinkage of cast iron-one-eighth of an inch to the foot. Thus, a pulley of twelve inches diameter and six inches face should be dished by the patternmaker so that the bub drops about oneeighth of an inch below the level of the pulley rim edge.
Pulleys and gears cast with these dished arms come straight on cooling, and they do not require to be uncovered -or partially uncovered-in the mould to facilitate even shrinkage. Every machinist knows what annoyance he has suffered from the chilling of cored hub holes and of the rims of pulleys, the core hole in the hub being sometimes swabbed while red hot, and the sand from the rim dug away, making much trouble in boring, and necessitating the grinding of a pulley face instead of turning it.

## Doctor Crosby and Free Trade.

The Reverend Howard Crosby, one of New York's most useful and energetic citizens, as well as celebrated divinesa man full of patriotism and good works-sent the following characteristic reply to an invitation to attend a recent free trade dinner in this city :
"I have received y our invitation to purchase a ticket to the Free Trade Club dinner, which I should accept were I a free trader, but I am a benighted protectionist, and could have no place at your table, unless to hear words of wisdom to convert me; but these I can ge's in the morning papers, and weep over my errors without being seen."
Such men as the above model citizen are just the men to take hold of the tariff reform question in place of the parlor statesmen, who have never done anything for their country except to talk and live off of her by eating more than they produce.

## REMOVABLE BOTTLE TRAP

The object of an invention recently patented by Mr. G. M. McCloskey, of No. 1911/2 Atlantic Avenue, Brooklyn, N Y., is to facilitate the cleaning of bottle traps and also to increase the ease of attaching and detaching the traps from the pipes. The body of the trap is cast in the shape of a cylindrical cup, as indicated by the dotted lines in the engrav ing. The open end is spun so as to fit upon the screw tube,


## McCLOSKEY'S REMOVABLE BOTTLE TRAP

$b$, which is soldered in place, and into which is screwed the tubular part, $c$. Upon the outer part of the tube is screwed the coupling ring, $d$, whose inwardly projecting flange holds the inlet pipe firmly in place. The pipe, $e$, is screwed into the inner end of the tube, $c$, so as to form a continuation of the inlet pipe extending nearly to the bottom of the trap The upper part of the side of the trap is cast upon a female screw similar to the one shown at $b$. 'The outlet pipe is held in place in the same way as the inlet. With this construc tion the trap can be disconnected from the outlet and inlet pipes by unscrewing the coupling rings, so that it can be easily cleaned and replaced. The trap being cast in one piece, soldering of the parts is done a way with.

## CORN PLANTER.

The annexed engraving represents an invention patented by Mr. Charles J. Mikesh, of Conover, Iowa, which is designed to facilitate the operation of corn planting. The wheels are made with wide concave rims to adapt them to cover the seeds. The ends of the axle are attached to the side bar of an outer frame which incloses the machine, and to the forward end of which the tongue is secured. An inner frame, fitting in between the hubs and resting upon the axle, oscillates freely between the cross bars of the outer frame. To a support attached to the rear bar of the outer frame is pivoted the end of a lever which, at a short distance from the end, is joined to the inner frame by a bar. The forward end of the lever moves along a notched circular ba as shown. By moving this lever the inner frame is oscillated, and by means of the notched bar and bolt, which is operated from the handle, the frame can be locked in any desired position.
To the lower ends of angular shaped bars journaled upon a cross rod are attached plows which open the furrows to receive the seed. A spring bearing upon the horizontal portion of the bar holds the plow down, yet permits it to move up when it encounters an obstruction. This construction is clearly shown in the engraving, in which the forward part of the side bar is cut away. The seed boxes are secured to the forward cross bar of the inner frame. The two seed dropping slides are connected by a rod which is joined by a link to an arm projecting upwardly from the end of a short shaft whose other end is rigidly attached to the center of a bar, which is so placed that the driver, when sitting upon the seat, can rest his feet upon the ends and so operate the seed dropping slides. The slides $\mathrm{a}^{\mathrm{t}}$ the lower ends of the boxes receive the seeds from slides placed near the center (both sets of slides are operated by the same bar), and at the next movement of the dropping mechanism drop the seed in z bunch through the funnels to the ground

## Efficiency of Coal.

A pound of average coal develops, with perfect combustion, 12,000 units of heat, which, multiplied by 772, the mechanical equivalent in units of work of one unit of heat, equals $9,264,000$ foot pounds of work, representing barely a consumption of one-quarter pound of coal per indicated horse power per bour. The very best engines of modern times, leaving out only a few exceptional cases, require not less than $21 / 2$ pounds of coal ,per horse power per hour. She average engine uses very much more.

## Keep Your Eyes on Congress.

"Some of the bills now before Congress, notably those of Mr. Auderson and Mr. Voorhees, should they become laws, would prove a death-blow to our most flourishing industries. They would be more disastrous in their effects than an immediate adoption of absolute free trade. They would rob honest men of the fruits of their brain labor in order to benefit a few who are too lazy mentally, morally, and physically to exert what little ability the Lord in His generosity saw fit to waste on them.
"Shame on all who do not stand up manfully in defense of the right of every man to enjoy the honest fruits of his labor, mental or physical! More shame on those who, being intrusted with the duty of protecting those rights, neglect that duty, and are silent when their voices should be heard in vigorous protest! But greatest shame of all on those who willfully betray their trust and besmirch their reputations by advocating this wholesale robbery of a class of men to whom the nation is indebted for much of its present greatness! "-Sewing Machine Journal.

## IMPROVED FENCE POST.

The base of the post consists of a cast iron point, $a$, having spiral flanges, $e$, and a shoulder above which is a screw threaded section and a driving head, $b$. This section is driven into the ground about to the shoulder. The upper section is made of a suitable length and size of gas pipe, about one-half of which is cut away as shown in the accompanying perspective and sectional views. Through the back of the remaining part is cut a slot which is nearly as long as the open front portion. The lower end of the pipe is screw-threaded to fit upon the ground section, and the upper end is fitted with a plug. Wires are secured to the posts by hook headed bolts (shown at $d$, in the cross sectional cut) which extend through the slot, and are held by nuts so as to draw the wires firmly against the two edges of the post; two bearing points are thus formed, against which the wire may be clamped and securely held at any desired height.


## MINER'S IMPROVED FENCE POST.

When deemed advisable, in order to make the fence more easily visible to animals, the upper hook may be replaced by a bolt, having an $L$ form, for holding the lower edge of a board, the upper edge being passed under a lip formed in the top of the pipe.
This construction makes a simple and durable post which can be quickly and easily set.
This invention bas been patented by Mr. E. D. Miner, of Dayton, Washington Territory.


MIKESH'S CORN PLANTER.

## IMPROVED VALVE OILER.

The accompanying cut shows an invention, recently patented by Mr. S. D. Mershon, of Rahway, N. J., which is designed to facilitate the oiling of the moving parts of machinery, and also to secure regularity in the amount of oil delivered. Through the center of the oil cup, A, passes a tube, B , which may be made solid with the top and screwed into a hole in the bottom. Oil is introduced into the cup turough an opening in the top that is closed by a cap C, having a hole, $\mathbf{D}$, through it, as shown in the sectional view, Fig. 2, in order to admit air to the cup to take the place of the oil as it is discharged. In the lower part of the

MERSHON'S IMPROVED VALVE OILER.
tube, B , is an opening, E , through which oil passes to the interior and enters the recess, F , in the rod, G. This rod fits accurately in the tube, and its lower portion is made up of two halves held together by screws passing through short slots in the extension part, $G^{\prime}$, as indicated in the longitudinal section, Fig. 3. When the rod is raised, the recess comes opposite the opening and becomes filled with oil; as the rod moves downward the oil in the recess is carried with it and flows out through the lower part of the tube to the surface to be oiled. The upper part of the rod is jointed, and its upper end is attached to a crank formed upon a shaft, J, revolving in bearings, as shown. At each revolution of he shaft the recess, $F$, discharges its contents. On the shaft is secured a ratchet wheel, L , into the teeth of which meshes the end of a pawl, M , which is pivoted to, and operated by, the swing of the pendulum, N. The pawl is held in gear with the wheel by the weight on the arm, $\mathbf{0}$. The jar of the engine will keep the pendulum in motion; but it may be extended as indicated by the dotted lines and actuated by an arm attached to some moving part of the machinery. The swing of the pendulum is limited by the set screws, $P$, passing through the upper ends of the standards, Q. By means of the set screws the movement of the penQ. By means of the set screws the movement of the pen-
dulum can be regulated so as to move the wheel through the space of one or more teeth, thereby increasing or diminishing the time required for the shaft to make a revolution, and thus regulating the time between the discharges of oil.

## Lead Pencils.

With the improved machinery now used, ten bands will make about four thousand lead pencils of the cheaper grade a day. The cedar comes chiefly from Florida, and it is received in slabs of pencil length, one for the lead to go in and the other to cover it, as may be seen by examining the end of any lead pencil. Four little grooves are sawed in the thicker slabs, for the leads, which are kept in hot glue and taken one by one and inserted in the grooves. Then the bin slab is glued to the leaded slab, and, thus united, they are run through a moulding machine, four pencils coming from each slab. After the ends are rasped they are run between grooved wheels at considerable pressure for the only finish they get. This burnishes them, and they are tied in dozens and boxed for sale, mostly in plain wood, and of three degrees of hardness. The graph ite used comes in a fine black powder, and is mixed with German white clay, about half and half, and then ground with moisture, forming a paste. This is pressed in dies into lengths of four leads, which are cut and then baked at a very high temperature. These sell at 85 cents, $\$ 1.50$, and $\$ 2$ a gross, and are very good articles, writing smoothly and evenly. The manufacturer makes about one hundred per cent, selling the pencils at eighty-five cents a gross, and the retailer makes a good thing selling them at a cent a piece. The graphite costs about twenty. five cents a pound, and the clay little more than the freight. The more clay is used in the leads the harder they will be. The cedar is cut mostly from fallen trees in Florida swamps.-Geyer's ( $\boldsymbol{N} . \boldsymbol{Y}_{\mathbf{Y}}$ ) Stationer.

The report that a party of Americans intend pur chasing the volcano Popocatepetl or Vesuvius, and erecting extensive works there for the mining of sulphur and the manufacture of sulphuric acid, lacks confirmation.

## A New Commercial Treaty with Mexico.

Any legislation which has a tendency to make it easier for manufacturers to export the productions of our workshops and factories cannot fail to meet with general appreciation, while it will be particularly welcome to the ciation, while it will be particularly welcome to the
mechanics and artisans of every trade. Of such a nature is mechanics and artisans of every trade. Of such a nater
the new treaty with Mexico, ratified by the United States Senate March 11. Nearly all our exports heretofore have been of agricultural productions, but a proper growth and healthy expansion of our manufacturing industries cannot be steadily maintained without materially enlarged foreign markets. We need more customers ready to take our surplus of manufactures, above what is required to fill the home demand, and it is eminently proper that we should take a step in advance in this direction by making a sort of reciprocity treaty with our neighbors in the Southwest, of the Mexican Republic. They are in want of many things now, and with the opening of new railroads through the country will want far more, which it would be, indeed, a pity to send them to Europe to buy while our factories are far from being overworked.
Under the treaty, which has just been ratified by the U. S. Senate, the chief agricultural products of Mexico, including leaf tobacco, are to be admitted to the United States free of duty. The list of articles on the free list embraces few manufactures, and contains many entries now admitted free. Among the manufactured articles is sugar of not above No. 16 Dutch standard in color. The schedule of articles to be admitted free into Mexico from the United States contains over seventy entries, and comprises five great classes of manufactures-railroad machinery, steam building materials. To these are added coal of all kinds, building materials. To these are added coal of all kinds, petroleum, naphtha, precious metals, sewing machines,
vehicles of all kinds, clocks, stoves, and many minor manufactures and materials. The treaty will remain in force for six years.

## The Power of Boilers.

At a recent meeting in Manchester of inspecting engineers and other gentlemen interested in the inspection of engines and boilers, the question of the so-called horse power of boilers was raised by Mr. Boswell, and the debate which followed was well sustained, the general opinion being that the term "horse power" as applied to a boiler was wholly wrong, and should be abandoned. It was suggested that boilers should be rated by their evaporative capacity; but to this it was objected that the factors of this capacity were-quality of coal and water, the method of seating adopted, the area and altitude of the chimney, and, not least, the brains or skill of the fireman. Mr. Richard Thompson, the senior inspector of the Manchester Steam Users' Association, contributed very greatly to the interest of the debate by his contribution of facts acquired in actual experience, as didalso the majority of those present. It appeared that a full-sized Lancashire boiler, 7 feet by 28 feet or 30 feet, might, so far as horse power was concerned, develop anything up to 380 or 400 horse power, according to the conditions, which would of course include a very economical engine. A fact of great value, not sufficiently known, was brought up, namely, that when the evaporative efficiency of a Lancashire boiler was being tested at atmospheric pressure, the whole of the steam generated being discharged through a short 6 inch pipe with one right angled bend in its length of a few feet only, the pressure in the boiler rose to 3 pounds per square inch by the gauge, showing most conclusively that at such a low pressure it requires a safety valve to a boiler with at least an outlet area of 25 square inches. Whatever may be the pressure in a boiler, it will practically evaporate the same weight of water, but an orifice will practically discharge a constant volume at all pressures, and the volume varying almost inversely with the pressure, a safety valve will discharge more steam at a high than at a low pressure, and therefore a high pressure boiler does not require so great an area of safety valve as does one at a low pressure.

## An Anecdote of Peter Cooper.

The head of the Women's Art School of Cooper Institute writes of Peter Conper, in the Century: " One day he stood watching the portrait class, who, to the number of thirty pupils or more, were drawing likenesses of the same model from different positions. model from different positions.
One scholar made the face in One scholar made the face in
profile; another had it turned a profile; another had it turned a
explosive that is more powerful and more instantaneous than nitroglycerine.
Certain mixtures thus obtained resist shocks better in the cher

chemists, form a group which has no connection | chemists, form a group which has no connection | $\begin{array}{l}\text { liquid state than any other known explosives, even ordinary } \\ \text { with any other known explosives. They are possessed }\end{array}$ |
| :--- | :--- | :--- |
| mining powder. Ordinary powder explodes under the shock |  | with any other known explosives. They are possessed

of peculiar properties and power, and merit a descripof half a meter. Gun cotton and other products of


Fig. 1.-TURPIN'S PERCUSSION APPARATUS FOR EXPERIMENTING UPON EXPLOSIVES
tion. The combustive element of this new section of explosive bodies, which is the discovery of Mr. Eugene Turpin, is peroxide of nitrogen. The combustible body may be formed of different substances, such as sulphide of carbon, petroleum, toluene and xylene, benzoles, and vegetable and animal oils. Eacb of these substances gives a different ex
$\qquad$


Fig. 2-ARRANGEMENT FOR TESTING POWER OF EXPLOSIVES.
plosive endowed with special properties. Another group is formed of a mixture of peroxide of nitrogen with nitrobenzine. This latter group gives products of great stability. In fact, the combustible being already uitrated to saturation by nitric acid, the peroxide of nitrogen has no action upon it, and intervenes, merely as a combustive, by its simple ad-


Fig. 3.-COMPARATIVE RESULTS GIVEN BY THE EXPLOSION OF DYNAMITE AND PANCLASTITE. which is shown in Fig. 1. state. substance, such as powder, vandanite,
it again loses its sensitiveness to shock. clastite. broken. weight from a height of a quarter of a meter. Seventy-five per cent dynamite explodes under the same weight falling 0.15 meter, and dynamite gum explodes under a fall of from 0.20 to 0.25 meter. Pur nitroglycerine explodes under a fall of $0 \cdot 10$ to 0.15 meter. Panclastite in a liquid state does not explode under the shock of the same weight falling four meters. All these experiments were made under exactly the same conditions by means of apparatus constructed by Mr . Turpin, and one of

Certain compounds of panclastite are non-inflammable, while others are more or less inflammable, but never detonate through fire alone, in an open vessel. All the inflammable compounds burn quietly in the open air. It requires a preliminary explosion to bring about one of panclastite, such, for instance, as that of a primer charged with fulminate of mercury. Certain of the compounds burn so quickly and with so brilliant a flame that Mr. Turpin has been led to devise a portable apparatus for optical telegraphy at night, in which this material is used as an illuminating agent. Panclastite, considered as an explosive, enjoys the peculiar and valuable property that its sensitiveness and power may be varied at will. All the experiments with it have been made with the mixture that is least sensitive in a liquid

But its sensitiveness may be made such that a bermetically closed vessel filled with the mixture will explode under its own weight in falling from a height of from one to two meters upon hard ground. On the contrary, the sensitiveness may be made so slight as to make it impossible to explode it under the influence of a primer charged with 3 grammes of fulminate of mercury. Finally, as with nitroglycerine, panclastite may be united with an active porous substance, such as powder, vandanite, etc. In such a case,

When dynamite and panclastite are caused to explode in the open air upon leaden cylinders, it is found that the effects produced by panclastite are infinitely superior to those obtained with a larger quantity of dynamite.
Fig. 2 shows the arrangement before the explosion. A is the leaden cylinder, $\mathbf{B}$ is a bottle placed upon it and containing the explosive, and C is the priming and fuse. Here the bottle is represented as containing 10 grammes of pan-

Fig. 3 shows the leaden cylinders before and after the explosion. No. 1 represents the cylinder before the explosion, No. 2 the same cylinder crushed by the explosion of 20 grammes of dynamite gum, and No. 3 a cylinder crushed by the explosion of 10 grammes of panclastite. As may be seen, the effect produced by the new explosive is greatly superior to that given by dynamite, notwithstanding that the former be used in much less quantity.
Among other open air experiments that have been tried with it we may cite the following: An iron rail was placed upon an oak tie, and, in the channel between the flange and bead, there was laid a cartridge containing 60 grammes of panclastite primed in the ordinary way. When the fuse was lighted a violent explosion ensued and the rail was literally crushed into fine bits, the majority of which were driven deeply into the tie, the latter itself having been

Some of the fragments of the rail weighed but a few grammes. For these details and the engravings we are indebted to La Nature.

## Air.

Mean pressure of the atmosphere, at the level of the sea, is equal to 14.7 pouncis per square inch, or $2,116 \cdot 4$ pounds per square foct. One atmosphere of pressure is measured by a of pressure is masured by a
column of air at $32^{\circ}$ Fah., 27,801 feet, or about $51 / 4$ miles, high, of uniform density equal to that of air at the level of the sea.

The density, or weight, of one cubic foot of pure air, under a pressure of one atmosphere, or 14.7 pounds per square inch, is, at $32^{\circ}$ Fah., equal to 0.080728 pound. At $62^{\circ}$ Fah., the weight is 0.076097 pound.
The volume of 1 pound of air.
 or away from the light. He had stood observing the sceve specially adapted for military purposes. for a few minutes, when he said, 'Such a sight as this should be a lesson in charity, when we perceive how the same person may be so different, according to the way he is looked at by various people.'"

In principle, panclastite for industrial purposes consists f two liquids, one soluble in the other, which are inert The specific heat of air at constant pressure is 0.2377 , and taken separately, but which it is only necessary to mix to- at constant volume $0 \cdot 1688$, that of water being taken taken separately, but which it is only necessary to mix to-
gether to at once obtain, without any other operation, an

## Forming and Repairing Lawns.

The making of new lawns, and the best means for keeping old ones in good condition, and the keeping of our grass plats, great or small, free from weeds, are themes which interest and affect the majority of persons residing outside of our cities, and this is our excuse for so frequently referring to the subject.
The last number of the Garden (London) publishes the following article on lawns and their treatment, which contains much useful and timely information.
It bas been said, and with much truth, that there is nothing which adds so great a charm to English homesteads as the lawns or grass plats that are generally to be found surrounding them; and, as this is the season to form, relay, or repair them, a few remarks as to the proper mode of procedure may possibly be useful. In forming new lawns, it is hardly necessary to say that their extent must be dependent on the ground at command; every endeavor should, however, be ground at command; every endeavor should, however, be
used to make them as roomy as possible, and toward this end much may be done by placing the shrubs and trees, or at least the greater part of them, as far away from the house as the boundary will permit; any that stand out ought to be of the best kind. A lawn need not necessarily be flat or level; it may, on the contrary, be undulating, according to the natural formation of the ground. In preparing the latter for the turf, the most important thing is to see that any portion which has been moved is well rammed, for if not it will be continually subsiding, and nothing looks worse than little hollows caused by the settling of earth.
Another important matter to bear in mind is that the soil of lawns should not be rich, for if so the grass not only grows fast, but coarse, and it is impossible under such circumstances to get a good thick bottom or to keep it in anything like the perfect order attainable when the roots are less fed. This being so, it is a good plan to use sand, or to cart poor earth for the leveling and finishing off of the top, but when so applied it should be put on regularly or the grass will be patchy, which will spoil the effect of the whole. The leveling being completed and the surface raked smooth and fine, the next thing is either to sow seed or use turf, the latter being by far the best way, for though it involves more labor, time, and expense, the work is at once complete, while if seed be sown it takes a year to get a good bottom. The most suitable turf is that from pastures or waste places by the road-side which have been closely fed off and the grass is short and fine, with a sprinkling of white clover in it. If the turf of this kind can be got, a fine lawn may soon be made.

The most handy turfs to work with are those a yard long and a foot wide, and the thinner they are, so long as they will hang together, the easier will they roll and lay down again. No open joints should be left for the air to get in; to prevent this it is a good plan to pass the roller over the turfs quickly after they are down, so as to press them to the earth, in which the grass will soon take root. If any inequalities of surface should by chance exist after the roller has been used, they may easily be beaten down by means of a rammer when the ground is soft. Where fine turf cannot be had and seed has to be sown, it should be got specially for the purpose from some seedsman, as that otherwise obtained is full of weeds, and never makes a good lawn. The time to sow is about the middle of March, when the seed should be scattered evenly over the surface of the finely raked ground and slightly covered, after which, if birds are kept from scratching it out and devouring it, it soon germinates and grows at a quick rate if the weather proves favorable.

Lawns that are in a thin, patchy condition may be improved in two ways: the one by cutting out the bare or worn parts and relaying with fresh flag, and the other by a top-dressing of rich, finely sifted soil, to which should be added some soot and fresh slaked lime, which will not only stimulate the grass and give it a rich, deep green color, but will also kill all moss, which on some lawns is very troublesome, and if not checked or destroyed soon gets entire possession. Daisies and plantains, too, are often a nuisance, and to eradicate these weeds there is no plan better than cutting or digging them out, which, unless they are thick, is no great task if set about in real earnest with a sharp and suitable tool.
D. S .

## The Luxury of Rapid Transit in New York.

'The city of New York is provided with thirty-three miles of double railway tracks, built on iron posts-iron bridges, in fact-which occupy some of the finest streets and avenues. On these tracks the steam passenger trains roar and whiz along at intervals of a minute in each direction; the smoke and cinders are poured into the windows of the adjacent dwellings, in many cases only two feet from the railway; awnings are set on fire by sparks; passengers and workmeu are frequently knocked off from the station platforms, and fall twenty feet to the pavement, to be picked up dead; tools, hot water, fire, and lumps of coal drop upon the heads of luckless pedestrians or car men in the street below; and, finally, light iron shavings, cut, from the wheels of the cars by the brakes, float down through the air and lodge in the eyes of passers by. These are a few of the nuisances which New Yorkers endure for the sake of enjoying the luxury of rapid transit.
" One of the car drivers on the Sixtl Avenue horsecar line, the track of which runs directly under the steam railway, recovered in court not long ago $\$ 3,000$ damages for injury to eyes from a burning coal that fell upon him. The iron
shaving trouble is quite serious. When the brakes are put on the pressure on the shoes, as they call the iron that is thrown against and checks the wheels, is very great, because they have to make such short and quick stops. This friction tears off minute particles of iron, so small that the eye cannot perceive them, yet they are jagged and produce irritation.

Some of the city oculists have special microscopes made to detect them, so frequent are the complaints, and these in. struments require very powerful lenses and strong lights to detect them. Car drivers on the Third and Sixth Avenue roads are large sufferers from this trouble, so the professors at the Eye and Ear Hospital report."

## The Cincinnati Convention.

Our last week's report gave most of the proceedings of the second day. Among the incidents was the following admirable letter from Senator Hawley of Connecticut, which was read before the Convention and received with great enthusiasm:

Washington, March 19, 1884.
Dear Sir: Those patent bills pending before the Senate are not to become law by my vote, or if I can prevent it in any honorable way. My hope now is that the Senate bill, with the House bill, may be sent back to the Senate Committee on Patents, there to hear arguments which persons interested in patents are desirous of making. I have been wondering for two years that the patent industries of the United States were not more awake to the dangers which threaten this whole system. They are now bestirring themthreaten this whole system. They
selves. I hope it is not too late.

Yours truly,
Jos. R. Hawley.
At the evening session the Convention adopted the follow $\xrightarrow{\text { At }}$

PROTEST TO CONGRESS.
Cincinnati, O., March 26, 1884.
Hon. George F. Edmunds, President pro tem., U.S. Senate:
The American inventors, in convention assembled, desire, tbrough you, to respectfully enter their solemn protest before the Senate against the passage of any measure tending to impair their rights as inventors or to deprive them of any of the legitimate fruits of their hard earned labor.
By order of the Convention.
J. S. Zerbe, Chairman.

Chas. M. Travis, Sec'y.
The Convention also adopted the following

## APPEAL TO INVENTORS AND PATENTEES.

"Resolved, That a committee of three be appointed (the same to include the President of this Convention), whose duty it shall be to send a circular letter to inventors and patentees, urgently requesting them to write a private letter to their Senators and Representatives in Congress to vote and use their influence in all honorable ways to defeat all bills now pending before Congress, or which may be hereafter introduced, detrimental or in any way impairing their rights under patents."
The Constitution and By-Laws for the permanent organzation were next read and adopted as a whole. The annual assessment on delegates was fixed at $\$ 2$.
Some foolish fellow got in a set of resolutions that nobody but a lawyer shall represent an inventor before the Patent Office. They were laid on the table. This is on a par with the bill before Congress to compel patentees to pay $\$ 50$ ounsel fees to the defendant lawyer.
On the third and last day, March 27, the election of offiers resulted as follows:
President, James S. Zerbe, Ohio; A. J. Nellis, Pennsylvaia, First Vice-President.
C. M. Travis, Crawfordsville, Ind., Secretary.

John Fehrenbatch, Cincinnati, Assistant Secretary.
C. P. Lesher, Lansing, Mich., Treasurer.
J. J. Geghan, Cincinnati, Librarian.

The following Vice-Presidents were elected: M. Garland of Bay City, Michigan; Josiah Kirby, Cincinnati, O.; J. S Johnson, Mexico, Missouri; James T. Dongine, Chicago, Illinois; L. C. Huber, Huber, Kentucky; J. J. Johnson, Pittsburg, Pennsylvania; K. D. Davis, Cole City, Georgia; John Burleigh, Lawrence, Mass. ; J. E. Baker, Madison, Wisconsin; C. P. Jacobs, Indianapolis, Indiana; Hon. Fred. Atwood, Winterport, Maine; Edward Barrath, Brooklyn, New York; Al. A. Yeager, Knoxville, Tennessee; W. C Dodge, Washington, District of Columbia; William A.
Harris, Providence, Rhode Island; Frederic Fries, Shenandoah, Iowa; Irving M. Scott, San Francisco, California; Mr. Knapp, Portland, Oregon; C. A. Campbell, Mississippi; E. V. Caldwell, Hoopersville, Alabama; C. F. Hyde, Ottawa, Kansas; George R. Platt, Louisiana; Hon. Clinton B. Davis, Higganum, Connecticut; C. A. Barvoios, Bennington Vermont; A. J. Marberry, Cabot, Arkansas.
The Committee on Publication was appointed as follows: Dr. N. N. Horton, of Missouri, Chairman; Hon. Josiah Kirby; J. J. Johnson, Pennsylvania; J. S. Zerbe, A. J. Nellis, C. M. Travis, John Fehrenbatch, C. P. Lesher, J. J.

Buffalo was selected as the next place for the annual con vention, which takes place the second Tuesday in January, 1885.

Some one says a good dressing for leather is made of one quart of vinegar, two ounces of spermaceti oil, and six ounces each of molasses and ivory black.

Colorado Resolutions.
We hope that inventors and manufacturers in all parts of he country will follow the spirited example of their brethren in Colorado, and lose no time in sending to Senators and Representatives an expression of their views. The following is from the Denver Daily Newos of March 22:
The inventors' convention called to meet in this city convened at the office of J. A. McAnulty yesterday afternoon. General F. M. Case was elected president, and J. A. McAnulty secretary. A committee on resolutions was appointed by the chair, consisting of H. C. Lowry, H. W Yonley, and J. A. McAnulty. Remarks were indulged in by a number of inventors present. The following resolutions were reported by the committee, which were unanimously adopted:
Resolved, That we, the inventors of Colorado in mass meeting assembled, view with alarm the hostile legislation threatened the patent laws of our country, as evidenced by bills already passed in the House, in which is shown an enire disregard, if not gross ignorance, of the protection that is required by inventors, who necessarily devote much time and thought and make large expenditures in the advancement of the practical interests of all men.
Resolved, That we are of the opinion that in no ordinary case can a reasonable profit or remuneration for the care, labor, and expense attendant upon the manufacture, introduction, and sale of any patented article be realized in any curtailment in the present life of a patent, being seventeen years.
Resolved, As citizens of a country which produces more inventions to the amount of population than any country in the known world, as constituents of a government whose only department that is self-sustaining is supported by the fees derived from patentees, the citizens of the United States should be the last to be deprived of the legitimate fruits of their brain labor by the acts of their own represent fruits of their brain labor by the acts of their own represent-
atives to be stultified among the nations of the world as beatives to be stultified among the nations of the world as be
ing the first and only government to remove all inducement to invention.
Resolved, That we appeal directly to our Senators and Congressmen, Hons. N. P. Hill and T. M. Bowen, J. B. Belford, and to the Hon. H. M. Teller, asking for diligent attention, persistent and outspoken opposition to any such legislation, or any interference whatever with our present patent laws.
Resolved, That a copy of tbese resolutions be forwarded to each of our representatives at Washington, to Secretary Teller, to the convention of inventors to be held at Cincinnati, March 25, and a copy furnished to each of the Denver daily papers.
Resolved, That this organization be considered permanent, at least during the present session of Congress, subject to call by the president, secretary, or three members. Adjourned.
The following are names of members signing the memorial: General F. M. Case, J. A. McAnulty, H. C. Lowry, H. W. Yonley, A. M. Wood, H. D. Preiser, Aaron Allen, W. Holland, Hadwin Swaim, G. M. Kitterman, J. P. Tryner, J. N. Best, George W. Gay, P. B. Hirsch, John W. Collins, Charles H. Murray, J. C. Phillips, James Scott, W. H. Lyman, E. R. Hubbard, M. Harrison, W. H. Rundall, Thomas D. Hughes, A. B. Evans, J. Lytle, John Berkey, Otto G. Patterson, J. H. Montgomery, Dennis Hughes, George Graves, S. E. Carson, J. Wilkelm, H. L. Rice, D. D. Shaw, W. A. Maloney, William Pim, John T. Fertig, James Goodlander.

## Ideas of Locality.

An Ohio correspondent suggests that there is some relation between lost people describing a circle in their wanderings, from one limb being longer than another, and what is ordinarily spoken of as getting "turned around," when people traveling are confused as to the points of the compass, and attributes both phenomena to some peculiarity of the brain. Neither is owing to any "peculiarity" of the brain, but both are rather the necessary results of the normal operation of a sound mind. On the prairie as on the ocean, in the dark, or in strange places anywhere, one depends upon definite known bearings for fixing the points of the compass. When these pass out of sight on land it is generally by sucessive steps through surroundings less and less accurately observed, so that, particularly in journeying through the night, or for a period when the shifting of position as to external objects cannot be noted, the memory bears a constant mpress of the direction last observed, and seeks to fit new surroundings thereto. The compass, or the sun and the stars, are the usual means for correcting the wrong impressions; but it is only by a subsequent mental process, which, with intermittent attention, is often a good deal protracted, that we are able, in some cases, to obtain correct ideas of locations into which we have been but newly introduced.

## Alcohol and Digestion.

We see many preparations of which the chief virtue is supposed to be that they contain all the digestive principles. These can be active only so far as they contain pepsin, and have no advantage over the simple drug.
It has also been shown that certain substances combined with pepsin in solution, render it inert. Alcobol is one, and even in moderation diminishes its action, while, in any quantity, the activity of pepsin is totally prevented. This is a point often lost sight of, and serves as a hint concerning the use of liquors at meals, by dyspeptics."-\$ed. and Surg. Rep.

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## Leather Belting.

To the Editor of the Scientific American:
In Scientific American for March 8, 1884, question No. 32 , in reply to J. W. in regard to the proper side of a leather belt to run next to pulley, you say either side, and then pro ceed to favor the grain side ou account of uneven skiving, etc. As far as my experience goes, I find it best to put the tesh side next the pulley. I have had numerous arguments with other mechanics, but actual test in our shop is in favor of flesh side to pulley. We are running some belts one way and some another, and I find that running the grain side as a wearing surface has a tendency to cause it to crack.
Besides, wear on flesh side does not weaken the belt nearly as much as the same wear on grain side.
Our belts are all oak tanned, are from 4 inches to 10 inches in width, and are used without oil of any kind, in a woodworking estabishment. The newest belt of all was put on with grain side next to pulley, and it has suffered more from effects of wear than any of the rest, and shows a tendency to crack, while those run with flesh side to pulley are free from cracks entirely.
I have found no difficulty from uneven skiving. The lengths of our belts run all the way from a 2 inch belt 7 feet long to a 10 inch belt 50 feet long. The one referred to as cracking is a 4 irch belt about 25 feet long, passing over a driver 24 inches in diameter, and pulley on saw mandrel $41 / 2$ inches.

Corpus Christi, Texas.

## Touching the Tender spot.

T'o the Editor of the Scientific American:
Seeing in your issue of February 2 a notice of a bill in. troduced by J. A. Anderson, of Kansas, for limiting the duration of patents to five years, I would beg to suggest to all inventors and others interested, each to write a letter to all inventors and others interested, each to write a letter
in the form of a pledge, signed by themselves and as many in the form of a pledge, sigued by themselves and as many
of their friends as is possible to obtain, to the effect that any of their friends as is possible to obtain, to the effect that any
Congressman who would vote for such a bill must be blind to the best interests of their country; and for this reason the persons whose names were appended would feel it their duty to oppose all such persons, not only for re-election to Congress, but for all offices in the gift of the people. Such a letter sent from all parts of the country to Congressmen and Semators from their own immediate constituents would arouse them from their torpor, to state it in its mildest form.
J. F. Williams.

Reading, Pa .

## A Novel Patent Act.

To the Editor of the Scientific American:
Seeing by your editorials and letters published in the Scientific American, that you invite correspondence in relation to the pending amendments to the patent laws (I think a more appropriate title would be "A Cowardly Thrust at Patentees'"), I take the liberty to ask you to publish the following draught of a bill to be presented to Congress for their consideration:

An act to relieve railroad corporations and others from vexatious litigation, when they happen to purchase stolen property, whether they knew it to be such or not.
"No 100,000 . Be it enacted, etc.-On and after the passage of this act, any person purchasing any description of pro-
perty, whether patented or otherwise, shall be, and is hereby, exempted from any penalty in consequence of said property having been stolen; and any attempt on the part of the owner to recover his property or prevent its use shall be deemed a misdemeanor, and fined seventeen dollars for the first offence, and, if repeated, shall in addition be liable to imprisonment for a term of seventeen years.
' Be it further enacted: That any person engaged in the manufacture and sale of an article patented by some one else shall be exempt from injunctions or writs of any kind, in order that he may fully enjoy the fruits of the other fellow's brains without let or hiuderance, the other fellow being subject to the same penalty as the foregoing for an attempt at interference or injunctions.
'، And let it be further enacted: That in view of the vast importance of our railroads-and the safety of the public traveling on the same-any inventions for securing safety, ecoũomy, and speed, now in existence or which shall hereafter be made, shall be free for their use, without money and without price.
" And be it still further enacted: That any person securing a patent, and after paying all expenses attending the same, shall keep strict account of all money received as well as paid out, deduct one from the other, and if the balance is found to be in his favor to the amount of seventeen dollars, his patent shall be public property, whether one year old or five; but in no case to be declared public property until his profits amount in the aggregate to seventeen dollars, whether it be one year or fifty.
"All laws or parts of laws that conflict with this act are hereby deciared nall and void."
I would suggest, also, that it would be in keeping with this act, as well as the acts that have already passed the House, that the judges having jurisdiction in such cases be members of the N. R. R. League.

Clayton Denn.

The judicious and tasteful planting of fruit and ornamental trees enhances the value of real estate more than an equal amount of money invested in any other way. It is not necessary to have a large extent of idle land in lawn or dooryard, or expensive drives and fancy walks, in order to
give a country place an attractive appearance. A plain, give a country place an attractive appearance. A plain,
neat yard, with a few trees and shrubs well selected and judiciously planted about the grounds, and properly kept, would often change the appearance of many a place from a neglected wilderness to that of a thrifty, comfortable home. It is not desirable to have an elaborate design to produce the best effect in small places. To give explicit rules for landscape gardening of universal applicability for amateurs to work by, would be impossible, but I offer the following suggestions, which may aid in perfecting a plan:
Most persons who have any fondness for trees or plants, when they once get started in horticulture operations, become very much interested. The great secrets of success in amateur landscape gardening are, tirst, to become interested, then to look and study and plan and contrive. A little ingenuity is also desirable, but it is not half so formidable or expensive au undertaking to lay out the grounds and plant a small lawn as many persons imagine.
Plant a few shade trees near the house, about ten feet from it, on the south and west sides, to screen it from the midday and afternoon sun. These should be rapid growers, as silver maple, or Carolina or balsam poplar. If these trees are planted about ten or fifteen feet from the house, they will give a very appreciable shade in three or four years, but they are not the most ornamental or desirable for permanent trees. Rapid growth is their recommendation, and they will be too close to the house to remain many years; therefore, plant some finer varieties about twenty-five or thirty feet off. For this, there are nothing better than sugar maple, Norway maple, horsechestnut, European chestnut, ash, Magnolia acuminata, red colchicum maple, sweet gum, willow leaf oak, and mossy cup oak. These trees
should stand about thirty or forty feet apart, in order to should stand about thirty or forty feet apart, in order to
have room to develop into perfect specimens; but it is often better to plant at half these distances, or plant some cheaper, rapid growing trees between them, in order to shade the place quicker, and then cut out alternate trees in a few
years. There should be a vacant space directly in front of the house, affording an unobstructed view from the street or road. The trees which are necessary for shade on the front side should be trimmed up as they increase in size, so that there will be a view from the second story windows un der their lower branches or hetween them.
Evergreen trees produce an effect in ornamental planting not to be obtained by any other means, and every large lawn should have an evergreen belt or hedge on one side at least. In exposed situations, a screen of large evergreens is of great value in protecting houses and out-buildings from cold northern winds. It is astonishing what a modifying influence a belt of tall evergreens, standing on the north and
west side of buildings, will have in blustering, windy weather. The best varieties for this purpose are Norway spruce, hemlock spruce, silver fir, white pine, Scotch pine, American arbor vitæ, and Retinospora obtusa. It is not always essential that they should be planted in a straight row; it is sometimes preferable to plant in a curved or irregular line, or in a succession of clumps, so as to give the effect of a continuous background without the formal stiff-
ness of a hedge row. As a general rule, evergreens do not appear to the best advantage in straight rows; they look better when grouped in clumps, or dotted about in a rather promiscuous manner. The larger varieties should not be plauted any nearer to the verge of a carriage drive than fourteen feet. When planted in clumps, they are often set fifteen feet apart, with three or five trees of one variety together. At this distance they will attain their perfection in about fifteen years, and will then commence to deteriorate as the branches grow together. After the large shade rees and evergreens are planted, there will be a number of maller evergreens and flowering shrubs needed for " filling from blank spaces. They should be planted in clumps of men in the smaller nooks.
The following are a few of the most desirable dwarf evergreens: Arbor vitue compacta, A. globosa, Siberian, Hovey's golden, Tom Thumb, and George Peabody arbor vitæs. The last is a new golden variety of singular beauty, the hardiest and most distinct golden arbor vitæ yet introduced. Retinospora plumosa aurea, R. plumosa, R. obtusa nana, and R. squarrosa are not naturally dwarf trees, but they can be kept so by frequent shearing. If allowed to grow unchecked, they will attain considerable size. Irish, Swedisb, and pyramidal junipers grow tall and slender, occupying but little room. The dwarf white pine is one of the prettiest small e-vergreens. It forms a compact. symmetrical bush, three or four feet high, and about equal diameter, presenting a dense mass of silvery green foliage. Abies orientalis, or eastern spruce, from the shores of the Black Sea, is a very handsome evergreen, of moderate size and very dense, compact habit. It is one of the neatest and most symmetrical of the spruce family, and appropriate for almost any situation.

Weeping trees are at present a fashionable feature in landscape gardening. The following are a few of the most desirable varieties: Weeping beech, cut-leaf weeping birch, and common weeping willow grow tall and form large trees.

The Camperdown weeping elm and Kilmarnock weeping willow are dwarf trees, and never grow any higher than the point where grafted. Abies inverta, or weeping spruce, is the best weeping evergreen, and it is a very unique and effective tree in a lawn.
Hardy flowering shrubs develop more quickly than any ther class of trees, and are therefore indispensable for filling in a new lawn, where it is desirable to get something to make a show as quickly as possible. There are aiso many nooks and corners that look bare at first, but which will eventually be occupied when the other trees are developed. Such places may be filled temporarily with some cheap shrubs, that can be thinned out or removed in a few years, as the trees encroach upon them. I name a few of the more recent introductions in this class of plants, all of which are hardy, free bloomers, and desirable for general cultivation, although not yet generally known because of their scarcity. They should be planted more extensively: Cercisjaponica, or Japan Judas tree; Cornus sanguinea, or crimson dogwood; Exochorda grandiffora; purple-leafed filbert; Standish upright honeysuckle, the earliest and most fragrant variety; dwarf horsechestnut; Viburnum plicatum, or Japan snowball; Weigela hortensis nivea, or pure white monthly weigela. The purple beech is one of the most effective rees that can be planted in a lawn, particularly where it can be seen agaiust a background of dark green foliage.

## The Economics of Disease.

There is one side of preventive medicine that may be urged upon the public with a strong chance of securing their attention, and that is the expensiveness of disease. In their individual cases they appreciate it well enough, and often howl loudly about loss of time and heavy bills at the docor's and druggist's. But with the narrowness of view and selfishness of interest which generally characterize mankind, it is hard to get them to look at its cost in gross.
This may be estimated in several ways, and includes a number of factors. It has been calculated by statistical hygienists that of the cases of disease now current in civilized communities, about one-third could have been prevented by intelligent saritation, personal or general. In our opinion this estimate is too low, rather than too high; but take it at one-third. Then the actual loss to these patients or their famiies is represented by one-third the whole amount paid doctors, druggists, nurses, etc., in a community, plus the loss of time, whatever that may be.
But this is only the first item in the bill of charges.
One third of all the investment locked up in hospitals, dispensaries, asylums, homes, etc., could be placed to profitable and productive use were the laws of health observed. Much more than this; numerous limited localities, vast racts of fertile land, now shunned or but partly tilled, because of their ill repute on the score of health, would be doubled, quadrupled, in selling value and producing power, were they made free from the poisons which infest them. Millions of acres of the fiuest soil in the United States are lying idle by reason of the paludal poisons which are generated about them. Yet there is strong testimony that sysematic action on the large scale can overcome these miasms.
We have spoken only of disease, but we must also ake into account the sequelæ of disease in destroying bility to work, and thus casting the heavy expenses of permaneut invalidism on the family or the commonwealth, or by a fatal result depriving the community of a life which would have possessed a value as capital applied to the prouction of wealth.
This bas been the subject of calculation by political economists in England and Germany, and in both countries they have reached the conclusion that the value of an unkilled laborer, at twenty-five years of age, to his country is $\$ 1,200$. In other words, this is the average sum which such a person will contribute during his life to the wealth of the community in which he lives. Now, if we suppose onethird the deaths in a community are preventable, we can readily see how much richer the community would be were it to exercise the necessary prophylaxis.
These are but a few of the practical considerations to which this subject leads, but they will serve as hints how strong a case may be made of this side of sanitation.-Med. and Surg. Reporter.

## Refining of Shellac.

## bye. l. andes.

The crude shellac is refined in the following way: One and a half kilos. of soda are dissolved in 45 liters of water contained in a small boiler or kettle; 5 kilos. of the crude shellac are added in small quantities at a time. This turbid solution bas the characteristic odor of shellac and a violetred color. The liquid is boiled for a few minutes, and, while hot, a wooden air-tight cover is cemented on the vessel. When the liquid is quite cold the cover is removed, and the thin cake of fat which is found on the surface is separated. The solution is filtered through linen, the clear filtrate slowly decomposed with dilute sulphuric acid, and the resulting shellac washed with water until no acid reaction remains. The washed resin is now pressed and melted in boiling water, when it can be shaped with the fingers. This shellac is cooled in water containing glycerol, and when hard is dried. The refined shellac forms yellow-ish-white, glistening tufts or bars, which, when dry, at
yellowish-brown ; it should entirely dissolve in alcohol.

## IMPROVED WARPING MACHINE.

Fig. 1 is a perspective view of the warping machine as constructed by Messrs. Howard \& Bullough, Fig. 2 is a side elevation, and Fig. 3 a sectional plan, which indicates more clearly the improvements adopted. The presence of


Fig. 2.-beaming or warping machine.


Fig. 3.- Beaming or warping machine.
a stop motion renders a large number of falling rods unnecessary. Two only are required ( $b b$, Fig. 2) to take up the slack due to over-running of the bobbins on a stoppage. They also serve to reduce the strain on the yarn due to the inertia of the bobbins on starting again, the tension being applied gradually as the falling rods are lifted to their nor tion of the weight of leather by adding glucose, or gape sugar, appears to be carried on rather extensively in Ger many, and the shoe trade societies are taking steps to protect themselves from the imposition. A simple test is recommended, which consists in plac ing pieces of the leather in water for the space of twenty-four hours, when the glucose will be dissolved by the water, and the result will be a thick, sirupy liquid. When two pieces of the leather are placed together and left in that position for a time it will be found difficult to sepa rate them, as the gummy exuda tions will stick them together It is stated that some samples of sole leather were found to con tain as bigh as 30 to 40 per cent of extra weight. Another test recommended is to cut off small pieces of the leather, and, wrapping them up in a damp cloth, lay them away for a few days in a temperate place. If the leather is adulterated, the pieces will be found to be stuck together, and surrounded by a sirupy substance in proportion to the quantity of he adulterant used; and the pe culiarity about leather treated with grape sugar is that, after wetting, it is difficult to dry, and resembles gutta percha or untanned leather more than the genu ine article.

The "setting of gypsum" is he result of two distinct phenomena. On the one band, por tions of anhydrous calcium sulphate, when moistened with water, dissolve as they are hydrated, forming a supersaturated solution. Again, this same solutiou deposits crystals of the hydrated sulphate, gradually augment in bulk, and unite together.


Fig. 1.-HOWARD \& BULLOUGH'S BEAMING OR WARPING MACHINE.
mal working position. Upon the shaft, D , is fixed the surace drum, E. The warper's beam that rests upon it is not shown, but the course of the warp toward it is indicated by the dotted lines. The self-stoppage is effected as follows: The two rollers, M M, are of equal length to the width of the frame, and revolve in contact with the right-hand roller, being driven by means of inclined shaft, $J$, and bevel wheels from the surface drum shaft, D. The threads are about 3 inches above the rollers, as are also three slots in the table of the machine. These slots contain a set of fallers or stapies of $\cap$ shape, each staple, I (see Fig. 2), hanging upon its own thread, and being kept up thereby. Suppose a thread fails; the staple it supports falls into the nip of the rollers and separates them, pushing the left-band roller toward the left. The small movement due to the entry of the faller into the nip is multiplied at the foot of the lever, N , to an extent sufficient to knock the notch of trigger, I, off its support, H. When this occurs the weight, K, which is kept up by the trigger, is allowed to fall, in doing which it disengages the driving motion and causes the stop.
This motion, as will be understood, is very rapid in its action. The only time lost before the driving is knocked off is that taken up by a faller falling 3 or 4 inches, as the case may be, say about one-tenth of a second, and immediately it is in the nip the slightest revolution of the rollers causes their separation and stoppage of the warping before the broken end has reached the beam. The faller drops into trough below, and no further notice is taken of̂ it for the time being. When the end is pieced and the machine again started, which is done by depressing the treadle, $A$, the minder places another faller upon that end, and so on in every case, the fallers that from breakages accumulate in the trough being collected from time to time and used over again. The choking of the slots by the accumulation of floss is prevented by the mode of suspending the fallers. The threads run in close proximity to the top of that part of the frame containing the slots, and consequently the fallers are allowed to sink for their full depth into the slits and away from possible contact with floss, only the very tops being exposed, and the collection of fibers at these points is practically impossible, the threads rushing in close proxmity to the surface, effectually sweeping them away as they fall from the yarn. The machine is driven by the belt pulley, $B$, which, when the machine is stopped, runs loose on the shaft. By depressing the treadle, the inclined surface of the clutch or cam forces the pulley against the friction plate, $\mathbf{C}$, and causes the surface drum to be gradually set in motion, in this way also easing the strain on the yarn.
An improvement has been added to the Singleton machine by Mr. Tweedale, of the firm of Messrs. Howard \& Bullough, that should be mentioned. It consists in applying a clutch (as shown in dotted lines) on the inclined shaft, J, that drives the stop motion rollers. When the machine is znocked off, this clutch is automatically disengaged at the same time. This allows the beam to be turned back for find ing a lost end, when necessary, with far greater ease than in the old Singleton, because the rollers are not now turned by the operative. When the treadle is depressed and the machine started, the clutch is simultane ously put into gear. The roller on the right in Fig. 2, that the yarn first passes over after leaving the creel, is a measuring roller, 18 inches, or half a yard, in circumference, and it is made to actuate a stop motion when certain lengths have been wound For instance, it is usual for this motion to be adjusted to stop for every "wrap" of say 3,500 yards, as an indication to the minder that this length has been wound, the warper's beam containing several "wraps" (about four or five) when full.

It only remains to add that the commonest width of machine is $\frac{9}{8}$, or 54 inches wide inside of warp beam flanges, butthey have been made on Singleton's principle in all widths up to $\frac{14}{4}$, or 108 inches wide inside of warp beam flanges, and this machine has so much merit in practice that Messrs. Howard \& Bullough have made the astonishing number of 7,000 , and this number is being added to at a rapid rate.Textile Manufacturer.

## Softening Water.

An account is given in The Engineer of a method of soften ing water followed in some in dustrial establishments in Ger many. The principle of the process is based upon the fact that heated and hydrated oxide of magnesia readily absorbs the free carbonic acid of natura water; and by thus depriving the water of its dissolved gas,
precipitates the carbonate of lime previously held in solution. The magnesia then dissolves, and unites with the bicarbonate of magnesia in the water. At first, water thus softened was suspected of attacking old boilers fed with it, and filling them with mud. It was afterward found, however, that it was the old hard scale that had been dissolved into mud; thus exposing any weak places and leaks that might have been corroded over before the purified water was introduced. The water thus treated bas an alkaline reaction, and counteracts any possible acid corrosion. At first, stirring was considered an indispensable part of the process; but, eventually, it was found that straining the water, through an excess of the hydrated oxide of magnesia spread on a filtering medium, would produce the desired effect without further trouble. By mixing proportionate quantities of finely powdered oxide of magnesia and sawdust with water, and subsequent heating, hydrated oxide of magnesia will be formed throughout the whole mass. This preparation forms a most valuable filtering material. Metal cylinders are tightly filled with the mixture, and used as filters; and they are efficient, not only in cleaning dirty water, but also in softening it, for the carbonate of lime crystallizes directly upon the sawdust.

## CENTRAL FRANCE UNDER THE CLOUDS.

It frequently happens that the plateaus of the center of France are covered with fogs, and even with a stratum of clouds that descend as far as the ground, while the mountains and elevated plains are enjoying a clear sky and at-
prevailing over Western Europe since the 30th of October was driven loward the south. The gyratory motions upon the Mediterranean ceased, the phenomenon disappeared, and, up to the 21 st, a series of tempests agitated the atmosphere of the country, under the influence of strong depressions that entered England or Brittany and afterward traversed the north of Europe. The stratum of clouds reappeared on the 21 st and 22 d , after a fall of snow, and this reappearance coincided again with the existence of a new barometric minimum in the latitude of the Gulf of Genoa. From the 25th to the 27 tt , Central France was again free from its stratum of clouds, because a zone of strong pressure had established itself over Italy and Southern France, while great cyclonic disturbances were passing over England. But, on the 28th, these movements became weaker, and went off through the north of Europe. Then a -slight center of depression manifested itself anew over the Mediterranean, and the stratum of clouds again formed.
Since I have observed this phenomenon, it has always occurred under the same conditions; so its formation and disappearance may be foretold. Thus, on the 22 d of January last I was able to announce that the clouds and fog that had lasted since the 18th would disappear the next day, on the 23 d ; and this really happened.
The stratum of clouds, which envelops us like a winding sheet and which involves a portion of France, and doubtless many other countries, in a misty and unwholesome atmo sphere, is always thin, although its opacity is very great Its lower surface, when it does not graze the ground, may $\left\lvert\, \begin{aligned} & \text { effect. }\end{aligned}\right.$
be remarked that the mean temperature at the Puy de Dome (4,600 feet) being about $4^{\circ}$, while at Clermont ( 1,200 feet) it is $10^{\circ}$, the inversion is still greater than it at first appears, reaching really $26^{\circ} .-$ M. Plumandon, in La Nature.

## The Theory of Magnetism.

At a recent meeting of the Royal Institution, Professor D. E. Hughes gave a lecture on "The Theory of Magnetism," llustrated by experiments. The mechanical theory of magnetism may be deemed to be the proper style and title of that brought forward by the lecturer. The phenomena of magnetism he explains by a simple rotation of the molecules of iron, as well as of all metals; nay, more, of all mat-ter-solid, liquid, gaseous, or ether. Ail matter, according to his views, has inherent magnetic power, varying in degree in molecules of different vature, but not to any great extent.
The lecturer demonstrated each portion of his theory by experiment, so that the effects were visible to the audience. The striking effects of vibration, torsion, or mechanical strain upon the destruction or creation of manifest magnetism be showed in a variety of ways, the soft iron obeying he slightest mechanical tremor, while bard iron or steel resisted the most violent treatment. The molecules of the same bar behaved with extreme freedom, as in the instance of soft iron, but when a slight strain was put upon them, as when slightly bent, like an archer's bow, the bar became as igid as steel, and mechanical action had no longer any


## SEA OF CLOUDS OBSERVED FROM THE SUMMIT OF THE PUY DE DOME FRANCE.

mosphere. Such a phenomenon has just again occurred between the 25th and 31st of December, 1883, and between the 18th and 24th of January of the present year. The annexed engraving gives an exact idea of the extraordinary spectacle as seen at the time from the top of the Puy de Dome.
The formation of this low stratum of clouds is due to atmospheric whirlwinds that have their origin near the Gulf of Genoa, and that remain afterward upon the Mediterranean. In order to prove this, let us go back a little. On the 28th and 29th of October, 1883, the winds from the southwest, under the influence of areas of low pressure that were passing over the Channel, blew tempestuously in mountain and plain, and carried along as they did so an excess of moisture that resolved itself into a drizzling rain. On the 30th, a zone of high pressure bad established itself upon the east coast of Europe, and a gyratory motion made its appearance over the Gulf of Genoa. As always happens, the central plateau immediately came under the influence of the latter; the wind fell in the plain, and, preserving its force, turned to the northwest, at the altitude of the summit of the Puy de Dome. This state of things kept up until the 12 th of November, and caused a few falls of snow. Low pressures succeeded over the Western Mediterranean, and the upper wind oscillated from northeast to southwest, and frequently blew strongly. Eight times during this period it was possible from the summit of the Puy de Dome to enjoy the spectacle of a sea of clouds covering the plains, nothing being seen but the summits of the Puys, the culminating points of the Forez chain and of Mount Dore, like islands here and there.

On the 13th, the zone of strong pressures that had been
rise to 1,500 or 2,200 feet, and is then perceptibly plane and horizontal and appears to be uniformly gray. Its upper surface, wlich is of a dazzling white, is sometimes mamil lated, sometimes jagged, and sometimes plowed up into long parallel furrows that make it resemble the surface of a roll ing sea. It oscillates between 2,200 feet and 3,800 feet.
The thickness of the stratum varies, then, between 625 and 2,200 feet. Sometimes it is only necessary to ascend the declivities in the vicinity of Clermont in order to emerg from the cold and damp clouds, and to get into the sunshine and breathe a pure and mild atmosphere.
In the midst of these clouds abundant deposits of hoar frost are observed to be frequent, and below them there sometimes falls snow or a drizzling rain. It is especially during the existence of this stratum of clouds that a com parison of temperature observed in the two stations of the Observatory of the Puy de Dome presents great anomalies They are then very pronounced, because the upper surface of the clouds is in contact with very dry air, and there occurs a very active evaporation; because the warm currents can prevail at the altitude of the summit of the Puy de Dome; and because near the ground the air, which is already chilled when the clouds form, is entirely shielded for several days from the calorific action of the sun.
On the 28th of last December, toward 7 o'clock in the morning, the thermometer marked $0^{\circ}$ at Clermont, and $+7 \cdot 9^{\circ}$ at the summit of the Puy de Dome. This fact is re markable enougb; but on the 26th of December, 1879, the temperature ascertained at the Puy de Dome was $+47^{\circ}$, while at Clermont it was $15.6^{\circ}$ above zero. Again, it should

A detailed account was given of the lecturer's researches upon the atmosphere, in the course of which be bas discovered that it has a saturating point, like iron, and that it is just like iron itself. This was illustrated by striking experiments upon the magnetism of the atmosphere as compared with that of iron, and with the effects of vibrations in allowing freedom of motion to magnetic conduction in ron, by means of which a magnetic pole was pushed for ward to four times its previous distance. Heat and electri city produced like effects, whence Professor Hughes drew the conclusion that these three forces, each allowing mole cular freedom when frictional resistance is lessened, must have a like origin, and that electrical currents can be fairly classed with heat as a mode of motion. When a bar of soft iron is strongly magnetized, as in the instance of an electromagnet, it returns, like a spring, to a neutral state upon the cessation of the inducing force.
This well known fact has long remained a mystery. All theories of magnetism up to the present time supposed that the molecules became, on the removal of the induced current, mixed or heterogeneous. Professor Hughes believes he has made a great discovery in having solved this problem, leaving no mystery any longer, as the demonstration which he will bring forward this week before the Royal Society will reduce the matter within the domain of absolute fact. He proved his case before his audience at the Royal Institution in a les formal way, but quite as effectually, rendering a bar of iron sensibly neutrai or polarized at will by simply turning it upside down. The mechanical inertia of the molecules was demonstrated by magnetizing a bar
and then changing its polarity by the earth's influence alone. The inertia of magnetism and of electricity was illustrated by two bars of diverse hardness.
Having dealt with other points of great interest, the lecturer concluded by saying that scientific men are agreed that heat is a mode of motion, and that the molecules of the most solid bar of iron can move in a certain space with comparative freedom, the oscillations being greatly increased with every rise in temperature. If, as already well known, the molecules can move in all planes, then there could be no valid objection to the idea of their rotation, in fact, they were known to rotate in the act of crystallization. Thus, according to Professor Hughes, magnetism is an endowment of every atom of matter.

## AN IMPROVED CRUTCH.

The accompanying illustration represents a crutch recent ly patented by Mr. W. H. D. Ludlow, of La Porte City, Iowa. Through a hole in the lower end of the crutch passes a steel rod which extends up between the branches, termi nating in a screw socket that receives a screw stem attached to the lower end of a yoke, and provided with a jam nut. With this construction the prod may be turned, so as to project more or less from the end of the crutch, as required by circumstances. The two upper ends of the yoke are connected eccentrically to the ends of the handbold, which is swiveled, so that when turned by the hand of the user the prod will be projected from or withdrawn into the end of the crutch. Upon the inside edges of the branches of the crutch are fastened $t w o$ lugs, so fixed in relation to the yoke that when the latter is turned past the dead center, in rotating the bandhold to project the point, the sides of the yoke will strike against the lugs, keeping the yoke in place, so that pressure on the prod cannot arive it back until the handbold is reversed. In the crutch made in accordance with this plan either the rubber end or the prod may be used, as circumstances may require, the change from one to the other being instantly effected by turning the handhold. The cut shows a front view and an enlarged section.

## Bleaching and Oxidizing Cotton Goods with Chloride of Lime. <br> by н. schmid.

Vegetable fibers can be converted, by the action of chemical agents, into a condition resembling wool or other animal fiber, in which state they take the dye without previous mordanting. A new method of accomplishing this, discovered by G. Witz, of Rouen, is based upon the action of oxidizing agents, in acid or neutral solutious, upon textile fibers.
Witz's investigations have put an end to one of the most serious accidents in the bleaching process. The practical bleacher is familiar with the fact that in steaming bleached goods spots not infrequently make their appearance, which are either the same color as the unbleached goods were, or have a reddish yellow color. Witz bas proved that they are caused by too strong a bleaching bath and by being left in it too long, since chloride of lime, not uniformly applied, and aided by the action of air and light, may prove very destructive. Hitherto it has been customary, if sucb spots appeared on steaming, to increase the strength of the chloride of lime bath, which likewise increased its destructive action. The rotting of the fiber caused by an inordinate use of bleaching material was attributed to its imperfect removal, and they sought to remedy the evil, and frequently in vain, by he use of anticblor. Witz substitutes a clear solution of chloride of lime not exceeding $0 \cdot \tilde{o}^{\circ} \mathrm{B}$. in concentration, and gives more effect to the operation by boiling with water aud washing.
Witz investigated the oxidation or animalization of the fiber with a 4 per cent solution of chloride of lime, using methylen blue as test reagent. Strips of cotton were suspended for a long time partially in and partially out of the cbloride of lime solution. After washing and removing the chlorine with an alkaline bisulphite and acids, it was dyed with methylen blue. The portion that was in the bleacbing solution took a faint blue color, while that which was just above took a dark blue color, showing that the carbonic acid in the atmosphere played an important part in setting free the hypochlorous acid which oxidized the cellular tissue. Light and warmth have a favorable effect on the oxidizing power of the chloride of lime.
The oxidized cotton not merely absorbs the aniline dyes, but it decomposes the neutral salts of iron and alumina, fixing the bases. Vanadium especially is precipitated on the oxidized fiber, as is readily recognized by the ease with which aniline black is formed, even when the vanadium solutions are extremely dilute. The action of air upon cotton for years will produce the same effect as the hypochlorite
as proved by the test with methylen blue. Light assists the action of the air. Hydrogen peroxide and ozone play the same part, but ozone attacks the fiber least in proportion to the beauty of the blue produced. Even wool and silk, after being subjected to the action of ozone, take a deeper color in the dye bath than in their normal condition.
To utilize the new reaction for calico printing, Witz uses the chlorate instead of the hypocblorite. He prints upon the cloth with a saturated solution of potassium chlorate mixed with a little less hydrocbloric acid than is required to liberate all the chlorine, thickened with gum tragacanth, and containing. 10 milligrams of vanadium in a liter Chromates can also be substituted for bypochlorites.
Dyestuffs can be divided into two classes as regards their behavior toward the oxidized cotton-attracted and repelled. The latter dye cotton that has not been oxidized better than that which has; to this class belong the acid azo-dyes, like Ponceau and Bordeaux, and acid dyes of the nature of the phenols, phthaleine, and the amine colors that haveacquired acid characters by the introduction of acid groups. The dyes that have basic characters, like rosaniline, constitute the attracted colors.
The dark side of the subject is that these dyes which have been fixed without mordanis are unable to resist the action of even the feeblest alkalies, such as the soap bath.
Witz's process is not limited to cotton, wood fiber, silk, and wool, but even horn, hair, scales, skin, feathers, sponges, and bones can be so changed as to have the same qualities as the other fibers with respect to dyes.-Dingl. Jour.

## A New Test for Lead.

A solution of cochineal is prepared by boiling the ordi ary commercial cochineal in water, filtering, and the adding sufficient strong alcobol to insure its preservation from mould. A few drops of this solution added to a colorless neutral or alkaline solution containing disscilved lecd, strikes a deep mauve blue to a red with a faint blue tinge, according to the amount of lead present. The test will distinctly indicate a tenth of a grain of lead per gallon in ordinary drinking water, and, by comparison with a solution free from lead, much smaller quantities are indicated.
In searching for traces of lead in water, it is convenient to take two porcelain dishes; into the one place 100 c . c. of the water to be examined, and into the other a solution of carbonate of lime in carbonic acid water, known to be lead free, and approximatively of the same hardness as the water to be examined; then add to each an equal bulk of the coloring matter in quantity sufficient to distinctly tinge the water; the colors may now be compared; the slightest blue tint will be either due to lead or copper; for copper in very dilute solutions gives a similar tint, but in solutions of 1 to 1,000 or stronger the hue is so different as to differentiate the two metals.
The method is within certain limits applicable for quantitative purposes on the usual colorimetric principles. As a qualitative test, it is superior to hydric sulphide and more convenient.-Analyst.

## WINDOW BEAD FASTENER

The engraving represents an invention recently patented by
Mr. H. F. Neumeyer, of Macungie, Pa., by the use of whic


NEUMEYER'S WINDOW BEAD FASTENER.
window beads can be fastened to the casing in such a way that they can be removed, and replaced and fastened readily. The bolt, $b$, is provided at one end with a milled head, $c$, and at the opposite end with a tubular head, $a$, having transverse slit forming two prongs, each of which is recess ed to form hook prongs as shown in the detached figures. At the inner end of a hole through the bead and into the casing, is held a screw, $f$, which is provided with a cross head that passes between the prongs, and into the notches of the hooks on the head, $a$. The withdrawal of the bolt is prevented by a brad driven through the bead.

After the bead has been placed against the casing, the bolt is pushed inward until the head on the screw passes between the book shanks of the bead, $a$. The bolt is then given quarter turn, so as to cause the ends of the screw head to enter the notches of the hooks. The bead can thus be fastened on or released from the casing very easily and rapidly.

## A Safety Rail Fast ning.

The drawing of railroad spikes, from the springing of the rails under the wear of engines and trains, is the cause of many accidents. An invention which promises to obviate his difficulty has been made by Capt. Thomas J. Bush, of Lexington, Ky., interlocking bolts being used instead of spikes. Holes are bored in the tie on either side of the rail where the spikes would go, at such angles as to cross each other beneath the rail in the form of the letter $\mathbf{X}$; the bolts have at their upper ends screw threads, which hold nuts squarely down on the flange of the rail, and one of the bolts has a slot, into which the beveled lower end of the other bolt causes a shoulder thereon to lock, and thus bind the rail firmly to the tie. A number of railroads are now experimenting with these bolts, among them the New York Elevated, the N. Y. Central, the Erie, the Pennsylvania, the West Shore, and the New York City and Northern.

## RIPPING ATTACHMENT FOR SCISSORS.

Riveted to the inner edge of one of the handles of a pair of scissors and to the lonp is a knife casing, in one end of which is pivoted the blade, which is held in the desired position by the usual form of spring at the back of the casing. When the blade is to be used for ripping seams, etc., the cissors are opened as shown in Fig. 2, so that the cutting edges of the blades will be as far apart as possible, and the knife is opened so as to project from the end of the handle. The attachment does not interfere in any way with the use of the scissors, as it is very compact when the knife is hut. This invention
 has been patented by Francis S. Loockerman, of Manokin, Md.

## Forms of Planer Tools.

The form of the cutting portion of tools used $n n$ iron has much to do with their useful life and the result of their work. Some planer men in the machine shop will not use for roughing any but a diamond point tool; others do all heir " first" work with a round-nose or U tool, and both finish with a square-nose tool. There is a planer tool that should be known and encouraged, that can be used either as a roughing or as a finishing tool. It may be described as a side tool for the lathe, curved around to make a "spoon" form, as understood by lathe and planer men. The tool takes the weight and pressure of the cut at its lowest and strongest point, and the forward uprising portion cleans the surface way, while the backward uprising portion finishes the deep cut. Properly made and properly used, such a cutter is as good as two-if not three-cutters in one. A practical, experienced planer man said recently, that he had used a tool of this shape on cast iron, with a one-eighth of an inch feed, for four hours without grinding, and got better work as to exactness than was possible with a diamond point or a round-nose tool.

## The Attempt to Change the Patent Laws

Every important manufacturing concern from Maine to California is experiencing the withering effects of this uncalled for agitation. Fools may roll back and stay the tide of invention which is sweeping over the land, that may destroy our industrial progress, and bring ruin and havoc by their action, but they can give no recompense in return for their deeds of vandalism. Is it not time that manufacturers, inventors, indeed business men of intelligence everywhere, should let their voices be heard in this matter? Every senator should be fairly deluged with letters of remonstrance against the bills now before the Senate. And these letters should all be carefully written. Senators ought to know the feeling of the people in relation to these measures, and good sound reasons should be urged for their defeat.
This is a matter of vital importance, and no time should be lost in demonstrating to Congress that the American nation is not ready or willing to do injustice to our inventors even to accommodate the crowds of moonshiners or in fringers, who, lacking brains to invent nything themselves. re only too willing to purloin the discoveries of those wh can."-Industrial World.

New subscribers to the Scientific American and Scientific American Supplement, who may desire to have complete volumes, can have the back numbers of either paper sent to them to the commencement of this year. Bound volumes of the Scientific American and Scientific American Supplement for 1883 may be bad at this office, or obtained through news agents.
All the volumes of the Scientific American SuppleuEnt from its commencement, bound or in paper covers, may be had as above.

## ENGINEERING INVENTIONS.

A rotary engine has been patented by Mr . John T. Davis, of New York city. The constraction in, with a sloot through their centers for the piston, the cones forcing the piston around the sphere to give motion to the shafts, the steam being cut off at the argest grea of the steam chamber by the other half of the piston passing through the same point.

## MECHANICAL INVENTIONS.

An engraving machine has been patented by Mr. Ira R. Beam, of Dryden, N. Y. It is for engraving jewelry, watches, plates, etc., and has holding devices with wide range of adjustment, improved con-
struction and arrangement of the engraving tool and struction and arrangement of the engraving tool and
the apparatus for working it, and also for holding the copy, from which the m
are directed by a style.
A friction pulley has been patented by Mr. olney W. Mason, of Providence, R. I. A counter balance is combined with the shoe, the latter being made. with an attached counter balance, and there is a method for throwing shoes in and out of contact with
the pulley, the principal object of the invention being to counteract the effect of centrifugal force in the working parts of friction pulleys.

## AGRICULTURAL INVENTIONS.

An improved seed planter has been patented by Mr. William L. Hutson, of St. Lawrence,
N. C. This invention covers a special construction of a plow with removable hopper and means for dropping and covering the seeds, the space between the hills of sizes, and the height of the plow beam to be regulated sizes, and the height of
by an adjustable bolt.

## MISCELLANEOUS INVENTIONS.

A folding table has been patented by Mr. William W. Quigley, of Santa Ana, Cal. The invention supports at that edge only, for receiving and supporting a skirt while the same is being sewed, so that all parts cau be easily reached by the seamstress.
An improved pump has been patented by Mr. Luis G. Careaga y Saenz, of Puebla, Mexico. It is simple and easy of construction, not apt to get out of
order, will raise large quantities of water with but little order, will raise large quantities of water with but little
loss of power, and is not likely to be clogged by sand loss of power, and is not likely to be clogged by sand
or other analogous impurities.
A process of removing oleine from linseed oil has been patented by Mr. Thomas H. Gray, of Brooklyn, N. Y. It consists in maintaining the oil at a
temperature of $110^{\circ}$ F., and in a state of agitation for a emperature of $110^{\circ} \mathrm{F}$., and in a state of agitation for a
certain time, then mixing therewith a saline solution, drawing off, and washing the purified oil with water
An artificial leg has been patented by Mr. Edgar D. Richmond, of Hart, Mich. The invention knee, ankle, and toe joints, with special arrangement knee, ankle, and toe joints, with special arrangement thigh and lower sections of an artificial leg for thigh mputations.
An electric alarm for spring clocks has been penn. An electric circuit is applied to a special form of clock, with contact points, to be closed by the ex-
pansion of the mainspring, wherehy an audible signal pansion of the mainspring, wherehy an audible signal may be given on
Smoothing the inner surface of wooden tubing forms the subject of a patent issued to Mr.
Merrill F. Wilcox, of Bay City, Mich. The method Merrill F. Wilcoux, of Bay City, Mich. The method ing smooth steel plag, slightly larger than the bore, and distributing resin or like substance for glazing
An improved bee hive has been patented by Mr. Joshua Vanzandt, of Seward, Kendall County Ill. The body has comb frames and a high cover, with a honey board having cleats or flanges upon the edges the board is liept out of contact with the comb framee, is allowed to escape freely
A sidewalk curb and surface case for electric wires has been patented by Mr. Richard Wylie, of
Napa, Cal. The invention consists in a case made of Napa, Cal. The invention consists in a case made of
grooved castings or blocks along curbs and across the nd with corner pieces, all specially adapted for the easy laying, repair, and adjustment of wires.
A process for coloring and bronzing leather has been patented by Mr. Lorenz Klopfer, of Munich,
Germany. The leatheris wrapped in a cloth moistened with water and milk, washed with a mixture of white of egg, glycerine, and water, covered with a varnish and then a flexible collodion compound, followed by a coating of size or similar mixture, to which the metal
coating is applied before the mixture has become dry.
A hat pouncing machine and lathe has been patented by Messrs. Willet Thompson and Joseph A.
George, of Brooklyn, N. Y. The pouncing machine heorge, of Brooklyn, N. Y. The pouncing machine ing or lurching movement, so the machine can be run at a high speed, and there are means for shifting the
position of the still point, to adapt the machine for position of the still point, to adapt ther
A wire fence stretcher and splicer has been patented by Mr. Jonathan E. Pierce, of Deming's
Bridge, Texas. In the ends of an open box is journaled a screw, one end of which is prolonged, and has a vertical bevel pinion, a rotary motion being imparted
to the screw by pinions, while springs force together
the ends of levers to grasp an end of broken fence
A combined cane and cigar case has been patented by Mr. David Lee, Jr., of Mount Willing, Ala The cane is hollow, and the cigars are so placed there in, one above another, that a spiral spring in the bottom will force each one successively to the top, a remov-
able tube adapting the space to sizes of different thickness, and a match receptacle being provided for in the handle
A mill feeding device has been patented by Mr . James B. Allfree, of Cumberland, Md. The inven-
tion covers a shoe with a trough, to oscillate laterally tion covers a shoe with a trough, to oscillate laterally
to the path of the grain, the bottom of the trough bein lower than its delivery edge, the shoe having a steep incline therefrom and a gate acting therewith, in order oo spread the grain and deliver it in an even sheet the hole width of the delivery
A riding saddle has been patented by $\mathrm{Mr}^{2}$. William Frazier, of West Alexander, Penn. It is mad of India rubber or its compounds, and is cheap, dur-
able, and elastic, having no tree to break or sewing to able, and elastic, having no tree to break or sewing to
rip, and is not liable to be injured by exposure to rain. rip, and is not liable to be injured of exposure to rain and the whole may be shaped to prevent contact with the spine and withers.
A revolving map stand has been patented by Mr. Henry E. Hayes, of Brooklyn, N. Y. The base
block has screw rod and nuts and a triangular socket revolving top block has sockets, supporting rods fitting into the sockets, a wedge block for securing the lowe supporting rods in place, and a suspension rod for the upper supporting rods, all to
exhibiting maps, charts, etc.
A spring board wagon has been patented by Mr. John C. F. Harris, of Litlleton, N. H. A foot board is mounted on the spring board by springs more
yielding and having longer range of movement than the spring board itself, to protect the feet of the rider from the benumbing jar of the spring board, and there is a novel arrangement of springs with the seat to render its
motion easier.

An improved inserted troth fastening for ice plows bas been patented by Mr. John G. Roden-
stein, of Staatsburg, N. Y. The invention consists in a stein, of Staatsburg, N. Y. The invention consists in a
fastening with a stop plate having a specially slaped fastening with a stop plate having a specially sliaped
head at its upper end and a shoulder at its lower end, with a wedge key having a screw and a nut on it
upper end to adapt it to be inserted between the part of a plow beam, to clamp an inserted tooth against the edge of a plow plate section.
A safety stop for elevators has been pat ented by Mr. Ellison Saunders, of Austin, 'Texas. lever is pivoted to the bottom of the car, with a sprin
for throwing it into position transversely to the ca bottom, so that the ends of the lever can catch on hori zontal bars on the sides of the elevator shafts, a rope on one end of the lever to the car cable keeping the
spring taut and preventing it from throwing the leve unless the elevating cable brakes

An apparatus for manufacturing illuminat inggashasbeen patented by Mr. James J. Shedlock, of Barnet, Eng.; with the retorts for first distilling the tar, the condensing devices and tar receptacle, is a ver tical retort, having a feed pipe at its upper end connect-
ed with the tar receptacle, and an outlet pipe for gas leading to the mains, the retort being adapted to steam coil, verted into permanent gases.

An improved railway gate has been patThe object of the invention is to provide a simple and trustworthy means for closing railroad crossings on th approach of trains, for which purpose a suitably sized gate is so hung by pulleys from a bar above that the gate may be rolled to one side and back again by wire
or levers properly connected with a station, or by mechanism in position to be operated by passing
trains.

## NEW BOOKS AND PUBLICATIONS

New York State Survey. Report for the year 1883. By the Board of Commis-
sioners and James T. Gardiner, Director. In 1876 the first accurate trigonometrical survey of the State of New York was commenced, a work which has since been prosecuted in a mauner which reflect
credit upon the Board of Commissioners and upon th credit upon the Board of Commissioners and upon the
able director in charge and his assistants. During 1883, beyond the general work of the survey, considerable attention was given to the hydrography and drainage of
Ni:gara, Erie, Genesee, and Orleans Counties, at the Ni:gara, Erie, Genesee, and Orleans Counties, at the request of the State Board of Health, the results reached
in which have, also, an important bearing on questions in which have, also, an important bearing on questions
relating to the maintenance of water supply in streams. relating to the maintenance of water supply in streams.
These reports have been growing more valuable each year, but now have an added interest, as people are mor tion, average rainfall, and the maintenance of the large streams and navigable channels of the State.

Shavings and Sawdust; A Book on Wood-
working Machinery. By John Kane, Working Machinery. By John Kane,
"Observer." C. A. Wenborne, Buffalo,
N. Y. Price, $\$ 1.50$.
(orticles formor
his book, eonsisting largely of articles formerly published in the Lumber World, is the work of a prac tical man, and speaks as with the authority of an experi enced workmen on the designing, construction, care and operation of machinery used in planing mills, sash blind, and cabinet factories, car shops, etc. It is wel
calculated to be of value to purchasers and owners of machinery, and has much of instruction and needed maching for inexperienced or carelessoperat and need
The Glass Dealer's Ready Reckoner A series of tables of superficial measurement, from 1 to
132 in . in width ty 2 to 180 in . inlength. John Thorpe 132 nn . in width by 2 to 180 in. inlength. John Thorp
New York. Price, $\$ 1.50$.

## CLERGYMAN'S REMARKABLE EXPERI-

 ENCE.Evidence of the wonderful results which are follow-
ing the use of Compound Oxygen accumulates with an lmost - Jwildering rapidity. There seems to be no hase of bodily suffering, and no type of disease, which munication gives the history of one of a class of cases especially found among clergymen and all professional men and brain workers. The changes wrought in three
months, as related by the writer, are truly marvelous ad be health that, to use his own language. "I found myself able to preach Sunday morning, teach a Bible class of
seventy-five or a hundred after sermon. attend an seventy-five or a hundred after sermon, attend an
afternoon service often, and preach to a congregation at the close of my evening service, that I was not conscious of any more weariness than when I began in the
This seems almost incredible, but Dr. Cushing, pastor
of the First M. E. Church, Rochester, N. Y., is a clergyman of wide repute, and no one who knows him will for
a moment question his statement. It is given herewith in his own words:

16 N. Fitzhugh St., Rochester, N. Y.,
Drs. Starkey \& Palen:
Dom in in in inst used Compound Oxygen. lhave often spoken of its effects
to others, but have never, I think, made any statement to you. There are others, doubtless, who would be glad
to know of its effects in a case like mine. I was not sick, though my strength had been greatly impaired by sickness I found myself gradually losing the power of endurance so that my worg left me too much exhausted. f could
see that my whole nervous system was giving way; that here was a manifest lack of vital force. This wy study. There $I$ discovered a lack of the usual quickness of per eeption-a lack of power to hold on. My mind was losing its grip. At the point where I needed most strength, I
found it suddenly failing me. This alarmed me, though I am not a ware that my friends had discovered it . Con nected with this case was a lack of that physical vigor utrition. Sleep was fitful, insufficient, and unrefresh ing. Under these circumstances I began the use of
Compound Oxygen. At first I saw no results. After ime I observed my digestion was much improved. More
estful sleep followed. At the end of three months restful sleep followed. At the end of three months I
found myself able to preach Sunday morning, teach found myself able to preach sunday morning, teach a regation of a thousand persons in the evening. and say in truth, at the close of my evening service, that I was not conscious of any more weariness than when
began in the morning. My sleep was as refreshing on unday night as on any other night of the week. My mind has never worked better than during these four
years, and in no other time of my life could 1 do as much work, or do it with as much ease.
I do not use the Oxyge ne
I do not use the Oxygen now unless I find myself getting a little weary. Then a resort to it fo
three weeks puts me in normal condition again. This is my experience, and I hat
sincerely
dis. W. Cushing, D.D. fficacy of Compound Oxygen as a curative agent. It is so unequivocally indorsed by such leading public men udge Flanders, of New York City, for many years law partner of Vice-President Wheeler; T. S. Arthur, the eteran author and temperance writer; and Wm. Penn Drs. Starksher of the Chicago Inter-Ocean,
Drs. Starkey \& Ple dispensers of this rema st., Philative agent, and will send, without charge, their Treatise on Compound Oxygen, giving all desired inform
regard to tt, to any one who will write to them.

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The Sweetland Chuck." See ad. p. 188.
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tates for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other oreign patents may also be obtained. For instructions
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Newark, N. J., and 92 and 94 Liberty St.. New York. Catalogue, Catalogues free.-Scientific Books, 100 pages; ElectriAmerican Fruit Drier. Free Pamphlet. See ad., p. 2.21 . Curtis Pressure Regulator and Steam Trap. See p. 222. Brass \& Copper in sheets.wire \& blanks. See ad.p. 222. The Chester Steel Castings Co., oftice 407 Library St., Philadelphia, Pa.. can prove by 20,000 Crank Shafts and 15,000 Gear Wheels. now in use, the superiority of their The Improved Hydraulic Jacks. Punches, and Tube panders. R. Dudgeon. 24 Columbla St., New York Friction Clutch Pulleys. D. Frisbie \& Co., Phila. Tight and Slack Barrel Machinery a specialty. John Cutters for Teeth of Gear Wheels formed entirely by machine Wood work'g Mach'y. Rolstone Mach. Co. Adv., p. 222.
C. B. Rogers \& Co., Norwich, Conn., Wood Working C. B. Rogers \& Co.. Norwich, Conn., Wood
machinery of every kind. Seeadv., page 221.

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HIN'S TO CORRESPONDENTIS. No attention will be paid to communications unless writer.
Names and addr
Wen to inquirers.
We renew our request that correspondents in We renew our request that correspondents, in referring
to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.
Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then pub-
lished, they may conclude that, for good reasons, the lished, they may conclude that, for good reasons, the
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as we cannol be expected to spend time and labor to as we cannol be expected to spend time andi
obtain such information without remuneration. Any numbers of the ScIENTIFIC American Supplisment referred to in these co
office. Price 10 cenis each
Correspondents sending samples of minerals, etc.,
for examination, should be careful to distinctry label their specimens so as to avoid error in their identification.
(1) W. A. E. asks: How is the gelatine made which the plaster of Paris workers use for their
moulds? Can I find a book on this kind of casting? A. The gelatine used for monlds is made by soaking ood white or light colored glue with a little water until it is thoroughly swelled; have no excess of water. Then add four times its weight of glycerine. Melt and stir, keeping up the heat for an hour to boil off the water that was in the glue. If too hard, add glycerine; if too
soft, add soaked glue, reheating each time until you get soft, add soaked glue, reheating eacb time until you get
the exact consistence for moulding; pour your moulds the exact consistence for
hot; grease the matrix.
(2) C. S. F. asks: Which is the better way to set a small circular rip saw ( 14 in. )-so that ft will just
reach through the stuff, or lower the table that it will move perpendicularly? Which method requires the wost power? A. A saw cuts easier across the grain. Cutting at the top of the saw is lengthwise of the grain of the wood, and cats harder and of course takes more power. Saws cut easier or with less power with the top of the table as near the center as possible, or so that
the flange that holds the saw just clears the stuff to be the flange that holds the saw just clears the stuff to be
sawed This is the practice with the makers of frames sawed. This is the practice with the makers of frames.
Sometimes the tables are made to raise for some speSometimes the tables are made to raise fo
cial purpose-not for the saving of power.
(3) J. B. W. asks for a formula for the veocity of steam in steam pipes under different heads. what Idesire. A. You will find the formula for flow or velocity under different pressures, also or velocity under different pressures, also tabie of velo-
cities, in Clark's "Manual ''or Engineers,",pages 890,895 , etc.; they are too large to extract and send in a written communication. For ordinary air pressure engine
steam pipes of area one-twelfth to one-fifteenth the area of cylinder will do well; the greater thic speed of area of cylinder will do well; the
the engine, the larger the pipes.
(4) H. W. S. says: I have long noticed in church or othar :public assemblies, the women almost
ziuiversally sit upright in a natura) atitude, while men almost universally take a lounging position, leaning on one hand, or with back much humped, or with one leg
over the other, or in some other unnatural position over the other, or in some other unnatural position
Can there be any reason for the difference except foolCan there be any reason for the difference except fool-
ishly contriacted habitit? A. The ungraceful antitude of ishly contracted habit? A. The ungraceful attitude of
the meni is doubtless owing to carecess habits. The erect and finely developed physique of the ancient
Egyptian women was said to be due to the habit of carrying water pitchers on their heads; bonnets and hair
suffic e for moden suffice for modern ladies.
(5) W. M. P. writes:1. We are about to put tubes. I contend that it is not safe to carry the fire over the shell of the boilier to to te stack or chimney;
others contend it is safe, and some boiler makers claim others contend it is safe, and some boiler makers claim
it is the proper way to set a boiler. A. Returning the flue over the top of the boiler is much practiced for economy, and is perfectly safe. The arches must bear
upon the side walls and be thoroughly stayed, because the arch has a tendency to push the walls apart:
which is the only objection. 2. What size flue do we want to build in the chimney for 3 boilers 5 ft . by 16 ft . 444 in. tubes, furnace 5 ft . square, to each boiler? Also would you build the flue larger at top than at bottom to burn shavings and wood $q$ A. Build the flue 4 ft. square
(16 square feet area) for shavings. The universal way (16 square fet area) for shavings. The universal way
is to build straight inside and taper outside. Do not know that there is any gain in widening toward the
(6) C. S. Writes: I want to use a rope and
pulley, and at a certain point on the rope there is a pulley, and at a certain point on the rope there is a
clutch or grip brought against the same to hold the rope and its load, but the grip wears the rope in a short time. Is there no substance that could be put on the rope to prevent the wear? A. A rubber vannish
upon the rope would give it more stickiness, but the kind of grip that you describe will tear anything that you may put on the rope. Instead of the short
hold of your grip on one side of the rope, make a hold of your grip on one side of the rope, make a
groove in two straight pieces of lignum vite and fasten one piece near the pulley so as to bear on the straight
part of the rope. Fasten the other piece to a lever oppart of the rope. Fasten the other piece to a lever op-
posite to the first piece, so that you can grip a long surface of the rope at once; then you will not have to
(7) J. S. K. asks: How is the cost of gradnng the bed of a railroad through an unbroken country
easiest and best delermined? The land is of a sandy soil, and quite level, with an occasional small swamp to cross. A. If you can run your road so that the cuts
and fills will be equal to each other, the subject is very much simplifed. The cost of excavating is computed at so much the cubic yard, the prices being affected by
the quantity and quality of the material and the disposition of it: If there is not excavated material enough, If the swamp cannot be readily filled, you can compute the cost of pilling at so much the pile or running foot. The cost of ballast, ties, and rails can be obtained upon (8) G. F. L. asks: 1. What load will a flat boat $15 \mathrm{fl}$. wide and 40 fl . ong, carry. A. Af the scow
outline is a parallelogram with vertical sides and ends, it will carry one ton treach one inch additional draugh of water in frresh water. 2. If boat empty sinks in water
3 in., how much loau willit take to sink itdown to 4 in., 3 in., how much load willit take to sink itdown to 4 in.,
then inch by inch to 12 in. deep? A. uf boat of same dimensions, 4 tous will sink it 4 in., and 1 ton for each
(9) W. S. asks how to read the indicator or registering dials of an ordinary gas meter, and also de-
scribe the cold water annealing process? A. For reading your meter dial commence at the right hand dial; ;it is marked 1 thousand, which means for the whole cir-
cuit each division is one hundred cubic feet. The second dial hand turns to the left on account of the construction of the gearing upon tue inside for simplicity; this dial is marked 10 thousand, each division reading one thousand. The third dial hand again turns to the
ight. and is marked 100 thousand, which also is the rum of the whole circuit, each division reading 10 thousand. Always enter the flgure following the hand (not
before) in the way the hand is turning. Enter each before) in the way the hand is turning. Eiter each
figure, and place 00 at the right. The small dial marked cubic feet is not used except for lesting. Water annealing of steel is simply heating the piece to a full
red heat; lay it in some dry ashes or lime until it plunge in warm water- $80^{\circ}$ to $100^{\circ}$. This makes steel soft for die cutting.
(10) E. C. O. writes: 1. I have an iron cylinder 50 in. internal diameter, 3 ft . long, and $\%$ in.
thick. This cylinder is placed inside of a somewhat larger cylinder whose internal diameter is $513 /$ in., leaving a space between the concentric cylinders
of $1 / 2 \mathrm{in}$. This space is tightly filleã with water under pressure of 1 atmosphere. The ends of the cylinders are closed with heavy iron plates capable of with-
standing almost any pressure. Now, how much external pressute per square inch will this double cylinder stand, supposing it were placed inside of a large iron
box and water pumped into the iron bos by hydraulic pressure? A. Under the conditions you name, it yoor
cylinders are of the same thickness and quality, you will get, theoretically, the combined strength of the two. The intervening water jacket permits of this.
Butif you make the cylinders with flat heads, the question of distortion comes in, the problem becomes much more complicated, and the power of resistance of your
cylinders will be greatly reduced. The two cylinders, if made of good qnality of wrought iron and with heads of proper form and strength, sbould sustain practically an exterior pressure of 200 pounds per square inch. 2.
A log 16 ft . long and $41 / \mathrm{ft}$. in diameter with the ends somewhat pointed is floating in a lake with about an inch of ite upper surface projecting above the water.
The log weighs 8,000 pounds. How much forward traction will it require to pull the log slowly? A. This
cannot be answered as no form of ends, condition of
cannot be answered, as no form of ends, condition of
surface, or veloeity is given: you will find the results of experiments in towing logs in Beaufoy's " Nautical Ex
periments."
(11) J. M. H. asks: What will whiten the Vory keys of an old organ that have turned yellow by
tanding in a church?
A. Bleach them by treatment with hydrogen peroxide; see Scientifio American (12) B L
(12) R. H. M. writes: A. has a circular arm containing 80,000 square rods. What will be tircle, so they will just touch each other?
A. For the solution of your problem-rule for finding the diameter:
divide the area by 0.7854 , and the square divide the area by 0 risst, and the square root of the

quotient will give the diameter of the circle. Thus: | quotien |
| :--- |
| 80,000 |

$\overbrace{0.7854}^{\text {diameter }}$ diameter. Its half diameter is $159 \cdot 55$ rods. The center or on around circle is the apex of the two sides of a hexahe sides of hexagon to the radius of ist inscribed circle $1 \cdot 156$ to 1 , which by adding equals $2 \cdot 156=$ the semilessercircles. Then from in semi-diameters of the esser circles. Then from abov
ti.5.

## $2 \cdot 156$

(13) F. J. M. asks: Is there in successful peration any motive power (other than the steam engine) for propelling small boats and launches? A.
We know or none, but many experiments have been We know ot none, but many experiments bave been
made with electricity, some of which are claimed to be made with electricity, some of which are claimed to be
successful. None, however, are in more than the ex-
perimental stage.
(14) W. R. H. asks: 1. What is the cause of pipes bursting in cold weather? Is it that water expands
when frezing? A. Water expands when freezing, the when freezing? A. Water expands when freezing, the
ce occupying a larger space than the water that proice occupying a larger space than the water that pro-
duced it; but as the process of freezing is a gradual one, the water in a pipe partially frees itself from constraint, and the pipe may become filled with solid ice and not burst until the temperature has fallen so low that the contraction of the iron over the rigid ice produces rupture in the iron. Pipes are also burst by
frezing solid at different points. The falling temperafreezing solid at different points. The falling tempera-
ture of the interme diate water-flled space will cause an ture of the intermediate water--ilied space wil cause an
expansion of $t$ he water between the point of greatest density, 400, and the freezing pointsunficient toproduce he requisite pressure for rupture. 2. And what is is under 60 pounds pressure? $I$ s that obtained by throtting steam? Ihave a $21 / 2$ in. Judson governor: it works as well as possible up to so pounds, but above that engine. In supply pipe, above governor, I have attachiil, but got no better result. A. The 40 pound pressure may be the mean pressure caused by cutting off by the
set of the slide valves, or may possibly mean the initial pressure caused by throttling. Governor valves, when
per gine within certain limits of pressure, require read justment for change of speed by change of the size of the speed pulley, and for change in the boiler pressure by adjustment of the cut-off position of the governor valve.
For a given amount of work a governor valve set for average of 60 pounds pressure with a variation of 10 pounds will not operate satisfactorily with 80 or 90
pounds pressure without readjusting the valve.
(15) C.W. V. writes: There is in this city a coal run which rises 5 ft . in 100 , or the rise is one-
twentieth of the length. Now, a locomotive standing twentieth of the lengt. Now, a locomotive standing
on this incline can just hold her own with her brakes set on her drivers, that is, the friction between the drivers and track will keep her from sliding down hill. The locomotive weighs say 100 tons with tender. The 1,200 tons. I reason as follows-the locomotive holds one-twentieth of its weight, equals 5 tons, that is, on a
level it would pull 5 tons. This 5 tons dead pull pulls 1,200 tons on wheels, that is, 1 ton pulls 250 ; the coefsient of friction is therefore one two hundred and fifthis right? $\mathbf{A}$. It is found that, with an exceptionally good track, and cars in good condition, after motion is started 6 pounds per ton ( 2,000 pounds) will keep up a slow movement-but 8 pounds per ton is usually allowed. The resistance increases with the speed -at 20 miles
per hour to about 11 pounds per ton, and at 30 miles per hour about 141/2 pounds per ton. Fight pounds per ton (16) J. A. T. says: In the inspection an repair of freight cars built of the best material and manưactured in inst class shops, one of the defects
frequently discovered is loose wheels. The wheels are frequently discovered is loose wheels. The wheels are
sometimes found to be lose on comparatively new cars, that have enever been wrecked in any manner whatever. to what machinists term "the wheel fit," and left enough larger torequire a pressure of from 2 to 30 tons
to orce the axle into the wheel. Now, in the absence
of an accident of any kind to the car, what can be ass signed as the cause of these wheels getting loose? Would the bore of the wheel, next to a journal that
for some distance had been runuing hot and heating Por some distance hat been running hot and heating
the wheel, be after cooling again the same size as when originally bored out? A. Loose whels in 99 out of 100
cases are due to bad fitting; generally in such cases the axle fit is straight, and throngh wear of boring tool of axle fit is straight, and tronogh wear of boring tool of
car wheel boring machine the wheel fit is slighty
and taper, and the wheel works loose. With straight fit
n both axle and wheel, and an allowance in size reguiring 30 tons to press on, no trouble is experienced. If the bearing runs hot and is suddenly cooled with water, the tendency would be to loosen the wheel, owing to the
shrinkage of axle due to sudden cooling, etc. Excescive clearance between flange of wheel and rail, especially on sharp curves, if the car is heavily loaded,
tends, owing to the sudden blow on the flange, to drive the wheel in and loosen it. Difference in hardness of iron of wheelschanges pressure required to press wheel on, sometimes as much as 10 tons, and loose wheels
sometimes result from this. The chilled tread puts a strain on the wheel like a tire, and when this is wor away the strain is lessened, allowing wheels to slip on
axle if an aggravating cause occurs, such as sharp
using too pointed a tool with too coarse feed, the fit
presenting $\mathbf{a}$ surface of being threaded. When the wheel is pressed on, it may go on with the required allow wheel to slip.
(17) S. P. writes : 1. Can I make the tele phone, Fig. 4, SUP. 421, for my own use andexperimenta
purpose, but not to sell?
A. You can make it for ex periment, but not for nse or sale. 2. What is the be
kind of glue for sticking carbon to wood and ferrotyp etc.? A. Use gutta-percha and pitch equal parts melte ${ }^{\text {in }}$ etc. . A. Use gutta-percha and pitch equal parts melte申h
togelher. . . What would be about the power of the
onner ynamo in Sive. 1112, enlarged five timess A. If you pro-
yse to make a arge yynamo, it would be best to make Sse to make a large dynamo, it
(18) C. N. S. asks the best plan to moisten the atmosphere of a closet or chest by cold water alone?
A. By rearranging the shelves you might get room enough next to the top ahove the shelf to slide in shallow tray of water, with partitions standing about in. above the water, with cotton or linen cloth folded
over them so as to dip into the water, which will greatly increase tbe surface for evaporation. The shelves
and front for circulation of the moist air
(19) C. W. H. asks: What will caseharden prussiate of potash, and it does not harden the surface A. Make a powder of common salt 8 parts by weight prussiate of potash 7 parts, and bichromate of potash 1
part. Heat the iron red hot, cover it with the powder part. Heat the iron red hot, cover it with the powder
melt it on, and chill in a water bath while the iron is
(20) I. L. H. writes: My engine has a 20 ft . hy 10 in. stack, twenty-three 2 in. flues; size of fire box,
length 30 in., width 18 in., depth 27 in; length of flues, 60 in., but does not steam as it should; will you please fell me what is wrong? Also what horse poon $51 / 2 \times 8$, running 225 revolutions? A. Your description of the boiler is not sufficient for earact estimate of its
power power. We eetimate it as an 8 horse boiler. The ened at 10 horse power. Your boiler is not large enough by 50 per cent for the engine rate.
(21) J. L. C.-Steel upon steel has less friction than steel upon yellow brass. Steel upon a com-
position of copper and tin, such as hard journal boxes are made of, has the least friction. A slide having a fat bearing has less friction than with a round bear ing.
(22)
ner
(22) G. H. M. asks: Does a vessel passin over the span of an aqueduct increase the weight sus-
tianed by such span, and reasons, pro or con.? A. Yes. Theoretically, by the amount that the water is raised by displacement. Of course this is not appreciable in the weight would he considerable. This calls to mind the anecdote of how King James puzzlerl the philoso-
phers in regard to weight of the fishes and the bowl of

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\begin{aligned}
& \text { vater } \\
& (23
\end{aligned}
$$

| water. |
| :---: |
| (23) |

(23) J. H. Z. asks: 1. Gan you give me rough the columns of your paper the composition and the process of making the alloy used for hard soldering
brass, copper, etc.? A. A hard solder may be made of rass 1, zinc or tin 1 ; a soft solder: tin 2 , antimony 1 , brass in a crucible, add the softer weitals, and when solidified but not cold, beat the mass in an iron mortar to a granular consistency. 2. Also process of making gold solution to plate without battery, that is, to give
gola color by rubbing solution on article to be plated? A. Dissolve gold leaf in quicksilver and apply with a woolen cloth. This method of gildiog is evanescent
 borax? A. Borax is produced from the borate of soda, borax? A. Borax is produced from the borate of soda.
(24) E. E. H. asks: 1. What is the best method of varnishing slate table tops which have been
ornamented by painting on them a design in oil colors? What varnish is used, and how applied? If with a brush, how can the strokes of the brush be prevented from
showing? If dipped, give particulars?
A. Use a soft camel's hair brush and cover the table with a coat of heavy body varnish, such as can be purchased of any paint house. 2. A receipt for ebonizing liquid. I have
used nut galls and acetate of iron, formerly with good resulls, but lately the iron acetate will not produce the black. A. The majority of the receipis given include ace entirely free fcom iron salts, and may be found aesira ble: First sponge the wood with a solution chlorhydrate of aniine en water, to which a i ittle copper chlor-
ide has been added. When dry, repeat with a solution
(25) J. H. K. asks for a stain for violins of dark chestut or seal brown will give a boxwood brown stain: Hold your work near the fire, ao that it may receive a gentle warming; then
take aquafortis, and with a feather pass it over the work till you find it change to a fine brown (always keeping it ear the fire); you may then varnish or polish it.
(26) P. K. W. asks: 1. What can I put nto calcimine that will harden it so it will bear wash-
rg? A. The addition of a small quantity of potassium bichromate to the calcimine will probably render it
it suffic iently insoluble for your purpose. 2. What can I vut into a wash made of sizing and Venetian red, that
will harden it sufficient for outside work on brick walls? A. There is nothing we can recommend to you other than the use of a better quality of paint. If it were
possible to accomplish the end you sugrest, we think hat such an article would entirely supplant the use of
pint and therefore would be directly procurable from paint, and theref
be paint houses.
(27) A. S. C. asks: Is there any paint or wall to keep out moisture or dampness? The plastering is done on rock, and t think the moisture is mostly from persiriation. I I wish to paper the wall. A Y You might
coat it with silicate of potash or soda, which would recoat it with silicate of potash or soda, which would re--
sult in a very hard surface, or two or three good coats of zinc ground in linseed oill would do. But we think
your best plan would be to have a wall within a wall
one of which would receive the perspiration and permit
t to drip and run off, and the other could take the paper
(28) W. F. T. writes: Have steam yacht;

 We are using 43 in. 3 sloded. screw. 1. Would we gain In speed by sing 4 laded screwz A. We think not. 2.
is so, what size would you recommend? fso, what size would you recommend? A. Your pro-
peller would do better if 3 or 4 in. larger in diameter If you have ample boiler, you may get increased speed. by making a propeller 3 or 4 in. larger and of less pitch
(29) S. B. D. asks: What size wheel he should use for a yacht 35 ft . long, 6 ft . wide, 3 ft . deept When not loaded draws 18 in. at the bow and 28 in. at
the stern. Enine $4 \times 6 ;$ biler of steel, $27 \times 46 ;$ fifty the stern. Engine, $4 \times 6$; boiler of steel, $27 \times 46$; fifty
$11 /$ in. flues; pitch of shaft, 1 in. to the foot. A. Two eet 8 in. diameter and 3 ft .4 in. to 3 ft .6 in . pitch; wo (30ubt if Jou have boiler evough for good speed
(3a B. asks: 1 . Which is the best ats to put a patch on a boiler-to rivet, or with patch of a boiler have, size of boiler 17 ft . long, 66 in. diaof a boiler have, size of boiler $17 \mathrm{ft}$. long, 66 in. dia-
meter, iron $3 / 8$ in. thick, and seventy-two 4 in. fiues, and at what pressure would they be safe with only $\%$ in. lap? A. If single riveted, and using $3 / \mathrm{in}$. rivets, 33/ in. We cannot understand what you mean by
? in. lap; 34 in. rivet is the smallest that should be used in $3 / 8$ in. plate; you world then have but $1 / 2$ in. outside the
rivet. If you mean $\% /$ in. outside rivet hole, then by Government rule you could carry safely, if single rivet ed, 85 to 95 pounds
quality of the iron.
(31) J. J. A. asks: 1. How to find the shape of a plank or planks of a boat about 20 ft . long, so that have the drawings of the boat I would like to make, perhaps you could inform me how to proceed therefrom A. The width at the several sections is taken from the mould loft floor and set off on the plank, and a batten setto strike through the points set off. 2. Also how to
find the pitch of propeller, size of engine and boiler find the pitch of propeller, size of engine and boiler
for a given boat? A. There is no general rule which for a given boat? A. There is no general rule which
will apply; size of vessel, the model, and dranght of will apply; size of vessel, th
(32) F. F. asks: Can air be forced through a pipe a mile long by a pump, and if so, would it make
a slight pressure? A . Yes; the pressure would depend pon the power applied to the pump.
(33) J. H. M. asks: How are nickel plated The articles are frist dipped in caustic potash and so cid folly cleansed, then dipped fore moment in nitric is put into the silver bath.
(34) W. S. C. asks: In a steam engine, which gives the most power-lap or lead of the valve: . Lap increases economy by working the steam to a ept in cases where passages are so small that the inilight degree.
(35) S. S. C. asks for a receipt to make common newspaper water tight and tough? A. Strong
unsized paper is immersed for a few seconds in sulnsized paper is immersed for a eew seconds in sul-
phuric acid diluted with half its volume of water. It is then washed in pure water or in a weak ammonium bydroxide solution. The acid liquid must be of the ame temperature as the surrounding atmosphere Also a muciage that does not soften by being
exposed to the water? A. The addition of 2 per cent of potassium bichromate to the water in which lue is dissolved, just prior to its use, and exposing the IIued article to light, will make it insoluble even in hot
water. See also "Cements," SciENTIFIo AmERICAN vater. See also
(36) E. L. B. writes: 1. [ have a lot of shop Can you tell how to mix a solution that will remove the nickel and not injure the surface of the brass? Can it e done without employir, electricity? A. The only way that the nickel can be recovered is by buffing it off that will dissolve nickel will likewise dissolve the other metals. 2. Would also like receipt for making yellow ome in tred or bronze metal. I have expeta! to run ood this direction, but carnot get the meal torning copper, 20 lb ; zinc, 10 lb ; l lead, from 1 to 5 oz . Put in the lead last before pouring off. Red brass, free, for
urning: copper, 160 lb; zinc, 50 lb.; lead, 10 lb;; antimony, 44 oz .
(37.) C. H. writes: 1.I am a fisherman, and in the course of a year catch a good many dog fish,
gars, turttes, and other unsalable fish, amounting to everal tons. How can I cheaply reduce them to ferilizers, so that they may be kept till wanted for use?
A. Let the fish rot in open tanks or covered under round. After they have partially rotted, add sufcient dilute sulphuric acid to cover them, then nentralze by adding lime. Work the mass up and dry it. 2. nat is the best preparation to use on ish nets, such as ing coal tar. Do you think pine ar better? A. Either oal or wood tar can be used; perhaps linseed oil would be better. 3. I would ike to know how to reduce old bones to fertilizers, so that they will keep till wanted?
A. Bones may be treated by filling an old barrel with alternate layers of wood ashes and fresh bones, slightly wetting from time to time with hot wate
(38) D. W. E. asks: 1. How to temper open oiled springs, so that the coils do not close in heating and hardening. What is put between the coils when ter hardening A. Nothing. 2. In winding a spring, oiling it cold, getting it too hot, or hardening it too uch ? A. The spring should be heated evenly over a arcoal fire or in a muffle (oven) to a clear red, chilled in animal oil, and tempered by blazing over a char-
coal fire. 8. What is the difference between a char-
coal and a coke firefor heating for tempering? A. Char sulphur, which is injurious to the integrity of the steel (39) J. S. C. asks: 1. Can molten brass .be successfully run into iron moulds? If not, can you say the reason? A. The composition of brass-partly zinc
a volatile metal-precludes its successful casting in a cast iron mould, there being no adequate escape for th heated gases. 2. If that is impossible, is there an mixture which would do so, and take a silver plate by deposit or wash? A. Use a composition of which
the basis, and it will pour readily and plate easily.
(40) J. G. W. asks if there is an Englisk (40) J. G. W. asks if there is an English
translation of "Brehm's Animal Life "' A. "Brehm" translation of "Brehm's Animal Life "? A. "B.
Animal Life "is not yet translated into English.
(41) G. L. F. asks how to prevent his melt ed tin moulds from sticking to his shcet tin pattern proving tutile? A. Use a blacking made of ordinary lampblack mixed with lard or sperm oil, and
powdered plumbago through a muslin bag.
(42) S. F. F. asks: Can malleable metals be compressed by pressure or hammering to one-half thickness, the edges being confined; or can the weigh
of metals be increased by pressure or condensing of of metals be increased by pressure or condensing on
the metal? A. No. All metals are subject to conden ation by pressure, but none to the amount of one-hal heir bulk. No increase of weight isgiven to metals by finished coin. The only use of pressure of metals is making a better surface for finishing.
(43) A. C. G. says: 1 . He has difficulty in older, and a mixture of both, and heating the mould. The metals do not run. He asks what composition will do? A. Neither lead, nor lead and antimony-sol der-will make a metal fluid enough for the purpose if
the casting is thin. Use pure Banca tin, or tin 8 , zinc the casting is thin. Use pure Banca tin, or tin 8, zinc
2, or a composition having tin for a base and no antimony. 2. He asks also how to make his ink black a the time of writing, or to become so afterward? A. We tific American Supplement, 157.
(44) D. and T. ask: Can you inform us how light hardware, such as hat and coat hooks, cur tain fixtures, etc., are bronzed? A. Dull bronze is shellac varnish-shellac dissolved in alcohol. A br l
lignt brone is liant bronze is given by a coating of furniture po sh
left until "tacky," and then the bronze powder app ied left until " tacky," and
with chamois leather.
(45) S. R. R.-To sand wood: Paint the wood with a thick paint and dust the sand on through a sieve fixed to a small tin box in which the sand is (46)
46) E. F. H. asks how Seidlitz powders are made? A. The following ingredients are mixe 1 -in a blue paper: 40 grains soda bicarbonate, 120 grains
Rochelle salts; and in white paper, 35 grains Rochelle Rochelle salts; and in white paper, 35 grains Rochelle
salts.
$(47)$ J. J. G. asks what is best compound to paint row boats with? A. Use zinc paint mixed with raw linseed oil.
(48) W. M. H. asks for a receipt for the liquid used to ebonize wood, and how to apply it? A One gallon of vinegar, one-half pound of green cop-
peras, one-quarter pound of China blue, two ounces peras, one-quarter pound of China blue, two ounces a slow fire, then add a pint of iron rust. Wash the wood with this. 2. Also, the receipt used by instrument makers for staining or lacquering brass that dark
green seen on surveying instruments? A. Dissolve green seen on surveying instruments? A. Dissolve
shellac in alcohol, strain, and add turmeric or gamboge shellac in alcohol, strain, and add turmeric or gamb
(49) M. and W. ask how to boil soap water and kerosene, so that it would become a solid mass.
$W$ hat could be put in to make it become hard? Also, would it be dangerous to boil the kerosene? A. It is not possible to produce a solid mass in the way you any fatty acid, and hence will not saponify. An emulsion can, however, be produced. Great care is neces sary in boiling kerosene to prevent an explosion.
(50) W. S. M. asks: If coal oil, supposed to be $175^{\circ}$, should "flash" at a lower temperature at this altitude ( 10,200 feet), also the correct way to make the test? A. We do not know that the high altilude test for coal oil is known. We should judge that the name. You may easily try it, by placing a thermome ter in a small cup of the oil, and gently heating until by epeated trials of a lighted match passed over the cup about an inch above the oil a flash is produced; then
(51) J. B. H. writes: In the shop where I am employed there is an engine, 14 in . bore, 30 in .
stroke, making 90 revolutions per minute; the steam pipe is $31 / 2 \mathrm{in}$. gas pipe. The exhaust leads into a tight steam box, never in open air, about 60 feet away from engine; about one-half of the exhaust pipe is $4 \mathrm{in}$. gas
pipe, balance 6 in . sheet iron pipe. question: is the expipe, balance 6 in . sheet iron pipe. question: is the ex-
haust sufficient? I have claimed that to take away the 4 in. gas pipe and to put in 6 or 8 in. escape pipe will improve it, inasmuch as the exhaust must be cramped at box. Is this so? A. You are right; if the bo' into which you exbaust is really tight, back pressure may be
produced there, more than by the small exhaust pipe. produced there, more than by the small exhaust pipe,
(52) A. J. asks: Wbat to paint wood with, so hat glued paper will not stick to the wood while the glue is drying? A. We would re
the painted work with paraffine.
(53) S. L. asks: Which is the best wood for making violin tops? Norway pine and spruceare what by the best makers of straight grained deal, and the back of maple, sometimes of sycamore, and in very old instruments of pear wood.
(54) W. S. asks: Will one cell be sufficient co operate a small vibrating bell? If so, what kind of
cell must it be? A. Use one cell of Leclanche or Fuller battery.
(55) C. F. J.-We cannot furnish you with (55) C. F. J.-We cannot furnish you witt made to determine its ingredients. We are disposed to rticle is either the crude soda ash or pearl ash. The use of the name "Soapine" is, we believe, protected by
(56) D. E. X. asks how small steel springs can be blued to make a first class job? A. After the springs are hardened and tempered, run them through
wheels of cotton, or rags of cotton, charged with rotwheels of cotton, or rags of cotton, charged with rot-
tenstone or any other abrading material which will tenstone or any other abrading material which will
eave them bright, and then heat them in hot sand to leave them bright, and then heat them in
color, quenching instantly in cold water.
(57) A. F. L. asks how to make a sand blast, how to get or construct a bellows? A. You will reYou will also need power for driving the bellows blower. For a very small arrangement a circular bellows might do. A Root blower would do better, or you might make a gas holder after the principle of those at he city water works, like an injector with a siphon to arry off the water under the required pressure. See (58) C. G C ask: Con you in
(58) C. G. C. asks: Can you inform me through your paper of a good process for caseharden-
ing cast iron? A. If the casting is too large to be conveniently packed in a box with cementing materialveniently packed in a box with cementing material-
ground bone, rawhide, etc.- heat it to a red heat and sprinkle powdered prussiate of potash on
(59) E. S. S. asks in what position the sounding post of the violin should be placed to get best ef-
fect? Also of what material it should be made? A. Make the pin of spruce, place it under the bridge step the right hard side or under the $\mathbf{E}$ string.
(60) C. D. asks: 1. Can I use No. 36 co ton-covered wire in making induction coil described in
Scientific American Supplement? A. It can be Salentific American Supplement ? A. It can be
used, but silk-covered is to be preferred. 2 . How much ould I require of both kinds, covered an ancovered for both secondary and primary coils? A. Use the (61) B. W. D. asks: What adherent force could a magnet be made to have, and what size would if such is possible? Cansuch be procured? Would it adhere to rubber as well as iron ? A. A magnet has no appreciable effect on rubber. A compound, permanent magnet 10
more.
(62)
(62) N. P. B. asks: 1. Will an induction coil one-fourth the size of that described in Supple-
IENT 160 charge a Leyden jar, said coil beiug run by MENT 160 charge a Leyden jar, said coil beiug run by
one cell of Law's battery? A. It would charge a Leyone cell of Law's battery? A. It would charge a Ley-
den jar feebly. 2. How do the iron battery, and the battery composed of niter with iron and coke electrodes, work with an induction coil? A. Any battery with sufficient current will operate an induction coil. 3 .
Would common spirits of niter do for the latter battery? A. No. Use nitrate of potash. 4. What is the proper thing to fasten the tin foil to the outside of a Leyden
jar? A. Use she llac varnish. 5. What makes the fixed
stars twinkle? A. Atmospheric disturbances.
(63) A. K. Writes: I claim that the vapor
arising from gasoline will ascend, the same as any arising from gasoline will ascend, the same as any
ther vapor; M. claims that it will go down. A. It has other vapor; M. claims that it will go down. A. It has
been found that benzine vapors, which are frequently he cause of fires in paint factories, seek the lowest levels, which they follow for long distances; and it has
been shown that a fire in a furnace, the grate of which was but a few inches above the ground or floor, has ignited benzine vapors that came from a tank 200 feet oor the
(64) H. N. H. asks of what is phosphorus formed, how obtained, and is there any other substance
as easily ignited, and how? A. A very full description as easily ignited, and how? A. A very full description
of the properties and methods by which phosphorus is of the properties and methods by which phosphorus is manufactured is given on page 1,029 of Scientific
AMERICAN SUPPLEMENT No. 65 ,and also on page $1,65 \%$ of American Supplement No. 65,and also on page $1,65 \%$ of
Scientific American Supplement 104. Phosphorus melts at about $99^{\circ}$ to $100^{\circ} \mathrm{F}$., but potassium b
spontaneously ignited when exposed to the air.
(65) R. S. B.-Caustic soda is obtained by catang or decomposing dilute solutions of sodium car-
bonate by means of quick lime. Its manufacture will be found described very completely in "Dussauce's Treatise on the Manufacture of Soap," or in Geo.
Lunge's work on the alkalies. Sufficient general inormation will be found in Spons' encyciopedia
Ure's dictionary.
(66) H. \& B. ask what the ingredients are or making a white stain for shoe bottoms? A. Use a
stain consisting of soft water one pint, oxalic acid two tablespoonfuls, or more if stronger be required, then This we think will prove satisfactory
(67) F. L. O. writes : 1. Will you please ell me where to put my water gauges in building a 22? A. The water line should be about 3 inches belo upper end of lower flasks. 2. And what amount of
steam I can carry with safety? A. 150 pounds per guare inch will be quite safe
(68) G. S. L.-Tellurium is sold as a curiosity at about $\$ 72.00$ per oz. It has no recognized (69) B. F. B. asks: Is common salt good to mix with oil to prevent an explosion? A. We have
never heard that salt mixed with oil would prevent explosions.
(70) G. S. M. asks what the thermostats are made of that are used for regulating purposes? Some thermostats consist simply of a rubber bar.
Some of a compeund bar of strips of brass and iron riveted together. Others are simply large thermome
71) R. W. J.—The principal use of tripoli is for polishing powders; it is, also, sometimes used to
ive body to soap. At one time it came largely into use in the manufacture of giant powder, but its use for
this purpose is now supplanted by wood pulp. It is no therefore, it has no market. Under the trade name of Electro Silicon it is largely sold by a company on John
Street, New York, but they have more than they can Street, Ne
dispose of.
(72) A. L. asks how to make dark resin clear, and how to clean resin that is full of dirt, leaves,
and bark \& A. Melt it and strain through a suitable and bark \& A. Melt it and strain through a suitable
filtering material, or else dissolve in turpentine, and filtering
(73) P. R. R. asks: With what white sub stance cau I cover a draughting board that I may easily erase the black pencil lines after the drawing has been
copied or used ? A. For this purpose paint the board with three or four coats of white lead ground in Japan. Rub each coat down after it is thoroughly dry with
(74) A. W. B.-You can put your push but ton, your bells, and battery all in one circuit, if you do not object to both bells ringing at the same time. If
you want to ring the bells independently. you must divide your circuit just below the lower bell and run two wires to the top floor and place a push button on eack turn wire. Cost of bells, from $\$ 1.50$ upward. Push buttons,
(75) J. D asks : 1. Is there any means of restoring the asks $: 1.1$ Is there any means of restoring the oxygen to worn out prisms of the Le-
clanche battery? A. No. 2. By making and breaking clanche battery? A. No. 2. By making and breaking it; is that produced by atmospheric electricity accumulated on the line? A. Earth currents and atmospher-
ic electricity. 3. The objects in my nickel bath sometimes turn black, what is the tiouble? A. Possibly your current is too strong. 4. Can I gain time by warming my nickel bath? A. Yes. 5. In a high speed
engine, the piston, piston rod, and part of connecting engine, the piston, piston rod, and part of connecting
rod come so many more times from their state of rest to a higher velocity, and again torest, than a low speed engine. Is there not a loss of energy on account of the inertia of piston and connections, and consequently low speed or rotary engine more economical than an ordinary high speed engine? A. The inertia is coun-
teracted by lead or cushion. There is no very marked teracted by lead or cushion. There is no very marked
difference in economy. The present tendency among difference in economy. The present tendency
engineers is to high pressure and high speed.
(76) A. K. asks: What preparation the put on silver leaf that makes it look like gold, such as hat on cheap mouldings? A. You can purchase a gold jour purpose. A palegold lacquer of 1 gallon of methyl ated alcohol, 10 oz . of seed lac bruised, and half ounc of red eaunders dissolved and strained is often used
(7\%) J. G. W. asks for a recipe for red-edg ng or gilt-edging books? A. The book is very firml clamped between the arms of a press, so that none of The edges are then coated by means of a camel's hai brush with a mixture of carmine and a suitable shade of aniline red with sufficient gum arabic to thicken the solution. The ingredients vary according to the shade desired. In the case of gilt-edging the leaves are first
coated with a solution of white of egg, gold leaf is then put on,
agate.
(78) C. G. D.-The usual process of nickel plating is described in the Scientifio Amerioan Sup PLEMENT, No. 310, under the title of Electro-metallur purpose rouge and buffers are generally employed. We
would recommend you to read some of the works on the subject, such as Wahl's "Galvanoplastic Manipulations," recently published. See page 109 of ScIENTIFIC
(79) C E P
(79) C. E. P.-Your general conjecture about the minerals is correct. As regards tin, from a rough qualitative test, traces of it appeared present.
We would suggest that a larger quantity of the mineral We would suggest that a larger quantity of the mineral
be forwarded and sufficient money $\$ 5.00$ ) be included, be forwarded and sufficient money (\$5.00) be included,
so that an assay could be made, by means of which the working amount of the metal could be determined.
(80) C. H. L. asks: Can you give me any information of Cooper Institute, and the conditions on which students are admitted? And is it so fixed that a
student can earn his board and clothes? A. There is no bar to ane student of good character entering the classes of the Cooper Union. Only ladies can enter the classes in engraving. They can earn the value of their
work for themselves. There is no other means of earnwork for themselves. There is no other means of earn
ing anything within the Union. You may obtain a situation at any employment in the city, and attend the
(81) S
(81) S. W. R. writes : 1. What is the mat eer with my plating bath? I prepared it by dissolving according to Scientifio American Supplement No 310. It plates dark, and when polished looks like lead. It seems to take a good deal more battery power than
does the silver bath, is very hard to polish at all, an I understand should look nearly tike silver. A. Yo are probably using too much current. Try a weak
battery. 2. What will an induction coil $2 \times 11 / 4$ do? A It depends upon the construction of the coil and the mount of battery employed.
(82) F. K. asks: 1. What is the best conductor of heat, that is, what material will retaiu the most heat the longest? A. Tbe best conductor of heat according to Despretz is gold, and according to Wiede-
mann and Franz, silver. 2. What is the best non-conmann and Franz, silver. 2. What is the best non-con
ductor of heat, or just the opposite of the other? The best non-conductors are ashestos, mineral wool paper, soapstone, and animal wool and bair. 3. Will an electric machine, if made in the lightest practical form and material, lift more than its own weight, and
if so, how many times its own weight would it lift? A. if so, how many times its own weight would it lift? A.
An electro motor will lift almost any weight by means of a windlass or equivalentdevice. Time is an element which you do not consider. A light dynamo should
sustain several times its own weight when used an connection with a suitable electromagnet. Your query is hardly clear enough to enable us to give you a definit
(83) B. H. writes: If a perpendicular pipe ne inch square surface be connected with a horizonwith water, and the perpendicular pipe be brought under pressure of ten pounds, the pressure in the horizontal pipe will be the same, viz., ten pounds. If ten pipes of the same size should be similarly connected with the horizontal pipe, and the water in each pipe brought under a pressure of ten pounds, would the pressure in the horizontal pipe be $10 \times 10=100$ pounds, or only 10 pounds? A. If the ends of the pipes are ten pounds plus the hydrostatic pressure caused by the height of water in the upright tubes; which adds one pound for every twenty-seven inches in height. The number of pipes does not affect the question.
Minerals, etc.-Specimens have been reeived from the following correspondents, and examined, with the results stated:
J. H. G.-The specimen is pyrite or iron sulphide, in value.-R.T. B.-The mineral not likely to be of any etic oxide of iron. It is one of the most valuable iron ores that is found.

INDEX OF INVENTIONS For which Letters Patent of the United March 25, 1884,

## AND EACH BEARING THATR DATE.

dist about copics of these patents.]

## Advertising articles to cards, attaching, S. P. Mount ....................................................65,65 ir compressor, hydraulic, c. Pfanne.... . ....800

 Air compressor, hydraul,Alarm. See Fire alarm.

## Animal trap, C. Hall

Antiseptic solution, J. F. Kenne...................... 295.634. 295,876
Asphalt, machine for mixing, G. Winding.......... 295,707 Bag. See Mail bag.
Bait, spoon, C. B. Hibbard
 Sallot box. J. Kluger........ ... .................... 290,560
Batery. Salvanic battery.
Bee hive, J. Vanzandt.......................... 295,693 Bee hive, J. Vanzandt.......................... 295,693
Bee hives, moth trap for, J. T. McEIfresh........ 295,786
Belt stud, O. S. Turner. ... .... ................
295,599


Boiler scraper, J. H. Beare.......................... 295,854
Bolting chest, Kohnle \& Hamilton........... 265561
Boot or shoe toe cap, F. H. Kennedy............ 295,877Borer, hand, w. E. Clough.... .......................
Boring machine, w. E. Clough ................
Bottle lips and necks, tool for forming, J. B. Wil-son........... .......... ........................... 295...........78
295,708
Bottle stopper, A.H. Wirz........
Bottles cutter for wires and cords of, Bevins
Propst .......................................... ..... 295,721

Allot box. Blacki

Bracket. Lee Toilet brack
 Brick and tile kiln, W. A. Eudaly.................... $295,745,871$
Brick and tile machine. A. Horrocks....... 25969

Brick machine, P. H. Kells........ | Bridle and halter combined, H. Rorebeck.......... .. 295,558 |
| :--- |
| Broom band, J. Smith......................... ... 295,685 | Buckle, F. Armstrong



Button, P. Kalish..............
Button fastener, M. H. McNair
utton fastener, W. H. Wood 295,714
295,584
295969
295,775 Button fastener, M. H. M cNair..... .. .............. 295,575
Button fastener, W. H. Wood. .................. 295,709
Button fastener staples, implement for setting Button fastener staples, implement for setting,
J. H. Goodfellow........................
 abinet maker's clamp, w. E. Sheldon, Jr.........
Camera. See Photographic camera. Solar
Cane and cigar case, combined, D. Lee. Jr.........
Capstan bars, etc., rack for holding, Foster \& Han-295,654
Car coupling, F. K. Adams...
Car coupling. N. P. Cowell..Car coupling, Duffy \& McIvor........................ 295,860
Car coupling. Huber \& Barnhart............... 295,763
Car coupling, . D. Lee .................. 295,773
Car coupling, L. E. Sloan......
Car coupling, G. W. Smith...
Car coupling, W. H. Ward....Car cupupling, H. B. Williams.
Car, safety railway, E. Henn.
Car wheel, Melvin \& Clute................................
ars from one track to another, mechanism fo${ }^{295,535}$
Carpet stretcher. W. A. Ski
Carrier. See Cash carrier.
Cash carrier for stores,
hain link, ornamental, S. L. Le
Chandelier, extension slide,Chimney cowl, E. R. StaschChurn, W. H. Dyerhurn, A. Jackson.........
Clasp. See Rope or line clasp.
law bar, W. II. Lyman.......Cleaning textile fabrics. wooden and metallic sufaces, etc., composition for, F. S.Monroe sur295,571
295,538
Clock, alarm, J. Ganss...............................
Clocks, electric alarm for spring, E. Jungerman. ..... 

Clutch guard, D. Tilton.
Clutch guard, D. Tilton.................. .
Collar or tie readjuster, W. W. Deniston.
Colors, machine for sifting Colors, machine for sifting. J. C. Matte Converter employed in the manufacfur. 295,544 , and steel, T. Griffiths.. Conveyer. screw, F. C. Calting machine, F. J. Nuttin Corn from the cob, machine for cutting green, $D$ Corn in the cob, machine for cutting, S. F. Savits. Cot. folding, W. H. Wooldridge.. Coupling. See Car coupling. Electric wire coupling. Whiffetree couplin
Cultivator, B. C. Bradley...... cultivator, Long \& McBeth Cyltivator, J. Woolridge.
Dental vulcanizer, F. W. Seabury.... .............
Doors, hanging, c...................
Dredge. R R. Osgood............. Dredge. R R. Osgood.
Drill. See Ratchet drill. Rock drill. Egg holder, W. Kearney............... Electric implement, A. H. Kinder.
 hausen............................ . ........ ...... J. McTighe..
Electric machin

Boothby
Electric wire coupling, G. L. Kitso
Electrode or element, battery, E. T. Starr
Elevator safety stop, E. Saunders.
Engine. See Gas engine. Rotary engine. Steam.
Engraving machine, I. R. Beam.
Envelope, E. J. Trum
Fare register; H. Marshall.
Faucet screw, M. O'Connor
Feed water heater, B. Webster
ence stretcher and splicer, wire, J. E. Pierce...
wills.........................
Fire alarm, electric, J. Hill.
Fire arm magazine, Lee \& Diss.
Fire arm, magazine, J. Leemann
Fire escape, V. . . Blanchard...
Fire escape. L. J. Gott . .
Fire escape, A.. W. Lozier
Floor mat, S. Tofler
Folding table, W. W.
Tolding table, W. W. Quigley
Fruit and vegetable washer, J. Baker.
Fruit, vegetable, and meat can, J. Baker...........
Furnace. See Puddling furnace. Reverberatory ore furnace.
Galvanic battery
Galvanic battery cell Pabst Gage. See splitting gage. J. J. Shedlock.
 J. L. ..stewart....................
Gate. See End gate. Railway gate Gate, N. B. Huffman
Gate, H. H. Locklin
Gate, E. D. Rathbun.
Gearing for changing speed, S. N. Gallup Glass cutting apparatus, W. H. Walker Grain and fertilizer distributing apparatus, A.
Grain binder, J. H. Anderson.
Grain drier. R. S. Jennings.
Grater, nutmee, , J. J. Church
Grinding mill, H. Hungerford
Griard. See Clutch guard.
Hanger. See Shafting hanger.
Hangers to ceilings, implement for attaching, $P$.
Lorillard. Jr.... ....
Harness, G. H. Ingalls.
Harrow or soll pulverizer, J. Schindle
Harvester, S. D. Locke
Harvester, S. D. Locke.
Harvester cutting apparatus, E. D. Roth
Hasp lock, D. .
Hat lock. D. smith..
Hat shaping machine, J. R. Kelsey
Heater. See Feed water heater.
Hepaparatus and drying rack, combined,
R. Moore.....................
Hinge, brace, A. W. Sangster.

Hinge, duplex brace. A. W. Sangster
Hoisting and conveying apparatus, M. W......cke.
Hoisting and conveying machine, A. E. Brown Hoisting gear, J. IL Booth.

| Golder. See Bouquet and ticket holder. Egg |  |
| :---: | :---: |
|  |  |

holder. Tag or label
Hominy mill, T. Hudnut.
Hook. See Snap hook.
Hoop nailing machine, A. C. Batcheller
Horseshoe. M. Caspari.
Horseshoe, G. A. Dean.
Hot air furnace regulator, electric, F. M. Sparro
Hydrant. B. C. Vanduzen

## lee plows. inserted tooth fastening for, J. G. Bo denstein .. ..........................

nuling apparatus, automatic registering. Jones
Ink stand or r
kiln. See Brick and
Knobs, handie for dial lock. Lumber kiln.
Lamp. double carbon arc Bohman
Lamp. electric. W. Morava...


|  | Paper folding machines, tension device for tape of, J. H. Stonemetz. |
| :---: | :---: |
|  |  |


Parachinanisol, manufacture of
Parer, fruit, Keigwin \& Talley
Pencil pointing device, H. G. Schr
Photographic camera, A. Herzog.
Photographic pictures, printing and mounting,
D. Terreforte.................................
Piano forte stringing device, J. R. Lomas.
 Planter, hand seed, A. Hoag.
Planter, potato, J. P. Wick.
Planter, seed. W. L. Hutson
Plow, Wiard \& Bullock.....
Plow, sulky, S. W. Barr....
Plow sulky, W. McNary...
Pool rack, H. W. Collender
Power, device for transmitting, ...................
Precious metals from ores, extracting, E. Russell..................
Press board finishing machine, F. L. Case........
Printing plates, making lithographic, P. C. Mölle
Pro
 Puddling furnace, rotary, J. Glall, J................
Puddling furnaces, water joint for rotary, Gri \& Hall, Jr

## Pulley, O. R. Olsen.

Pulley, Waterous \& Peel.

Pulverizing machine, L. S. Ch
Pump, L. G. Careaga y Saenz
Pump, air, G. Ross ........ ....... .....
Pump, hollow piston, J. F. Hess et al. P'ump, rotary, F. S. Troutm
Pumps, valve gear for hydraulic, G. W. Dickie. Radiator, steam, E. T. Weymouth. Railway crossing, D. Lippy Railway gate, L. C. Walsh. Rohrer.. Rat trap for buildings. T. M.
Ratehet drill, J. H. Vinton Ratchet wrench, A. E. Osb
Razor strop. J. R. Torrey... Register. See Counting register. Fare registe Reverberatory ore furnace, G. W. Jone Rock, drill, Coe \& Hofnagle
Rock drill, H. C. Sergeant..................................
Rolling threads on metal, machine for, Wilson \&
Haskins............................... Ronfing composition, w. White.
Rope or line clasp, A. L. Pitney Rotary engine, J. T. Davis. Rubber waste for the recovery of the rubber or
caoutchouc therefrom, treating fibrous O. Bourn.,................
Saddle board, J. A. Wilson.. saddle, riding, w. 'razier.: addje tree, harness, L. A. Ringwalt ash fastener. S. Farquhar
Saw guide, T. J. Neacy ......
Saw mill, D. F. \& J. T. Milne
Saw mill head block, Martin \& Metcal w tooth, R. W. Kellen
scaffolding attachment. J. T. O'Brien scaffolding, interior and exterior, J. T. O'Brien........... Scale, coin and letter, C. Richtmann
Scale pan. folding, W. Maguire cale pan. folding, W. Maguire crew jack, A. R. T. Tiffany crew, wood, G. A. Stiles. Seal ock, A. B. Barnard...




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on Directacting Underground Steam Pumping Ma.
chin
 Leather,
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