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WILLIAM BAXTER AND HIS INVENTIONs. $\quad$ of Señor Montez, about 20 aquare leagues in extent, and of the Sierra Madre mountains, where the gorges were 300 William Baxter is the son of Gtorge Baxter, a Scotch en- which also furnished power for mills. In all he erected in to 400 feet in width, in which ran torrents, often rising 60 gineer, who, in the year 1805, emigrated to America with his Mexico some fifteen different works. The dams at Belen feet in a few hours during heavy rains. It was prophesied
family, settled near Morristown, N.J., and in that locality constructed two of the first cot'on mills built in this country.
The subject of this eketch, the young. est son, was born November 22, 1822, and is, therefore, now 51 years of age. When a boy he was placed at work in his father's factory, thus inheriting and acfather's factory, thus inheriting and ac-
quiring mechanical taste and skill in no small degree. Even when quite a cbild, he made severalingenious improvements in his fatber's machinery, and at the age of 12 he was placed in the machine shop of Alexander Paul, of Paterson, where he workt upon the first locomotive ever b silt in that city. He soon after went with Stephen Vail, of Morristown, and was one of the assistants of Professor Morse in bringing out the magnetic telegraph, helping to put it in operation for the sending of the first message. Returning to Paterson, he remained in that city from 1840 to 1846, superintending the erection of machinery and making many inventions and improvements. Meanwhile he was an extensive reader and a hard student, becoming familiar wichal mec Fril the French and Spanish languages. His reputation extended, and he became fa-
vorably known as a designer and constructor. He was engaged for some time with the Newark Machine Company, Newark, N. J, where he made the plea. sant and profitable acquaintance oí Seth Boyden.

In 1851 he was called to Mexico, to erect an extensive cotton factory. For ten years Mr. Baxter was engaged in that country, in works of great magnitude, anong which may be mentioned a cotton factory at Talamantes, another near Penyon Blanco (an Indian pass), where he built up a new town in the desert, naming it Belen, which, in English, is Bethle ${ }^{1}$


WILLIAM BAXTER,
place, and a large number of extensive mining works at and Santa Catarina were very dificult jobs of engineering, rations and even titles, and was urged by the State Chihu Parral and other places. At Santa Catarina, he constructed all previous attempts to hold the water at those places hav- ahua to establish and take the presidency of a college of a reservoir or artificial lake for the irrigation of the hacienda ing been failures- They were built across cañons at the foot arts and sciences, on the plan "of the Cornell University

which he declined to do on account of the diaturbed state of the goveroment at that time. He was frequently furnished with officiel passes by both the governments of Maximilian and the Repablic, of which the following is a specimen, and shows the high regard in which he was held by all parties, he being strictly neutral in all their struggles:

- By the President of the Republic of Mexico.
" To all the Authorities, both Military and Civil, wherever thi may be presented:
The bearer of this, Don Guillermo Baxter, an American engineer, is passing through the country on his own private business, and you are hereby commanded to give him whatever protection and assistance he may require, and a military escort when he shall demand the same, Señor Baxter being worthy of the most distinguished consideration.

Benito Juarez."
On his return home, in 1867, he traveled from Durango to the city of Mexico with the President and Cabinet, under the protection of their military escort, making extensive exami. nations of the mining districts through which they passed.

Since that time, Mr. Baxter has been constantly at work on one mechanical problem after another. On his way home to the States, more as a diversion tban otherwise, he whittled out of a piece of pine a model of what is known as "the Baxter adjustable $S$ wrench," which, by means of its peculiar shape, enables the workman to reach parts of complicated machinery previously inaccessible. This indispensable little tool is to be found in factories and workshops in every part of the world. It is manufactured at Birmingham, Conn.

Having established his residence at Newark, N. J., Mr.


Barter turned his attention to the invention of a small, com. pact, portable, safe, and economical steam power, which should be so easg to manage as to warrant its introduction for all uses among the people. This resulted in bringing out, in the year 1868, the now widely known and justly celebrated Baxter engine. Already thousands of these engines are in uee in all parts of the country, and many have been and are being sent to foreign lands. They are manufactured by the Colt Fire Arms Company, Hartford, Conn., on the inter changeable principle, each piece being made in duplicate, which is the first instance of this feature in the manufacture of such machinery.
In these matters, Mr. Baxter has received most valuable aid and assistance from Mr. Willian D. Rassell, President of the Barter Steam Engine Company.
Mr. Barter's next work was the invention of a steam street car, which is attracting great attention, and can hardly fail to be one of the first to come inte extensive if not general use, as soon as the prejudice against the application of steam to that purpose shall have been overcome. These cars are built at the celebrated Remington Works, Ilion, N. Y.
His last triumph is the succesoful introduction of steam in canal navigation, a problem which had previously baffed all the engineering talent which had been applied to it. It had long bsen considered impossible; but the State of New York, having offered a large reward for its solution, a great number of competitors came forward, and Mr. Baxter has just been awarded the first prize. The difficulty has never been the mere use of steam for propelling boats on canals, but to compete with horse power in economy, and thus to cheapen traneportation. The official record of the trial trip gives credit to the Baxter boat for a speed of 3.09 miles per hour, upon a consumption of $14{ }_{10} 820 \mathrm{lbs}$. coal per mile, carrying a load of more than 200 tuns in addition to her machinery and fuel, which may bo condensed as follows: One tun of freight, sixty miles, at a cost of one cent for coal; or, in other words, it is carrying freight at twice the apeed and half the cost of the horse boats. It was estimated by the Commissieners of A ward that this result would effect a saring of $\$ 4,000,000$ per annum on the Erie canal alone, and it is calculated that, when the aystem shall have been generally introduced, the yearly saving on all the canals of the country will not fall short of $\$ 10,000,000$; it will also double the capacity of all canals, being a complete solution of the problem of cheap traneportation, enhancing the value of every acre of land in the West, but being no greater boon to the producer than to the consumer, inasmuch as it will reduse the cost of bread on the sea board, while enhancing the price of wheat in the Western granaries.

It would be difflcult to overestimate the value, to the community and to the world, of such lives as Mr. Baxter's. The fame such men achieve is rarely commensurate with their doserts. Soldiers, statesmen, orators, authors, artists, all are likely to stand more conspicuously forth before their fellow men, but impelled by his imperative instincts, the mechani cal inventor calls to his aid, and into exercise and active use, executive and financial ability; he inspires men to the estab lishment of new industries, and the employment of thousand of hands; he gives work to both capital and labor, and is the leading force of civilization. No better example can be given of the truth of this assertion than reference to the army of men employed in various capacities upon the inventions of Mr. Baxter, and the number of skilled mechanics required not only in the manufacture, but in their operation. The portable engine, the street car, and the steam canal boat, all require engineers, and it is not impossible that a hundred thousand young men will, by the influence of these inveu tions, acquire the necessary knowledge and be lifted to a higher level than they now occupy.
It is not likely that Mr. Baxter will now rest upon his laurels; he is just in the prime of life and in vigorous health and it is far more probable that, under the impulse of his wider experience, and the stimulus of constantly increasing reputation, his active brain will be at work upon new and jerhaps greater problems.

## Srientific Ammerican.

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A short time ago there was discovered in Teras a ince of diminutive grangers who had solved the transportation problem by the simple and sensible plan of raising all th grain required for their commanities, each for itself and at its own doors, and letting other communities do the same of go hungry. They were ants, clever little fellows, whose agricultural operations were carried on with the utmost system and success, and who were thought to be the only crea tures not human who had arrived at so high a stage of civilization. Other harvesting ants collect the chance productions of the fields or trust to the husbandry of man for their supplies of grain; but these are independent farmers, who urround their colonies with grain land, which they keep lear of useless growths by nipping in the bud every plan oxcept the rice grans whose seeds they intend to gather for their winter store, thus giving evidence of no amall degree
of calculation and forethought, as well as industrial eco. omy.
But it appeare that they are not alonoin this sort of thing, and that their operations are slight and.simple compared with those of the accadome of Central America, better known as leaf cutting ants. These leaf catters have long been notorious as the most destructive of all the insect pests of tropica
ocalities suffering eapecially from their ravages. Indeed, multitudes of plantations of orange, mango, and lemon trees have been stripped and destroyed by them, so that in many parts this otherwise profitable industry has had to be given pentirely.
Their nests generally consist of a cluster of low mounds, pierced by tunnels, from half an inch to six or eight inches in diameter, and situated in a little clesring made by killing the shrubbery through the persistent biting off of buds and eaves, evidently to secure sunshine and a free circulation of air. Leading out from these mounds are well marked paths, it may be half a mile long and several inches wide, throngad like the streets of a great city with busy workers bringing in leafy burdens or hurrying outward for a load. As far as he eye can distinguish their tiny forms, says a recent ob erver, troops and troops of leaves are seen moving up to ward the central point, and disappearing down the tunneled passages. The out-going, empty handed hosts are partly concealed among the bulky burdens of the incomers, and can be distinguished only by looking closely. "The ceaseless, toiling hosts impress one with their power, and one asks: What forest can stand before such invaders? How is it that vegetation is not eaten off the face of the earth? Surely nowhere but in the tropics, where the recuperative powers of Nature are immense and ever active, could such devasta tions be withstood."
But wonderful as the operations of these leaf cutters are in the open air, they are as nothing to those that go on under ground. Hitherto the use made of the leaves gathered in such immense quantities has been a mystery. Some have thought they must be used directly as food: others, that they were employed in roofing the ants' underground chambers; but no one suspected their real use until the secret was disclosed to the observer already quoted, Mr. Thomas Belt, in the course of certain mining operations which he was superintending in Nicaragua.
On two occasions, earth cuttings were made from below up through very large neats of these ants, in such a way as to lay heir operations clearly open to observation. The tunneled passages were found to lead to numerous connected chambers about the size of a mar's head, usually three fourths filled with a flocculent mass of light and loosely connected bits of leaves, withered to a brown color and overgrown with minute white fungus. Mixsd with this substance were numbers of ant nurses with pupæ and larva.
By numerous observations, which be describes at length, Mr. Belt became convinced that this fungus growth was the real food of the ants; and all of their outside operations were tributary to its cultivation! In other words the leaves are collected, as human farmers collected marl and guano, for indirect use as fertilizers. The ants do not confine them selves to leaves, but take any vegetable substance suitable for growing the fungus on. Nor do they take leaves indiscriminately, gra 3s, for examople, being always rejected: and when any ant,more stupid or less experienced than ordinary, makes the mistake of carrying in unsuitable leaves, they are promptly brought out and thrown away. Great care is also taken in regard to the condition of the leaves carried into the chambers. In case a sudden shower comes on, the wet pieces are deposited outside, to be picked up and taken in when nearly dry, should the weather clear up promptly when spoiled by too much rain, they are left to rot on the ground. On the other hand, in very dry and hot weather, when the leaves would wither on the way to the nest, the ants wait until sundown before going out, or do their gathering wholly in the night.
When a community migrates, the fresh fungus growths are carefally transported to the new burrows in the jaws of the middle sized workers, the larger members of the community acting only as directors of the march or defenders of the rest in case the column is attacked. The nurses already mentioned are the smallest of all, and their duties lie wholly underground, in cutting up the leaves and attending to the young ants. They never carry leaves, but may sometimes be seen ranning out along the paths with the otherf, apparently for the fun of the thing; for instead of belping the rest, they perch themselves on the pieces that are being brought in, and so, like petted children, get a ride home
As might be expected with creatures who have developed so complicated a system of industrial economy, these ants are extremely clever. A single illustration will suffice to how their practical good sense. To drive off a colony which had established themselves in his garden, Mr. Belt gave heir nest a aoaking with carbolic acid and water. The effec was all that could have been desired. The marauding parties were at once withdrawn from the garden to meet the danger at home; the whole formicarium was disorganized; and big fellows came stalking up to repel the supposed invader, only to descend again in the utmost perplexity. By the next morning a new nest had been established, some yards distant, and the survivors were busy carrying thit supplies thither. It happened that between the two stations here was a steep slope. Instead of descending this with heir burdens, the ants cast them down at the top, whence hey rolled to the bottom, where another relay of laborers icked them up and carried them to the new burrow. It was amusing, says Mr. Belt, to watch the ants hurrying out with bundles of food, dropping them over the slope, then rushing back immediately for more. Is it possible to attribute such a sensible, and at the same time exceptional, division of labor to anything radically different from human intelligence?

Granite and macadam are to be banished from the city of London, the Streets Committee having determined to lay down in future nothing but asphalt or wood

## a model transatlantic steamer

We have heard it asserted that there is acarcely a steamer crossing the Atlantic that could not be sunk by a fow blows from a heavy sledge. We have received ample evidence, in recent ocean disasters, that the action of the waves alone may strain a modern vessel so that she is considered unseaworthy by a modern captain. Such matters are of graveinterest to the traveling public, and they may be glad to know that it is possible to build vessels that will be able to withstand much more severe usage. In the early days of iron shipbuilding, it was pointed out, by the best authorities, that the way to make a vessel safe and strong was to build it with a double skin, making, as it were, a ship within a ship. One of the most noted vessels of modern times, the Great Eastern, was constructed in this manner, and our readers may remember that she ran aground in New York harbor, tearing a hole in her outer skin something more than eighty feet long, and that it was not even necessary to dock the vessel to repair the damage. Of course, a vessel built in this manner is much more expensive than one of the ordinary construction, and it is scarcely necessary to remark that very few examples of this kind are to be found in the mercantile marine. Sieamship owners and the traveling community seem in general to have opposing interests, the former desiring to build and run vessels as cheaply as possible, while the lattor are more interested in the strength of the ship and the efficiency of the officers. It is with great pleasure, then, that we call the attention of our readers to an exceptional case, that of a company which seems disposed to use the best vessels that can bo built, regardless of
cost. We refer to the company operating the Red Star line of steamers,formerly ruuning from Philadelphia to Antwerp, which have recently changed their place of sailing to this port. Ouly three vessels of this line, the Nederland, the Vaterland, and the Switz $\mathrm{S}^{2}$ land, are as yet completed, but several others are in course of construction. Our readers may remember that not long ago the Nederland ran ashore on the New Jersey coast, in making what appeared to be an effort to reach Philadelphia overland, and that, after having been aground for about two days and exposed to a pretty severe storm, she was floated again and taken to Philadelphia, ap parently uninjured. We need scarcely remark that not every steamer crossing the Atlantic could be expected to behave $a_{3}$ well under such circumstances. The Switzerland, the as well under such circumstances. The Switzerland, the
other vessel belonging to this line, reached New York on othar vessel belonging to this line, reached New York on
the 8 in instant, this being her first voyage. She is 350 feet the 8 h instant, this being her first voyage. She is 350 feet long, 40 feet beam, has 33 feet depth of hold, and is of about
2,800 tuns burden. The vessel is divided by bulkleadsinto 2,800 tuns burden. Tine vessel is divided by bulkleadsinto
6 watertight compartments. Each bulkhead is composed of two thicknesses of plate, with a space between, the plates being strongly stayed together. The ship has a double skin, the distance between the outer and inner skins being between 18 and 20 inches, the main and berth decks being built double, in the same manner. The main deck is covered with heavy planks, and the inner skin of the vessel is abeathed with wood. These compartments between the skins are fitted with good sized pumps which can be worked either by haud or by engines on the upper deck. The steam puinps in the engine room are unusually large for a vessel of this size, and it would seem as if nearly every safeguard that could de required, in case of a ieak, was provided in the present instance. The door of each watgrtight compartment can be closed from the upper deck, by means of a screw.
The Switzerland has a compound engine, the length of stroke being 48 inches, and the diameters of the two cylinders, 40 and 80 inches. There are accommodations for 160 first class passengers, and for about 900 in the steerage.
Wishout going very fully into details, we trust that have shown that the vessel under consideration is one of the most substantial crafts that can be built, and offers security to passengers that cannot be guaranteed in the case of the ocean steamer as ordinarily constructed. Our readers may rest assured, also, that, when ocean travelers demand such safeguards to be provided on all lines, they will be forthcoming, and not before.

## LEFT HAND WRITING.

A correspondent asks for the best way of holding the pen in writing with the left hand, and the best angle ot slope for the letters. No absolute answer can bo given in either case. Hands differ, and what would be an easy position of pen for one person might be a very awkward one for another. Each writer must by governed by the necessities of his individual case, to be discovered 1ather by thoughtful observation of
his own writing than by the study of rules. It is enough to say that the ideal position figured on the covers of copy books can be maintained but for short periods without excessive fatigue, and only by persons having slender hands. It answers well enough for writing as a fine art, but is altogether too stiff and tiresome when much offhand writing is to be done. What is true for the right hand is equally true for the lelt. A good deal depends, too, on the mode of writing, whether the motion is a wrist stroke or a finger stroke or a ombination of the two.
Equal freedom must be allowed in regard to the angle or slope of the writing, prevising simply that the greater the departure from the perpendicular the greater the danger of illegibility; while a slight slope to right or left adds much to the gracefulness of the script without making it perceptibly less easy to read.
In writing with the left hand, the easiest position would seem to be with the body square before the table, the arm making an angle of about forty. five degrees with the front line of the table, the line of writing being at right angles with the direction of the arm. In this porition the writing is naturally " back hand," about twenty degrees from perpendicu.
lar. To the present writer, whose left hand practice began
rather late in life, in consequence of an accident which threat. ened the disabling of the right hand, it is much the easiast way, in left hand writing, to hold the pen reporter-fashion between the first and second fingers, as in this position the pen is held steady with the least effort, and is not so likely to wander from a uniform slope. It is well, however, to accustom one's self to a variety of positions, especially when much writing has to be done, since, by changing the posture, the labor of writing may be thrown on different sets of muscles, and rest obtained without ceasing to write.
One of the clearest and most graceful left hand writers of our acquaintance writes a style that cannot be distinguished, save in a slight peculiarity in shading, from normal right hand penmanship. To one watching the process, the writing appears to be done upside down. The pen is held between the thumb and forefinger in the regular way; but the paper is placed so that the line of writing is perpendicular to the front of the body, the direction of the writing being toward the body. It seems most natural, however, for the writing o slope to the left when the left hand is employed.
There is a special advantage in using the left hand to write with, and one that we have never seen commended. The hand is never in the way of vision. The pen point is always n plain sight, and so is the paper to be written on. There is, consequently, no inducement to stoop forward or to turn the head so as to throw the eyes out of focus. It is a common fault with those who write much that the left eye has a shorter range than the right. It is overworked and compelled to adapt itself to nearer vision. In writing with the eft hand, these evils are avoided. An upright posture is the easiest, and the eyes are equally distant from the paper.

## RUBBER AB A DEFENSIVE ARMOR.

We have before us a petition for the relief of Jonathan L. Jones, recently submilted to Congress, in which the memorialist prefers a claim against the United States for the sum of $\$ 500,000$ for compensation for the use of his paten dated April 15, 1862, for improved defensive armor upon the gunboats Essex, Choctaw, and Lafayette, in their oderations against Vicksburgh and the Confederate batteries on the Mississippi river during the late war. This rmor was composed of one inch of iron plaing, backed by one inch of vulcanized india abber and twenty three inches of solid timber, covering the portions of the hulle abreast the boilers, the forward and after casematen, and the pilot houses. Thus protected, the boats went repeatedly into action, passing Vicksburgh, destroying the ram Arkansas, and participating in other engagements, during the course of which they were struck, it is alleged, by heavy projectiles, an aggre gate of 276 times without the same penerating that portion of the armor constructed on the mernorialiss's plan. Shot, it is admit. tad, passed into the vessels at various times, but never through the parts protected by the armor. A host of letters attidavits, etc., are submitted in corroboration of the assertions advanced; and with the apparently plain
claim nicely made out, Mr. Jones gots in for claim nicely made out, Mr. Jones gots in for
the above mentioned grab. It forcibly reminds us of the efforts of the claimant in the famous Tichborne case.
On
On the 3rd of October, 1863, Mr. Jones' own target, made materials furnished by himself, consisting of four one thick, backed by twenty inches of solid oak, was set ap agaicst thick, backed by twenty inches of solid oak, was set ap agairst
a clay bank in the Washington Navy Yard. The first four inches of the shield nearest the timber were composed of alternate layers of rubber and iron; and the two sheats of one inch rubber and two one inch wrought iron plates were added, the latter being on the outside of the target. The first shot, weighing 169 lbs., was fired from a 11 inch gun at 84 feet distance. It went entirely through plates, rubber, and timbor, and penetrated the bank a distance of 12 feet. Diameter of shot hole, $11 \frac{1}{\frac{1}{2}}$ inches. On the 6 th of October, the target was placed at an angle of $45^{\circ}$ to the line of fire, and a similar shot fired at it. The ball again penetrated everything and ontered 6 feet into the clay bank. The holes made by the shot are shown in the annexed engraving, made from the target at the time and published in the Screntific american. In order fully to prove the inefficiency of Mr. Jones' shiold, another target was made, of simply 4 one inch iron plates, backed by 20 inches of aolid oak, for com. parison, to indicate the effect of the rubber. The first shot fired under similar circumstances to the above went through and penstrated the bank 5 feet. The second projectile, at an angle of $45^{\circ}$, broke in pieces and glanced off, leaving a frag ment in the plating. If the members of the committee to whom Mr. Jones' claim has been relegated desire farther evidence, we would refer them to the files of the Ordnance Bureau in the Navy Department, as to the detailed account of the tests conducted upon targets Nos. 45 and 46 in the Pencote battery. Further, a year before Mr. Jones produced the above mentioned shield, which failed so conspicuously, a Mr. Bennett, of Now York, furnished a rubber plate one inch thick, for target No. 10 in the eame seriss of experiments, and this also was repeatedly penetrated, ascording to the official report "the same as by previoue shots fired at other targets made in the usual way without rubber." Target No. 18 was made of two thicknesses of 7 inches of yellow iron plates backed by $1 \frac{1}{4}$ inches of rubber,
running lengthwise the shield. The shot tore through the plating and rubber as before and penetrated the bank for 17 feet. Target No. 21 had two inches of rubber between two one inch iron plates and 7 inches of pine, with beams as before. This was pierced with equal facility by two shots. Target No. 37 was faced with 4 one inch rubber plates and backed with $4 \frac{1}{2}$ inches of scrap iron and 20 inches of oak. All the rabber was forced off. Trials at similar targets without the rubber proved the latter to be of no value.
It would be idle for us to proceed further in disproving Mr. Jones' assertions. Leaving out the above experiments altogether, it is a very simple matter to show that even theoretically the inventor's ideas are false. Rubber alone in the form of plates or blocks opposes a resistance to projectiles of about fifty per cent of that of oak. The balls go hrough it almost as if it were tallow. Now when it is conceded that the shot easily penetrated targets unprovided with the material, it is palpably absurd to suppose that the addition of a substance so easily pierced would add materially to the general resisting power.
T'hat there is any truth in the "philosophy" of the results said to havetaken place, namely, that the rubber causer a diffusion of the force through its elasticity, we cannot for a momentadmit. As in the converse case of shooting a tallow candle through a door, no time is afforded in the passage of he shot through the single inch of iron for its force to act and react before the penetration is effected.
How Commodore Porter could have been ignorant of the experiments which proved the inefficiency of the rubber, we fail to understand; nor can we reconcile the letters of the olticers in its favor in any other manner than by supposing that the results ascribed to the armor must have been due to other causes, a fact which we think would have been ap parent had the gentlemen considered the subject in the light of the simplest mechanical laws.
In justice to Mr. Jones, however, it may be added that alhough his shield could not have repelled the shot, it never theless may have served some useful purpose, as the crews ,

of the vessels evidently believed in it; and hence, going into action with a greater confidence in their safety, they perhara performed better work. This, however, is hardly worth $\$ 500,000$ to the people.

## PHOTOGRAPHY AT THE BOTTOM OF THE SEA

Dr. Neumayer has recently exhibited before the Berlin Geographical Society a photographic apparatus designed for the determination of the temperatare and of the currents at great depths in the ocean.
The invention is composed of a copper box, hernetically sealed and furnished with an extorior appendir made like a rudder. In the interior is a mercury thermometer and a compass, each enclosed in a glass receptacle in which are admitted treoes of nitrogen gas. 1 small eloctric battary completes the apparatus. When the latter is allowed to descond attached to a sounding line, the action of the current on ite rudder causes it to assume a parallel direction, thus indica ting the set of the flow by the rolative position of compass, needle, and rudder. The thermometer of course shows the surrounding temperature. In order to fix these indications, a piece of photographic paper is suitably disposed near the glass cases containing the instraments. Then at the proper time a current of electricity is established through the gas in the receptacles, causing an intense violet light, capable of acting chemically upon the paper for a sufficient length of time to allow of the photography thereon of the shadows of he compass needle and of the mercury column. Within three minutes, it is said, the operation is complete, when toe apparatus is hoisted and the paper removed.
an American River Nile. -The valley of the Rio Grande del Norte, in New Mexico, recalls the features of the Egyptian Nile. A large population is entirely dependent upon the river. An annual rise of the waters carries a muddy sediment, superior in fertilizing properties, as was proved by analyais, to that of the great African river. While the amount of phosphoric acid is nearly the same, the amount of potash is considerably bigher. Thousands of acres are lying idle along the valley of the atream, awaiting the onter-

## fattening chiceens by hachinery.

It seems to be generally admitted by gourmands that no chickens of mechanical fattening have such exquisite flavor as those submitted to the process. In the Gardens of Acclimatation at Paris, this is very scientifically practised under the direction of M. Odile Martin. "Its adrantages," say the authorities, "do not consist in the rapidity of the process alone, but above all in the special quality of the meat thas produced. It is solid, very tender, exceedingly fine grained, not overfat (which would not be an advantage), very white in. color, and of a flavor quite exceptionally excel lent."
If this is so, of course there is no help for the chickens. They must perforce enter their épinettes, and be mathemati cally crammed. Behold here the ingenious contrivance of the Gardens of Acclimatation for manufacturing this "exceptionally excellent" flavor!
It is a huge cylinder with fourteen faces, each in five stories of three compartments each. It holds, there fore, 210 fowls. The cylinder is hollow and empty, except for the axis on which it turns. This hollow con except for theaxis on which renders it easily ventilated and kept clean. Before it is a box for the operator. This box, or carriage, moves up and down by pulleys. The gaveurthat sounds less offensive than crammer-operates thus : Commencing at the bottom of one of these fourteen faces, he seizes with the left hand the neck of the chicken; and pressing on each side of the beak, the bird is forced to open its mouth, as any lady knows who has doctored a sick cbicken or canary. The gaveur then introduces the metallic end of the rubber tube into the throat of the chicken, and by a pressure of the foot on a pedal the food rises, and at the same time the amount passing through the tube is indicated on a dia in front of the operator. It is therefore a akillful ope ration ; for the gaveur; whatever other motions are ne ceseary, must pay strict attention to the needle on the dial, or he will give his chicken too much or too little. The three chickens duly fed, he turns the cylinder on its axis a little, and the next face of it is before him. When he has completed the round he tarns the crank, and the carriage rises to the next story; and so he goes on to the top. Having completed the upper circuit, every chicken in that épinette is duly fed. Then he turas the crank in the other direction, and the carriage doscends to the floor, where it rests on a railroad. It is then mored along before the next epinette, and the whole operation on 210 more chickens is repeated. A skillful operator will gave, or crant, 400 chickens in an hour! That is less than nine seconds to each one; for the time to move the cylinder, to move the carriage up, down, and to the next épinette, must be counted out.
Under this épinette régime, it requires an average of fil teen days to fatten a duck, eighteen for a chicken, twenty for a goose, and twenty-ive for a turkey. The food used for chickens is barley and corn meal mixed with milk into a dough so thin that no other liquid is necessary. The ordinary quantity given is from ten to twenty centiliters, or from seven tenths to one and four tenths of a gill each time; but this quantity is reached gradually. When the maxi mum that any chicken can assimilate is found, the number indicating this quantity is placed before its compartment, and the gaveur must measure it exactly on the dial.
Truly this is an age of wonders. What a labor-saving invention this épinette must be to the chickens! Maybe it is not wise to give these details. What if some enterprizing American should be thereby tempted to invest his whole fortune in a grand improved antomaton steam power épinette, warranted to feed ten thousand chickens a minute! -Harper's Magazine.

## JUPITER'S SATELLITES.

M. Camille Flammarion, the distinguighed French astronomer, says in La Nature that on March 25 last the planet Jupiter offered in the telescope the curious aspect of being anaccompanied by any of his satellites. The first was con cealed behind the disk. The second and third passed over the face of the planet, accompanied by their shadows, and the ourth was at its greatest elongation and hence far out of fhe field. The appearance of the planet is shown in our

illustration, the diak being divided into parallel zones, the darkest of which extended below the equator for some $20^{\circ}$. above this was a broader and lighter band,and then a white region, terminating at about the 50 th degree of latitude in a gray zone. On the white belt was projected a black opot, No. 1, near which was a second circle, No. 2, of a grayish color. A third point was with difficulty discernible at 3 ,
passing along the upper limit of the gray band. By noting the changes in position of these spots, M. Flammarion reached the conclusion that No. 1 was the shadow of the hird, and No. 2 of the second satellite, both of which were passing orer the planet, and that No. 8 was the third astelite itself. Consequently at the period of observation there must have been upon Jupiter two total simultaneous and ontiguous eclipses of the sun.
The various shades of the spots lead to the determination of some curious and important facts regarding the satellites. The second satellite was evidently more luminous than the third, since it remained invisible on the white zone; while the third was even darker than the gray belt over which it traveled. The latter in fact was hardly brighter than the

fattening Chickens by machinery.
shadow of the second. Stranger still, the shadow of the third was blacker than that of the second. This cannot be ascribed to the $0.5^{\prime \prime}$ difference in size, or to the effect of the penumbra, for the latter is practically nothing; and hence $M$. Flammarion considers it due to retraction produced across an atmosphere enveloping the second satellite. It is well known that in certain eclipses of the moon the refraction produced by the terrestrial atmosphere is so considerable that even the central region of the lunar diak is not totally darkened, and remains red like the entire moon.
The third satellite, ordinarily white, appeared darker, and hence must either have become changed in the physical condition of its atmosphere or else have turned another side. Dawes, Lassell, and Secchi have, however, all distinguished spots on the body; and to the exposition of these, its clouded appearance was probably due. Hence it revolves,but, unlike our moon, in a period different from that of its revolution around the planet.

THE NE PLUS ULTRA NEWSPAPER AND MAGAZIEE FILE.
In the ingenious form of file represented in the annexed

instrument in a very simple manner. It consists of a wooden box, with a top made of tin or sheet iron; the chimney is made of the same material. if. The lens is the same as used upon a camera for making photographs. At the back of Fig. 3. ference to the elevation and plan Figs. 2 and 3) are two doors placed upon hinges.
When the box is in use, the door, $e$, is kept closed. The other door consists of two parts placed at right anpark placed at right an-
gles one another; the object of this is to fill the opening in the door, $e$, while the piotures are being attached to $c$; when $c$ is swung into position opposite, the lens, placed at $b, d$, is carried to one side. If stereoscopic views are to be shown, a slit may be cut,at e, through which they may be inserted without open. ing the box. The door, $e$, should becut off a littleat the bottom so as to admit air. The light is placed at $h$, as nearly opposite the picture as possible. It should be a strong light; opposite the picture as possible. It should be a strong light;
an argand burner is the beat. At the back of the light is a piece of tin, bent into the form of a reflector. The light coming from $h$ strikes $\tilde{c}$, and is reflected through the lens upon the screen. The plan of the box is represented with the top removed. I have given no dimensions, as they will depend upon the focal distance of the lens and hight of the light. Care must be used to have the distance from the lens to 0 , when closed, equal to the foosl distance." -Photo Nets.

Is India, a timber bridge of 205 feet apan has been erected, principally of satinwood.

## Chtrefymuleuct.

## solar attraction and the earth's orbital

## centrifugal force.

To the Exditor of the Scientiflc American:
The accompanying illustration represents an instrumen constructed for the purpose of proving, by actual practical test, that the sun's attractive energy is balanced by the cen trifugal force called forth by the earth's orbital motion round the sun. I desire it to be distinctly underatood, however, that my intention is not to demonstrate what astronomers proved centuries ago, namely, that solar attraction is counteracted by the centrifugal force resulting from the orbital motion of the earth round the luminary. Léon Foucault, in his colebrated experiment of swinging a pendulum from the dome of the Panthéon in Paris, simply intended to furnish ocular proof of the correctness of the assumption that our planet rotates round an axis at right angles to the equator. So with regard to the instru ment under consideration : the object is simply to furnish ocular proof of th correctness of the assumption that the sun's attractive energy is counteracted by the centrifugal force developed by the orbital motion of the earth round the sun. The readeris aware, from pre vious statements in these columns, tha my scheme consists in presenting a high ly polished iron globe, floating on the surface of mercury, to the sun at the moment of rising or setting, the terres trial attraction being then exerted a right angles to the line of solar attrac tion, hence incapatole of interfering with its action. From previous statements the reader is also aware that experiments, conducted with the new instrument t sunrise and sunset, have established the fact that, although a tractive force of a few grains is capable of moving the polished iron globe over the surface of the mercury, yet no movement whateve takes place when it is subjected to the pull exerted by the attraction of the sun as stated. A brief description will suf fice to explain the nature of the instru ment. The illustration represents section through the center of the iron globe and the circular cistern which con tains the mercury. Two spheroidal
cavities, it will be seen, are formed in the globe, the upper cavity being empty while the lower one is filled with a metal of much greater specific gravity than iron, the object being to retain the vertical axis of the floating globe in a fixed position. A movable ring is applied at the upper part of the mercurial cistern, admitting of a free rotary motion while the cistern remains stationary. To the said ring an angular bracket is secured, supporting the central column of a delicate chemical balance. Obviously this arrangement admits of the scale beam being turned in such a direction that it points toward the rising or setting sun, without disturbing the mercurial cistern or its contents. The lower end of the vertical index of the scale beam is connected with the floating iron globe by means of a straight steel wire, as shown in the illustration; this wire extending beyond the vertical axis of the globe, a amall counter weight being applied at the extreme end of the extension in order to relieve the balance from disturbing influence. To prevent dust from lodging on the mercury, a glass shade covers the cistern, resting in a groove at the upper part of the rotating ring, the shade also preventing currents of air from agita ting the sensitive globe during experiments. Sach is the nature of the instrument constructed for comparing the energy of solar attraction and orbital centrifugal force, which Dr. Vander Weyde says he has "disposed of" by his discovery that a " floating object is identical with a lever scale as the liquid balances the floating body," and because (see his communication inserted May 23) he understands the in strument "only too well, so well indeed as to know that even the attraction of the rising and setting moon can never affect such an arrangement." I will not detain the reader by demonstrating the absurdity of mixing up questions con cerning lunar attraction with a question relating solely to the comparative energy of the earth's orbital centrifugal force and solar attraction. I deem it necessary, however, to point out briefly the utter fallacy of Dr. Vander Weyde's stated objections. It requires but a slight acquaintance with dynamics to perceive that his first objection has abso lutely no bearing on the question. Of course, the weigh of the floating iron globe is balanced by the weight of the liquid metal which supports it; but how can the pull exerted by the rising sun on the iron globe be affected by the earth's attraction because the weight of the globe is balanced by the weight of the fluid mass which it displaces? The second objection urged by Dr. Vander Weyde, that my instrument is incapable of showing that solar attraction balances the earth's orbital centrifugal force because the instrument is not affected by the rising and setting moon, scarcely needs refutation. It will sulfice to state that, when the floating iron globe is presented to the rising sun, the mercary which supports the globe remains perfectly level, because the cen trifugal force which acts on the fluid metal exactly balances the sun's attractive energy. But, in presenting the instroment to the rising moon, the unbalanced pull exerted by it
attraction on the mercury will produce an inclination of the surface of the latter in a direction opposite to the satellite. Obviously, that inclination will bring the floating globe under the influence of terrestrial attraction to an extent ex actly balancing the lunar attraction. Having called the reader's attention to Dr. Vander Weyde's objections, it would be inconsistent not to notice the communication from Mr. Hugo Bilgram, published in the Scientific American of May 23, concerning my demonstration on page 291, current volume. Mr. Bilgram says: "Though Captain Ericsson in his communication of March 14 proved to be master of the subject, he evidently overlooked one point." This "over looked" point your correspondent thus adverts to: "Though solar attraction does balance the orbital centrifagal force while the sun is rising, it will not do so three hours after wards." Now, the sole object of my demonstration was to
prove that such is the fact, my figures showing that,althoug
is made, lunar attraction will sensibly affect the equilibrium of the mercury in the cisterns. The relative energy of terestrial and lunar attraction at the earth's surface being in the mean ratio of 320,602 to 1 , a difference of level in the cisterns amounting to 0.000748 of an inch takes place under he stated conditions. Consequently this difference calls for a correction, after the adjustcient at noon, readily effected by tarning one of the micrometric screws through an arc of $8^{\circ}$ 40', the pitch being thirty-two threads per inch. The per ectly level state of the mercury in the cistern of the solar attraction instrument having been established by such ac curate means, the absence of any motion of the floating globe when subjected to the pull of the rising and setting sun furishes positive ocular demos un's attractive energy exerted on the mass of the iron globe is exactly balanced by the centrifugal force resulting from its orbital motion round the laminary. No reflecting ob erver, aware of the actual amount of the solar pull (748 grains), can witness the perfect' repose of the floating iron globe on the level surface of the mercury, a the moment when the sun is rising, with out being impressed with the importance of what he beholds. Again, if he has previously calculated the curvature of the or bit in which the instrument is moving, $h$ can aesert that the velocity of the floating iron globe round the sun must exceed 18 miles per second, in order to develop, by centrifagel force, an energy capable of counteracting the pull which heknows the globe is subjected to while be is watching tr repose on the sarface of the flaid me tal.
J. Ericsson.

## The Planet Mars.

To the Editor of the Brientific American: A few particulars relating to the fu. ture movements of Mars may be of inteest to your readers:
At the present time this planet is badly situated for observation, being nearly at its greatest distance from the earth and but a few degrees east of the sun. The next opposition of Mars will not occar until the 20th of June, 1875. The planet will then be seen near the well known Milk Dipper of Sagittarius. This opposiion will not be a very favorable one, how ever. The low altitude which the planet will attain in our northern latitudes wil
solar attraction exactly balances orbital contrifagal force at sunrise, the energy of solar attraction graduahy overcomes the orbital centrifugal force during the diurnal revolution, until at noon the difference amounts to 00001312 . My demonstration also proved that a weight of 20,000 pounds suf fers a diminution of 0.001546 of a pound during six hours o diarnal rotation, owing to the very cause which Mr. Bil ram asserts that I have overlooked!
Referring to the experiments which have been instituted with my solar attraction instrument, it will be well to ob serve that, although the energy of lunar attraction is prac tically imperceptible, it has been deemed best to conduct the observations when the moon is in the first quarter, its attraction being then exerted at right angles to the line of solar pull. Let us now consider whether the observations have been conducted on a sufficiently large scale to warrant definite conclusions. The weight of the iron globe employed being $181 \cdot 47$ pounds, calculations based on the relative mass of the sun and the earth and other known data show that the pull of the sun amounts to 748 grains. The startling fact that the floating iron globe. while subjected to such a considerable direct horizontal pull, remains stationary, at once suggests the following question: Is the surface of the mercury in the cistern perfectly level in a line pointing east and west,-does not solar attraction raise the surface of the fuid metal at the eastern edge of the cistern, thereby producing an inclined plane which solar energy is incapable of causing the iron globe to mount? This important question the writer has disposed of by the following device: Two pen cisterns containing mercury, connected by a horizontal abe, are placed twenty feet apart on a level stone foundaion. Above the center of each cistern a micrometric mechanism is applied, by means of which the hight of the mercary may be measured with the utmost precision. The wo cisterns with their connecting tube being placed east and west, and time allowed for the mercary to come to a state of perfect equilibrium, the micrometers are adjusted. This adjustment, it should be particularly observed, is made when the sun is in the zenith, at which time its attrac tion evidently cannot disturb the equilibrium of the fluid metal in the connected cisterns. The contact of the micrometers and the mercury is then examined from time to time during the diurnal revolution, the final observation being made when, near sunset, the two cisterns point towards the luminary, at which moment the attractive force, tending to disturb the equilibrium of the fluid metal, is at its maximum. Regarding the result of the observations conducted P. M., it may be briefly stated that, when the micrometers are pro perly adjusted, not the least excess of elevation of the leve of the mercury in the western cistern is produced by sola attraction, at the moment when the attractive energy is ex erted in the direct line of the two cisterns. Persons familia with cosmical questions will say that, in case the sun and with cosmical questions will say that, in case the sun and
moon should be nearly in conjunction when the observation
render it difficult to obtain good views. Moreover, on account of the ellipticity of the orbits of Mars and the earth (especially that of Mars), the planet is much arther from the earth at some oppositions than at others and on this occasion, it will not be as well situated in this respect as is sometimes the case.
At the next following opposition, however, which will take place in the first part of September, 1877, Mars will be very favorably situated for observation. The planet will,on this occasion, arrive nearly at its minimum distance from our globe; and as it will be situated but a fow degrees south of the equinoctial, it will, when on the meridian, be at a con venient altitude for observation in these latitudes.
It happens, in 1877, that Saturn will arrive in opposition to the sun nearly at the same time as Mars. Both planets will be seen, near the time of their opposition, close together, in the constellation Aquarius, near the line which separates hat constellation from Pisces.
At the next opposition, in November, 1879, Mars will not be well situated, but a favorable opposition will occur again in 1892.
At present, the perihelion point of the orbit of Mars is in heliocentric longitude $333^{\circ} 45^{\prime}$, and the aphelion is in heliocentric longitude $153^{\circ} 45^{\prime}$. Mars is therefore most favorably situated when its opposition occurs in the latter part of August, while the most unfavorable oppositions take place in the latter part of February. In the former case the apparent diameter of the planet reaches $23 \cdot 5^{\prime \prime}$, and in the atter case it is only about $13^{\prime \prime}$.
St.Catherine's, Ontario.
J. M. Barr.

Laying Out Rallroad Curves and Gear Wheels. To the Editor of the Scientific American:
In your issue of $\Delta$ pril 11, 1874, I notice an article from the pen of H. C. Parsons, concerning the laying out of railroad curves. Having felt the need of some simple mode for this operation, I discovered the following method, which I find sufficiently correct and easy of application. I append a sketch, the rule for its application, and tables of coefficients with which to ascertain the chords. These tables are calculated especially for laying out gear wheels, by using the angular or chordial pitch instead of the arc; therefore it must always be borne in mind that the pitch mentioned is the chord of the arc.
Rule.-Divide the circleinto a convenient number of equal parts of degrees and: minutes, then use one half of the eame for the changes on the instrament, in establishing points. Then apply rule 2 of my table of coefficients for gears, which will give the chord of the arc of each division of the circle. Ecample: What will be the angle for the instrument and thelength of the chords for a circle of 600 feet radius, divided oto 36 parts of $10^{\circ}$ each? Answer: The angle will be $5^{\circ}$, and the chord of the arc will be 10488 feet.
By this method at least one third of the circle can be laid withort moving the instrument, or the latter can be ehifted
to any point of the circle, whenever any obstructions or ir regularities of the land make it requisite to do so. By dividing the circle into many parts, the chords can be brough down to any desirable length.

table of coefficients.


Rule 1: To find the diameter of a wheel when the pitch and number of the teeth are known: Multiply the coefficients in the table, corresponding to the number of teeth, by the given pitch, in inches and hundredths; the product will be n inches and hundredths.
Rule 2: To find the pitch of a wheel, when the diameter and number of teeth are known: Divide the given diameter by the coefficient in the table corresponding to the number of teeth, and the quotient will be the pitch.
Rale 3: To find the number of reeth in a wheel where the pitch and diameter are known: Divide the given diameter by the given pitch, and the number in the table corresponding to the quotient will be number of teeth.
These tables were computed by two distinct processes, at seven places of decimals, and are warranted not to vary more than $\frac{1}{10}$ of an inch in the diameter of a wheel of 200 teeth and 3 inch pitch.
New Bedford, Mass.
H. C. Crandall.

## Professor Mayer'm Discoverios in Acousticm. -o-A note from the Anthor

## To the Erditor of the Scientific American:

Will you permit meto correct two erroneous statements i the accounts you published of my discoveries in acoustic recently read before the National Academy of Sciences?
Under the heading "The Duration of the Sensation of Sound," for "he concludes that the whole ear vibrates as one mass," etc., read as follows: The following table gives the notes, the number of their vibrations, and the duration of their residual sensations, (the French notation, used by König, is adopted):

| Note | No. of Vibrations. Der second. | Duration of the sound. |
| :---: | :---: | :---: |
| $\mathrm{C}_{1}$ | 64 | $\frac{1}{16} \mathbf{8 e c}$. |
| $\mathrm{C}_{2}$ | 128 | $\frac{1}{26}$ '* |
| $\mathrm{C}_{3}$ | 256 | 就" |
| $\mathrm{G}_{3}$ | 384 | $\frac{19}{60}$ " |
| $\mathrm{C}_{4}$ | 512 | $\frac{1}{16}$ " |
| $\mathrm{E}_{4}$ | 640 | ${ }_{96}{ }^{1}$ |
| $\mathrm{G}_{4}$ | 768 | $\frac{1}{19}{ }^{\prime}$ |
| $\mathrm{C}_{5}$ | 1024 | $\frac{1}{136}{ }^{\prime}$ |

Calling $D$, the duration of the residual sensation, and $N$
the number of vibrations per second of the note, we have: $\bar{D}=\left(\frac{33248}{N+29}\right)$ )001
Now carrying this law (which we discovered by means, $n$ vigorous experimental measures) downwards and upwards, through the range of audible sounds, we have, for 40 vibrations per second, the residual sensation lasting $\frac{1}{17}$ of a second after the vibrations which caused the sound have ceased; while for 40,000 vibrations per second, we have a residual sensation of only 60 of a aecond. If we apply
the law to vibrations below 40 , where they produce, not a
continuous sound, but explosive sensations in the ear, we reach a remarkable result, thus: 39 vibrations per second give a residual sensation of $\frac{1}{2}$ of a second; but if the resiual seneation is 10 of a second, why is it that 30 impacts on the ear, in one second, do not blend? This is explained by the another at each $\frac{1}{3}$ of a second. This is explained by the fact that co-vibrating parts of the ear, corresponding to
sounds produced by vibrations fewer than 40 per second, do aounds produced by vibrations fewer than 40 per secona, and keep up their oscillations after the cause which set them in motion, has ceased to exist, it follows that in other cases the ear is vibrated only as one mass, and the duration of these oscillations of the whole ear are far too short to remain the $\frac{1}{30}$ of a second. This supposition also explains why the higher notes, fer beyond those used for musical sounds, pro duce continuous sensations, though we have every reason to believe that no co-vibrating parts of the ear correspond to hem; with these high notes, the ear vibrates as a mass, but the duration of this vibration is sufficient to keep up sonorous vibrations, following one other at each $\frac{1}{5000}$ of a second; but for notes thus perceived without the intervention of corres ponding co-vibrating parts in the inner ear, the pitch should be difficult to distinguish, and this wo find is actually the case.
The heading "The Reflection of Sound from Flames and Heated Glasses" should read "The Reflection of Sound from Fiames and Heated and Cold Gases." Under this head, for among other curious results. Professor Mayer has ascer ained that there is an absorption of sound in the bat's wing game; that the flame is heated by the sonorous vibrations which enter it as such, and issue as heat vibrations," please abstitute the following:

The contemplation of these experiments naturally calls up he question:
Is the action of the flame due entirely to reflection? May it not also absorb part of the sonorous vibration, as in the nalogous phenomena of the reflection of light?
If the intensity of the sonorous vibrations which have raversed the flame equal the intensity of the vibration which impinged on the flame, minus the intensity of those which were reflected from the flame, then there is no absorption of these vibrations by the flame; but if this equality does not exist, then there is absorption in the flame; and this means that the flame is heated by the sonorous vibrations which enter the flame as heat vibrations. It thus at first appears that the absorption of the sonorous vibrations might be detected by their production of an increase in the temperature of the flame, just as sonorous vibrations are absorbed by caoutchouc, and reappear in this substance.
In the following manner I have recently made experiment in the direction of determining the equivalent of a given onorous aerial vibration, in fraction of a Joule's unit of 772 foot pounds. I stretched between the prongs of an $\mathrm{Ut}^{3}$ tuning fork a pisce of sheet caoutchouc, 100 th of an inch in thickness, and about $\frac{1}{2}$ inch broad. The effect of this rubber on the vibrating fork is rapidly to extinguish its vibrations, with which the rubber itself is heated; and if a fork be vibrated continuously, by one and the same force. when the rubber is stretched on it and then when it is taken off, the aerial vibrations produced by the fork are far more intense in the latter circumstances than in the former. By a method described by me in the American Journal of Science, ebruary, 1871, I now measured the relative intensities of the aerial vibrations, in these two conditions of vibration. The sheet of caoutchouc was now enclosed in a compound hermobattery, and the fork vibrated during a known interval; the rubber was heated by the vibrations,which would have appeared as sonorous vibrations, it the rubber had been removed from the fork. The amount of heat given to the caoutchouc was accurately determined, by the deflection of a Thomson reflecting galvanometer, connected with the thermo battery; and by knowing the interval during which the fork vibrated, and the amount of heat given by the caoutchouc during this interval, and the equivalent of the heated ubber in water, I calculated the intensity of the sonorous vibration in terms of a thermal unit, from which $I$ at once obtained the value of the sonorous aerial vibrations, when he fork was not heating the rubber, in other worde, when it vibrates freely. I thus found that the sonorous aerial vibrations, during ten seconds, of an $\mathrm{Ut}^{3}$ fork placed in front of its resonator, equaled about the 100,000 th part of a Joule's unit ; that is, they can be expressed in the work done in lift ing 54 grains one foot high. This quantity of heat, which is equal to the heating of 1 pound of water one 100,000 th of a degree Fah., expressed the amount by which the gas flame would be heated, if it absorbed all of the sonorous vibrations issuing from the $\mathrm{Ut}^{3}$ resonator. But this is such a small fraction of the entire heat in the flame that it is far within the actual fluctuations in temperature in the flame ; and,even if the fiame were constant in temperature, this small increase could not be detected by any known thermometric method. We cannot therefore determine the amount of absorptive power of a flame, or sheet of heated air, for sonorous vibrations, by ex priments on their increased temperature, when sonorous ribrations impinge on these bodies."

Alfred M. Mayer.
Stevens Institute of Technology, Hoboken, N. J.

## Turbine Water Wheels.

To the Braitor of the Shientific American
In our experience, if we have a flood of water with reasonable head, almost any kind of wheel, if it be large nough, will do; but when we come to substitute a turbine for an overshot wheel, on light streams, we find that it is a nice matter to decide on the size the wheel should be to give
sufficient power and to use the water economically. We
venture to say here that there have been more failures in turbines on light streams on account of using too large wheels an from all otber causes combined; and we set it down as well established fact, without having reference to any water wheel pamphlets, that there are now in use and have been for some years several different makes of turbine wheels that will give from seventy-five to eighty per cent. when working with seven eighths to full gate; and persons inter working with seven eigbths to full gate; and persons
inter interested can inform themselves more alisfactorily by cor-
responding with parties having wheels in use than by conulting pamphlets on the subject.
It is said that the best wheels afford almost all their power at five eighths gate or under. Now this is entirely at variance with our experience. Putting in a turbine wheel, on a light atream, that would be large enough to drive the machinery at half gate would be a failure simply because of the small percentaga yielded, and consequently the use of too much water for the amount of power given. Substituting large wheels operating at from one quarter to ne half gate, for small wheels requiring seven eighths gates, results in the use of much lees water for a given effect, and is also at variance with our experience and can only be based on the idea that the wheels give a better percentage at one quarter than at three quarter gate, which is not the case with any wheels we are acquainted with; but there is ample room for improvement in turbine wheels in that direction.
There is one advantage in using large wheels, and it is that when there is a flush of water it can be utilized, which is the only offiset to the loss of power in running at ordinary ges of the water
J. Broomell.

Christiana, Pa.
New Steamboat Law. Authorized Increase of Steam Pressure on the Miesissippi.
sels used exclusively for towing and carrying freight on the Mississippi river and its tributaries
Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled: That the provisions of an act entitled "An act to provide for the better security of life on vessels propelled in whole or in part
by steam," etc., approved February twenty-eighth, eighteen by steam, etc., approved February twenty-eighth, eighteen
hundred and seventy-one, so far as they relate to the limitahundred and seventy-one, so far as they relate to the limita-
tion of steam pressure of steamboats used exclusively for towing and carrying freight on the Mississippi river and its tributaries, are hereby so far modified as to substitute for such boats one hundred and fifty pounds of steam pressure in place of one hundred and ten pounds, as provided in said act for the standard pressure upon standard boilers of fortytwo inches diameter, and of plates of one quarter of an inch in thickness; and such boats may, on the written permit of shall carry on their business, be permitted to carry steam above the standard pressure of one hundred and ten pounds, but not exceeding the standard pressure of one hundred and fifty pounds to the square inch.
Approved January 6, 1874."
To the Editor of the Scientific American:
A recent act of Congress, regulating the management of steam vessels, authorizes tow and freight boats on the Mississippi river to carry a steam pressure of 150 lbs. to the square inch, instead of 110 lbs . as heretofore, in standard boilers of 42 inches diameter and one quarter of an inch thick. I presume that, by standard boilers, is meant such as are ordinarily well made of good average material and aingle. riveted. However this may be, the pressure stated is clearly in excess, and very dangerously so, of that allowed by the rules generally adopted by first class engineers. A boiler 42 inches in diameter and one quarter of an inch thick, with 150 lbs. to the square inch, is subjected to a strain of 12,600 bs. to each square inch of sectional area of the solid plate, or fully one quarter of the ultimate tensile strength of good boiler iron. According to Fairbairn, in single riveted work the strength is reduced to 0.52 and in double riveted work to 0.7 , of that of the solid plate. Under the above circumstances, therefore, a good new boiler, if single riveted, would be subjected to a working pressure equal to nearly one half of that at which it might be expected to tear asunder, or, if double riveted, to more than one third of the breaking strain. The rule given by Bourne for the thickness of locomotive boilers is to multiply the diameter in inches by the pressure per square inch and divide by 8,900 , which, in this instance, would require the shell to be about seven tenths of an inch thick. For marine boilers he allows 3,000 lbs. per square inch of sectional area of plates. Now it does not appear that there is any legitimate reason why the owners of boats, used simply for freight or towing, should be allowed to subject their employees to imminent danger from explosion, while persons merely passengers are protecter by law from such danger. That the pressure stated is really known to be dangerous needs no further proof than the fact that it is confined to that class of boats; and since it must be admitted that all citizens are entitled to equal protection, why not the officers and men serving in these vessels? It may be said that they voluntarily expose hemselves with full understanding of the circumstance, but this is not always the case, and, if it were, would not be a good argument. An explosion of one of the above mentioned boats occurred in March last, causing the loss of aixteen lives. Dare we say that those lives were less precious because they belonged to engineers, firemen, deck hands, or others forced by the necessity of providing for themselves and families to work under constant dread of danger and death?

John Lepper.
Washington, D. C.
Of all solid substances found upon the earth, carbon is both the hardest and the softest. In the form of diamond, it is the hardest. In the form of graphite, it is the softest. Both diamond and graphite are the same in chemical comBoth diam
position.

## sCIENTIFIC AND PRACTICAL INFORMATION.

testing belting leather.
M. Eitner proposes the following simple method of de termining the value of leather employed on belting. A cutting of the material about 0.03 of an inch in thickness is placed in strong vinegar. If the leather has been thoroughly acted upon by the tanning and is hence of good quality it will remain,for months even,immersed without alteration simply becoming a little darker in color. Bat, on the con trary, if not well impregnated by the tannin, the fibers will quickly awell and, after a short period, become tranaformed into a gelatinous mass.

## (her the sun.

M. Janssen states that Croce-Spinelli, in his recent balloon ascension to an elevation of 25,000 feet, finds by spectroscopic observation that the lines in the spectrum, ascribed to the vapor of water, are due to the terrestrial and not to the solar atmosphere; since when the former, by reason of the elevation, is greatly eliminated, the bands are also in like proportion decreased. It may therefore be considered that in the sun there is no watery vapor, at least in appreciable quantity, and that consequently the temperature of that body is not yet sufficiently lowered to allow water to form.

THE SWEDISH EXPEDITION TO THE NORTH POLE.
M. Nordenskjold has recently found, in the ice and snow of the Arctic polar sea, a black dust. This he had melted, and subsequently submitted it to chemical analysis, which has proved that it is composed of nickel and cobalt, and similar in constitution to the meteorites. It seems probable, therefore, that the powder is actually due to the disintegration of these aerial bodies at a short distance from the earth.
The regions which this intrepid traveller has lately explored are the most inhospitable on the globe. He has traversed ice seas, the level of which rises to over three thousand feet above that of the ocean, and which are rent with huge crevasses often entirely concealed by snow and fog, rendering their exploration an enterprize of the greatest danger. M. Nordenakjold is now organizing a new expedition to start in the spring of 1875.

## HYDROGEN ALLOTS.

In pursuing their investigations into the metallic combina tions of hydrogen, MM. Hautefeuille and Treost have succeeded in obtaining a definite hydride of sodium. They have since compared this product with the hydride of palladium, in order to determine the density of the hydrogen, could it be solidified under like conditions. The hydride of palladium, having a density equal to 11 , if the density of palladium, itself equal to $11 \cdot 7$, be considered, admitting that no variation in volume takes place, the density of the hydrogen is found to be 0.62 . Repeating the same calculations for the hydride of sodium, the number 0.63 is obtained. Palladium, however, is much heavier than wrater, while sodium is lighter; and hence it is believed that the figures 0.63 more truly indicated the density of hydrogen under the above conditions. This number is very near to that which represents the density of lithium, and tends to confirm the opinion that hydrogen is one of the true metals.

A LUMINOUS SIGNAL FOR GEODESIC OPERATIONS.
M. Laussedat proposes, for the above purpose, to direct a spy glass from one station toward a second point, to which the signal is to be transmitted. In the focus of the instrument, he places a diaphragm having a very small aperture; so that, on looking through, the field of vision will be restricted to the tower, steeple, or other ?ocality at which the receiver of the signal is stationed. Tho eye piece of the telescope is then removed, leaving the diaphragm, and behind the latter is placed, in the axis of the instrument, a light, the conjugate image of which, produced by the conveying glass, falls precisely on the opening of the diaphragm. The luminous ray transmitted through the telescope will fall directly on the edifice comprised on the restricted field of vision, and not elsewhere, and the light is therefore invisible to all without that field. The observer will perceive the objective of the telescope illuminated over allits surface ; and necessarily the larger the diameter of the glass, the farther will the signal be visible.

## A Chemical Centennial.

Dr. H. Carrington Bolton, of Columbia College, has suggested the idea that, as centennial celebrations are now in order, the present year is eminently appropriate for the organization of a social réunion among the chemists of the United States, in commemoration of events alike important to Science and civilization. Dr. Bolton considers that since so many remarkable discoveries in chemistry were made in 1774, we may date the foundation of modern chemical science from that period, and that consequently the year 1874 marks the lapse of the first century. It is pointed out that in 1774 Scheele first isolated chlorine, recognized baryta as an independent earth, and published his essay on manganese. Lavoisier was engaged in an investigation of the cause of the increase in weight of tin when calcined in close vessels, a research leading to the most important discoveries. Wiegleb proved alkalies to be true natural constituents of plants. Cadet described an improved method of preparing sulphuric ether. Bergmann showed the presence
of carbonic acid in lead white. On the 27th of Septemberin of carbonic acid in lead white. On the 27th of Septemberin
that year, Comus reducsd the "calces" of the six metals by that year, Comus reducsd the "calces" of the six metals by
means of the electric spark, before an astonished and de. lighted audience of eavante. On the first of August, 1774, Priestly discovered oxygen, the immediate results of which were the overthrow of the time-honored phlogistic theory and the foundation of chemistry on its present basis.

The proposition has already been acted upon, and the New York Lyceum of Natural History has passed resolutions appointing a committee of five, consiating of Dr. Bolton and Professors Chandler, Wurtz, Leeds and Seeley, to correspond with the chemists of the country with the view of securing their cöoperation in the observance of the anniversary. The time fired, we understand, is the first of August. The ides is a good one and doubtless will be favorably received by the profeasion.

## The Iron Trade.

The Bulletin of the American Iron and Steel Association says:
There are 175,000 men who are usually employed at rolling mills, furnaces, etc., out of employment today in consequence of the depression in theiron business; to these must be added
many mechanics and others whose business has not been pros many mechanics and others whose business has not been pros-
perous, or has been partly or wholly destroyed because the iron business upon which they depend has been prosrated.
More than one half of the rail mills of the country were wholly idle on the first day of January last, and the same number remain idle to day, while others are only running a part of their time. Few mills are running to the extent of heir capacity. The amount of work now done by merchant bar mills, car wheel makers, car and locomotive builders, and other branches of business intimately connected with the railroad interest, is fully one half less than it was a year agu.
Mer
Merchant bar mills, plate mills, founderies, machine shops, and other establishments not dependent upon the railroads for orders have as a rule lens business than during the irst month of the panic.
Of the 666 completed furnace atacks in the country, the whole number in blast on the first of January last was 400 ; out of blast, 266. The aggregate number of furnaces out of last at this date is as great as it was in January.
The decline in prices is as followe:
Principal Articles.
Rails at eastern mills. gh... Aprll.
$\$ 87.00$ Aprll,
$\mathbf{1 8 7 4 .}$
$\$ 68.00$ Pig iron at Pittabo........... 4 1.5c. 2t No. 1 Lehigh pig iron at Philadelphia..... $84200 \quad \$ 2800$ These figures represent an averagedecline in prices during he past year of over 30 per cent. When it is considered that he prices one year ago, which we have used for comparison, were lower than they have been previously, that money was then abundant and sales for cash were of daily occurrence, and hat mill owners and furnacemen then had orders month ahead and now rarely know that they will be able to sell tomorrow what little.they make to day, the extent of the dis aster to the iron business which yet survives the panic is eadily seen.

The Iron Dome of the Capitol.
The iron dome of the Capitol at Washington is 300 feet high, and is surmounted by a metallic statue. In reply to an onquiry, as to whether there was a daily movement of the statue, due to the heat of the su
The statue on the Capitol has a motion resulting from the unequal expansion of the opposite sides of the dome. The entire length of the line of oscillation of the plummet from the eastern limit to the western limit is only four and a half inches, which would make the inclination in the morning two and a quarter inches to the west, and in the afternoon the same diatance to the east. This apportionment of the distance for morning and evening, however, is not strictly correct, and for this reason: that in the morning the east side of the dome is rapidly heated, while the west side is chilled by radiation through the night. Now as the sun passes to the western side of the dome, this side is heated, but as the east side still retains a good portion of its heat, the expansion is more nearly equalized on both sides and the inclination of the statue to the earth to some extent counteracted, so that the inclination to the west is a little greater than that toward the east. The variation is probably about the same all the year around, the extra contracting by cold on one side of the dome during the winter producing the same effect as the extra degree of expansion by heat on the other side in the summer.

## Electroplating with Cobalt.

The following process of George W. Beardslee, of Brooklyn, N. Y., is stated to form a thick and useful covering, which will very perfectly protect the plated surface from the action of the elements, and form a most beautiful plating, very white, exceedingly hard and durable, tenaciously adherent, and not liable to tarnish :
Dissolve the pare metal cobalt in boiling mariatic acid, and evaporate this solution to dryness. Then dissolve from four to six ounces of the salt thus obtained in a gallon of distilled water, to which add ammonia sufficient to show on test paper the solution just olightly alkaline. Then prepare an anode of the metal cobalt, in granular form or roken into small pieces, free from impurities, as follows Take a plate of carbon, or of some other material that is a conductor of electricity, but not susceptible of being attacked by the plating solution, and place it within a sack or envelope made of some material that is neither a conductor of electricity, nor attackable by the solution, formed with open meshes or interstices through which the solution may freely circulate. This envelope should be made to conform in shape to the carbon plate, and large enough to leave a space between it and the plate of, asy, ene half an inch to
one inch; then fill thie space with the granules of cobalt, which will, af is ovident, surround the plate and be in contact with it.
By an anode thus constructed, a large surface of the cobalt is readily and conveniently exponed to the action of the solvent, and the steady flow of the entire battery current through the cobalt is secured, thereby rendering the dissolution and deposition of the metal ateady, uniform, and very perfect.
This anode is to be connected with the copper pole of the battery by connecting the wire to the carbon plate and sus pending in the plating solution before described, and the article to be plated is connected in the solution with the zinc pole in the usual way. A battery power of from two to five cells (Smee's battery) will be sufficient to do good work. Care should be taken not to permit the solution to lose its slightly alkaline character, as, if this is not maintained, the plating operation will be rendered imperfect, the tenacity, adherence and uniformity of the deposit becoming thereby impaired.

## The Open Treatment or Wounds.

A very remarkable study of surgical cases in the hospital t Zürich has lately been published by Dr. Kroenlein, illus rating the new so-called " open" treatment of wounds advocated by Professor Rose. He compares two periods of sever al years each, during the first of which the wounds, amputions, etc., were treated by bandaging in the ordinary way. The results of the two series were, as regards mortality per ent., as follows:

|  | Bandaging. | Open Treatment. |
| :---: | :---: | :---: |
| Thigh. | .86•1 | . $35 \cdot 7$ |
| Leg. | 58.3. | .18.1 |
| Foot. | .35'2. | . . $20 \cdot 0$ |
| Upper arm | 55.5. | .14.0 |
| Forearm. | .16.6. | 0.0 |
| Hand... | 0.0.. | ... $0 \cdot 0$ |

Critical researches by the author show that this remarkable result was due neither to the age and sex of the patients, nor to the method of amputation, but solely to the after treatment.
The principal maxims followed by Profeszor Rose (the pres ont director of the clinic) in the treatment of wounds are to secure absolute rest after arrest of bleeding, and to provile or perfect freedom of discharge and scrupulous cleanlinees. Another principle is to interfere with the healing process of wounds only when special indications are afforded, and to consider stitches and bandages of all kinds as interferences to be so avoided. The air to which the wounds are freely exposed in the open treatment must, of course, be pure, and the ystem accordingly inciudes the use of energetic ventilation. In the hospital at Zürich, the ventilation is obtained only by constant opening of the doors and windows, a proceeding which, it is true, renders the heating arrangements often in ufficient in winter.
The advantages claimed for this open method are:

1. There is no pressure or constriction by dressings.
2. An irritation of the wounds by changing the position ad external applications is avoided.
3. There is no danger of infecting the wounds by impure rticles.
4. The danger of retention of matter is small.
5. The state of the wounds may be controlled at any time $y$ simply lifting the coverlets.
6. As healing by the first intention is given up, as many igatures may be applied as are desirable, and thus secondary wmorrhage may be better avoided.
7. The air of the wards is notinfected by emanations from the dressings, as in the case is other methods, except Lis er's.
8. There is less need of material for dressings, therefore Lese expense.
Naturally these statistics have excited much attention among surgeons, and corroborative evidence is not wanting o support Professor Rose's views. Mr. Richard Davy, F. R. C. S., writes to the London Medical Times and Gazette that the open treatment of wounds has been practised among his surgical cases for the last five years; the results arrived at have been gratifying, and his firm conviction is that all socalled dressings, to the majority of wounds, are not only need. less but injarious.
Amputations, resections, wounds for removal of tumors, injuries, etc., are exposed freely to the atmosphere of the ward. The exceptional cases that receive dressings are burns, calds, and subcutaneous operations.
The treatment that the woundsare subjected to consists in heir adjustment by metallic suture; the atmosphere sur rounding the bed is attended to, as to purity and temperature; the surface of the sore is occasionally cleansed by an aqueous apray (the most delicate brush, that destroys itself by usage), and the margins are gently freshened up by a small hog's bristle brush (a separate one for each patient), dipped into clean tepid water.-Medical and Surgical Reporter.

From a comparative pay schedule given in the Naval Gazette, Portsmouth, England, it appears that engineers re ceive rather more than twice as much pay in the $A$ merican Navy than is given in the British Navy. For example, an American engineer receives $\$ 2,800$ per annum, and the British ongineer, $\$ 1,100$ per annum.

To Dye Leather Blue-Black.-Tuke of beeswax 8 ozs., black resin 2 ozs. Melt together, and then add : Prussian blue oz., lampblack $\frac{1}{} \mathrm{oz}$. While the mirture is cooling, add turpentine till a suitable consistency is obtained. It ahould beapplied with a soft rag, and the lesther afterwarde polished with a brush.

THE TARANTULA WHEEL ROTARY HARROW.
The accompanying engraving represents a novel and, doubtless, very useful agricultural implement to which, from its odd and spider-like appearance, the above appro priate name has been applied. It is a rotary harrow, com posed of several wheels, each containing a number of teeth which operate in a manner below deacribed. The wheela are so arranged that they may bo turned from a horizonta into a vertical position, thus enabling the device to be con reniently transported from field to feld.
At $A$ are two bars, to the inner sides of which areattached brackets, B, through which pass the vertical shafts of the wheels, said shafts being secured by the nuts abore. The inner onds of the brackets, C, are slotted to receive cross bars, D , which are secured to them by two bolts, as shown, by removing one of which the connection way be changed from a rigid to a flexible one if desired. In Fig. 2 is shown the position of a wheel when turned vertically on the connection, as above described, as on a hinge. The bars, $D$, are made with a bow or arch in the middle, to enable tue harrow to be used for cultivating corn or other vegetables planted in rows. The harrow teeth are made in $U$ shape, with their ende bent downward and to one side, Fig. 3. The hubs are constructed in two parts secured together by bolts which also pass through the bends of the tecth. The latter are received in grooves, as represented in Fig. 3, and are thus securely clamped and held. The journals are made longer than the hubs in order that the wheels may have play to enable them to adapt them: selves to the surface of the ground.
As represented-in our engraving, the device is adapted for use as a cultivator, but it may be readily changed to a harrow by hooking the draft bars to the eyes in the brackets, ing the draft bars to the eyes in the brack.
shown at $F$, at right angles to the beams.
The advantages claimed for the invention are as follows: It is durable, and, being constructed of iron, cannot decay when left out in the field. It is simple in constraction. It will run, we are informed, deeper or shallower, as desired. Each tooth cuts through ground three times as far as the distance passed over, owing to the rotation of the wheel, thus harrowing the soil to three times the extent of a simple drag machine. The convenience of moving, afforded by the vertically adjustable wheels, is also a point of merit. There is, besides, a reversible motion in every otber wheel when besides, a reversible motion in every otber wheel w
drawn, double harrowing the ground in every direction.
The teeth, it is stated, never choke or clog in any trash, but pull up all that has been plowed under, and scatter it regularly over the surface. None of the soil, consequently, becomes mixed with the refuse, so that the danger of wheat or winter crops freezing, from the springivg up of the ground, is largely obviated. For preparing the soil for wheat, we are informed, the machine is especially adapted; and as a cultivator, the inventor states the device to be of great merit.
Two sizes of this harrow are manufactured, one of six wheels, cutting from six and a half to seven and a half feet, wheels, cutting from six and a half to seven and a half feet,
making one cultivator. The other and larger size has eight wheels. In field harrowing it is run four wheels abreast, cutting nind feet and nine feet ten inches. By removing two bolts, it is changed into two cultivators. We learn that, in repeated trials, the machine has proved very successful.
Patented through the S:ientific American Patent Agency, April 7, 1874. For further particulars address the inventor, Mr. D. L. Benson, Tamaroa, Perry county, Ill.

HOTZ'S PATENT SELF-CLOSING FAUCET.
Overflowing basins, leaky facets, and burst water piper

are probably the commonest troubles which families in cities have to endure. Plumbers' bills in cities are, as a rule, excessively bigh, and when, in addition to this expense, the hapless landlord finds himself compelled to pay for the services of a plasterer to repair soaked and fallen coilinge, and of a painter to make good his disfigured walls, it becomes
very clear, to him at least, that an invention which will ren ${ }^{-}$ der water pipes proof against leakage and an overflow of basins is of infinite importance. Faucets which will stay tight, and not require re-grinding every few months, are also an important desideratum. We can assert, from our own experience, having the Hotz faucet some time in use in this office, that it meets all the requirements of a faucet better than any other we have used.
Hotz's self-closing faucet, a sectional view of which is represented in the annexed engraving. is an invention which has been in use some four years, during which time it has withstood severe tests of both frost and heat. The construc-


THE TARANTULA WHEEL ROTARY HARROW

Time Telegraph of the Reading Railroad Company The manner of giving the correct standard time of the Philadelphia and Reading Railroad Company, to all its telegraph stations, 255 in pumber, along the main road and all its branches, is as follows: At three minutes to 4 o'clock $P$. M., daily except Sunday, all business along the lines is suspended; and by means of a series of repeaters, all the lines of this company, 36 in number, are arranged so as to be operated and controlled by one operator at the Reading otice, who has a chronometer before him, from which the crrrect time is given. Commencing at three minutes to 4 P . M., the Reading operator says "t time" on the lines, which calls the attention of all operators to adjust their clocks, and is continued at short intervals un til five seconds to 4, when he opens the circuit. At 4 o'clock he makes one tap; at fifteen seconds after 4, two taps; at thirty seconds after 4, three taps; at forty five seconds after 4 , four taps, and at one minute after 4, five taps. By this arrangementevery telegraph station is able to get the correct time to the second, daily, and thereby have the railroad clocks and watches of the employees properly adjusted, which is a very important matter in the management of a railroad.

Mr. Proctor has returned to England from America. He recenuly gave an intensely interesting lecture at St. George's Hall, Langham Place, on the progress of astronomy in America. Mr. Proctor showed that in many respects the Americans were in advance of Englishmen, both in their instruments and the courageous and rapid manner in which they conduct scientific enquiries. He spoke highly of the manner in which he was rectived, listened to, and treated in the was received, istened to, and
$\cdots$
ates.-English Mechanic.

## CARON'S FOUNTAIN MARKING BRDSH.

tion consists in a rubber-faced stop valve, A, from the top of which rises a spindle, B, which is slotted to admit the point of a thumb lever, $C$. $D$ is an upper cylinder, which is flanged and united to the body of the faucet by a union, E, with suitable packing. At the bottom of the cylinder is an annular septum, through which rises the spindle, B. Between the valve, $A$, and this annular septum, the spindle has, slipped over it, a pisce of rubber tubing, $F$, which abuts againet the septum and makes a watertight joint, so that no againet the septum and makes a watertight joint, so that no
water can rise into the cylinder. The spindle, $B$, is made water can rise into the cylinder. The spindle, $B$, is made
omall at the top, and over this portion, and resting upon a shoulder, is placed a coil spring. The upper part of the latter abuts against a male screw, $G$, which fits into a femal screw at the top of the cylinder. Screw G has a milled head, by which it is easily turned ap ordown to adjust the tension of the apring to the premare of fater againut the valve, $A$. By so regulating the screw that the tension of the spring is just sufficient to overcome the pressure of water against the valve, it is evident that the pipe in connection with the fau cet is provided with the means of relieving itself the moment any extra pressure begins within. The tension of the spring, in such case, being overbalanced, the valve will be lifted from below, and water al:owed to escape until the equi librium is restored. No furthor explanation is, we think necessary to render it obvious that, no long as the mechanism is properly adjusted and free to work, it is hardly possible for an excess of strain to happen in the pipe.
While this advantage is of first importance, there are others claimed, which are perhape of nearly equal value. The faucet being self-closing, the danger of its being left running by accident, causing overflow, is obviated. Its construction is such that no grinding of metallic surface is necessary.
The deterioration of the piece of rubber tubing and the valve face cannot but be slow; and when worn out, their replacement is a very easy matter, accomplished at a trivial cost. It will be observed that the valve can be regulated to any pressure,
and that the water, striking the valve, meets a cushion which is elastic, and hence there is no jarring or hammering of the pipe due to the sudden turning off. Not only is this the case in the ringle faucet operated; but should the flow from any other cock be quickly stopped, the shock is communicated to the rubber valve which, after lifting, relieves the pipe instantly. From the same cause range boiler explosions will be prevented. Finally; a direct saving is claimed in the cost of pipe, because the heavy tubing necessary to withstand concussions, freezing, and similar forces is rendered unnecessary.
We have had submitted to us reports of several cases which exemplify the successfal working of the device, in instances where pipes froze solid throughout a house but no rupture took place. The inventorgives several illustrations (in a pamphlet he las published which parties desiring further information should send for), showing the variety of forms in which the faucet is manufactured in order to suit hydrants, closets, etc.
Considerable ingenuity is shown in the bath tub arrangement, in which the faucet is so governed that it allows water to escape nntil a sufficient quantity is drawn, when it automatically closes. This is accomplished by a float fas tened to a chain of suitable lengtb, attached to the faucet sufficie When the float hangs from the latter, its weight the tub until it reaches the float, which it buoys, relieving the lever, and so causing the valve to be shat by its spring,
For further particulars address the E. P. Gleason Manu-

Our engraving represents a simple form of fountain brash which will, to porters having goods to mark, expressmen, bulletin writers, and others who have occasion for its use, prove, we think, a handy and time-saving invention. It consists of a rubber tube, A, Fig. 1, lined within with a material known as Frink's indestractible rubber lining, which, we are informed, revists the action of acid compounds. The tube is some five or sir inches in length, and has on its upper end a cap and ferrule in one, provided, as shown, with a ring, for suspending whed not in use. The lower end has also a ferrule, and is threaded to rective a metal funnel, B, as shown in section, Fig. 2. Over the end of the funnel the brush is slipin section, Fig. 2. Over the end of the funnel the brush is slip-
ped. In use, the funnel is removed from its ferrule and the lianped. In use, the funnel is removed from its ferrule and the lian-
dle filed with ink. The former is then returned; and on being held to write, the liquid fows down to the brash through a small tube, C, which extends up into the excremity of the funnel. It will be seen that the necessity of a pot of ink is avoided, and consequently the hand of the operator ordinarily employed in holding the same is left free. The interior construction is of the simplest description, with no mechanism to get out of order. The ink flows freely, and, from its gradual feed and large supply, lasts for a long time. By its use marks can be eanily made on uneven surfaces, such as coarse sacking, which cannot be done, except with considerable difficuliy, with the ordinary brueh. Fine or coarse lines are readily

traced, as the flow is regulated by the pressure of the hand upon the compressible tube.
Further particulers, regarding sale of righte, etc., may be obtained by addressiog Mr. William A. Caron, No. 14\% Union street, Springfield, Mass., or Mr. F. W. Wentworth 45 Green street. Boston, Mass.

## EMANUEL CHURCH, CLIFTON, ENGLAND.

 The large and commercially important city of Bristol is so crowded with docks and warehouses that its merchants are driven out of town for residences; and the beautiful parks and avenues of Clifton, which crown the noble downs over and avenues of Cliton, which crown the noble downs over studded with many exceptionally fine public buildings. One of the best of the recent structures is a church of the perpendicular order, of which we present a view. The buildiag, says the London Builder, from which we select the engraring, is spacious and lof. ty, measuring internal y, meaciog incernal ly 122 feet by 60 feet, and the root carried through a uniform hight of 60 feet. Th chancel is apsidal, and measures 39 feet by 28 feet. The nave is of five bays, with lofty arcade arches springing from circular columns. Arcades of two bays di ide notb and vide north and south chapels from the chancel, designed for ves tries and organ chamber.
The charch is buil of the native stone, of a reddish tint, with bands of doep red sandstone. The dressing are of Bath stone; the chancel steps and dais of Limerick, marbles and encaustic tiles. The reredos is carved with subjects in high relief. The steeple reaches to hight of 222 feet, the tower being 108 feet, the spire 114 feet high.

## e Polyspheni

 ship.Proceeding from the well known fact that when flat bottomed ves sels are urged forward by a strong propelling force their bows are lifted, and in that way some advantage of speed is gained, Mr Charles Meade Ramus, M. A., Trinity College Cambridge, designed a ship in which the bot tom was composed of two parallel and conse cutive inclined planes, so that, being simulta neously lifted fore and aft by two similar lift ing forces at the highest rate of epeed, it might rate of epeed, it might be able to so maintain its equilibrium as neither to drop forwards
nor turn over. Experinor turn over. Experiments with models showed that a vessel so constructed would, when driven at a sufficiently high speed, rise veuly over the water 0 as to ekim over it. Further trials proved be superiority proved or six inclines over the lesser number. From he results of his experiments Mr. Ramus calculates that 5,000 horse power will give to a ,000 tun ship any ppeed up to six'y knots an hour. Having em. ployed rockets as the propelling power in his experiments, the idea was suggested of using
he vessel as a rasing lbs. rocket would be capable of driving a float of one tun displacemen at a hundred knots an hour to a distance of two miles. This float, he adds, would carry quite half a tun of explosives, and it is at least very doubtful whether the sides of any ironclad would resist the ehock of the explosion that would take place on contact.

## efrect or Heat on Textlle Fabrics.

Recent experiments on disinfection by means of heat,made by Dr. Ransom, of Nottingham, England, show that white wool, cotton, silk, and paper may be heated to $250^{\circ}$ Fah., for wool, cotton, silk, and paper may be heated to 220 Fah., for
hree hours without apparent injury, although the wool will
show a fainc change in color, especially when new. Thesame may be said of dyed wools and printed cottons, and most dyed silks; but one kind of white silk easily turns brown by this heat, and pink silks of some kinds are also faded by it. The same temperature will,if continued for a longer period, slightly change the color of white wool, cotton, silk, paper, and unbleached linen, but will not otherwise injure them. A heat of $295^{\circ}$ Fah., continued for about three hours, more de cidedly singes white wool, and less so unbleached and white
out-going carrents, which represent the maximum and minimum temperaturer of the chambers. A self.acting mercurial regulator maintained the temperature of the entering carrent at any required degree.

## The Woolwich Furnace.

The Royal Gun Factory, at Woolwich, has been for some time past conspicuous for its efforts to economize fuel, both ${ }^{\circ}$ for steam and manufacturing purposes, and it is now pos-
sessed of a novelty in furnaces, in which the economy of fuel is a striking feature. It is at present applied both to reheating and puddling, and its con sumption of fael and yield of iron taken with scrupulons accuracy.
The saving of fuel is, over a period rising to six months, an average of 40 per cent, while the saving in fettling in the puddling furnace is scarcely lesa remarkable. The durability of the furnace is also much greater, and the provisinn against an excess of free air-the pestilent source of waste in the iron trade-is peculiar and effectual in savin iron, whether in reheat ing or puddling. The plan on which the fur nace is constructed is to provide an ordinary furnace with an upcast at the rear of the existing combustion chamber, and in contact with it. The products of combastion from the furnace are led into the said upcast by parsing either over, under, or around the body of the furnace. In the upcast is placed a conical cast iron tube in a vertical position, and between the sides of which and the upcast are spaces for the free circulation of the producte, the heat of waich is taken up by the cast iron vessel or tabe. This tube is fitted with a hopper at the top, and check dampers, by which the fuel is let into it without the intrusion of air. Its capacity is equal to containing 12 cwt. of coal, which is kept up by regular charges of about 2 cwt. Its temperature is usually at a bright red heat, and as the fuel deocends it is freely rari. fied. It is provided with an outlet into the combustion chamber, through which a constant stream of carbu. reted hydrogen is passing over the fuel on the fire bars, taking up the free air passing through the interstices of the fuel, and arresting their wasting action in the furnace. The remain. der of the fuel that becomes coked is passed by the same passed to the fire chavsel on and hot, so that no cold fuel passes into the com. bustion chamber. The amount of heat thus carried back into the furnace, and which is the and white, but does not materially injure their appearanco. |great economizer, can be partially estimated from the fact

The same heat, continued for about five hours, singes and injures the appearance of white wool and cotton, unbleached linen, white silk, and paper, some colored fabrics of wool, or mired wool and cotton, or mired wool and silk. It is noteworthy that the singeing of any fabric depends not alone upon the heat used, but also on the time during which it is exposed. In these experiments the heat was obtained by burn ing gas with amokeless flames, and conducting the products of combustion mired with the heated air, by means of a short horizontal flue into a cubical chamber throngh an aperture in its floor, and out of it by a amaller aperture in its roof. Fired thermometers showed the temperature of the entering and
great economizer, can be partially estimated from the fact hat, in place of the waste gases passing off at some 3,000 legrees, it does not exceed 500 degrees, as they escape into the stack beyond the region of utility. These furnaces are not complicated by mechanical aids, the combustion being carried on by in draught. They are easy of adaptation to existing plant, incur but a trifing expense, and give great durability to the bricks, being free from the chemical action o common to furnaces of less perfect action. The present puddling furnace has gielded 250 tuns of iron-the work of ordinary furnace-and is far from its termination. Here wams to be met. -The Eingineer.

## ABTRONOMICAL NOTES.

Obgervatory of Vabsar College.
For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to students.

Ponitions of Planete for Juno, 1874. Mercary.
On the 1st of June Mercury rises at 5 in the morning and wets at 8 h .15 m . in the ovening. On the 30th, Mercury rises at 8 h .40 m . A. M., and sets at 9 h .2 m . P. M. This planet should therefore be seen atter sunset during the latter part of June.
vonus.
On the 1st of June Venus rises at 6h. 8m. A. M., and sets at 9 h .22 m . P. M. On the 30 ft , Venus rises at 7h. 9m. A.M., and sets at 9 h .33 m . P. M.

On the 3d of May Venus and Mars were so nearly at the same point of the heavens that, in a telescope of large field, the two could be seen ar the same time, giving an excellent opportunity to notice the difference of color. Both are very small at present, being far from the earth.

Mars.
On June 1, Mars rises at 5 h .6 m . A. M., and sets at 8 h . 12 m . P. M. On the 30th, Mars rises at 4 h .36 m . A. M., and sets at 7h. 42m. P. M.

On the 1st Jupiter rises at 0 h .36 m . P. M., and sets at 1 h . 8 m . the next morning. On the 30th, Jupiter rises at 10 h . 8 m . the next morning. On the 30 th , m . A. M . and sets at 11 b .18 m . P. M.
On May 2 the shadow of Jupiter's fourth satellite passed across the disk of the planet, just skirting the northern edge, appearing like a small black spot. It was seen for 2 h . and 15 m .
On May 3 Jupiter's third satellite was occulted, that is, the planet seemed to pass over its satellite.
On May 7 the first satellite made a transit across the planet, or the satellite seemed to pass over the planet.
f. On May 14 the shadow of the third satellite passed across the face of the planet, as a brownish-black spot, not perfectly round. It was seen for about 3 hotrrs.
The broad belt of Jupiter, always seen near the middle of the disk, is at present slightly rosy in color.

## saturn.

Saturn is very beautiful -in the early morning, about 4 A. M. It rises at 11 h .29 m. P. M. on the 1st of June, and sets at 9 h . 21 m . the next morning. On the 30th of June it rises at 9 h .33 m ., and sets at 7 h . 21 m . the next morning.

Uranus.
Uranus is not well situated for observation and requires a good glass. It rises at 8 h .48 m . A. M. on the 1 st , and sets at 11 h .10 m . P. M. On the 30 th it rises at 7 h . 1 m . A. M., and sets at 9h. 21m. P. M.

## Neptune

It is useless to attempt to see Neptune at the present time. It rises just before daylight on the 1st of June, and sets in the afternoon. On June 30th it rises a little before 1 A. M., the afternoon. On June 30
and sets at $1 \mathrm{~h} .54 \mathrm{~m} . \mathrm{P}$. M.

Meteors.
Meteors were frequent on the morning of April 28; one brighter than Jupiter was seen at 3 h .15 m. A. M., starting from Taurus.
On the morning of May 12th, from 3 A. M. to 3 h .30 m . A. M., meteors were somewhat frequent.

Sun Spots.
The record is from April 18 to May 15. The number of observations is larger than usual. Generally speaking, the spots have been of good size, rather more numerous than usual this year, and have shown little change from day to day. A very interesting series of photographs has been obtained of a group which was first seen on May 7. Reckoning by its subsequent movements, it was then about 12 hours eince the sun had turned it fully in sight (or since it had entirely cleared the eastern limb to an observer on the earth). When it was half way to the center, its daily niotion was aboat equal to its width; at the center its motion
was about once-and-a fourth its width. Comparing from day was about once-and-a fourth its width. Comparing from day
to day, there were very gradual changes, so that its recognition was unmistakable. These small successive changes reached, however, such an amount that, after crossing the
disk and reaching the western limb, there could be no likeness traced between its appearance then and its appearance on the 7th. It was seen during eleven days. The ingress and egress were not observed; but estimating by the rate of the passage when near the limb, it occupied twelve or thirteen days for the entire passage from limb to limb, its course being nearly a diameter of the disk. Its rate was more rapid over the latter half of its course, showing that it must have had a motion besides that due to the sun's revolution on iti
axis. When in the center, twenty-five conjatituent apots were counted on tie photographed disk (which has a diameter of $3 \frac{f}{4}$ inches). It had then widened to three times its breadth when at the edge.
Faculæ were conspicuous on May 17, but have generally been infrequent.

## Zodiacal Light.

This phenomenon, so seldom seen in the spring later than March, was noticed on the evenings of May 3, 5 , and 8, stretching very obliquely from the northwest towards the stars of Castor and Pollux

## Barometer and Thermometer,

The meteorological journal from April 18 to May 17 gives the highest barometer, May 11, 30.41 ; the lowest barometer, April 26, 29.41; the highest thermometer, May April 29, at 7 A. M., $31 \cdot 5^{\circ}$

## Amount of Rain.

The rain which fell between the morning of April 20 and and the morning of April 21 amounted to 2.53 inches. The rain which fell during the day of April 23 amounted to 0.43 inches.
The rain which fell during the night of May 15 and the morning of May 16 amounted to 0.33 inches.

## SOCLAL SCIENCE.

The American Social Science Association is now in session in this city. Several able and learned papers have been read and discussed, from which we give below brief abstracts of the conclusions reached. President Gilman, of the University of California, spoke in reference to that State as a social study. He considers that California is rapidly becoming the
center of bullion operations for the world, and that, through center of buinion operations for the world, and that, through
the resistance of the State to a paper currency circulation, it the resistance of the State to a paper currency circulation, it
has had no share in the panics which have visited other sections of the country. California was one of the first States to inaugurate hostility toward the predominant influence of railroad corporations and monopolies. Erroneous impressions, the speaker stated, exist in the East regarding the state
of society, but the future will show that in California the best forms of Cbristian culture and civilization are to be in the ascendant, education is to be widely diffused, and the favorable sky and soil are to render the physical conditions of life enjoyable to an immense population.
Mr. David A. Wells read a lengthy and exhaustive paper on the rational principles of taration. It would occupy too much space for us to trace the cogent arguments adduced by the learned speaker, but the general conclusion to which his investigations lead is that the rational principle of taration is to tax but comparatively few articles,tangible property and fixed signs of property, for in this way only can taxes be
assessed equitably, uniformly, and cconomically; and then leave them to diffuse, adjust, and apportion themselves by the inflexible laws of trade and political economy.
Professor Benjamin Peirce discussed the subject of ocean lanes for steamships, and advocated a systematic organization of the paths of the Atlantic steamers, so as to remove the principal source of the dangers of collision. He consid ers that, when the number of steamers is increased tenfold, as it will be before many years, each vessel will be in direct prcportion liable to destruction from the above cause. The meridian of greatest danger is that of $50^{\circ}$ west of Greenwich, as in that locality dense fogs, squadrons of fishing vessels, and stranded icebergs abound. The speaker said that the route taken by the Cunard line reduces the dangers to th least amount, and in conclusion suggested that some pro
visions on the aubject, introduced into marine policies, might be wise and effective. It might be well also to have the loge of all steamers examined, and to cause an adverse report to be a serious and dreaded result.
In a paper on American and European railroads, Mr. Gardiner G. Hubbard, of Boston, dealt with the question of cheap transportation. He quoted the opinion of the Senate Committee, that the only means of securing and maintaining trustworthy and effective competition between railways is through national and State ownership or control of one or more lines which, being unable to enter into combination, will serve as regulators of other lines. If two paralle routes between 400 and 500 miles apart, with the Missis eippi river in the center, are extended from the Gulf to the
Canadian boundary, they will embrace the best cotton, corn, and wheat lands in the world. A short canal will connect the Missiiseippi with the lakes. A comparatively small sum will open these routes for three quarters of the year. The Senate Committee believe that the most advantageous channels of commerce to be crested and improved by the government are the Miseissippi river, the northern lines by the lakes, a central line by the Ohio, through Virginia to Richmond, and the southeastern route by the Tennessee, through Alsbama and Georgia to the ocean.
The first will open the Mississippi from the Falls of St. Anthony to the Gulf of Mexico. The northern line wil open a navigable way through the lakes, the St. Lawrence, the Welland, Erie, and Caughnawaga and Champlain canals, and the Hudson river to New York. The other lines will open the Ohio and Tennessee rivers to their head waters, and the rice connect by canals or freight rallways with the ocean at Fifchmond or Bavaninh. The House Committee recommended a double track freight railway from the Misissippi river to New York, with branches to Cbicago and St. Louis, and that government aid shall be given by in dorsing the bonds of the company for one half the actua cost of the road, the rated of freight to be fixed and incorporated into the charter. The Senate Committee report
favorably on this plan, and it is dffficult to underatand why lavorably on this plan, and it is difficult to understand why of the gave the preference to the Richmond they estimate at $\$ 55,000,000$, or nearly the same as that of the freight rail way, and the freight charges will be nearly 10 per cent less by the latter, with a saving of from two to three weeks in time. The railroad will never be closed, while the canale will be frozen at least one month in each year. 'The benefits that will result from the opening of such a road to the whole porting grain from the west will be reduced one half, which will be equal to a saving of $\$ 47,000,000$ on the product of 1872. This reduction will enable us to compete with Russia for the supply of Great Britain, and give a market for all our surplus. It will reduce the price of breadstaffs to every consumer in the East, and, in an equal ratio, the freight on merchandize and manufactures to consumers in the west The speaker admitted the inerpedioncy of government
undertaking that which can be performed by private onter

prize, but believed that this is the only way in which the needed relief can be obtained.
Dr. J. Foster Jenkins, speaking of tent hospitals, said that the tents should be made of cotton, rather than flax. They should have board floors, either covered with oilcloth, in order to provent fluids from sinking into the wood, or, proferably, wared or coated with parafin. All tents should have a double roof; the ventilation will be better and they will be drier. Both should have openings near the ridge for ventilation. The heating in winter ahould be by stoves placed underground at the end of the tent, with pipes carried through under the floor.

Flud Extract of Cerestnut Leaves.-Dr. J. Eisen mann, of Vienna, has experimented with a fluid extract made from the leaves of the Enropean variety of castanea vesca, as a remedy for whooping cough which had but recently entered into the spasmodic stage, and in which the subsequent course of the disease could be well ascertained. The results were so favorable that the author calls the attention of European physicians to this remedy.

## COMMISSIONER'S DECISIONS.

LLIM FOR THE ARTICLE AND APPARATUS IN ONE PATENT.-ILPROVEIRENT


oombination olaims.-impbovement in entilope oounting machine [Decided May 9, 1874.]











## DECISIONS OF THE COURTS.





$\qquad$



Composition to :be Applied to the Surface of Paper for Artificial Flowera
Paui es acquerel, New York city.-This is a composition for protecting
and preserving the vegetable paper applled to articial fowers, consisting of colo phony, gum dammar, and camphor, spirits turpentine, poppy seed oll, kerosene, and castor oll. It is an 1 mprov
patented by the same inventor, October 21, 1862 .

Improved Kcroll Saw Table.
Patullo, Dexter, Mich., assignor to hid
George Halkett Patullo, Dexter, Mich, assignor to himself and David A. Boggs, same place.-This invention relates to the mode of adjusting the
 means of which the table is rotated on its pedestal while standing level or at any desired

## Improved Hand Potato Digger.

Horace S. Phelpa and Alfred Phelps, Frankiln, N. F.-In using the ma-
chine, the $u$ pper end of a jotnted hande chine, the upper end of a Jointed handle is pushed out ward, which raises
one set of prongs away from another set, and allows the latter to be thrust one set of prongs away from another set, and allows the latter to be thrust
into the ground in the manner of an ordinary fork. The end of one haninto the ground in the manner of an ordinary fork. The end of one han-
die is then drawn toward another handle, which forces the prongs into the ground to meet the others. Inclosing the potatoes between the prongs The operator then lifts the digger upward, draws it toward him, shakes out
the dirt, and drops the potatoes into a basket by pushing one end of a hanthe dirt, and drops the potatoes into a basket by pushing one end of a han-
die outward, leaving the parts in position for the prongs to be again thrust die outward, lea
into the ground

Improved Mitten
Bolomon J. Clute and Daniel M. Durfee, Rockwood, N, Y.-This inventhon relates to the old and well known class of one fingered mittens, and consists in constructing them from a number of pleces, cut with much
economy of material. The palm comprises a plece, which is the palm the foreflinger, another plece, which is the side and back of the front finger and part of the back of the hand, with an extension to take the place of the
fonrchette of the first finger. The edge of the said extension is sown to fonrchette of the frst inger. The edge of the sald extension is sown to
the edge of the part not so extended. The palm and back are formed from the junction of the fore and second fingers at the back of the wrist. An extension takes the place of the fourchetie of the forefinger, and is sewn to the edge of the palm, along the Inside of the second finger.
Improved Bydrant.
$\left.\begin{array}{c}\text { Michael Allen, Schenectady,N. }\end{array}\right]$.-To pack the joint so as to prevent leak--
age between the bar connecting the valve with the screw which operates age between the bar connecting the valve with the screw which operates to open and closote and the bottom of the groove in which it works, is a
thimble in the passage, an elastic ring, and an adjusting nut, by which the inger end of the thimble is pressed watertight on the bar.

Improved Steami Mining Pump.
gers, Central City, Col. Ter.-This inventio
Andrew N. Rogers, Central City, Col. Ter.-This invention consists of a reciprocating steam cyllnder with a statiobary piston and a continuous
acting force pump in a light strong frame, having apparatus by which it can be conventeetily suspended by ropes and palleys, so as to be convent.
ently adjusted as the work progresses. The steam is conducted down to ently adjusted as the work progresses. The steam is conducted down to
the engine by plpes, and the water is forced ap by other ploes, of which the englne by plpes, and the water is forced up by other ploes, of which
sections will be added on as the engline descends. The invention also consections will be added on as the engine descends. The invention also con-
sists of certain improvements in the construction of the engine and the pump to adapt it for the use for which it is intended.

Improved Plow.
Hill, Mo.-This is an
John M. Tingley, Clifton Hill, Mo. - This is an Improved short beam plow so constructed that the beam may be adjusted to cause the plow to run
deeper or shallo wer, and to take or leave land, without removing a bolt. deeper or shallo wer, and to take or leave land, withont remoring a boit,
and which will eaable the beam to be eailly detached without remoring a bolt. The invention relater speciacally to the comblnation, with the stan-
Improved Hose Patch.
Oscar E. Phillips, Richmond, Va.-The object of this invention is to provide ready and conventent means for repairing hose or plpes employed for
conductlog water or other liquid, when from over preasure or other cause conducting water or other inquia, when from over pressure or other cause
they have burst or holes have been made thereln; and it consiste in a metallic patch composed of an inner and an outer plate, between which the hose is clamped by means of one or more screws.

Improved Screw Forming Machine.
Peter H. Howell, Black River Falla, Wis.-This is a gulde attachment for swaging machines by which store and other plpes may be produced with
wcrew threads, so that they may be readily put together and disconnected and the silipplng of thi same or escape of ashes or sparks be effectually preand the silipping of th same or escape or ashes or sparkse effectuany pre.
vented. The evite consist of two maln standards whtch carry a verti-
cally and laterally adjustable arm with two wheels, on which the stove or other plpe is placed and fed. under sultable inclination, to the swaging machine.

## Improved Violin Bow Rosiner.

Thomas . Kathaway, New Bediord, Mass.-This is a pocket case for the rosin, which may also be employed for a handle whlle applying the rosin
to the bow hair ; and it consists of a ittle paper or leather case of approximately ellipticalform in cross section, open at both ends to allow the bow to be drawn forward and back through it, and provided with end flaps Which close the ends and fasten together along one side. In this a plece
of rosin is secured, about haif diling it and extending from end to end, so of rosin is secured, about haif alling it and extending from end to end, so
as to be rubbed along the atring without having to touch the roaln by the as to be
hand.

## lmproved Hay Loader.

Carmio. Benton, Topeka, Kan.-The axle is bent at right angles near each end, to bring its misdile part suffclently near the ground. To the
bends are attached Dars, the forward parts of which meet and have an eye to hook apon the middle part of the axle. The bars project to the rearward, and rakes are plivoted to them. When passing from place to place, by unhooking the chatn, the rake may be turned up to rest apon the eleva-
tor frame. Tne latter may be adjuated closer to or further from the ground, as may be req apart, are attached cross bars, which are provded with prongs, by which
the hay collected by the rake teeth is taken from said teeth, carried pp the frame, and deposited apon the wagon. The elevator is operated by the advance of the machine.

Improved Cotton Bcraper and Thinner.
T. Dollahon, Pitman, Ark.-This invention consists or
Charles T. Dollahon, Pitman, Ark.-This invention consists of a master
Wheel, the axle of which is mounted on the left hand side of the beam,
from which a from whors for cultivating the right hand side of the row, while the wheel rons along the left hand side, and is followed by a scraper on that side. A shaft geared with the master wheel extends across to the left hand side, and has a crank at that end connected with a horizontal elbow lever, which
works a chopper, and causes it to chop out portions of the row at certain distances apart. The elbow lever is cennected with the orank by contritive while the machine is running along one side of the row, as it is only necessary for it to work during one pasagg of the scrapers, whllethey are required to ran t $\begin{aligned} & \text { wice along the row, once on each side. Thus the machine } \\ & \text { and }\end{aligned}$ scrapes off on one side, cultivates on the other, and chops ont, all at the
same time, and by runing both up and down the row scrapes off and cult1same time, and by
vates both sides.
Improved Ice Pitcher
Joseph B. Cox, Mount Laurel, N. J.-This invent
a a cap on the front side of the . J.-This invention consists in providter which communicates with it. The water accumalating in the gatter will be taken up by the sponge, so that it cannot be spilled in handling the pitcher, as it would be liable to be if allowed to remain in the gutter.

Improved Vapor Bath.
Volney Miller and Horace Cole, Andover, Mo. -There is a small case for
confning the vapor, which incloses the whole of the body except the head. counning the vapor, which incloses the whole of the body except the head.
There is a vertically adjastable seat under which is a vapor-distribating There is a vertically adjastable seat under which is a vapor-distribating
pan, under which the alcohol lamp is burned. Sultable dampers are pro-

Improved Die for Welding Linkg.
John B. Baugh, Detroit, Mich. -This invention conglats
of two wedge-shaped link dles, which latter work in the bed die dind and ralsed therefrom by a lever which throws up wedges and allows the link to be removed. The face of the steam hammer which strikes the link in the operation or weeding has an orifice which recelves the top part of the link
and thereby keps the link in place when the welding blow is ptrack. By is apparatus the operation of welding links for car couplings and for other purposes is greatly facilltated.

## Improved Milk Safe.

Hiram Babcock, Aplington, Iowa.-This invention consists of a safe pro Vided with hollow slding shelves, which are closed at the sides, but open
at the ends, where they connect, by slotted apertures, with air chambers t both sides of the shelves, through which a current of air is kept up by regulating draft holes and a pipe connection with chimney.

## Improved Medical Compounds.

Robert R. Roberts, Bonham, Texss.- The first compound is prepared for
ase in the form of pills, of about the weight of three grains each, and con-
 sists of podophyllin, leptandrin, extract of butternut bark, extract of
rhubarb, extract of jalap, powdered capsicum, sulphate of quinine, and sallctne. These pills operate as a conic as well as a cathartic, and are The second compound is also in plll form, and consists of podophyllin leptandrin, extract of rhubarb, extract of jalap, extract of butternut bark making a three-grann catinartic plll. These pills are employed for the cure
of various diseases, more espectally those which affect the bowels and of various diseasea,
digestive organs.

## Improved Clothes Pounder.

David Grafnn, Catasauqua, Pa.-This machine for washing clothes may be used with an ordinary wash tub. The invention consists in a disk made attachod a standard and cross handle. Under the disk is secured a semispherical knob, and at equal distances from each other are attached four radial seml.cylindrical blocks, the ends of which are rounded off. Midway between each two blocks are attached radial blocks, which are grooved transversely, and the space between each two grooves is roanded off into
semi-spheitcal form. In the spaces between the latter blocks are stiched semi-sphentcal form. In the spaces between the latter blocks are attached
short radial blocks, the ends of which are rounded off, and in which are formed two or more transverse rounded grooves. The concavity draws the clothes in beneath it, so that they will receive the full force of the
blows. As the device is raised, its concavity tends to draw the clothes up with it, which loosens the clothes and causes them to move, so that they
may become more qaickly saturated with water. may become more quickly saturated with water.

Improved Lamp Trimmer and Extingrisher.
burners, so construth that it mas tinguishing the flame, and which shall be simple in construction, conve nient in use, and effective in operation. There is a flat wick tube, around Which is Atted a sleeve, from which, upon the opposite sides of the wick when the sleeve is pusbed up, to meet above the top of the tube and plnch off the wick. Sultable devices prevent the jaws from pressing against the wick before they have risen to the proper hight above the tube. When the
jaws come together, they may form a close cap over the top of the wick
tube, and thus extlinguish the wick.

Improved Watch Case Epring.
Levi Stone, Mount Vernon, ior watches, and conists in providing one end with a fastening brace,
whereby the same spring may be adapted to any case by cutting off a little more or leas, from the end of the brace.

Improved Pump
George W. Robaugh, Lee Sunmit, Mo.-This pamp consists of a central tube, which guides a plston in the usual manner, surrounded by an outer
tube of larger dlameter, forming a chamber around the inner tube, and discharging the water from a plpe extending upward from the base of the outer tube. The outer tube has an extension of smaller diameter, in which
a second piston with a central valve is guided. it being attached to the excision of the upper plation rod. The lower part of the extension tube connects by a conmmon conical valve in the uasual manner with the well
tube. The waterin raised by the ap stroke otthelowerpiston through the stroke through the valve of the lower piston into the upper part of the nain tube, untll the same is nearly fllled. Each up and down stroke forces then, by the joint action of the plstons and the pressure caused thereby, he water through the discharge plpe, so that a fregular and continuou

Improved Grinding Wheel.
John T. Henry, Hampden, asslgnor to blmeelf and Joseph Manger, Water bury, Conn.- To form a secure and durable attachment of a stone or whee opening, and provided with circular shoulders to engage with correepondIng shonlders on clamps. One clamp bears against a collar, whlle the other s forced up and tightly clamps the wheel by a nut.
Improved Portable Fence.
James L. Grifnn, Cussetia, Tex.-This improvement in fences consists of balf dovetail projections on the enis of the panels, by which the meeting ends of the panel are locked together within a long yoke extending from bottom to top of the panels, and are fastened with a key. The panels ar
mounted on stakes or blocks, and supported by oraces. The object is furnish a light and cheap fence, which can be manufactured at the mill, and carried into the field ready to $p$
down and moved about as wanted.

Improved Press.
John Gramelspacher, Jasper, Iowa.-This invention consists of a brak lever plvoted at the middle in the top of the follower stem, and having a
fnlerum on each side of it on a rod working up and down through a and supporting beam. The rod also works through a griping pawl, which allows it to descend freely, but. gripes and holds it against rising, so that
the falcrum of one siae deacends while the other in holding the lever for pressing the follower down. This cauaes the follower to be forced dow auckily by the vibrations of the levora

## Improved Stove P1pe.

David Boyd, New York city.-An annular fue ts left between outer and Inner plpes for the passage of the smoke and heated gaseous products of
combustion. By this means, Instead of a central column of ascending heat, the heated gases are spread out into a thin layer, and are compelled o part with their Leat before being discharged.

Improved Furnace Attachment for Steam Boilers. which is placed on the rear ends of the grate bars at the fire bridge, belng open at the bottom, with forward projecting top plece and connecting
sides, to which a front plate is attached. This plate extends laterally across the casing, and is inclined dagonally toward the top corner of the heet of air is connected and thrown forward to mingle with the fire gase for their more complete combastion.

Improved Dough Kneader and Cutter.
Frank Möckll, Galveston, Tex.-This invention is an improved instru-
ment for rapldy and thoroughly kneading dough, and for scraping, rolling and catting the same, and consists of a main part of 0 sbape, with curved ower part and ends, which main part is used for kneading the dough While a knife at the apper end serves for ecraping and catting. There is a at the sides for stamping out cakes. A handle at the inside of the lower end serves, in connection with the apper curved end, for the conventen handiling of the instrument during kneading.
Improved Window Screen,
George F. sarles, Bedford Station, N. Y. This invention consists of an arrangement of the sash in the window, so that the net can be used at the top or bottom of the window, and shifted from one to the other withon

Isasc F. Van Duzer, Middletown, N. Y.-A T coupler, of lead, joins a branch to the side of a plpe. It has a groove along the top to receive the
alde of the plpe in it, and a hole through the center, at right angles to the groove, for the plpe. The coaplers are made of lead, so as to allp on the pipes easily to form the basts of the Joint. They are fastened by solder,
overlapping them at the edges, and flowing in between the paris at the orerlapping them at the edgen, and flowing in between the paris at the Improved Planter.
Charles D. Wilson, Kentland, Ind.-This invertion is an Improvement in a well known class of seed planters, and relates chtefly to the arrangemen ing wheel, and on the same shaft therewith. The face of the toothed wheel has projections or teeth attached to it , which are struck by the pro jections attached to the see
the advance of the machine.
Improved Sagger.
Benjamin Jackson, Geddes, N. Y.-This invention relates to improve ments in saggers employed in the process of backing or burnitag crocker Ware, for the parpose of protecting the ware hrow direct action of th are and the injurions products of combusition. The invention consists in nently attached to the walls of the same, and provided with notches The latterare adapted for the reception of detachable pins, designed to apport the ware to be burned.
Improved Nail Plate Feeder.
willtam H. Field, Tauntou, Mass.-For the purpose of Inserting the nall plate into the nippers, at the front end of the nipper rod, the attendant works a treadle, releasing a spr!ng clutch and throwing the maln shaft ou of gear. Thenipper rod is simultaneously carried back by its hanale. The he ready insertion of a $e$, ters. The $\nabla$-shaped form of collar admits of the opening of the nippers Whether the bar levers are in the upper or lower position, so that no time
ts lost in adjusting them. The treadle is then released, the spring clutch s losi in adjuasting them. The tradie is then released, the spring clutch engages instantly the main shaft, and the weight carrles the nipper rod an aill plate forward, and feeds the latter to the cutter knives. The inter mittent rotary motion of the nail plate, required for giving the same direction, is obtained by suitable mechantsm.

## Improved Water Wheel

Nelson Conner, Jalapa, Ind.-This invention consists of a double wheel comprising a horizontal wheel, recelving the water at the periphery and
discharging it at the center for the upper portion. Another wheel below ect fres the water at its centerfrom the upper wheel and discharges it a be periphery. The two wheels are contained between tol, and bottum Im a ilttle wider than the depth of the buckets It is fitied ait ane edge with the bottom plate of the scroll case, to form a joint to confine the water to the upper wheel as it enters from the chates. The buckets of the ower wheel are arranged to discharge the water in the contrary directio oo that in which it is recelved on the upper buckets, and in a manner to
recelve the reactionary force, while the upper ones recelve its direct
 Improved Fence Raill
John Wolder.

Felates to mean Whereby the ralls or longitudinal boards, which are usually affled by nalls
or other fastenings to fence posts, may be spaced at exactly the interval desired and in a corresponding manner on all the panels. The invention consista in a rall gage constructed and put together in a noveland pecular manner.

Improved Railroad Car Brake.
William L. Belt, Little Rock, Ark.- This iavention relates to means fo operating the brakes of a train or cars from the engine, and consists in com bining, with the ordinary vibratory brake lever, a grapple and three rods
rranged in a novel and pecullar manner, whereby the brakes are brough ato operation the moment the power is applied, withnut walting for the cars of the whole train or any two of them to come together.

Improved Lifting Jack.
Maxwell B. Henry, East st. Louis, Ill.-The lifting bar has ratchet teeth on opposite sides, and is worked ap and down in a vertical stand or frame
by means of a lever, to each arm of which are applited a sllding rod and a pivoted pawl. The rods are flattened and bent near the inner end to form spings, which enable the pawls to yleld and sllde over the ratchet teeth
The rods can also be used to hold the pawli out of engagement with th The rods can also be used to hold the pawls out of engagement with the
ratchet bar when the latter is to be lowered.
Improved Commercial Register.
egister consisting essentially of a serites of supply chambers, spiralchanuel way positely parforated and gulde tubes, slide tubes, a recelving a chamber, of op ucting tube, a tilting bottom, cords, and lock box, all combined in a nove other places of business.

Inventions Patented in England by Americans. [Complled from the Commissioners of Patents' Journal.] ariotltural Implement.-A. McMartin, New York city Air Enaine.- W. Manson, San Franclaco, Cal.
Alikali Pacienag.- B. T. Babbitt, New York citg. Archor.-J. T. Fewkes, Philadelphis, Pa.
Brafe and Signal.-G.Westinghonse,Jr. (of Pittsburgh,Pa.),London,Eng
 Combination Loci. - W. F. Ratter, Philladelphla, Pa. cutting Treth on Wherle, etc.-J. A. Peer, San Francleco, Cal.
Extension Table.-F. Osgood, Boston, M
Efilet.-J. P. Puitz, Planteville, Conn.
Ienition Fuse.-W. A. Leonard, Boston, Mass.

Loom.-W. Nuttall et al., Westerly, R. I.
Mrtathio Cartridaz.-H. Berdan, New York city. Molding Conoretr Pipis.-J. W. Stock well, Portland, Me.
Pitrolevin Furnack. L. C.d'Homergue, Brooklyn, N. SEPABATIMG FLoub.etc.-J. T. McNally. Brooklyn, N. Y. SEwing MAchine.-G. H. Bishop, New York city, et Shot Cartridaz.-A. B. Kay et al., Newa
Sirup Jug.-G. M. Irwin, Pittsburgh, Pa.
SPade bayonet, etc.-r. Cbillingworth, Springtield, Mas
SPARI ARRERTRR.-H. G. Holmes, New Y
Equib, etc.-S. H. Daddow, St. Clair, Pa.

## NEW BOOKS AND PUBLICATIONS

Compound Engines. Translated from the French of $A$ Mallet. No. 10 of Science Series. 50 cents. New
York: D. Van Nostrand, 23 Murray and 27 Warren
Report on the Determination of the Astronomical Cöordinates of Cheyenne and Colorado Springs, made
during the Years 1872 and 1873, by First Lieutenant during the Years 1872 and 1873, by First Lieutenant
George M. Wheeler, Dr. F. Kampf, and J. H. Clark,
Civilian Astronomical Assistants. Washington: GovCivilian Astronomical Assistants. Washington: Gov ernment Printing Office.
Lleatenant Wheeler characterizes this elaborate volume as a step in the
and the western interior and plan in the prosecution of astronomical work in distributed among the offcers engaged in pleased to know that it is to b

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ary. Keystone Portable Forge Co., pulladelpha, Pa. Silicatese of Soda, Nolubbe or Water Glass
manuactured by us in all quantutes for Paint, Artul-

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 To Patentees and Merchants-The manutactare or any speciatty in quantittes would be under-
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Works, Baltimore, Ma. Works, Baltimore, Ma.
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paratus tor holsting and conveying materials by ron For Solid Emery Wheels and Machinery, Lathes, Planers, Drills, Milling and Index
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for $A$ merica, 20 Platt Street, Nem York.
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ment. Andrew's Patent, Inside page.
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alling Machine. Send for circular and eample of work. B. C. Mach's Co., Battle Creek, Mich.. Box 227 .
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nc Works, Philladelpha, Pa. Bone Mills and Portable Grist Mills.- Send
oor Catalogue to Tully 世 Wilde, 20 Platt St, New York. For descriptive circulars, and terms to gentar of new and saleable mechanical novelties,addrese
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electric light, glivig alarme, and various other parposes. Can be put in operation by any lad. Includes battery. key and wires. Neatiy packed and sent to all parts ot
'he worid on receipt of price. F. C. Beach $\&$ Co., 2 25

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A. B. E. L. will find directions for making

 article on $p$. 6 , vol. 30 , on "Indicating Steam Enginees."
 manuracturers. -C. M. can transfer engravings to metal
by the proceess of transerfing to wood, detalled on $p$.
 see our advertisidg columns.-L. M, E. W.M., and C.H:
F. will ind the particulars of the offer of a premtum for a. car couplig by het German railmay confederation on
p. 16 , vol. 29. C. A. s. can mold rubber by following send h1s name and addrees. $-\mathbf{B}$. $\&$ B. Fill nnd a recipe
 A sun dal shows solar time, which must be corrected
for mean time by the fast and slow tables published in most alimquaces.- - B. B. B. B. will And directions for exter-
 M. E. T. asks: Is the force of the powder
destroyed by puting tussue paper between the ball and the powoer? A. No. 2. What 18 the modus oper
andio of looding a plitul and catchtng the ball 1 the the Woold an invention for coupllig freltat care mhen
standing on the top of the car De of use? A. There it alwas
ment.
J. S. F. asks: Ought there to be any differ-
ace tin the capactity for pullung between two locomo
 the cyllinders belng of such diameters as to contain the
samenumber of cubtc Inches, the valve motion in each belng proportional to the stroke, but beling allise in every otherparticular? A. Yee, it steam presane, ple
ton speed, and other partlculars were the same in both
J. S. asks: What is the best non-conductor
magnetism; A. An interval of space. W. P. says: I have a boiler 24 feet $\times 42$ Water to go into the boller hioter; it takes 50 Des. of
seam to keep upa suppply of water. Would it be prac. Intoa heater, thence to the biller, and would It require
more steam, or would the beater ald the injector? Your injector cannot be in very good order, if $1 t$ will not work with a lower preserere of steam. You do not
send enough data to enable us to answer your auestion defintely. Ir the use of the heater causes sdatilonal
back pressure determined by
nomical or not.
J.H. K asks: How can I eetimate the pres-
ure of a column of water 25 feet nligh ? ure of \& column of water 25 feet high ? A. Divide the
head of water in feet by 28 , and the reanalt will be the W. C. S. asks: 1. In the bursting of a, does all the water instantiy nash into steam? If not,
does the water that remanis in the boiller tinstantly cool down to 2120 when the presesure tis removed? A. A large
portion of it wonld suddenly be converted Into steam

B. R. K. asks: Where and by whom was
the irst steamboat made?
a. There are anthentic ac.

 Dundas, built by Symington of England, in 1801 . Regu-
lar steam narigation, that tis, the running of at ateamer
 Bell. Yon will ind these facts, and many others of in.
 eral well a athenticated, in Woodcroft's "s sketch of th
F. H. asks: Why is a common flat iron and word " aed" appled to arthng heasy
B. asks: How can spiral stael springs made ing the temper? What would be the result of tarrden. ing the springs before galvanizzing, and apon withdraw. nto cold water? Would this harden themif not pre
 termards be drawn to the requiste point, and if so. by
what process? A . We think the best plan would be to what process? A. We think the best plan would be to
B. W. asks: Can you inform me how Phil-
adelphat ice cream is made, and why it is different from Boston cee creamp 4 . The aifference ts dueto the fac that EenuIne Phlladel phata tc
J. B. E. asks: How can I dye ivory and get
anice ciear red color? Lhe mordant. After haring-steeped the IVory in this a
short time, immerse tin a hot solution of Brazil wood or ochtneal.
E. H. M. asks: How are toy balloons made Are they of indala rubber or gin cotton? A. The rubber
bags are imported from Paris, and they are merely flled pare hydrogen.
 A. By removing in the course of the distillation those
aydrocarbons of the paraffin sertes melting point.
J. B. H. . asks: 1. Is there any cure for hy.
drophobas ? What la the ebest thing or a persoon to do When biten by a mad dog? A. The victims are com
monly treated by doas
mith ith $m$ dogs to prevent them from golng mad? A.Tie
tones around thelr necks and pat them under water.


 boller for dome is 5 tichene tn dataneter, the esteam sup
 seat, and cyllinder rings out in a rew days' rnn. One
party says that if we put on a steam dome 24 Inches in
 blow-of will be all that is needed. A. Yon do not send
quite enough data. It would seem, however, that the ritice in the boilier ior tie dome is $t 00$ small. We think t quite probable that a larger dome, properly connect.
de, woald remed the trouble to some degree. But we thint it would be dealrabie for yon to get a feed water Ill remove the treater part of the dirt from the water efore it goes into the boller.
W. F. S. asks: Which is the best form, for
accaracy, for the tinatde of a sprrtit level tube ? It be aright line or a carved one?
that the tube should be curred.
E. W. S asks: Will you give me the philsack, upon the Aoor, holds himselif perfectly stiff, cross.
es his havds so as to get his arms ont of the way, and es his havds so as to get his arms ont of the way, and
inhales all the alr he posilby can: and turee, fouror more percons stand around him and at a given signal al

 can reacb. A. We think that the blowing ap process 10 $t$ mast be evident thatil four persons lift a man, each one sustalns about one fourth of the melght apon one
anger; so that, if this welght is not perceptibe, it ould seem to be dne to the tmagination
N.F. A. asks: What is the best for a per-
son io read for general lmprovement $A$. It would be well for you to get a rellaole cyclopedia, which will be Very good work for yout treas, for aserul ninorma
Hon will ind in it replies to most of your other questlons, which are quite stmillar to
recently been answered 1 n our colvomas
 invented ordiscovered in any particular line? A. The patent records of different countrite. 2. Is there a re.
ward offered for plans to tmprove the month of the Ms. sissippl ? A. No. 3. Suppose that a palr of blrds were placed so that they could not see other brds of thetr
kind. Would such blrds bulld neats like therr parents? If so, what is the phillosophy of such knowledge ? A. They would. The philosopony of thetr action we cannot
explati. 4. Can Iron be melted by eun glasees? Why are explatn. 4. Can iron be metted by ean glasees? Why
notsuch glasees more tin use for heating purposes? Yes, bnt it it not generally a convenient method.
What will prevent magnets from attracting tron? we do not kn
out? A. Yes.
Wire rope or the same wetght of iron made stion anger, od of the sam any substance that will make more gas, at a \& less cost,
than ordinary Dlasting powder? What will make the most gas in the shortest time? A. These questions are 00 Indenalte.
E. asks: Why are gunpowder engines not.
general use? A. Gunpowder engines are too expen-
F. H. T. asks: Is there a substance (pro-
 2. Is there a proceess for por
We never heard of any.
J. H. A. asks: : Is there any law that requires
man who runs a steam are or stationary engine to

F. C. S. asks: What examination must a made the atean engline a study, and feel convinced that
Icould run one and take good care of 1 t, but I hear that examiners often try to confrase young applicanta. A.
Tne laws vary somewhat in the different States. But so ar as we know, the examination required for itcense to nasmail engine relates princtpally to the care and
P. S. S. asks : Is Cornell University a good beling equal, wonld $1 t$ be more adrantageous for me to go
there and stady for a mechantcaleng Ineerthan to enter
 struction at sach a school, and practice in the shops also. We th.
course Airst.
J. M. . asks: Are there any high pressure
engine on siteamers running between Liverpool and



 aking care not to breathe over it, as the fumes of mer-

J. B. S. says 1 . I have a four inch whistle, 18faction. I propose to pat a trumpet on it; of what
aterial should it be made? naterial shoulat be made
or tin, 17 painted $A$. Galvanized iron will answer,


H. .P. asks: Why is it that pork shrinks
from the bone when bolled, 11 tit tis tiled in the decrease
 stead of sketchng, oro the puroose of securing pletures the objects or interest and beanty he mikht meet? Would It require special care and arrangements to adapt
uch pleturea to the stereoscope?
A. There
ts a areat umber of amateurs, who travel to every part of the with all their apparatus contained in a box no larger
R. A. asks: Is water an element in a scien.
fic sense? If not, what combination is it?
A. Water
 art Dy welght of hydrogen.
 clocks, and how is it applied? A. For gold lacaner,
take of seed lac 6 oza,., amber and gum gutta, each, 2 oze, extract of red sandal wood in water 24 grains,
dragon's $b l o o d$ go grang, orlental saffron 36 grans
 orphyry; then, mix them with the pounded glase, and atrec alconol (atter forming with it an infubion) and stract or sandal wood. The rarlign munt then be com
pleted as before: the metal articles are heated, and those
 the varnish mas be raried by modity tig the dotes of
the coloring substances. For green, use any green trans. parent veretable color, mixed with the above. 2. With dich cement can I mend glass ware
cement. s. What mixture can I use to stop cracks In Walnutrurniture? A. Take equal rarts of beesmax and
sealing wax and mix them by meltug them together,
 Use yellow shellac varnish in the desired pattern, upon which lay the gold leaf.
C. H. M. asks: Which is the healthiest State it the nion? A. That State in which the great.
ant regard is patd to reilglon, law, and edacation. In reapect
rank.
G. D. F. apys:
2120.
Here in Argenta, Montana
Territory, it bolls at 200 . Does the alttude afifect the degree as marked on
eithermometer, or to it the pressare of atmoepher he leermometer, or 18 it the preesure or atmoephere
only which affects the boollig? $A$. Water aoes not boll untll the tension of the vapor formed by heatng 11 is
greater than the atmospheres level, where the pressare of the atmosphere is about 15
竍 1bs. per square tich, the water must be heated to $2120^{\circ}$
betore tti vapor has sumflent tenilon to overcome this pressure. At Argenta, where you are so much above atore and have a much less depth of atmosphere
atove jou, the preasure is ist so many pounds, and the
H. W. G. says: 1. Please give me the an-
alyalis of crude carbolic acid or dead oll. A . Carbolic clld consists of 12 atoms of carbon, 6 atoms of hydro-
gen, and 2 atoms of oxygen. The less rolatile portlon of the fuldes produced by distiation of coel tar con. extracted by agitatitin of the coal olls (bolling be ween $5000^{\circ}$ and $400^{\circ}$ ) with an aizailine solution. The lat the carbolic acld tin the state of carbolate of the alkill
 erated, and rises to the suitace tn the form of an oil. To
obtain It dry, recourse must be had to digeation wit chloride of calclum, followed by a new rectifaction. It required pure, only tatat portlon must be rececived which
bolls at s70. Commerclat carbollc acid 18 generally Very impure. Some spectmens do not contunn more veran so pere cent of aclas soluble in strong solution of
tootah. The tngoluble portion contalng naphthal'ne, potash. The insolable portion containg naphthal'ne
fatd bydrocarbons, and small portions of chtnoline and
and leplaine. 2. Are there any tertilizing prnperties in it of the use as a fertillizer.
J. J. apks: If there is any substance that a sabstitate for llmestone? A. Other anbstancee, like
canatic soda or tuor spar, can be used, when certain ob.
L. H. says: On p. 267, vol. 20, one per cen moss from brown stone stoops. How much is that to a quart of water? I have a house with whte marbie stoop sills, etc. Will the above remove the discolorations
alto the iron rust? A. Seventy-ive grains to a quart. It will partly remove the disccoorations but not th


Ron Ind B．asks： 1 ．How can I dissolve com． ness？A．Cat ${ }^{2}$ lbs．of cao utchonc into thnt，smol pour over 12 to 14 libs．of sulphide of carbon．For the
 The oolution will take place prompty，and the flatd will thicken very soon．2．Is there ang chemical that wil know of any．
A．C．R．asks：1．Is electricity instantane－
ous？
A．No．
Its 2．If two bodies，one heary and one light，are dropped
 ground．
J．G．asks：I．How can I make an electri－ cal condenser ？A．With sheets of turonil．They are fas．
tened on two sides of a band of olled silk，which Insu． ates them，forming thus two coatings；they are then dilk belpg interposed bet eaen them，another band of duction coll connected with it？A．One of these coat Ings，the positive， 18 connected with the binding screw Which recelves the current on emerglig from the pril
mary
wre
and the other，the negat mary wire；and the other，the nega＇Ve，is connected
with the bindigg screw which commundicates with the anme electric lamp，with only 1 carbon point，wha gas does he eapply after harligg exinausted the alt rom the tube？A．Pure hydrogen will aniwer．4．If
connect one wire from the machne with the car on，what must I do with the other wire？It stands to complete．A．Connect your wires to elther end in nuch a manner that the carbon
G．S．T．says：I recently found that a light 01 corruxated tbin sheet copper，and that he attache them to buildings by nailing strips of sheetizinc around them instead of passing them through plass insulatore，
claiming that，theugh glass when dry might be so used yet when wet，it was of little value and not to be re method of attschment described is correct．The im portant thing ta applylng a 11 lightning rod is to have a
large extent of conducting material at the base or ter mrge extent of conducting material at the base or ter

G．C．R．asks：How are the aniline colors colors are made from aniline，carbolic or phentic actid，
and napthaline，bodies obtained directly or indirectly from the distilation of coal．The reds，such as magen ta，are obtalned by the action of dichlorides of carbon， mauve，by
S．G．Jr．asks：How is the beartiful crystal instruments produced？A．By exposing the metallic

G．E．P．asks：How can glucose be distin－
gulshed from cane strup？A．The easiest method is by gutshed from cane
the saccharlmeter
$\underset{\text { white metal for harness castings？}}{\text { B．}}$ A．Melt together 1 lb．brass， $11 /$ ozs．spelter，and 1 oz ．tin．Your other
question is illegtble．
J．E．L．asks：What will keep Russian iron
from rustingand becoming discolored during the sum mer season？A．Immerse in a strong solution of car－
bonate of soda，out of contact with air．Or coat thor
D．asks：What colored veil will afford the
the best protection to the complexion？Of course an immediate solution would be furnibhed by a knowledge
of the colors which intercept in the greatest measure the actinic or chemical rays of the sun．I know tha yellow possesses $t$ nue which would scarcely be tolerated for the purpos
 vivid tint which could be used with similar effect．Blue muat be particulariy injurious，judging riom the fact of Its invariable use as a shade to photographers＇skylights
where the transmission of the sctinic rays of the sun is absolutely Indispansable．Please also state the effect vells will probably serve as well as any for obtaining

E．P．H．asks：Can you givea recipe for the manupacture or a stmpate in a short tlme after belng developed，and wblch cannot be re－develop．
all these conditions．
Ond I F．Mld like to take a stereotype or electrotype
and
plate from It．How shall 1 proceed？$A$ ．To stereotype plate from It．How shall 1 proceed？A．To stereotype Paste together a plece of tissue paper and a plece of
printing paper，and lay on the type（with the tissue
paper next the metal）witch must be well olled printing paper，anc lay on the type（with the tissue
paper next the metal）Whith must be well olled．
Cover the paper with a damp rag．and beat on to the type evenly with a hard brush；then add three other thicknesses of sott paper，pasted，and beat as before
after adding each plece．Back up wilh stif paper．Dry after adding each plece．Back up with stif paper．Dry
under a moderate heat，and take off the paper mold． You can readily arrange this mold for casting，but a metal marrix，properly constructed，can be cheaply ob－
taloed．To electrotype ：Take a cast in plaster of Paris， brush plumoago into the matrix，
galvanic bath in the usual way，
A．B．asks：1．Why does lime water，when A．Because the breath contains carbonic actd，and the carbonic acid uultes with the lime to form carbonate of lime or chalk．2．What is photographers＇paper made of，
and why does it become black when exposed to the light？ A．Because it is covered with a wash of chloride of ail ver，which blackens by exposure to the light．
S．asks： 1 ．What would be the temperature
of a body in soace．removed from the infuence of the sun？A．The a bsolate zero is estimated to be－ 900 F Fan．
2．How can common factory cotton cloth be rendered wa． terproof and transparent，to be used instead of glass
for protecting planta？A．Try Canada baisam and rectided turpentine，equa．
pepala be cured？ $\boldsymbol{A}$ ．Yea．

G．S．B．says：I am constructing a machine in which I require to use an electric spark，and will have
but a small place to spare on my machine for it．What can I ase to give me a spark that I can conduct to the I prefer something that will work promptly with very
ittle friction，and that can be made cheaply．What intle friction，and that can be made cheaply．What
two bodies brought in contact by friction will be cheap． est and give the largest spark？A．Attach a shallow cap gulred length；the end from which the spark is to be drawn should be sharpened down and tipped with platinum．In the cap place a smooth tight．fiting plece h hard rabber；for your movable disk use backsking
conventently stretched and monuted．Fine ofled silk ary be used in place of the buckskin．This answers oth questions
M．O．M．O．B．says：I wish to study min $\min _{\text {－}}^{\text {Malog．}}$ A．Dana＇s＂Mineralogy＂is the standard work．See our
L．says：1．F．H．H．asks why does water
orm an exception to the law of contraction by cold． would ask，does it？A．It contracts untll the temper twre has fallen to $39 \cdot 40$ ，and then expands until it has
reached the freezing point，and is converted into ice． A eached the freezing point，and is converte illed with melted lard snd kept until dd was found to be cracked from top to bottom．Was the expansion of the lard，or was there a chemical or bursting of the jar？
cause above named．
C．L．asks：What is the best method of $\Delta$ ：The best method is that of electro－plating．For lating without a battery，see p．331，vol 30 ．
A．W．M．asks：1．What must be the Jength
the raiters of a boune，so that the shingles mag tast as long as posible，the width of the house being 40 feet？ a．About $28 \%$ feet will answer very well．2．In a com－ bination of movable puleys，the inclination of the ropes
belng at any angle，required to find the power，the welght and the number of pulleys belng given ？It is understood that the ropes are not parallel，and that
unere ts more than one pulley．A．In such a case the there is more than one palley．A．In such a case the
relation between the power and welght will generally relation between the power and witg since the angles of
vary at every position of the welght he cords will be continualiy changing．But cating rela．位 for a silght displacement． 8 The area of the piston of
a high pressure engine is 1,200 square inches，the length a high pressure engine is 1,200 square inches，the length
of sirote 8 feet，and the presiare of steam upon the square inch of the plston is 88 lbs．，the number of strokes per minate belng 18；required the number of cublc feet
if water which the eogine will ralse from a mine 350
 he pressure of the atmosphere？A．You will ind an－
swers to this question on p．64，vol．so，on indicating team englnes，and on p．48，vol．29，on the friction of water in pipes．
G．S．D．says：A friend of mine bought a
ing，with a stone in it called aquamarine．The atone cut like a diamond and is very clear；it cuts glass，but not very well．What is the value of the stone？It is
about the size of an ordinary white bean．A．The name of aquamarine is applied to a bluish green variety of beryl，on account of its resemblange to the color of
the sea．If it is a genuine aquamarine，it ought to the sea．If it is a g
W．B．P．asks：1．How can I make a hydro－ electrical machine？A．Use a smomil steam boiler，insu－
lated from the greund by glass plllara．The steam is howed to escape from a number of jets against a num
erof sharp metallic points． 2 ．Will such an apoaratug make chemical decompositions？A．No．8．Suppose 1
have a battery of copper and zinc，and Instead of join are a battery of copper and zinc，and instead of
ng copper to zinc，I joln copper to copper and zinc to the usual way making an intense current？A．Yes．4． Wind impedes heat and sonnd；will it impede light？A．
t will not Impede light．5．How can I obtain oxygen It will not Impede light．5．How can I obtain oxygen
from the oxide or sulphate of oxide of zinc？
A．It could not be obtained from elther in an ancombined porous cup in a voltait battery？A．No ；besides，the
acld would act ou it．7．If In nall the copper and zinc together on a plece of dried wood，would the bat－ ery work？A．Yes，by runniug a wire from one to the
other so as to complete the circalt．8．How can I make a cructble out of bone ashes ？A．By compressing the
bone ashes into a mold of the desired form．9．In what bone ashes into a mold of the desired form．9．In what
number of the SCIENTIFIC AMERICAN was that recipe or mending rabber boots？A．See p．203，vol．so． 10 ．
Will rubber tubes do to they are rapldly decomposed．11．Which will break the quickest by heat，thick or thin chimneys for lamps？$A$ ． Thlck ones．12．Can I prepare oxygen from the spect－ men I enclose？A．Your specimen is oxide of zinc．See niswer to No．5．13．Are not chlorhydric and hydrochlo．
ticacids the ame as muriatic acid？A．Yes． 14 Are pot ash and potassa the same，and thetr salts，such as chlo ater of potassa and chlorate of potash，identical？A．
H．T．H says：I have a roof covered with can－ roken in many places，and I wish to remove the old paint．How can it be done without damaging the can $\underset{\text { wheel which does not give as much power as i water }}{\text { N．P．}}$ Can I put in an engine，andbelion to my main shaft to regulated allke？Will the engtine assist the power of the wheel without both running at the same speed？A．It
would be better to arrange the engine so as to drive ortion of the machinery separately．
R．A．says：I am building stationary en－ bled with their poanding．Theys strike hard on turning out a personal examination．An experienced engineer could readlly find the trouble and the means of pre venting it．2．Can you recomeend a good practical dapted to saw and grist mills，etc．？A．Thengine adapted to saw and grist mills，etc．？A．There is no
hook pubushed such as you epeak of．It has yet to be written．
R．F．B．P．asks：Is a man who uses his and his left applied to the center of the handle，a right
Mankrals，etc．－Specimens have been re－ coived from the following correspondents，and aramined with the results stated：
A．H．S．－Two are iron pprites．One is copper py．
tes．－C．S．\＆F．C．S．－It is magnelic oxlde of iron．－

H．M．F．－The ittle scales are kaolinite，which is a hy－ drous sillicate of alumina．－A．S．－The stone is valuable
for some purposes．It it iound in quarries．－F．C．K．－ it is galena or sulphuret of lead，and contains 87 pcr cent of lead．－J．S．N．－It is iron pyrites，and is not
worth working as an ore of iron．- R．W． Z ．- No． 1 is banded argilite or clay rock．No． 2 1s micaceous oxide
of iron．No． 3 is actinolite，a sillcate of magnesis and IIme．－W．F．S．－Partiallydecayed wood，corvered with
a varitety of vegetable mold．－E．P．H．－It te a fine clay containing a large amount of hydrated yellow oxide of ron．It would probably repay you to have the numert ary to do so before its market value could be deter mary to do so before is market value could be deter
m．M．B．－It is fibrous selente，which is a na－
iver tive crystalized sulphate of lime．－J．S．W．－It is a fine
sand，and might be advantageousily used in some case as a polishing powder．－R．Mt．－It is not iron pyrites．It
is blende or sulphuret of zinc．－J．D．W．－They are fect，they are interesting as mineral specimens，and when cut，are of some value as ornaments．－W．F．S．－
No． $1 \& 2$ are very No． $1 \& 2$ are very impare lifmestone．If poilshed，they
might answer for ornamental purposes．No． 3 is a vari ety of plpeclay．No． 4 is gray clay．－W．P．B．－No． 1 is a
variety of kaolin．No． 2 did not come to hand．No． is crystallized carbonate of lime or calctte－G．M．R．
－No． 1 is greenstene．No． 2 is iron pyrites and galena No． 3 contalas blende or sulphuret of zinc．No． 4 is de－ composed talcold schist．No． 5 is carbonate of lime
and iron．The last，if in suffletent quantity，might ed in iron manufacture．
E．F．T asks ：How can I print on gelatin？
J．E．B．asks ：What is the best stain for stalning pop． arclgar boxes ？－H．M．G．asks ：How can I smoke
unttons？- － ．asks：What will remove wall paper that has been put on with gum arabic dissolved in vinegar
and copal varnish，without staining the paper？

COMMUNICATIONS RECEIVED
The Editor of the Scientific American cknowledges，with much pleasure，the re－ ceipt of original papers and contributions apon the following subjects ：
On Eremacausis and Cremation．By H．H． On a Curious Freak of Nature．By C．H．M． On a Californian Chute．By J．J．G On the Sun＇s Attraction．By W．B On Gravitation．By H．B．W．
Also enquiries and answers from the follow． ing：
н．в．B．L．V．－J．F．－G．B．S
Correspondents in diferent parts of the country ask
Who sells the best drawing instruments？Where can boys＇chemical apparatus be obtained？Who make card rallway tickets，as used in Europe？Makers of the sbove artucles will probab＇y oromote their interests by
sdvertising，in reply，in the soirmitrio Amenican． Correspondents whose inquiries fall to appear should
repeat them．If not then publisbed that，for good reasona，the Editor declines them．The address of the writer should always be given．
Several correspondents request as to publish repile
to their enquirles about the patentability of their ventlons，etc．Such enquirles will only be answered by
letter，andthe partles should give their letter，andthe parties should give thetr addresses． Correspondents whowrite to ask the address of certan
manufacturers，or where specifed articles are to be had manufacturers，or where specifled articles are to be had
siso those having goods for sale，or who want to finc partnera，should send with thetr communications ar
amount sufflent to cover the cost of pubilication undel the head of＂Business and teroted to sach enquafles．
leme

## ［OFFICLAL．］

## Index of Inventions

 por whichLetters Patent of the United Stater were granted in the week endina May 5，1874，
and rach bearing that date．

## Those marked（r）are relssaed patents．］




Car coupling，J．E．Stevenoon． Car coupl！ng，G．Worden Car，dumptng，J．E．Bemis Car ramp，w．Weatlake（r）．．．．．
Car lamp．raliroad，W．H．Smith Car starter．J．H．Quackenbush．．．．．．．．．．．．．．
Car trucks，sa fety device for，M．M．Barry． Car wheel，W．Walters，
Carriage curtaln knob，A．T．Rice Carriage Jump seat，J．A．Hanna．．．．．．．．．．
Cauntic alkail package，B．T．Babbitt．
Caustc alkalles，coating B．T．Babbitt Custic alkalies，coating，B．T．Babb Chatr，bathing，Bancroft \＆T． Chair spritg rocking frame，H．s．．．．．．．．．．．．．．．． Chmney damper，etc．，D．Curle．．．．．．．．．．．．．．． lothes pin，D．M．Smith ．．． othes wringer，E．Becker．
Clutch， $\begin{aligned} & \text { riction，A．M．Brown．} \\ & \text { Clutch，friction，Sweet \＆Wood }\end{aligned}$
Cooler，milk，J．M．Jackman．．
Cort，machine for cutting，E．
Coupling thimble，
Cow stall，A．Lowe
Cultnary vessel，L．P．Bodi．．．．．．
Cultivator，cotton，W．H．Was
Cultivator，wheel，E．D．and O
urrycomb．W．E．Laurence．
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Dredging bucket，T．Symonds．
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Engator．H．J．Reedy．．．．．．．．．．．．．．
Engine，direct acting．J．Clarkson
Engine cylinder back
Engine crlinder back，D．B．Deniso
Engine ralve beari II．W．Burrows．
Explosive compound．J．H．Dold
Eytracts．making，，M．MCKenz
Eyeglass frame，A．Fricke．．．．
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ancet，Emmonds \＆Welsh
eather renovator，O．W．B
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Fence，flood，L．H．Broy
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Fire arm，breech－loading，J．C．Dane
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Fireplace，D．Curle．
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Flour bolt，E．V．Easley
Flour stand and founiain basin，I．Chase
Food for horses and cattle，H．Chapman．
ruel，artifictal，S．H Daddow．．．．．．．．．．．．．．
Fuel from coal dust and slack，w．Brood Farnace and door，W．A．Martin．．．．
Furnace door，Woodward \＆Brown
Furnace，hot air，L．Patric ．．．．．．．．．．．．．．．．．．
Furnace air distribut｜ing pipe．A．J．Creig
Farnace air distributing pipe．A．J．Crelgh Gas machine or carbureter，E．P．
Gas，manufacture of，W．D．Ruck． Gas regulator，J．Adam
Graln drill，J．C．Baker
Grate bar，rocking，
Garrow，F．Post．．．
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Hasp fastener，E．W．Gllmore．．．
Head light，noovable，H．G．Angle
Heater，feed water，H．S．Marim．
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nicator，station，L．V．Adams．
ron and steel，C．M．M．Du Motas
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Iron，etc，casting．etc．，W．W．and R．H．Hubbell
Jack，hiftiog，C．D．Aylaworth Jack，liftidg，C．D．Agle
Jack． 1 Ifting，
Kettle scraper，S．A．E．and J．Potter． Knitting machines，wiles \＆White．．．．．．．．．．．．．．．．． 150,451 ， Lamp car，W．Westiake（ $r$ ）
Lamp chimney，O．A．Gool Lamp chimney，O．A．Goold
Lanteru，decorative，H．Hirscin bers，．．．．．．．．．．．．．．．．． Lathe，chucking and centering， $\mathbf{c}$
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L．J．Schlling． Malns，device for tapplng，J．M．Hadest
Mechanical movement，R．M．Frankiln． Medical compound，E．A．Vanderbeek． hetal，machine for milling，W．Hawti．．．．．．．．．．． Meter，liquid，H．F．Read ．
Mill，fullog，J．H．Tralnor． Mill，smut，J．Hiuzey（r）．．．．．
Millstone balance，J．Waish．
Mortising machine，H． K ．For Mortistng machine，H．K．Forbis．．．．．．．．．．．．
Onl guard for shaftiog boxes，C．E．Holt． Onl guard for shartiog boxes，C．
olls，still for reAning，C．J．Cronin．
oils，treating pe roleum，J．Reese Ordinance，breiech－loading，E．A．Sutclife Paging machine，W．IL．Mann．
Paint，ireproof，L．S．Gibson．．．．．．．．．．．．．．
Paper cilp and letter folder，w．B．Bary．．
Paper，trimming Paper，trimming wall，T．Chope ．．．．．．．
Paper machine regulaior，L．A．Ducket
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Pipe cocks，reguasing，E．F．Bro Planter，corn，williams \＆Cohn．．．．．．．．．
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 Preses cotion and has, L. Gantut
Pranting prean
 Pump, T. Dowlug
Purifier, middllinga, J. Aflleck. Puriter, middlings, A. Hunter Purifer, middllings, B. Jones Rallway gate, J. Kelster . E. Rugg Rallway a ittch, poriable, G. M. Wrigh Ralla ay tles, dressing, J. McAdams
keed testing apparatas, J. R. Perry Refrigerator, J. Guertler............ Register, el ectro-magnetic hotel, L. Fing Register, tal: ylng, D. Warren.... .......... Registerling machine, Bonner \& Davison. Regulator, preasare, Dinke
Roller, field, B. D. Tabor... , stopping the rotation of, Briggs et al
Sasb hulder, B. Amc
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Saw mill, circular, J. Saw mill, circular, J. N. Hal
Saw set, J. Smith
Sawing machine, Franklin et al Sawing machine, glg, A. G. Sch Separator, grain, A. Hunte
Sewing machine, T. Crane
Sewing machine, c. Page
Seving machine, book, Tho
Sewing machine feed, Smyth et Sewing machine needle threader, J. Dixie
Sewing machine shuttle Sewing machine tension wheel, P Sewing machine tension wheel, P.
Sewing machine treadle, w. Haslup. Shingle machine, B. B. Peugh. Shirt bosom, J. Ramsey. Shoe nppers, shaplng, W. Tboiua Shoe nppers, shaplng, J. A. Tapley Slung for packages, G.F. Steveñ Solder cond planing tool, J. C. Spark arrester, M. Zeck

Stamp, band, E. Spencer ( Sta ple dlank ribbous, forming, Keniston et al. Steel, welding and refintng, c. Schild... netal into, J.C.Buttera Stench trap, Knikht \& Gulllemin. Still for refinting olls, C. J. Crount stirrup, o. V. Flor
Stove, heating, s. D. voer.
Stove, magazine, C. Truesdal
stump extractor, M. Yochem
Sumps, extracting, Huntley et al
Table, folding, Co wles \& G11
Tan rat, s . H. Hall
Tanntng, double, evaporating, H. McKenzie. Theaters, stage ship for, s. H. C Capman
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Toe calks, making, A. Reese. Torpedo envelup. 8 , makiLg, M. Chichest
Tow cleaning machine, D. Trask liftel, W. H. Peniose...
Trap, mole, E. M. Heed
Valve, safety, G. H. Cros
Valves, operatiog canal lock gate, w. Thoma
Vehtcle axle, R. Gate
vehicle lubricating axle, J. S. Eggleston Vehtcle wheel, H. B. Leckenby Vehicle wheels, relly plate for, P. Krame Veneer cutting machine, J.N. Selb.
Ventliator, window, J. W. Browne Washing machine, N.S. Andrews
Washing machine, S. Goho.
Wailag machive. T. stumm
Waterproof composition, J. A. Turner
Whifletree, E.C. Go
Windmill, C. Rempe.
Windmill, E.S. Amith
Wire, casitng solder, Eing
Wire whutters, rolliag, J. I. Howard
APPLICAIIUNS FOR EXTENSION. Applications har, eeen dulynied and are now pending
for the extension of the following Letters Patent. Hear tags upon the respective applications are appointed for
tne daye herennaitter mentioned:
29,50).-File Blaxise.-N. C. Lewls. July 22.
 29,51C.-Iron CAR.-R. Montgomery. July 22.
29,533 .-Photo CAMERA.-A. Semmendinger. July 22.

EXTENSIONS GRANTED
29,139.--SEwing Machine.- G. B. Arnold. 23,174. - PICTURE HANGING Molding.-H. Hochatrasser
28,175.-BAYONET FRoG.-W. Hoffman. 28,175.-BAYONET Frob.-W. Hofiman.
28,181 - -BURNISHiNG Bool Soles.-E. T. Ingalle. 28.184.-Mold.-H. Kolght.
28.189 - Sugar Drying Machine.-A. W. J. Mason.
28,198.-Cultivator

28,198.-Cultivator Teeth.-D. B. Rogers. DISCLAIMERS.
23,139.-SEwing Machine.-G. B. Arnold.
28,184.-MAKING CEMENT PIPE.-H. Knight.
DESIGNS PATENTED.
7,111.-Onnamestal $\begin{aligned} & \text { dabe.-J. F. Fiske,New York city }\end{aligned}$
7.412.-Hoors.-M. D. Jones, Boston, Mass.
7,419.-SEELF BRACEET.-M. D. Jones, Bostod, Mass. 7,414 -Coffin Platr.-W. Parkin, Taunton, Mas8. 7,415.-Range Front -J.R. Rose et al., Pnlladelphla, Pa
7.416. - Monvments.-J. Sharkey, Brooklyn, N.


TRADE MARKS REGISTERED.
 150.524
150,450

| 1,762.-Spictadele, itc.-Fellows et al., New York city. 1.763.-Hays, zto. -Guthrle \& Co., Loulsville, Ky. 1,76t.-Flour.-Hensley \& Co., Leavenworth, Kan. 1,765.-Orangi Bittrrs.-I. I. Hite, Mellonville, Fla. 1.766.-Printing Pressess.-B. F.Renick \& $\mathrm{Co}^{\prime}$,Canton, O 1.767.-Whisix. -Sattler \& Co., Baltimore, Md. 1,768.-Mustard.-C. L. S.fckiey, New York elty. 1,769.-White Lead.-J. Alston \& Co., Chicago, Ill. 1,i70.-Plows.-B. F. Avery \& Sons, Loulsville, Ky. 1,771.-So4p. -J. Oakley \& Co., New York city. 1,772.-Bonnet Boardb.-T. S. Scott, Philadelphia, Pa. 1,773.-Cutlery.-F. Wiebusch, New York city. |
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| sCHEDULE OF PATENT FEES. <br> On each Caveat.......................................... 810 <br> On each Trade Mark...................................825 |
| On flugg each application for a Patent (17 years). 815 |
| On lseung each original Patent....................820 |
| al to E |
| On appeal to Commisiloner of Patents............. 8280 |
| On application for Reissue |
| On application for Extension of Patent............... 850 <br> On granting the Extension.............................. 850 |
| On filing a Disclaimer............................... 81 |
| On an application for Design (3X yea |
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## CANADIAN PATENTS.

 Ligt of Patents Granted in Carada. May 4 to May 11, 1874.3,599.-1. P. Billington, Duneas, Wentworth county,
Ont. Improvements on farmer's horse power, called "Billington's Improved Farmer's Horse Power." May
4, 1874 4, 1874.
provements on farm gates, called "Bolton"s Improved provements on farm gates, called "Bolton"
Balance Gate Attachment." May 4, 1874 .
3.401-A. Margrett and C. H. Moffatt, Orillia, Simcoe county, Ont. Machine for operating the opening and
securing of window sashes, called "Margrett \& Mofsecuring of window sashes, calle
fatt's Sash Fastener." May 4, 1874.
,402.-H. H. d'Abrigeon, Mon treal, P. Q.-Improvements on an apparatus for equillbrating millistones, called "d'Abrigeon's Adjastable milistone Equillbrator. May 4,1874.
,403.-W. Tod
U. S. Todd, Pertland, Cumberland county, Me. called "Todd's Car Coupling." May 4, 1874 .
3,404. T . Carpenter, Southampton, Hants county, Eng. Improvements on apparatus for supporting, lowering attaching and detaching ships' boats, called "C
penter's Boat Lowering Apparatus." May 4, 1874 penter's Boat Lowering Apparatus." May 4, 1874 .
M. 405 .-T. J. Whitehesd, South Paris, Oxford count
M., U. S. Improvements on comblned cooklng stove Me. U. S. Improvements on comblined cooking stoves
and hot alr furnaces, called "Whttehead's Comblned and hot air furnaces, called "Whitehead's Combined
Cooking Stove and Hot Alr Furnace." May 4, 1874.
 for edgers, caled "Taylor's Improved Edger Gaze. Yor edgers,
May 4, 1574.
3,407.-O. Tho
,407.-O. Thomlees, Guelph, Ont. Improvements on
window sash fasteners, called " 1 'howleas' Window WIndow sash fasteners, calle
Sash Fastener." May 4, 1874.
Aasi-W. A. Hawthorn and E. E. Scott, Carson City,
Ormbiny connty Nev., U. s. Improvement on window Ormsby county, Nev., U. S. Improvement on window
fasteners, called'"Hawthora \& Scotl's Window Fasten er." May 4, 1874.
Improvement on Brooklyn, Kings county, N. Y., U.S. proved Baker's Oven." May 4, 1874.
county,Cal.,U. S. Smprovements on atmospheric powe hammers, called '"Manson's Atmospheric Po wer Hammer. Nas
,411.-D. W. Dake. I
apparatus for working butter, called "Dake's Johnny
Bull Batter Worker" Bull Batter Worker. May 7, 1874.
s,112.-R. D. EwIng, Toronto, Yorkcounty. Ont. Imprcve-
ments in farnaces, by which that clase of coal known as slack can be more perfectly utllized as fuel, called "EWIng's Improved Furnace." Mas 7 , 1874.
3,41s.-H. B. Morrison, Le Roy, Genese county, s,413.-H. B. Morrison, Le Roy, Genesee county, N. Y.
U.s. Improvement on breast collars for harness, called "Morrison's Improved Breast Collar." May 7, 1874.
444.-O. B. Fuller, Newark, Esex county, N. J., Improvements in dough machines, called "Fuller's Sheetling Machine." May 9, 1874.
sounty, Snt. and J. G. Armstrong, Ottawa, Carleton county. Ont.-Improvement in a spring seat for wagon
aud cars, called "J. s. \& J. G. Armotrong's Wagon and Car Seat." May i1, 18:4.4.
sit.-E. W. Colley, st. Mary's, Per.h county, Ont. Improvement in lamp burners, called "Colley's Im-
proved Chimneyless Burner." May 11, 1874 proved Chimneyless Burner." May 11, 1874.
Improvements in horse shoes, called "Bayles' Improved Horse Shoe." May 11.1884 .
s. Inpprovement to the steam engine, useful in obtaining a greater
speed of tis workings, and useful mprovement as a other uses, called "Brown's Steam Engine CIrcalar Saw Mill:", May 11, 1874.
s,419.-A. Myera, Salem,
s,419--A. Myers, Salem, Marion county, Oregon, U. s.
Improvements in metallic cases for turbin Improvements in metainc "Myers' Improvement in Metallic Cases Turblae Wheels." May 11, 1874.
3,420.-W. s. Hanter, Stanstead, stanstead county, P. Q. Improvements on wooden soles for boots and
shoes, called "Hunter's Improved Wooden Sole," May 11, 1874. Me., U.S. Improvements on machines for sawlag shtn gles, called " Gooch's Improved Shingle Machine.
May 11, 1871. May 11, 1871.
s, $122 .-\mathrm{C} . \mathrm{H} . \mathrm{S}$ Improvements on machines for sawing wood, called
"Smith's Rallroad Wood Sawing Machine." May 11 1884. ,423.-M. C. Clark, Ingersoll, Oxford county, Ont. Im provements in bed springe, called "Cla
Double Coil Bed Spring." Mis 11, 1874.
3,424.- J. L. Gregory, St. Louis, St. Louis county, Mise.
U. S., assignee of W. Redhefter, Kanas Clty, Jacksor county, Miss.,U.S. Improvement in egg beaters, calle CRedheffer's Inproved Egg Beater." May 11, 1874.
425.-s. B. Scott, Montreal, P. Q. Improvement variable apeed motions, called 'scott's Improved Var1able Speed Motion." May 11, 1874.
ville county, Ont. Improvements on washing
vilenville county, Ont. Improvements on washing ma-
chines, called "The Dufferin Washing Machine," Mas 11, 187. Ont. Improvements on washing machines, calle
"Dangerneld's Washing Machine." May 11, 1874. ,428.-A. Carleton and W. F. Nufer, Whateha 11, Muake-
gon county, Mich., U. S. Improvements in clothes
racks. called "Carleto
Rack." May $11,1874$.
3, 429.-A. Berry

3,429.-A. Berry, Sbefford Township, Shefford county,
P. Q. Improvements on a machine for mulking cows,
3. called "Bercy's Cow Milking Machine." May 11, 1874,
 called " Ihe Weatinghouse Driver Brake." May 11, 1874.

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