a WeEkly Journal 0f practical information, art, science. mechanics, chemistry; and manufactures.

Colt's Armory Testing Machine.
This machine has just been completed at Colt's armory, Hartford, Conn. It was designed by Mr. Charles B. Richards, the engineer of the Company, who is already well known to engineers as the inventor of the steam indicator which bears his name. The idea, of using an ordinary platform scale to measure the strain upon a specimen, is claimed to be original by Mr. Richards, and an of the details of the apparatus have been worised out by him.
The Company was led to build the machine, first, for its own convenience and necessities; and, secondly, on account of the apparent need of an accurate testing machine in inquiries into causes of boiler ex plosions, strength of materials for bridges and other metal constructions, and in general for measuring the strengths of American iron and steel and other materials.
We give herewith an engraving which, with a detailed deseription of the machine, will sufficiently ex plain its principles and mode of action.
$A$ is the platform of a fifty tun scale, of which $\mathbf{B}$ is the weigh beam, with its' sliding weight, $C$. Upon the platforms, a cast iron frame, D, about ten feet high, is placed to receive the fixtures for holding the upper end of a specimen intended to receive a tensile strain. The platform is five feet long by three feet wide, and has an oblong opening in its center, through which two long screws rise about two feet above the platform. One of these screws, $E$, is shown in the engraving, the other is hidden by the frame, D . The screws carry a strong crosshead, F , which can be raised or lowered by two nuts, one of which can be seen in the engraving. The screws and crosshead are not connected with the platform until the specimen is platform until the specimen is placed, and the specimen makes
the connection. The crosshead receives the fixtures for applying strains of all kinds to specimens of every shape. The lower ends of the screws, E, are attached to the short arms of a massive forked lever (not shown in the engraving), which is beneath the floor, and has its fulcrasupported by the bed plate which forms the foundation of the scale. The long arm of this lever is coupled to the differential system of levers, $G$ and $H$, the coupling leing nearly in line with the fulcrum of the lever, G. The connections, between the lever, $G$, and the screws, E, which carry the cross-
head, are so arranged that, by depressing the free end of G, the crosshead is pulled downwards, and by raising the fulcrum of $G$, the same result is produced.
The weight to produce a strain on the specimen is applied at the free end of $G$, and a rod, $K$, is there suspended, to which plates and pans, $L$ and $M$, are attached to receive weights of various values.
To raise the fulcrum of the lever, $G$, a small hydraulic jack, $N$, is used, to which the fulcrum is suspended. The $\mathrm{j}_{\mathrm{wck}}$ is fixed upon a cast iron frame, 0 , erected upon the scale foundation.
If the foregoing description is understood, it is evident that if one end of a specimen, a rod of iron, for instance, be attached to the frame, D, above the crosshead, F, and the other end be attached to the crosshead, the rod may be stretched by bearing down the end of the straining lever, $G$, for the crosshead will thereby be pulled downwards. The arms of the levers are so proportioned that one pound applied-at K will exert a strain of 120 pounds on the specimen, so a strain of 100,000 pounds will be exerted by the application of 800 pounds at $K$, and this strain will be measured by balancing the weigh beam.
The specimen is supported on the platform, $A$, and any weight which pulls it down will be indicated on the weigh
beam with great accuracy. This result cannot be obtained by using straining levers alone, because the motion which takes place in the specimen requires a very great angular motion in the straining levers, which introduces several errors into calculations based upon the weight applied to the straining levers to produce the strain. Now in this machine it does not matter whether we know the weight applied at $K$, or no ${ }^{\circ}$, the strain will nevertheless be always accurately measured by balancing the weigh beam.
As the sources of error mentioned above are common to esting machines in general use, we think this will prove to be more accurate than any that has been used.


COLT'S ARMORY TESTING MACHINE.
The crosshead, under the action of the straining weight can be moved more than one inch without requiring readjustment. Any metallic specimen can, therefore, be stretched beyond its limit of elasticity in this machine.
For transverse strains, the fraine, D, is removed, and the specimen is supported at each end upon the platform, beneath the crosshead, and the straining weight is applied by a knife edge fastened to the under side of the crosshead. To crush a specimen, it is supported on the platform, and subjected to the pressure of the crosshead, under which it will stand. Torsional strains can be applied to shafts by using the neces sary fixtures for the platform and crosshead. [See adver tisement on back page.]

THE Banking Committee of Congress has reported a bil requiring the officers of national banks to stamp all altered or counterfeit bills which pass their counters under any cir cumstances whatever. The bill is a good one and should be passed; it is one of the surest safeguards against the circu lation of spurious notes.

In the bitter cold of the arctic regions, $40^{\circ}$ to $66^{\circ}$ below zero, Fah., iron breaks like glass-so says Dr. Kane.

## Railway Power Brakes

Within the last two or three years, the inventive fra ternity have brought forward many new devices for con trolling railway trains, independent of hand brakes, and some few of these have achieved quite a success. The Boston and Providence Railway has now in experimenal use no less than three different kinds of power brakes, one train each being fitted and operated by each of these devices. Included in this number is the Westinghouse at mospheric brake, which we have heretofore described some what at length, giving some account of its successful trial on the Providence road, and of itsadoption on quite a number important roads in different parts of the country, after full and re peated trials and proof of its effciency. The good character of this device seems to be settled in this country, and the inventor is now in Europe introducing the device there.

Next on trial is the Steinard steam brake, which was first in troduced on the Flushing and North Side Railway, and has been in successful operation there on its passenger equipment for some months. In the last volume of the Railway Times, we gave some account of the details of this de vice, which, we understand, is working very favorably on the Providence road.
The last of the three is the elec tric brake, which, though less known, is said to have proved quite successful on one of the in terior roads, and so far worked favorably on the Providence. One of the noted features of the man agement of the Providence road for many years, has been its liber ality in the trial of all new devices in railway machinery; and to this liberality the public is in debted $f, r$ many important im provements, without which they would have. never been publicly recognized. We are glad that this liberal system of experiments is still continued, and we hope that Mr. Superintendent Folsom will, after this competitive brake trial has been fully carried out give the public the results of his experience. There is hardly any thing more important in railway machinery than efficient means for controlling the movement of trains from the foot board of of trains from the foot board of the engine. The power should b certain and ample, and graduated in intensity to suit*the emergency that may arise from possible col lision, from unexpected obstruc tions on the track, and for stopping promptly but easily at stations. In the economy of railway operation, the engineer of the locomotive exercises a most im portant infiuence. If he is an intelligent person, he will understand that, in starting, if he throws the throttle valve open with a jerk, he takes a good many dollars, possibly hundreds of dollars, out of the wearing value of the rolling sto sk; and he hand brakemen, often of the most ignorant and unreflec ive class, can do the same injury by applying the brake so hard as to skid or slide the wheels, thus grinding out of a rue circle, and making the wheels instruments of discom fort and possible danger, to say nothing of the needless expense. In making the engineer responsible for the movement of the train by enlarging his duties, as must be done by the use of power brakes, he will be likely to take a more decided interest in the ease of the movement of the train, whetherin starting or stopping; he will take some pride in becoming an xpert, if not an artist, in these matters, and if he is the man or the place, can save the company a good many hundred and even thousands of dollars annually in the wear of rolling stock and rails. We are fully committed to the adoption and use of power brakes, for a great many good and suffi cient reasons, and when there are so many good devices of steam, air, and electricity brought forward to meet this want the railway managers ought to put themselves to some trouble to decide which is the best; and they can only do so by fol-
lowing the lead of the managers of the Providence road, and giving all these devioesan intelligent trial.-American Rail. way Times.
interesting lecture by professor tyndall-..the identity of light and radiant heat.

Dr. John Tyndall, F. R. S., recently lectured at the Roya Institution, London, on " The Identity of Light and Radiant Heat." There was a very large attendance, the theatre of the In:titution being full to overflowing, so that many of those present could find standing room only. Sir Henry Bart., M. D., F. R. S., President, occupied the chair
Professor Tyndall said that it was long a question in the scientific world whether light and heat were the same thing, or whether there was something very different between them. Melloni, in some of his experiments, found that light would not produce heat with his thermopile; but he forgot that the human eye is a very delicate instrument, capable of being excited by an amount of light which, when resolved into heat, would give so little increase in temperature that no thermometer in the world would detect it. Principal Forbes, of St. Andrew's, found that radiant heat, like light, could be polarised; and other philosophers have done much to establigh the absolute identity of light and radiant heat. Mr Faraday showed that the magnetization of a ray of light had its strict parallel in the magnetization of a ray of radiant heat; and he did this with delicate instruments-so delicate that it needed the utmost care and caution on the part of the observer in the laboratory to see the effects. Since then instrumen tal means had been increased, and so much so that he hoped that evening to be able to show, to the large audience before him, many effects which had bitherto been confined to the observation of those who discovered them and of students who followed in their footsteps.
Heat was sometines associated with-ordinary matter, so that it passed through it by ".conduction." In another condition, heat fites through space just like light, and is then called radiant heat. Light and radiant heat come both to gether to the earth from the sun, so that the first task of
the investigator is to separate the two and examine their properties.
Professor Tyndall here threw a short brilliant spectrum upon the screen, by means of the electric lamp and a single bisulphide of carbon prism. He then held a red riband in the red part of the spectrum, and pointed out that it there ap. peared of a brilliant red color; when be held it to the yellow, green, blue, or violet of the spectrum, it looked black. A green riband looked green in the green light; but black in all other parts of the spectrum. He then said that the red riband was not heated by the red rays, nor the green riband by the green rays; but when they were placed where they looked black, they were warmed by the rays falling upon them, because they absorbed the said rays, and wherever there is absorption there is increase of temperature. Black absorbs all rays, and it is black because it absorbs every color of the spectrum. Only where light is absorbed is heat produced by it, and the heat produced is the exact equivalent of the light absorbed. If a black riband could speak, it could say in what part of the spectrum it felt warmest; and it would say that it grew warmer as it was carried from the blue end of the spectrum towards the red, but that further on still, beyond the red, where nothing was to be seen by the eye, it felt warmest of all. It felt warmest when there were no rays competent to excite vision at all. Every eye in that theatre was receiving, from the non-illuminated part of the screen beyond the red end of the spectrum, rays which, measured by the force they were capable of exerting, were a thousand times more powerful than the rays from the part of the spectrum which was seen by the eye.
The lecturer added that he wished to prove this. He sub stituted a small round hole for the slit in front of the lamp, thereby producing a narrower spectrum with curved ends. He then placed a piece of red glass in front of the hole, whereby all the visible rays of the spectrum but the extreme red were cut off, and a small round circle of red light was seen upon the screen. He then brought a thermopile so near
to the red circle of light that, although it manifestly did not touch or encroach upon the red rays, yet it caught the invisi. ble heat rays beyond the red and was warmed by them. The consequence was that the needle of a large galvanometer connected with the pile swung round in the sight of all the observers, thereby proving the presence of heat. He then
cut off all the visible rays from the lamp by means of a glass trough filled with a solution of iodine in bisulphide of carbon, yet the needle swung round as before when the thermopile was placed in the track of the invisible waves. These experiments, he said, proved that radiant heat was refracted by a prism just like light.
He also explained the nature of the thermopile, telling how it was built up of little bars of antimony and bismuth soldered together at alternate ends, and how, when one end of the pile was made warmer than the other, in even an excessively silight degree, an eiectrical current was set up, the effects of which could be measured by a galvanometer. The thermo-electric pile is the most delicate instrument known
for indicating slight changes of temperature. Professor Tyndall next proved that radiant heat was re. flected from plane surfaces like light. Parallel rays from the electric lamp were thrown, upon the surface of a plane mirror placed at an angle of forty-five degrees, so as to reflect the light upwards towards the roof of the theatre. A lens above the mirror brought the rays to a focus; which could be platinly seen because of the illuminated dust in the air. The

when the thermopile was then placed where the brilliant visible focus had been, it was proved that dark radiant heat from the lamp still came to a focus there, as the needle of the galvanometer was powerfully deflected.
Above the lens used in the last experiment, he so placed prism as to totally retlect the upward beam of light o heat, making it take once more a horizontal direction. When the light was cut off by the interposition of the opaque solurion as before, heat rays vere still reflected by the prism, as proved by the thermo-electrometer. This radiant heat is re lected like light by a right angled prism.
The lecturer next proved that radiant heat is reflected like ight by curved mirrors, and can be brought to a focus like light by lenses. In each case, after showing the experiment with light, he cut off the visible rays by means of the iodine solution, and then by means of the thermopile showed that a radiant heat focus occupied the place where the light focus had previously been.
In the next experiment, he proved that crystals of Iceland par which split a beam of light into ordinary and extraordi nary rays will do the same with rays of radiant heat. A lit le circle of light was thrown upon the screen, and this, by he interposition of a piece of Iceland spar, was transformed into two little circles of light a few inches apart. When the hermopile was placed before either of these circles, and while all light was cut off by the trough of iodine and bisul phide of carbon placed in front of the lamp, the needle of the galvanometer was deflected as before, owing to the Iceland spar dividing the beam of radial heat into ordinary and ex traordinary rays, just like light. While the needle was de flected by the extraordinary ray of radiant heat, when he urned the crystal of Iceland spar halfway round the needle herned to zero, because the turning of the crystal removed the heat ra
other spot.
Professor Tyndall next showed that two tourmalines, when crossel at right angles, stop all light, although the crystals themselves are transparent. In this position the one crysta stops all the waves which vibrate in a horizontal plảne, and the other all the waves which vibrate in a verical plane consequently none can get through the two crystals, and darkness was the result. He then showed that, when a crys tal of mica is pushed between the two tourmalines at a cer tain angle, it would partially twist round the rays from the first tourmaline, and thus allow them to pass through the second one. Thus, as the mica was inserted, it seemed to scrape away the darkness upon the screen caused by the rossing of the two crystals of tourmaline. Professor Tyn dall next substituted two Nicol's prisms for the tourmalines,
and the mica enabled some of the light to pass as before a and and the mica enabled some of the light to pass as before; and he showed that a piece of glass when squeezed, so as th throw a strain upon it, had its molecular arrangement so altered a otlet light get through the prisms, much as if the mica had right handed quartz, cut perpendicularly to the axis of the crystal, gave a beautiful display of colors by circular polari

## sation.

While the two Nicol's prisus were in position, the lecture placed a lens to bring the rays to a focus, and then cut off all he light by the interposition of the solution of iodine in bi sulphide of caroon. Then he placed the thermopile wher it could receive the dark rays, and there was a slight deflec tion; he proceeded to turn one of the prisms, and then a larger deflection resulted, showing that more heat passed through the cryatal when in one position than when in an other. This fact of the polarisation of radiant heat, he said destroys many speculations once prevalent. It shows that waves of radiant heat vibrate transversely; polarisation has no meaning with respect to longitudinal vibrations, but where there are transverse vibrations there is a power of polarisa ion. He then placed the crystals where they gave a smal deflection of the galvanometer needle; then by the interpo sition of the mica he obtained a large deflection, showing bat it acted upon radiant heat as it did upon light. The pressed glass also allowed more heat to pass through the crystals.

## magnetization of heat

Next he performed Faraday's celebrated experiment of the magnetization of a ray of light, and followed it by the magnetization of a ray of radiant heat-one of the most delicate and complicated experiments ever shown to a public audience. First he took a parallel beam of light and heat from the electric lamp, theu quenched the light by the bisulphide solution. The dark rays thus obtained were then passed through a Nicol's prism, and afterwards through $\&$ piece of Faraday's heavy glass, placed between the poles of an electromagnet; next they were passed through a second prism and were finally received upon one face of the thermopile, which water were then allowed to fall upon the other face of the pile, and the heating power was regulated by a square disk, which could be placed so as to cut off more or less of the rays at will. Thus the two faces of the pile were brought to the same temperature, and then there was no deflection of
the galvanometer needle. Under these conditions, when the electromagnet was excited by the passage of an electric cur rent, so that the piece of heavy glass was placed in a power ful magnetic field, at once there was a deflection of the needle showing that some influence had been exerted on the radiant complicated becouse a This experiment was al the more ter had to be used. Professor Tyndall, therefore, had to illuminate the little dial of the galvanometer with one of his lectrlc lampe, and to throw an enlarged image of the dia
an angle of forty-five degrees; thus the movements of the needle were made visible to everybody prasent.
The lecturer then said, in conclusion, that the thing called radiant heat was part and parcel of the radiations from luminous bodies. At the other end of the spectrum, beyond he violet rays, there were some feeble rays of radiant heat; but in the short range of the visible spectrum lay all that vealth of color which is the chief source of beauty in nature and in art. . If they asked him how came the light to be thus composed, and how it is that external nature so sifts this light as to give to the flowers of the field and the leaves of he forest trees their wealth of beauty, and how it comes to pass that we have a sense of the beautiful which has grown up, in-the midst of these agencies, and how it is that man de ives perfection and elevation of mind from the contemplaion of this beauty, he would answer that the cause must be left for philosophers to discover. He thought, nevertheless, that they would be able to give but an approximate solution, and that the real root of the matter would forever lie beyond hem. -William H. Harrison, in the British Journal of Photography.

## Laughing Gas.

Dr. Colton recently lectured in Brooklyn, giving some ractical illustrations of the peculiar effects of nitrous oxide or laughing gas, which is composed of a mixture of two parts of nitrogen and one part of oxygen.
Now, said the lecturer, the air we breathe is composed of oxygen, hydrogen, and carbon. Any gas that will extinguish fire will not support life ; therefore, if oxygen were removed from air we should die. This Dr. Colton illustrated by a coaple of jars, in one of which was pure air, and in the other ir without oxygen. A number of experiments followed. An ordinary gas burner was lighted, then gradually some laughing gas was applied to the common gas, producing a white and remarkably powerful light, making the gas lights around the room and on the stage appear quite dim. Dr Colton stated that three miles of piping, for the conveyance of this kind of gas, is down in New York, and in a short ime it would be used opposite the Fifth Avenue Hotel. Abroad it had been used some time to light large public buildings, such as the Grand Opera Houses at Paris and Vienna. The lecturer believed that, after a while, it would e introduced into all large cities.
The next part of the exhibition was the inhalation of aughing gas by several ladies and gentlemen who were in vited on to the stage by Dr. Colton. Just sufficient was given o exhilarate. Since 1844, Dr. Colton had given the gas to 55,923 persons for dental operations, and none of them had elt the worse for it. He inhaled a small quantity daily, and elt the better for it. They had removed nineteen teeth from a Brooklyn lady that morning, and she never felt the slight est pain; indeed, she was astonished, when she awoke, to find that her teeth were out. Dr. Colton then gave the gas rom a small bag to two or three ladies and ten gentlemen. The first lady danced with ease and even elegance, clutching the Doctor round the waist and making him dance with her. When the effect of the gas was off, she stood in the center of the stage, looking at the audience, and wondering, apparently, what she had been doing. She ran to the couch and covered her face with her muff. Then a tall gentleman had a try; he was talkative, and said, "You know how it is yourself-delightful! beautiful! delicious!" His speech, however, was cut short by a pitch forward towards the audience, and, had it not been for the ropes placed in front of the stage, he would assuredly have fallen over. A small dark man came next; he was pugilistic, and cleared the tage in no time. 'Then there was a dancer, who threw bis legs about as if they did not belong to him, and had a desire oo get rid of them; he was most amusing under the influence of the gas, and the audience were convulsed with laughter. A little boy was put to sleep for a minute, and laid out flat upon the stage: he was quite insensible. After this came a
young man who snored like a pig while he was taking the young man who snored like a pig while he was taking the gas. He was inclined to make a speech, commencing thus: "Happy-wonderful-worth seven miles of travel-happy on't express it-a little more-would go fifty miles." Other gentlemen took the gas, and the effect was similar.

## Native Coke.

Messrs. Litman and McDowell, editors of the Genius of Librty, Uniontown, Pa., send us a curious looking mineral with hair upon it, termed among the miners "coa! with hair on." They ask us for further information. It is a beautiful speci men of native coke or fixed carbon. The "hair" or filiform tructure is sometimes seen in artificial coke. It originated in the action of heat on bituminous coal. The long line of outcropping old red sandstone, brought up by the rising of Chestnut Ridge, and stretching from Indiana county, Pa., to Marion county, Va., crossing Fayette county diagonally, is proof of igneous action. Very likely a trap dyke exists in he vicinity of the coal bed. Native coke also occurs near Richmond, Va .

An esteemed correspondent, M., of Princeton, N. J., sends as a letter in which he states that, some years ago, he picked up a number of the Scientific American in the ffice of a rolling inill. His attention was caught by an ar icle entltled "How to make a toy steam engine;" and in company with a schoolmate, he began to colftruct one, and vltimately succeeding, his course in life was determined. From this circumstance, he attaches particular importance to practical scientifici instruction, ind rightly considers its genral dissemination to be the Ghief plement in our modern progress.
the new york fire alarm telegraph.
A visitor to the central office in Mercer street is surprised at the amount of delicate and costly machinery which is crowded into the small room devoted to the use of the telegraph. Three sides of the apartment are completely filled with the apparatus-some of it so intricate that it must be kept covered with glass, to exclude the least dust or grit, which would at once interfere with its movements. At the end of the room facing the entrance may be seen the wires, which center here from all parts of the city to the number of nearly two hundred, each with its little brass key with which it is thrown "into circuit." To the right of this frame of wires stands a large " annunciator," similar to that used in hotels; this is surmounted by a Morse magnet and a small gong. Below and in front of the annunciator is a printing machine, and on each side of this a "dial machine" and pointer, similar to those used in the station houses. On the opposite side of the room a very beautiful piece of mechanism: stands on a table, covered with glass and always ready for use. At the first glance, one would say it was a ratiner complicated musical box or a small barrel organ; for it has six drums with the stops and steel combs, and its operation is somewhat similar. To this instrument is entrusted the work of conveying an alarm to every engine house from the Battery to Harlem, which it does with " neatness and dispatch."

To illustrate, let us suppose that an alarm is struck on the gon y . The number rung is 250 ; instantly the annunciator uncovers this number, and the printing machine writes it down three times and the gong repeats it twice. The wires are thrown at once into "circuit" by an operator, while another places a brass button bearing the same number on the spindle of the machine in the glass case, touches a spring, and off starts the automaton operator, striking 2-5-6 on every fire-gong in the city, making a pause of five seconds, and then repeating the $2-5-6$, and yet again repeating the numbers after similar pause. While this is going on, the numbers after a simiar pause. While this is going on, the
same operator throws the wires to the bell towers into circuit, and the alarm is thrice sent to them; and, in less time than it takes to read the description, the bells are heard, and if the fire is near the office, the engines rattle by.
The next step is to make a record of what apparatus is at the fire, which is done by pulling out, from their receptacles in a neat frame, cards bearing the numbers of the engines and trucks which respond to a first alarm. This is scarcely done before $3-3-3$ is rung on the gong. This is a private signal, sent from some box by a fireman, policeman, or perhaps one of the commissioners who has not heard the alarm distinctly, and wants to know where the fire is. The number of the box whence the alarm came (2-5-6) is at once sent to the box designated by the annunciator, where it is rung on a little bell. Occasionally this inquiry comes from half a dozen boxes.
By this time, the bells in the office have ceased their tinkling, the automaton has given its alarm, the record of engines out is made, and the operators sit down to compare notes as to what buildings are in the neighborhood of the box giving the alarm, and the probabilities of a large fire. But any apprehensions are allayed very soon by the signal 2-2-2 -6, announcing that engine No. 6 has returned from the scene of the fire, proving that it was either a trivial affair or a false alarm. No. 6 is returned to its place in the register, showing that the district is no longer unprotected. The other engines announce their return in a similar way. In a few minutes after the last one has returned, a report of the property burned, the cause of the fire and the probable loss is received from the police station in the district, all of which is registered.
At some time during the night, or perhaps two or three times, the roll is called, to ascertain if the tower men are at their posts and awake. This is done by throwing all the tower wires into circuit, and giving the private signal, which is respor ded to by the watchersstriking the numbers of their respective towers on the gong in the office. As an instancs of how acute the sense of hearing becomes by constant training, it may be mentioned that an operator can almost certainly tell by the manner in which the numbers are struck whether the reply comes from the proper tower, or another watcher is answering. For instance, if tower No. 6 answers for itseif, and then attempts to answer for No. 9, the difference in the manipulation for the longer signal will be detected by the operator at headquarters. In this case, or should no reply be received, a messenger is despatched to find out why reply be received, a messenger is
the tower is without its occupant.
Of course, where insiant action is required, it is necessary that the circuits be complete, the batteries all in working order, and the machinery without fault. To secure this, the aid of music is very ingeniously obtained. A number of magnetic coils are attached to the hammers of a harmonicon, and they, with the plates of the instrument, form the opposite poles. To prove that everything is in proper order this harmonicon is thrown into connection with the other machinery, and if everything is right a complete octave from C to C is performed. Should anything be out of order one or more notes will be dropped, and the missing tone indicates or more notes will be dropped,
where to look for the trouble.
Like all other telegraph lines, accidents will happen to the wires occasionally, and bere another very ingenious contrivance is brought into use. Should there be any break in the line running up Third avenue, for instance, instead of send ing a man to examine the wire from the central office to Har lem and back again, the circuit is made complete, a little ins ${ }_{i}$ trument attached, and a current sent through the line wh ch travels until it meets the break, where, of course, $i$ stops; and this point is indicated so exactly that the operato
can tell almost the particular block in which the repairers must look for the trouble.-New York Evening Post.

## the yale exploring expedition of 1871.

OSSIL SEA-SERPENTS-A CURIOUS SWIMMING BIRD-RE MARKABLE
SHOSHONE.
At a recent meeting of the Connecticut Academy, in th library of the Sheffield Scientific School in New Haven, Pro fessor Marsh gave a sketch of the Yale exploring expedition of 1871. The New Haven Palladium gives the following summary of his remarks:
"The object of the expedition was to ascertain the charac ter of the three great basins of the West; that of the plains west of Fort Lawrence in Kansas, that of the Bridge basin, just west of the main range of the Rocky Mountains and north of the Winter Mountains, and of the basaltic region still farther west, through which flows the Snake river, and farther to the north, the Columbia. The party was in the Kansas basin in July, and worked there-five weeks. The region is a parched, barren country, covered with buffalo grass, no trees, with but few streams, and what there were were very low at that season of the year. The heat was intense, ranging from one hundred to one hundred and twenty degrees Fahrenheit. The method of work was to start about sunrise and continue the examination of the country until about 10 o'clock, and then keep perfectly quiet during the heat of the dery. Many of the party were unable to endure the heat; the guide, an old army scout, was completely used up, and the Professor confessed that he never suffered so much in all his life. There was constant danger of sunstroke and at every step each man crept under his horse for a moment's shelter. The results of their work were most satis sactory. Several tuns of valuable fossils were gathered. They were mostly remains of great reptiles, corresponding to the popular idea of the sea serpent. One they exhumed measared ninety feet in length. They found also fossils of huge winged reptiles, one of which must have measured at least twenty-four feet across the wings. The largest found in Europe of equal perfection measures only three or four feet. The most curious of all their discoveries here was a
fossil birc, five feet long, which is like nothing ever seen befossil bird, five feet long, which is like nothing ever seen before. It appears to be a swimming bird, but has features
widely different from anything known. They also made some discoveries about the extent of this great lake basin and fixed its northern boundery.
The next region was the Bridge basin in Wyoming. Here they found another vast bed of fossil remains, that the Pro fessor estimates at a mile in depth. It is like the eastern basin in its deposits, but the animal remains are totally distinct. The eastern has nothing but tropical animals. The only reptile found there is a turtle, and there are no fishes But a large number of ruminants. In the western basin, on the contrary, are nothing but reptiles. It seems to have been an immense lagoon swarming with reptile life. They found five species of crocodiles, six of serpents, and many lizards. They discovered also mammals of the tapir family. In every tenth layer of the deposit may be expected a different series of animals. The deposits in which they are found are mostly sand. The scenery is very peculiar, as it is the region of cañons. The rivers have cut it through in deep gorges, subdividing this deposit, and the tops of the intervening masses have been washed down, leaving a region of conical hills with deep valleys between. He should say they found in that basin at least fifty species of animals entirely new to science. It was a much more interesting country, as regards its life, than the plains, for there was plenty of game. The scenery of the Winter Mountains is very fine, the peaks being very high, reaching frurteen thousand feet, and the lowest pass is eleven thousand feet above the sea. From this region ie party went to Salt Lake, where they made some observaions on the past level of the lake. The Professor concluded that at one time it musthave had an outlet toward the Col-
umbia river, through the mountains that form the northern rim of the Salt Lake. Going northward, the country changes, becoming a great basaltic plateau extending hundreds of miles. Here they visited the great Shoshone Falls of the Snake river. They are higher than Niagara, one fall being wo hundred and ten feet, and the gorge is much deeper and grander. There are two falls, and a stretch of fearful rapids. A curious feature of the scene is that the traveller perceives no indication of a river till he is close upon the ravine. The countyy is a land of desolation. The only vegetation is the county is a land of desolation. The only vegetation. is the difficult. The remains found in this country were discovered in the strata of fine clay at the base of the cañons, and were ll of fishes.
From this country they proceeded north to the Blue Mountains, a range but little known, and which they had no time to explore, as it was already the middle of November. From this range they struck the head waters of the John Day river and followed it to the Columbia. The upper part of the John Day valley abounded in fossil remains of horses. They like those now living. This northern country is the grandest rolcanic region of modern times. The clay strata show the ffects of volcanic action, being tilted up in all directions, while in the Bridger and eastern valleys they are horizontal. They followed down the Columbia river, and at last crossed the Cascade Mountains into the Pacific slope. The scenery on the Columbia river, he thought to be the finest of the kind
in the world. On reaching San Francisco, the narty broke up, most of them coming home by rail, the rest, with Proessor Marsh, taking the Panama route. In:Central America
series of pottery and some of the famous golden idols. In the explorations in the west, also, many valuable curiosities relating to the Indians were gathered for the new museum of archæology. Professor Marsh was listened to with the greatest interest, and left the impression that the expedition was one of the greatest importance and advantage to science.'

## printing the patent drawings

We are indebted to the Hon. L. Meyer, M.C., of Pennsyl vania, for a report of a recent discussion in the House of Representatives on the bill, to provide funds for the publicaion weekly of the drawings of patents, recently alluded to in our paper.
The project of the Commissioner, which is to publish an abstract with the drawings of all the patents, in the Official Gazette at $\$ 5$ a year, meets with general favor and has passed the House. It now goes to the Senate for, concur rence. In the course of the discussion Mr. L. Meyer, among many other reasons for advocating the publications of the rawings, said;
"By placing every particular relating to our patented in ventions before the people at the earliest possible moment many a man will desist from mental labors which he may find have been anticipated, and turn his genius into othe channels; while on the other hand, by a close study which only this information and especially these illustrations will permit, many scientific and valuable improvements will be given to mankind. The project, I think, must commend itself as a most judicious one. Certainly it will have the ap proval of the people, and I hope there will be no dissenting voice upon its passage.
"The publication of discoveries generates in others the desire and the ability to add to the inventive arts. These inventions should be placed before the country in the cheap est manner, but, at the same time, in such form that no only justice shall be done to the genius of our in ventors, but aredit and honor secured to the country.'
The Hon. Mr. Hoar, of Massachusetts, said
"There are inventors all over this country who are en gaged either in perfecting old machines or inventing new ones; and to whom a lifetime of laborious industry of mind and body may be saved by a prompt and perfect diffusion of this work.
"These gazettes, if deposited in the public libraries of the country, will be in a place where inventors will know where to find them, and they will keep themselves posted in regard to particular inventions, and they can send to the Patent Office for particularsheets which contain the lithographs and drawings and the printed statements of the inventions in which they are especially interested.
" Now, sir, this is a matter of immense importance to the people of a district like mine. It is of importance not only to the people of that district, but also through them to the people of the whole country. To show how important is this matter of inventions, eten to the agricultural districts where not many mechanics live, I have only to relate one fact to the House. Ten miles from where I live, within the limits of my district, was born a man who by a single invention doubled the value of every acre of land producing cotton throughout the entire South. Twelve miles in another di rection lived the inventor of the sewing machine, which has had an almost equal effect upon the industries of the country. Ten miles in another direction was born the man who practi cally introduced chlozoform to the knowledge of mankind, which for the entire world has lightened the pains of death, re moved the pangs of labor, and made surgery a blessing in stead of an agony to the patient.
" Now, sir, each one of those three men-and I might in troduce several other instances of almost as much impor tance-was a benefactor to the entire civilized world. Each of those men would undoubtedly have found an arrangement of this kind of immense benefit to him in his study of inventions."
Simple Disinfectants.-As a simple method of employ ing carbolic acid, C. Homburgh, of Berlin, proposes to satur ate sheets of coarse millboard with the disinfeetant in ques tion. The sheets may be hung up in the rooms requiring purification, or a small piece may be torn off when a small quantity only of carbolic acid is wanted. Sheets of mill. board, having an area of about seven square feet, and con taining about one fifth of a pound of carbolic acid, are sold in Berlin for a shilling a piece. Dr. Hager gives the compo sition of a disinfecting paste for use as a washing powder It consists of 100 parts of white clay, 1,000 parts of distill ed water, and thirty-five parts of ordinary nitric acid. The mass thus obtained is allowed to stand for a few days, being stirred frequently. The supernatant fluid is then to be poured off, and the clayey mass thoroughly washed with distilled water. Five parts of permanganate of potash are nuw to be added, and the composition, when dried, is made up into tablets and wrapped in paper saturated with para up in.

When Doctors Disagree, etc.-The temperature of the sun, according to Secchi's calculations, is at least $10,000,000^{\circ}$ C; and, according to Mr. Sperer's, $27,000^{\circ}$ C.; while Pouillet placed it between $1461^{\circ}$ and $1761^{\circ} \mathrm{C}$. Mr. Vicaire, in a note to the French Academy of Sciences, objects to Secchi's use of Newton's law of radiation, because applicable only in case of low temperature, and accepting that of Dulong and Petit, arrives at the more probable conclusion that the temperature does not exceed $3000^{\circ} \mathrm{C}$. $\left(5400^{\circ} \mathrm{F}\right.$.). He observes that the greatest heat of the oxyhydrogen blowpipe is $2500^{\circ} \mathrm{C} .\left(4500^{\circ}\right.$ F.), and the highest furnace heat is not above $2000^{\circ} \mathrm{C} .\left(3600^{\circ}\right.$ Fah.

## INTERIOR OF A GREENHOUSE.

The annexed engraving represents a fine greenhouse lately constructed for William Bull, Chelsea, England, and is considered one of the most admirably constructed and conveniently arranged houses for plant growing of the present day.
The range is about 47 feet long by 20 feet wide, $4 \frac{1}{2}$ feet high at the sides, and about 11 feet from the paths to the apex of the roof. It is divided into two compartments, one being fitted for stove plants and the othor as a greenhouse. Each division has a large center stage, and side stages with slate tops and wood supports. Under the middle stage, at each end, is formed a bed, in which are planted climbers, to be trained along the roof on light oof on ligh wooden trellis work. In the stove division there is also a hot water tank for evaporation.
The paths are tiled and border ed with cement curbs, on which urbs, on whic upright supports of the stages are fixed. Ventilatio is effected by means of iron boxes with sliding covers, built in the outer walls near the path level, and by an arrangement at the. angement of the roof. apex of the roon. This, asshownin he engraving follows the form of the roof, and extends over the opening made herein sufficient ly to prevent any chance of the rain falling or drift ing into the side of the house. The
entilator is rais
d and regulated by a system of levers and quadrants, which being easily used gives greatly for maintaining the desired temperature in the house. In addition, the coal compart ment has upright sashes in both sides; they are hinged at the top, and may be all opened when necessary.-The Horticulturist.

## The Hartford Steam Boiler Inspection and In

 surance Company.The Hartford Steam Boiler Inspection and Insurance Company makes the following repert of its inspections in the month of January, 1871 :

During the month there were 932 visits of inspection made, and 1,794 boilers examined-1,751 externally, and 491 internally-while 113 were tested by hydraulic pressure. The number of defects in all discovered were 1,291, of which 311 were regarded as dangerous. These defects were as follows:
Furnace plates overheated and contorted, 72-28 dangerous; fractures, 145-86 dangerous; burned plates, the strength being greatly reduced, $99-51$ dangerous; blistered plates, arising from a want of homogeneity in the iron, 119 -25 dangerous; sediment and deposit, 207-23 dangerous. These dangerous cases arose from the accumulated sediment preventing the water from coming in contact with the iron. The sheets were consequently overheated and buckled, and greatly weakened, unsafely so for the pressure carried. Incrustation and scale, 144-15 dangerous; external corrosion, 73-17 dangerous; internal corrosion, 30-5 dangerous. In these dangerous cases of external and internal corrosion, the boilers in places were worn so thin that smart blows of the inspector's hammer entirely penetrated the shell. We are aware that many old boilers are worked in a fearful condition. While the pump is sufficient to supply a little more water than leaks out through cracks and corroded spots, they are considered all right. Hence many steam users regard inspection of boilers as entirely unnecessary. They hold that a boiler will tell its own story, and give them due warning far better than an inspector. The boiler does frequently tell its own story, and it is one the steam user does not readily forget. As well might he neglect his house furnaces or stoves, and expect to escape accident and harm, as to allow a boiler known to be dangerously weakened to go unrepaired. Internal grooving, 9-1 dangerous; water gages defective, 44-17 dangerous; blow out defective, 9-1 dangerous; safety valves overloaded or out of order, 26-15 dangerous; pressure gages defective, 139-29 dangerous; boilers without gages, 4 ; cases of deficiency of water, $13-8$ dangerous; braces and stays broken, 51-26 dangerous; boilers condemned, 13. There were 11 serious explosions during the month, by which 13 persons were killed and 18 wounded

## Fig Culture in California.

W. H. Haynie, at a recent meeting of the Sacramento Farmers' Club, gave his idea of the cultivation of the fig in

California, in these words: The white Smyrna fig could be grown and cured as well here as in Smyrna or any of the countries on the Mediterranean. They cannot be imporied at less than about twenty-eight cents a pound in bulk, and there are millions of dollars' worth sent to the United States annually. We should and could supply the market. Fig trees ten years old would give on an average one hundred and fifty to two hundred pounds of dried figs a year; and two hundred trees could be grown on an acre-making for the acre 30,000 pounds - which at ten cents a pound would give $\$ 3,000$. On the same subject, J. R. Johnson said he had been raising figs and marketing them a number of years; he had twenty good trees over ten years old; they averaged him ten dollars a year per tree Fig trees must not be

It is claimed that in this way a light ball may be projected rom a gun having a larger bore with greater velocity than from one which the ball accurately fits, owing to the differ ence in weight, friction, and surface of impact.
For further information address S. E. Jones, Santa Fé, New Mexico, or G. W. Coffin, North Springfield, Mo.

## New Method of Copying.

A novel method of rapidly and economically copying man uscripts and designs, whether produced by hand or photogra phy, has been invented and patented in England by M. Euge no de Zuccator. An ordinary letter copying press is used for printing from the design, which is formed upon a varnished metal plate. This plate, which is of iron, is either coated with a shellac var nish, and the writing or design to be copied then traced thereon with a metal point -or it may be coated with gela tin and bichro mate, and the design produced by means of photography with a transparent positive. In any case the lines are formed of bare metal upon a surface of varnish. To the bed of the copying press is connected one wire of an electric battery, and to the upper plate of the instrument the other,sothat when the press is screwed down, and the top ard bottom plates come into contact, an electric current passes The varnished metal plate, upon

## INTERIOR OF A GREENHOUSE.

crowded; they do better standing large distancesapart, with the limbs trimmed horizontally, cutting the top of the tree off. They would run in this way like a grape vine, and one tree could be made to cover a qual ter of an acre. The Italians dry their figs on dry sand. This giving a uniform heat, and they don't require turning, the sand becoming heated.

## JONES' IMPROVED PROJECTILE FOR FIREARMS

We illustrate, in the accompanying engraving, an improved projectile, patented through the Scientific American Patent Agency, Feb. 20, 1872, by Mr. Samuel E. Jones, of Santa Fé, New Mexico. The improvement is in that class of projectiles with which a sabot is employed.


Fig. 1 represents the projectile with the improvement at ached; Fig. 2 shows the form of the ring or band, which is part of the invention; and Fig. 3 is a section of the projectile through the ring, showing the way in which the ring is applied, the patent covering an elastic prismatic ring, arranged in a prismatic groove of the projectile, this groove being made to correspond to the bore of the gun in which the projectile is to be used
The prismatic groove is cut in the present instance so as to form an octagonal section, the perimeter of which is lower than the cylindrical surface of the projectile, indicated by the dotted outline in Fig. 3. The ring, shown in Fig. 2, may be of leather, rubber, or other elastic material, which, when slipped over the cylindrical part of the projectile, contracts upon the prismatic bottom of the groove, taking the same form exteriorly and interiorly, as shown in Fig. 1.
In this manner, the ring stands out on all sides of the pro ectile, so as to form a shoulder, practically enlarging the sur face of the ball on which the powder gas acts. which a memoran. dum has Jan. scratched or otherwise produced, is covered with a few sheets of copying paper wetted with an acid solution of prussiate of potash, and then screwed into the press. As before stated, the characters or design upon the varnished plate are formed of bare metal, and in these parts, of course, an electric current is set up; this action permits of the union of the iron with the potash, and the consequence is that prussiate of iron, or Prussian blue, is formed in lines corresponding to those upon the varnished plate. Copies thus produced in blue ink may be printed at the rate of one hundred per hour.

## Value of salt.

This substance is remarkable as constituting the only min ral eaten by man. Not only does it afford an indispensable and wholesome condiment for our tables, but it forms an es sential constituent of the blood, and supplies to the human system the loss sustained by saline secretions. Its antisep tic properties are invaluable; but although it preserves, it ultimately changes and deteriorates the quality of the food to which it is applied, rendering the same innutritious and indigestible; for salt, notwitstanding its being a strong stimulant to the animal fiber, is not convertible into nutriment This is the cause while sailors who subsist long upon salted provisions are subject to the sea scurvy. Its medicinal qualities are also remarkable. While all other saline preparations tend to cool, this but heats the body and engenders thirst. Some years ago, a medical man wrote a brochure in which he condemned the use of salt, attributing to it all the diseases to which flesh is heir. The poor fellow eventuthe diseases to which flesh is heir. The poor fellow eventu-
ally committed suicide. Only lately, a book has appeared in which the writer, who is a physician, recommends salt as a sure antidote to the contagion of small pox. Doctors will of course disagree; but as variola is acknowledged to arise from a diseased or poisoned condition of the blood, the due use of salt may possibly form a safe and effective specific. Salt is not only an agreeable condiment, but also an indis pensable requisite. When moderately used, it acts as a genthe stimulant to the stomach, and gives piquancy and relish o our food. In Africa, the high caste children suck rock salt if it were sugar, although the poorer classes of natives cannot so indulge their palates. Hence the expression, in vogue among them, "He eats salt with his victuals,". signi ying that the person alluded to is an opulent man. In hose countries where mineral salt is not procurable, and where the inhabitants are far removed from the sea, a kind of saline powder is prepared from certain vegetable products o serve in its stepad. Indeed, so highly is salt valued in ome places-such as Prester John's country-that from itg very scarcity it is employed as a substitutelfor money.

There is a kind of granite, found in Finland, from which glass is made directly. Its composition is as follows: silica, seventy-four per cent; felspar, twelve; oxide of iron, three; lime, one; alkalies, with traces of magnesia, nine.

## MILLENER'S EXTENSION LADDER.

The object sought in the construction of this improve ment is to provide a ladder that can be used by firemen in stead of two ladders hooked together. It hooked together. It is, so to speak, one ladder, although made in two sections, and is, it is claimed, fully as strong as an ordinary ladder of equal length. As it is capable of being made both light and strong, it will, it is claimed, be equally claimed, be equally adapted to farmers and mechanics' use. A represents friction rollers attached to the stationary part loy bolt irons. $B$ is a roller placed between the two pairs of friction rollers, the movable part of the ladder working the ladder working up or down between them, and the sides of this part being in contact with all the rollers and sliding between the side pieces of the sta: tionary part.
The roller, B, is turned by the crank, C, either directly or by means of a rod or pitman, $D$, by the use of which the roller may be turned and the ladder extended by a person standing upon the ground, so that a person standing on the mov able part may be raised or lowered, to the hight required, by those below. A self-acting brace, E , holds the parts extended in any required position.
The friction roller bolts are fastened through the sides of the stationary part by screw nuts, so that there may be more or less friction on the movable part.
The invention was patented, through the Scientific Ameri can Patent Agency, Feb. 20, 1872, by Mr. Louis N. Millener, of Adams Basin, N. Y.

## MAGNESIUM IN MARSH'S TEST FOR ARSENIC.

## by john c. draper, professur of chemistry, university medicai <br> college, new yori.

The difficulty experienced in obtaining zinc free from arsenic, for Marsh's test, has led to the suggestion of the use of magnesium for this purpose. The latter metal is rarely to be found in any other form than that of strips or ribbons, which expose so large a surface to the action of the acidulated water as to render the evolution of hydrogen too rapid for the proper conduction of the operation. To meet this difficulty, I have contrived an apparatus in which the evolution of the gas is completely under control, and which also shows that the strip or bandlike form of the metal is well adapted to the purposes of this test.


The instrument in question consists of a stout tube, $a$, about one inch in diameter, open at both ends and six inches long, drawn down at $b c$ to a caliber which will per nit the free passage of an ordinary magnesium ribbon, $m$. The tube is attached by rubber bands to a paper file, $d$, with a stout iron foot or base which serves the purpose of a support admirably. At $f$, the supply tube, $s$, for the introduction of acid and other liquids, and the escape tube, $e$, pass air tight through a cork. The evolved gas is dried in a chloride of calcium tube at $e$, whence it passes through the hard glass tube, $g$, in which it may be subjected to the action of heat and finally escape through a dilute solution of nitrate of silver at $h$

When the instrument is to be used, it is dried and a column of pure mercury poured into the bend, $b c$. The cork carrying the tubes, $e$ and $s$, is put in position and the reduction tube, $g$, properly supported. Pure dilute sulphuric acid (one of acid to six of water) is then introduced through the supply tube, $s$, and a strip of magnesium, $m$, being passed through the mercury into the acid, decomposition instantly takes place and hydrogen is evolved. The rate at which this
goes on is indicated by the passage of the bubbles throug the solution of nitrate of silver at $h$, and is completely controlled by the rate at which the magnesium is passed through he mercury.
The apparatus having been filled with hydrogen, a Bunsen flame is applied to the hard glass tube at $g$, and a measured length of the magnesium 了and slowly passed into the acid. The purity of the muterials is thus tested as in the case of the ordinary Marsh apparatus, with the great advantage that the length of the strip consumed is known; and the quantity used in the test for purity of materials may be pro portioned to that employed in the final examination. Free dom of the materials from arsenic and antimony being thus established, by the failure to produce any metallic stain in the reduction tube $g$, the solution supposed to contain arsen ic is introduced through the supply tube, $s$, and the magne sium leisurely passed into the mixture. A few moments are required to expel the pure hydrogen from the apparatus, bu the newly evolved gas finally reaching the heated portion of the reduction tube, metallic arsenic is deposited in its char acteristic form and manner, and any portions of the arsenide of hydrogen that are not acted on by the heat pass into the solution of nitrate of silver at $h$ and produce a dark brown precipitate.
The contact of the magnesium and the mercury with the acid causes the formation of an alloy or amalgam of the two metals, which, since it does not interfere with the detection of very minute traces of arsenic, is not of any moment and may therefore be ignored.

## Carregyoudence.

The Eaitorrs are not responsible for the opinions expressed oy thetr Cor
Observed Changes in a Solar Prominence. To the Editor of the Scientific American
While observing the sun on the sixteenth of February, saw a prominence which, in the many changes it underwent will illustrate the formation of the hydrogen clouds often seen floating above the sun. This prominence was situated on the western limb of the sun, five degrees north of west and was first seen at $11: 20 \mathrm{~A}$. . At this time, it presented the appearance of two prominences, which had shot up in dependently, and finally joined themselves together by the interlacing of the filaments of which their summits wer composed. Its greatest hight was 40,500 miles ; its breadth equaled about two thirds the length of the slit of the spec troscope, or about 108,000 miles. The two stems of the prom inence joined each other about 13,500 miles above the chro mosphere. The size and form of the prominence were not remarkable, but the changes which it subsequently under went were various. The accompanying engraving represent he prominence as first seen.


At 11:40, signs of separation began to appear where, a fe moments before, all seemed a compact cloud mass; and a 11:50 the two stems were only joined by thin thread-like branches. The northern stem had begun to separate itsel from the chromosphere, and was only held here and there by straggling filaments; in a moment it cut itself entirely loose from the sun at its base, but was not as yet free from the

other stem. At 2:20 P. m., when again seen, great change had taken place; the top of the northern stem had been blown towards the ipole, and strikingly resembled the long streamers of smoke of ten seen issuing from the smokestack of a steamer at sea. The length of this streamer was nearly


150,000 miles. The $0: h$ r stem of the prominence had nearl faded out, leaving only a low stump slightly joined to the northern stem, which had sunk back again to the chromo phere. Increasing cloudiness rendered further observation impossible. The morning of the next day being clear, I
again turned my attention to the spot, not expecting to find any traces of the prominence; but in this I was happily dis appointed, for the northern stem still remained, torn, shat tered, and bound to the chromosphere by one thin thread. Faint traces were left of its former attachments in the form f light thin shreds. The hight had not visibly increased; he breadth had, however, somewhat lessened. It was now 9:20 A. M., and the changes which occurred in its form were too rapid to sketch. Here and there a thread of cloud was seen to form, and as quickly disappear.


At 10:30 A. м., it announced its determination of leaving the chromosphere for good and all by a gradual twisting off of the only thread which held it captive to the sun. This it accomplished about 12 m . ; I watched it for some time, until increasing faintness rendered it a difficult object to make out.


This prominence was seen through the C hydrogen line in the telespectroscope used by Professor Young in the Dart mouth College Observatory. The prism train consists of five whole prisms and two half prisms, the light being sent twice hrough the train by a prism of total reflection at the end of the train, thus making the dispersive power equal to that of 12 prisms. The cloud prominences are often seen floating above the chromosphere, but generally have their origin in he chromosphere, and are the result of the ejection of mat er therefrom. Father Secchi states that he has observed the formation of these clouds in the coronal atmosphere. I have many times observed these clouds, but have, without exception, been unable to discover any increase in their size; but, on the contrary, I have met with a gradual fading out and an ultimate disappearance of the cloud mass. This fact, as has already been suggested, may point to one of the sources from which the coronal atmosphere may draw its supplies of the matter whose spectrum of bright lines was first seen in 1869 and 1870, and wlich the observations made during the last solar eclipse so fully confirm. John H. Leach. Dartmouth College.

## The Abolition of Models.

## To the Editor of the Scientific American:

Your correspondent " B" objects to the proposal of dispens ing with the models on account of their supposed superiority for investigating as to the novelty of inventions. I fully acknowledge.their usefulness, but contend that the drawings are much better for this purpose in most cases, especially as the models are very far from being complete, and thousands of them are so broken up that it is impossible to tell what particular patents they belong to; and in many instances it would puizzle an expert to state what class of machinery these fragmentary models are intended to represent. Of these broken and separate pieces of models, there are cartloads stowed away up in the room over the portico, which not one person in twenty frequenting the Patent Office for the purpose of examination knows anything about, to say nothing of those fragments which lie in their appropriate cases, as mentioned in my last letter.
Besides this trouble of broken models, there is another reason, that makes the drawings more reliable, which arises from the fact that the models frequently show only the bare outline of the frame or casing of the machine-the details of construction and the smaller parts, in which may consist the essence of the invention as patented, being entirely omitted and only shown in the drawing and specification. In many cases the drawing shows several modifications of the idea embodied in the model, some of them so radically different that no one would suspect that they had any relation to it except that they belonged to the same class of machinery. I remember an instance of an excavator patent, having only a very simple model, of which the drawings show seventy-five figures, embracing twenty-six different machines for various purposes. How much could our friend "B." tell about the novelty of an invention from an inspection of that model? That drawings are the readiest means of making an exam ination is shown by the practice of the examinera, who always use them in making searches and very rarely look at the models. Speaking for myself as an inventor who has had considerable experience, I know that an examination of the dra wings, in nine cases out of ten, can be made in less than half the time necessary for viewing the models. That this is so is rather amusingly shown by the experience of one of our ex-commissioners, who, when in office, issued a $v e_{1} y$ stringent order that no one should be allowed access to the portfolios of drawings without a special permit, which was only to be granted for infringement searches, etc. After this gentleman resigned his position, and had resumed his prac-
tice of attorney, he found "that it was a poor rule that would not work both ways," as it prevented him from examining the drawings now that he was only an outsider. This caused him so much trouble in his researches that, through his influence, an order was issued allowing ex-commissioners free access to the portfolios at all times, but retaining the rule in force against all others.
The incident brings up the question: Why should ex.commissioners have privileges denied to other people? Is there anything inherent in the office of commissioner that should make its temporary possessor a privileged character for life? If there is anything of this kind, the world should know it, and every ex-commissioner should wear a leather medal, a " feather in his hat," or some equally conspicuous insignia, for, otherwise, the common people-such as Ericsson, Morse, and other poor devils of like character-will never discover this "divinity that doth hedge" an ex-commissioner.
This question brings up another: Why should not inventors and their attorneys have the same privileges with drawings that they have with the models? I think that it is fully shown above that an examination of the latter is not suf. ficient to determine the question of novelty. Such a search may lead an inventor to suppose that the coast is clear, and cause him to spend hundreds or thousands of dollars in experimenting, only to find, when he applies for his patent, perimenting, only to find, when he applies for his patent,
that his money, time and talents have been spent in vain, all that his money, time and talents have been spent in vain, all
of which might have been saved had he access to the portfolios of drawings.
Washington, March, 1872.
Inventor.

## Sulphite of Soda Not a Cure for Small Pox.

To the Editor of the Scientific American:
An article entitled "A Remedy for Smat Pōx, etc.," in your issue of February 24, was cut gut and sent to me by a friend, together with your factrable notice of the same. friend, together with your arorable notice of the same. Not long ago much agitation was excited by the vaunted
cure of cancer by means of a drug called cundurango. The cure of cancer by means of a drug called cundurango. The
false hopes of cure by the many sufferers from this dreadful false hopes of cure by the many sufferers from this dreadful
malady were dashed to the ground. Again, not a few persons were led, not by the advice of a physician, to an improper use of a new remedy for wakefulness by the name of chloral hydrate.

Not only is there harm created by improper use of remedies by those who know not the nature of disease, but there is also a great obstacle thrown in the way of those who are seeking to establish the science of medicine upon a sure and firm foundation. There is great source of regret that you were led to publish an article upon the subject named in the were led to publish an article upon the subject named in the
paper alluded to, trusting more to the candor of the writer paper alluded to, trusting more to the candor of the wh to his powers ot observation of Nature; and this has induced me to write these hasty lines, for fear that another agitation of a hopeless remedy has been thrown upon the public. The value of the contribution by your correspondent depends upon the following considerations:
1st. Can an eruption upon the skin, discovered the tenth day or eleventh day after exposure to contagion, be known as small pox? Can the constitutional symptoms referred to be only explained by supposing the child to have small pox?

2d. As physicians have of cen mistaken, in its early stages, one kind of eruptive fever for another, is it not possible that
a non-professional as well as a physician might equally be a non-professional as well as a physician might equally be
mistaken as to the character of the eruption noted in the published case?
3d. Might not the suspicions that contagion might spread from the loaned muff suggest to an anxious parent that the child had an exaggeration of symptoms which would naturally be explained by him to be caused by small pox? When the writer of this present article was studying medicine, he was taken by his instructor to see a man who had a slight rash, accompanied with pains in the back, vomiting, etc., which might possibly turn out to be small pox, to which the man had been exposed. The student was cautioned never to state that a given case was small pox, until the peculiar vesicle of that disease was developed, on about the sixth day from the appearance of the rash. After waiting a week
and without any remedies except a harmless placebo, the and without any remedies except a harmle
rash had disappeared and the man was well.
4th. Does one swallow make a summer? Or does one apparently successful cure by a given drug prove that post hoc, ergo propter hoc?
The writer of this present article has been occupied, for the past eight years, in studying the action of drugs by experiments upon animals and by clinical observation at the bedside. His faith in the enthusiastic testimony of the success of a given remedy in the hands of well informed and
educated physicians has been often shaken; and he believes educated physicians has been often shaken; and he believes
that one of the greatest obstacles, to the establishing of the science of medicine upon an exact and firm foundation, is this accepting a theory and calling it a fact. If it is difficult for an honest physician of large experience to believe. that his patient recovers because he gave him warm water to drink instead of cold, how much more difficult is it for a man of slight medical education and little practical experience to determine the success of a remedy in a given case ? Now observe how the enthusiastic candor of your correspondent has led him to make mistakes: He says "the Uni-
ted States Dispensatory giv:s in an ample detail the discussion of the valuable properties of this drux (sodx sulphice), by the French College of Surgeous. in the thirteenth editorial article of the edition of 1871." There is no such edition of the work your correspondent refers to; and in the edition of this work fur 1870, almost all the articles are "editorial" articles by Drs. Wood and Bache of Philadelphia. The name United States Dispensatory was given this book by these
eminent writers; but the official organ of American physi-
cians and apothecaries is the United States P
On pages 826 and 827 of the thirteenth On pages 826 and 827 of the thirteenth edition, to which I
have referred, occur the words your correspondent has quoted in his article, but unfortunately for his candor, he has omitted sentences and words which modify the apparent state ments of Dr. Wood, who would feel insulted if he were told that he had written as your correspondent would dictate.
For example, at the commencement of the third paragraph the words "locally applied" are omitted, and in the last line the word " appear" is omitted. Allow me to furnish the cor rect text.
"Also, locally applied, useful in controlling suppurative ul ers, etc. and in any disease in which purulent in fection of the blood may be produced by the same cause (parasitic or zymotic influences). They appear almost to act as specifics in such cases." "At $a$ certain stage of cance they operate usefully in the same way." There is no men tion of a discussion of sodee sulphice by the French College of Physicians and Surgeons, nor is there an association by this name in Paris. In 1865, there was a great excitement among physicians with regard to the use of sulph te of soda, but careful trial of it in a large variety of cases lim ited its action to a very small extent.
"On the whole, and not to occupy more space with a state ment of claims which seem at present (April, 1868) to be excessive, we (Stillé, Materia Medica and Therapeutics) are disposed to adopt the conclusions of Semmola, Professor of Clinical Medicine at Naples, when he says: 'Diseases which have been attributed to morbid fermentation, such as typhoid fever, scarlatina, measles, and malarial affections' (of course including small pox) 'are in no wise influenced by the sulphites; and their grave types continue to be fatal, notwith standing these remedies. Syphilis, malignant pustule, and purulent infection are equally unaffected by their opera tion." (Bull. de l'Academie. de Médécine, XXIX, 1003).
It is unnecessary to quote from other authors who have tested, clinically, the use of this drug, as its failures in treat ment are many times larger than its success in curing that
class of diseases to which small pox belongs. lass of diseases to which small pox belongs.
Crude petroleum, though very useful in t
Crude petroleum, though very useful in the treatment of certain skin diseases, has caused death by its indiscriminate local application to the whole surface of the body.
The popular use of vaunted remedies is an exceedingly harmful matter, and occasions more work for the educated physician. It has often been truly said that the quack is the strongest ally of regular physicians. Though I have tres passed largely upon your space, permit me to point out an other fallacy. The best application for the sting of an in seet, or the poisonous bite of a snake, is ammonia spirits though in snake bites it must be injected into the circulaiion.
If your correspondent had made the local application of a strong solution of sulphite of soda, and omitted the alcohol and ammonia, he could have borne stronger testimony to the efficiency of sulphite of soda in "the sting of a male seven teen year locust."
Allow me in conclusion to state that some competent person should write a treatise upon the popular abuse of drugs, and scatter it far and wide. The effect upon the sanitar condition of our people would be marvellous.

Experiatur.

## Shaving with Pumice Stone.

To the Editor of the Scientific American:
I notice, in your issue of March 2, a communication on the subject of shaving, in which the writer suggests, and he probably considers it an original idea, the substitution of pumice stone for the time-honored razor and brush. Now, I do not agree with your correspondent when he claims superiority for what he suggests, as I have tested it, and the result was very unsatisfactory-a sore face.
As for the originality of the idea, I will state that, about the year 1850, an article resembling a file in shape, and which seemed to be made of a preparation of pumice stone, was patented in France, the inventor claiming that rubbing (or filing) the face with his invention was equally as good as shaving with a razor and soap. But the article did not meet with any success.
I have, on three occasions, imagined that I had become an inventor, but each time I discovered, through your valuable paper, that some one else had had the same idea before me. If your correspondent will only put his pumice stone theory in practice on his own face, he will probably be glad to resort to the usual mode of shaving.
G. P.

## Shaving with Pumice Stone.

To the Editor of the Scientific American:
I beg to enter my protest against ine practical joker who rubs his face with pumice stone, and recommends it to those suffering with tender skin, cross grained beards, and dull razors. Now, I have experimented, from the Davenport tricks down to Solliday's paper windmill; and can truthfully asseit that I have suffered nething that can compare with this barbarous method of using pumice stone. I followed the writer's instructions to the letter, with the single exception that I rode no donkey or other hobby, for ferr of aggravatirg the result; and what is it? The hair is off my
face and the skin too, and he is laughing in his sleeve as he reads this. Yours in affliction,
H. E. M.

A Revision of the existing version of the Bible is now in in pr gress by c.jmpanies of emineat divines, working con-
jointly, in this country and Europe. In about seven years the work will be completed, and it is expected that we shall then have a version embodying the best results of the most learned and accurate thinkers.

HE COLOR OF THE GULF STREAM, AND ITS EXCESS OF SOLID MATTER ACCOUNTED FOR.

## by william l. walker.

The Gulf stream differs in color from the surface waters through which it flows, its color being blue, while the others are green. It also holds in solution, mechanically, more
solid matter than the latter. This difference in color and suspended matter is to be accounted for as follows:
"Color," as observed by Tyndall in his researches on the color of sea water generally, "resides in white light, appearing generally when any of the consticuents of the white light are withdrawn. The water attacks the visual rays with different degrees of energy. The red are attacked first and extinguished; as the solar beam plunges deeper into the sea, the orange and yellow disappear; next the green, and next the blue; and if water were dark enougb, and contained no suspended matter, it would work the absolute extinction of the solar beam and become as black as ink. But, in all natural water, matter is held in suspension, and a modicum of light is thrown back to the eye before the depth of absolute extinction is reached." The color, therefore, results from the relation of the solids. The stream, by reason of its greater expansion through its higher temperature, relatively contains less solids, thus cutting out the green, and leaving the blue.
It is more difficult to account for this physical difference in he stream, and why, with an excess of solid matter, it does ot sink, but continues to float upon the surface.
There is a difference, generally, between the waters at the surface of the sea and those at its greatest depths, the latter being heavier, colder, and containing more suspended matter. Since all admit that an entire circulation of the oceanic waters must occur, the cold, dense water which exist below must be hot to the surface, and transformed by some process into a surface current such as found in the stream. We will now attempt to point out the principle upon which this takes place.
Aside from gravity, it is heat which causes all the surface and submarine movements of the sea. The continued expansion at the equator and chilling at the poles cause the expanded particles to flow through this and similar streams on the opposite side of the globe into the polar basins. A weight added to one end of an equally balanced beam will cause that end to go down; but, at the same time, the other end must go up. In the equipoise of waters as they exist in the sea, if 1,000 cubic miles of water is carried daily through his and similar streams into the polar basins, an additional weight is thus added to the end of the beam; and, as this must go down from a loss of temperature, an equal amount must go up at the other end (the equator), through an increase in temperature. In both instances, it will be observed that the movement takes place from a change in the molecular motions in the water, a loss at the one end, and an equal gain at the other. In the polar basins, as each partisle loses its temperature, it loses its buoyancy; and when it reaches its lowest temperature it attains its greatest density, and, as a matter of course, sinks to the lowest depths, where all such particles aggregate into masses and pierce their way by a low submarine movement to the equator. These cold, dense particles, now resting upon the lowest depths of the sea, must each le expanded by heat before an upward movement can begin, and transform themselves into a current also. Two agencies operate directly in effecting this change.
First, the direct rays of the sun, as they fall upon the sur face of the equatorial sea, perform the following mechanical functions: "The vast body of the thermal yays," as observed by Tyndall, " are beyond the red, being invisible. They are absorbed close to the surface of the sea, and are the great agents in evaporation." The other rays follow, and are severally extingaished; and at a very limited depth, not exceeding a few hundred feet at most, are totally absorbed. But these rays have performed their functions in expanding the particles near the surface, giving rise to a lateral movement, and in turn enabling those at the bottom to move upward; but, before any movement of this kind can begin among these particles below, they must receive some expansion by heat directly imparted from below, since the sun's rays can not reach them. The slightest change in the specific heat or increase in the temperature of the particles liy reason of the excessive pressure and constantly diminishing weight of he column, also, by the action of the sun's rays expanding the surface, will enable them to ascend and reach the surface
in a deflected motion caused by the earth's rotation, and be thrown into a compact current, such as we now find it, moving into the polar basin.
In this transformation of the dense cold water from the lowest depths of the sea into a surface current, it will be ob-
erved that no change has been wrought in its physical prop served that no change has been wrought in its physical properties. It is the same in all respects except that it has be face as all bodies do which are relatively lighter than the liquid in which th $y$ are immersed. Bulk for bulk, of the same temperature, the water in the stream is 15 per cent heavier, but, with its increased temperature, the stream is lighter.
It follows that no mechanical application of the sun's rays alone can produce the movement; and that the heat from the
interior is related to it, is an induction from established laws.
For distinguishing benzole, which is made of coal tar, from benzine, which is made from petroleum, Brandberg re commends us to place a small piece of pitch in a test tube, and pour over it some of the substance to be examined. Benzole will immediately dissolve the pitch to a tarlike mass, while benzine will scarcely be colored.

# THE PROGRESS OF STELLAR CHEMISTRY. 

A very able and interesting lecture was delivered, not long ago, before the Liverpool Scientific and Philosophical Society, by Professor E. L. Davies, upon the subject of the progress of stellar chemistry. The writer of the subjoined was present on the occasion, and from notes taken at the time has siven us the following:
Though it is only within the last eight or nine years that stellar chemistry ha's developed itself into what may now be called almost a distinct science, it is necessary, in order to thoroughly understand the discoveries of modern times, to go back, nearly two hundred years, to the time when Sir Isaac Newton first discovered the compound nature of white light. In 1675, Newton first announced this discovery. He allowed a beam of daylight to enter a darkened room through a round hole in the shutter, and interposed, in the course of the light, a prism of glass. The light thus treated he found to have undergone refraction, and moreover that it had not been equally refracted throughout, but that certain of its elementary rays had suffered a greater dev.ation from their original course than others, and that, as a result, instead of the image of the hole in the shutter being formed on a screen placed behind the prism, there was produced a colored band; and this colored band Newton called the solar spectrum.
This spectrum is found to consist of rays of light of the following colors: red, orange, yellow, green, blue, indigo, violet; of which the red suffered the least refraction (that is, was bent the least from its original course), and the violet, the most, the others being intermediate in the order named Newton also found that if one of these colored rays, the grean, for instance, was separated from the others, and again passed through a prism, that it did not undergo any further any further decomposition, and that ft was therefore monochromatic. Esom these experiments, he concluded that while a daylight beam was composed of rays of different degrees of refrangibility, and also that rays that differ in refrangibility also differ in color.
Little more was done until more than a century after,
when Wollaston further investigated the when Wollaston further investigated the subject; and by admitting the daylight through a fine slit instead of a round hole, he observed that the solar spectrum was crossed by a number of fine black lines; and in 1814, Frauenhofer, an op and mapped nearly 600 of them ; but he did not account for
and their presence except by a vague suggestion that they were in some way caused by absorption, a supposition which has since proved to be correct. To account for the appearance of these dark lines, and also for that of other bright ones which are found in the spectra of incandescent gases, it is
necessary to examine the effects of heat upon matter in its two states of solid and gaseous. If we gradually heat non-volatile solid boty, and examine the light which it emits, we find that it first gives off red rays, or in other words, becomes red hot. On slightly increasing the heat, it gives off yellow rays, becomes yellow hot, and as the heat is still increased, it emits successively green, blue, indigo, and violet rays, which by their combination form white. light, and the body is now said to ke white hot; and when the light from this white hot solid is examined by a prism, it is decomposed into all the colors which go to make up white light; and the spectrum thus obtained is perfectly continuous, and not crossed by lines. And this being true of all
solids, the spectra of solids are in every case identical, and solids, the spectra of solids are in every case identical, and cannot be distinguished from each other.
With gases, however, it is different; if we heat, for in stance, the vapor of soda, it never becomes red hot, but at once gives out yellow rays, and however greatly the heat is increased, it never evolves rays of a higher refrangibility than the yellow; and if the emitted light of incandescent soda vapor is examined by a prism, it appears in the yellow part of the spectrum as a bright band occupying a definite and unalterable position. If, however, instead of heating the soda vapor to incandescence and using it as a source of light, we interpose a stratum of cooler soda vapor between
the source of light and the prism, we get the spectrum instead of the bright yellow line, and, occupying exactly its place, a black one caused by the absorption of the yellow passed the atmosphere of soda vapor, each gas having the power of absorbing light of the same degree of refrangibility as that which, when incandescent, it gives off. This fact at once affords an explanation of th black lines which appear crossing the solar spectrum. They show that the solar atmosphere contains certain substances
capable of absorbing light; and, by the exact coincidence of these black lines with the brightlines produced by certain terrestrial elements, we are fully justified in concluding tha many metallic and other elements with which we are ac quainted on the earth recur also in the atmosphere of th sun. The elements which have in this manner been recog nized in the solar atmosphere are sodium, calcium, barium magnesium, iron;' chromium, nickel, copper, zinc, strontium, cadmium, cobalt, hydrogen, manganese, aluminium, and selenium. Since the moon and planets shine by reflecting the light of the sun, the spectroscope can afford no informa t:on as to their composition, but it is able to afford some clu as to the presence or absence of an atmosphere; and the re sults of spectroscopic observation tend to show that the moon has no atmosphere, but that this is present in the case give characteristic spectra, and, as in the case of the sun many of the dark lines correspond with those of terrestrial elements. Stars, moreover, differ in color; those which are
bright to the naked eye show generally a tint of red, yellow, or orange, and with the telescope we may discover, in clos companionship with these other, fainter ones of a blue, green or purple color, and the cause of this difference is reveale by the spectra. We find that in the case of white stars, the dark absorptive lines are pretty equally distributed over th whole spectrum, which gives the characteristic color of the star.
The spectroscope has also afforded important assistance in the examination of the nebulc. These bodies appear in the heavens as a faintly luminous haze, some of which when examined by a powerful telescope, appears to be re solvable into a number of bright points; aud long ago Sir William Herschel suggested that these nebulex were the primordial matter out of which the existing stars have been ormed.
Spectrum analysis, notwithstanding the difficulty of apply ing it to bodies so very faint, has afforded much valuable in formation regarding the physical distinction which sepa rates the nebula from the fixed stars. The spectrum of the nebulce consists of bright lines, showing them to consist of ncandescent gaseous matter, and the same results are ob ained from those nebulce which appear to be resolved by he telescope, the only difference apparently being that the right points consist of more dense, but still gaseous, matte From such experime unresolvable ones.
From such experiments and observations as have been described, we appear to be justified in concluding that the sun consists of a white hot nucleus surrounded by a cooler atmosphere, containing many elements which are met with on the earth; that the fixed stars have a constitution analo gous to that of the sun; and that the color of the stars le pends upon the nature of the elements which occur in thei tmosphere; whilst, with regard to the nebula, the experi ments have perhaps not been yet sufficiently numerous to allow any definite theory being formed.

## Silver Mining in Nevada--A Visit to some of

 the Mines.After waiting a few minutes for one of the cages, as they re called (being large sheet iron boxes drawn up and lowered down by an everlasting windlass, propelled by steam power) to arrive at the surface, we spend the time in looking down down, until nothing is discernible but the faint glimmer of a light, no larger than a twinkling star. The cage has arrived and all aboard, our tour of inspection has begun. We ex perience none of the heat that was anticipated, as the draft of air formed by our $d \in$ scent has dispelled it. The cages go down very rapidly, and we could hardly believe that we were in motion until we were landed at the 700 feet level with a jar. Quickly jumping off the cage and lighting the candles handed to us, we follow our guide, finding the climate at this landing quite cool, as there is a strong curren f air being forced continually down from above by means of large blowers made for the purpose. The passage on his level is about five feet wide, with a car track laid on leepers, upon which small, open cars, drawn by mules, are run, carrying ore, working material, etc. There are smaller passages or drifts, as they are called, cut through here and there, while prospecting for pay rock. Now we go down inumerable ladders and inclines, preferring this more exciting method than the cage, and have a better view of the sur oundings; pass the stables used for the underground animals, where the mules stand perfectly quiet and looking as contented as if they were aware that they had plenty to eat and very little to do; we have finally reached the 1,100 feet evel. Pause, reader, and only think; 1,100 feet down in he bowels of the earth, among untold wealth waiting but to be carried away. Here we find the atmosphere very warm and the perspiration starts in streams. Going in an easterly direction, as the lead runs from east to west, we arrive at one of the many drifts, and finally pause for a moment and re asked to try our hand at the pick to see what kinl of a miner we would make; nothing loth, we seize hold of one and egin our new labor, but are very soon exhausted and find our progress has been slow indeed, as nothing but a blast of
powder will affect the rock. Being rather warm after our powder will affect the rock. Being rather warm after our
exertions, we concluded to start for more genial quarters; but eing asked if we would not like to go over to the Belcher mine, we conclude to do so, and we wait for a load of timber, which was coming down the tunnel on one of the cages, to follow afterit, meantime looking at the pamps, machinery, and workings of the incline cars, which come and go continually, laden with ore to the station, to be hoisted up in the ages
The lumber has at last arrived, and is quickly transferred aboard one of the cars; and we are all prepared to follow its course, but the carman, a shrewd Yankee, quickly sees that we are strangers, and immediately whips his mule up on a keen run, and we after him as fast as strength and " foot and walker's line" will admit of; our candles are blown out, eaving us in almost total darkness, and forgetting to keep our bodies in a stooping position, our heads come in close contact with the beams above. Arriving at the "Belcher" out of breath, we again halt before the face of a rock they re at work upon, which is sixty feet wide, and the ore very ich. As fast as the quartz is taken out, they fill behind hem with waste and timbers as a precaution against its cav-
ing in on them. The beams are twelve by fourteen inches, nd placed every few feet apart, and cross braced so as to be as firm as possible; yet we notice some of the timbers twistd and broken in every conceivable shap.; by the enormous weight they have to withstand. Leaving this, the fifth level, we go up to the fourth and third levels, and are shown some of the richest ore in the mine, and are given some fine specimens of crystallized quartz to carry home with us. From here
we are taken to see the cave-in that was had at the "Crown Point" a short time since, when thousands of tuns of rock fell, leaving the roof looking like a huge dome. Luckily he fall happened during the hour of noon, otherwise thirty human souls would have passed into eternity. In this part of the mine it is excessively warm, so much so that the men work in six hour shifts, and where it is cooler eight and ten but little clothing suffices, some having a cloth only tied around their loins; yet all appear to be healthy enough and very stout. Starting back on our return, we meet with no toppages until arriving again at the 1,100 feet level in the Yellow Jacket," where we are told by Mr. D, that we have raversed from three to four miles, and been under nearly all the city of Gold Hill, and then seen but about half of the underground works. All aboard the cage again, and in about thirty seconds, after passing station after station, with a jar we are landed from our first starting point, and with a hiver change our clothes, having come from the torrid to the reezing zone in so short a space of time. We step outside of the building and are much surprised to find the stars shinng brightly, as it was in the aft
he descent.-Philadelphia Post.

The manipulations are briefly as follows: A carbon print is made by exposing a piece of carbon tissue, sensitized by bichromate of potash, under an ordinary negative, in th usual way of printing carbon prints. A metal plate with a ilvered surface is taken and ribbed by rubbing it with a anded brush, to deaden the polish and to give effect to the icture. The plate is then cleansed with spittle, nothing lse answers the purpose as well, and then laid upon a sheet of paper on a table flowed with diluted alcohol. The carbon print is now laid face down upon the print, paper laid upon it, and a squeegee (made of a piece of wood and several thicknesses of ordinary bed ticking wrapped over one end) used oforceout the superfuous alcohol between the picture and the plate, and to make the one adhere to the other. The alcohol also serves to prevent the occurrence of air bubbles.
The whole is now immersed in a pan of water of about $100^{\circ}$ mperature, and developed in the usual way, leaving on the late a picture, the shades of which consist of the colored gelatin and the lights, or rather, the highest lights of the urface of the plate exposed under colorless gelatin. This part of the operation, as all carbon printers know, is most fascinating and beautiful-more like the developing of a col odion plate than anything else. As soon as the superfluous color is all washed away, the pictures (now on the metal lates) are removed from the water, and hung upon a line by clips to dry.
To render them more lasting still (though a carbon print on metal plate seems to be as permanent as anything can be) hey are, when dary, hermetically sealed to glass in the folowing manner: A little stand should be provided, made of plate of cast iron, say one quarter of an inch thick and welve by twenty inches in size, smooth on the upper surace, riveted to a leg at each corner. This plate is heated with gas, or a coal oil stove, the heat being applied at one end, so that the end of the plate furthest from the heat will ee considerably cooler than the other. Now lay the picture upon the iron plate at the warmest end. When it becomes warm, drop upon it a small piece of white wax, which will oon melt and naturally spread over the whole surface of the picture. Now, having first heated the glass, place it upon the surface of the picture, place them under a weight on the cooler end of youriron plate, where they will gradually cool and become effectually sealed together. They are then cleaned and mounted in a case or frame, as desired.
The results are very beautiful, and are made more brilliant by the metal plate on which they are mounted. The prints are made with " cut outs," so that, when finished, the white metal plate forms the margin, which adds greatly to the effect.

## Waterproof Glue

We have recently met with a very useful form of cement for wooden or other similar articles which are employed for holding water or non alcoholic liquids. Although the formula is not a very novel one, we know it to be useful and likely to suit the req
follows:-
Alcohol, (spirit of wine) 1 pint ; sandarac, 1 ounce; mastic, 1 ounce ; common white turpentine, 1 ounce ; glue and isinglass, sufficient ; water, sufficient. Dissolve the two resins-sandarac and mastic-in the spirit, and then add the turpentine to the solution. - Make some very strong glue, and add to it a good pinch of isinglass. Now heat the alcoholic varnish until the liquid begins to boil, and then very slowly stir in the warm glue. The amount of the liquid glue to be added is determined by noting the point at which, after thorough mixture, a magma or thin paste is formed capable of being easily strained through cloth. When required for use, the strained mixture is to be warmed and applied like ordinary glue to the articles to be united. í strong junction is effected, which is not destroyed by cold watér, and only after a comparatively considerable time by hot water or ordinary saline solutions.-British Journal of Photography.
Everything in nature indulges in amusement of some kind. The lightnings play, the winds whistle, the thunders roll, the snow flies, the rills and cascades sing and dance, the waves leap, the fields smile, the vines creep and run, the buds shoot, and the hills have tops to play with. But some of them have their seasons of melancholy. The tempests moan, the zephyrs sigh, the brooks murmur, and the mountains look blue.

## WALSH'S WATER WHEEL GOVERNOR:

We have been very strongly impressed with the efficiency of this ingenious device, not so much from the numerous testimonials which substantiate its merits as from personal examination of a working model, which convinces us that all the elements of a really good water wheel governor are combined in it.

Our engravings (Figs. 1 and 2) represent two different forms of this gevernor, the principle of construction being the same in each. Fig. 2 and 3 exhibit this principle.

A, Fig. 3, is the vertical shaft, which revolves the balls. driven by a pulley shaft and bevel gearing, shown in Figs. 1 and 2. The balls, as their orbit widens or narrows, move the collar, B, vertically, in the ordinary way. This move-

## Professor Treadwell.

Professor Daniel Treadwell died recently at Cambridge, Mass., aged 87 years. He was born at Ipswich, Mass.. in 1791, was a man of great inventive genius, and to his labors and research the world is indebted for many valuable and useful discoveries in practical science. At an early age, he invented a machine for making screws. In 1818 he produced a printing press of a new construction, and in 1819 visited England, where he conceived the construction of a power press which, upon his return to this country, he completed, and which was the first upon this continent upon which a sheet was printed by other than human power. In 1822, in connection with Dr. John Ware, he established and conducted "The Boston Journal of Philosophy and Arts." In 1825, he was employed by the city of Boston to make a
more rapidly on its return stroke than in making its forward stroke, the motion thus produced simulating, in this respect, that of the file in filing saws by hand.
A simple and cheap appurtenance, consisting of an emery wheel and proper supporting devices, may be attached at the option of the purchaser, and answers the purpose secured by the more costly ones now in use.
It is claimed that, with this machine, one man can do three times the work that can be done by hand, doing it better, and with a less number of files, than would be consumed in doing the same work by manual labor.
Referring now to the engraving, $A$ is a bar which supports the back of the saw. This bar is provided with guides, B, at thotottom of each of which is a roller. The bar, $A$, is supported, as shown, between the two parts of the clamping


## WALSH'S WATER WHEEL GOVERNOR

ment of the collar actuates the bell crank lever, C. To the bell crank lever is pivoted the connecting rod, $D$, which is also pivoted to the shield, E, Figs. 1 and 3. This shield consists of a disk, as in Figs. 1 and 3, or sector of a disk, as shown in Fig. 2, which has a rim upon its edge turned down at right angles. This rim covers the toothed wheel, F, Figs. 1 and 3, but has a notch cut in its lower part, as shown in Fig. 3. To understand the office of this shield, we must now refer to understand the office of this shield, we must now refer to
the eccentric, G, Fig. 3. With each revolution of the ball the eccentric, G, Fig. 3 . With each revolution of the ball
shaft, this eccentric, through the connecting rod, $H$, reciprocates a cross head carrying the gravity pawls, I. One or the other of these pawls engages the toothed wheel, F, according as the notch in the rim of the shield permits the engagement. As the collar, B. Fig. 3, moves up and down with variations of speed, the shield is moved by the connecting rod, D, above described, so that the notch in the shield permits the proper pawl to act.


The toothed wheel, F, Fig. 1, is fixed to the shaft, J, which is connected to the gate shaft by bevel gearing.

It is obvious that when the notch in the shield stands midway between the pawls, I, that neither of the pawls can act. Advantage is taken of this to limit the hight to which the gate can be raised by the governor. A nut and arm, K, run in a thread cut on the shaft, J, Fig. 1. The arm carries a pin, L. By the continued action of the pawl that raises the wheel, the nut, $K$, is run along the thread on J , till it finally abuts against a shoulder turned on the shaft, and then turns with the shaft. At the same time the pin, $L$, is brought un. with the shaft. At a l , formed on the hub of the shield. The shield is thus turned so as to bring the notch to the center, where, as neither of the pawls can act, the gate cannot be further raised. As soon as the speed of the general shafting, to which the governor is belted, increases, the action of the collar, B, and bell crank, C, Fig. 3, moves the notch off the center so that the proper pawl to lower the gate acts as before.
Fig. 2 represents,a governor made to act by two eccentrics, two systems of pawls, and two toothed wheels, so as to raise or lower the gate faster than the single system will, this style of governor being designed for certain turbines, the gates of which are operated with screws which require many turns to open or close the gate.
A friction brake, N, Fig. 1, is employed to hold the shaft, J, from turning back, as it will in some cases during the intervals between the impulses imparted by the pawls.
Patented, through the Scientific American Patent Agency, dress A. Walsh, Cambridge, N. Y.
survey for the introduction of water and in 1829 completed machine for spinning hemp for cordage, which was the first ever successfully used for the purpose and is still in use at all the navy yards in the United States. In 1832, he became Rumford Professor of Technology at Harvard College, which position he held until 1845. Shortly after becoming a proposition he held until 1840. Shortly after becoming a pro-
fessor he invented a cannon, which eighteen years ago was fessor he invented a cannon, which eighteen years ago was
adojpted and patented in England by Sir William Armstrong, adopted and patented in England by Sir William Armstrong

## CHAPMAN'S IMPROVED SAW FILING MACHINE.

The original filing machine, manufactured by the inventor of the improved machine herewith illustrated, has been before the public for twenty years, and is familiar to the majority of Amer ican lumber manufacturers. The improved machine, which forms the subject of the accompanying en

graving, is the result of practical knowledge gained during the period named, the improvements being numerous and important. The machine, as it is represented in our engraving, still retains the best points of the old machine, although the changes are so great that the machine may be said to be entirely remodeled.
The present machine is made wholly of iron, and is mach more compact than the old one. The clamps are peculiarly formed, being adjustable and adapted to filing all styles and sizes of saws in common use. By means of the swinging frame described below, all kinds of files may be used, and can be easily and quickly exchanged. Both ends of the file are held, and thus the file is guided evenly and straight across the saw tooth, so that any person, however unacquainted with aw filing, may manage this machine. A peculiar arrangement of the connecting rod.causes the file to traverse much
vise, C. The inner part of this vise rests upon a pirot at th bottom. It is pivoted at the top, a small graduated are and pointer enabling the entire clamping device to be set at any required angle, to give the proper bevel to the saw teeth; when thus adjusted, it is held by a set screw. It is instantly clamped by ${ }^{4}$,he foot lever, $D$.
The hight of the guide bar, A , is regulated by the set screw. E, which is adjustable in the longitudinal slots of the two parts of the clamping vise. The file, F, has its shank inserted at $G$, and its point is held at $H$. It is held by adjustable devices, so that different sizes of files may be used; and being placed as shown, is reciprocated through the rod, I, the arms, J being connected with the rod, K ,which is pivoted to the arms L, the latter being fastened to the rod, M. The rod, M, is reciprocated by the collar, N , the latter being actuated by the oscillating bar, 0 . The bar, 0 , is oscillated by a crank pin taking its motion from the pulley shaft, and impelling a sliding ing its motion from the pulley shaft, and impelling a sliding
block in a longitudinal slot formed in the bar, 0 . It is by the blatter means that the quick backward motion, as compared with the forward motion of the file, is secured. It will also be seen that the rods, I, K, M, reciprocate together. But the rod, İ, has V shaped grooves, in which slide suitable ways formed in the handle, P. This handle does not reciprocate, being held by a device for that purpose. It may, however, be rotated, and when so rotated by the hand of the operator, it holds the file in the proper position to act properly upon the saw tooth.
The handle, $Q$, does not reciprocate, but through suitable devices it is used to rotate the rod, $M$, on its longitudinal axis; and in so doing, it will raise the file clear of the teeth during the advance of the saw, and, by reversing the motion, lower the file to its proper position for filing again. Both this movement and the one previously described maybe made without stopping the reciprocation of the file, and thus the work can proceed rapidly and be performed with sup rior accuracy.
The machine is, as will be seen, very compact and substantial. The attachment of the emery wheel is shown in the engraving, and needs no particular comment, except that as we have remarked above, it saves the increased expense of a costlier device.
The improvements described were patented through the Scientific American Patent Agency, January 30, 1872, by T. M. Chapman, whom address for further information at Old Town, Maine.

We have received from Washington the advertising cir cular of Joel Floyd \& Co., under the free frank of Hon. R. R. Butler, member of Congress. We have occasion to send off large numbers of business circulars, but have heretofore been compelled to pay full postage on them. We would like to inquire of the Hon. Mr. Butler if he is open to an engagement to frank letters to other parties, and what his charges are to Floyd \& Co. for attending to their postal business.

Professor Shepard, of Amherst College, Mass., has one of the largest collections of meteorites in the orld. It embraces 146 different meteoric stones and 93 meteoric irons. The heaviest specimen of the irons is one from Aeirotopas, weighing 438 pounds, and the largest of the stones is that from New Concord, weighing 52 pounds.

# grinutific gmmrican. 

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## american art industry.

Prior to 1870 , the manufacturers of woven and printed fabrics in this country were accustomed to depend wholly upon foreign artists for the origination of ornamental designs. No sooner was a novel pattern produced in England or France than our manufacturers copied it here without giving to the artist, by whose study and labor it was designed, either credit or recompense
This illiberal and unjust policy was productive of a variety of evil results. First, it deprived the original artist of all chance of reward for his labors. Second, it encouraged our manufacturers in stealing the fruits of such labors. Third, it utterly prevented the development of home talent in the production of artistic works of this kind. Why should our rich and prosperous manufacturers hire home artists to prepare designs for patterns when they could steal them, ready made and free of cost, from foreign artists?
To remedy this evil, and gradually to compel our manufacturers to employ native artistic talent, Congress revised the patent law, in 1870, so as to permit foreigners to patent their designs here. This was an act of simple justice to foreign artists; at the same time, it gave protection and stimulation to home industry. The manafacturer could no longer copy his designs with impunity from foreign sources, and was compelled, as a matter of course, to call in home talent to his assistance ${ }^{\text {? }}$
This has been the practical effect of the new law thus far Hundreds of artists have found remunerative pay for their labors, and hundreds of art students are diligently at work preparing themselves for this new field of industry. In a very few years, if this law is allowed to stand, the United States will occupy a leading position as the originator of beautiful art works, and a noble branch of home industry will be created.
These remarks are cailed forth by the attempt on the part of certain manufacturers to change the existing law so as to restore the old status. A bill for this purpose, pre venting foreiguers from registering their designs, has juet passed the Senate. It bears the innocent title of "A bill to amend the statutes relating to patents and copyrights." But its title, if correctly given, would be "An act to discourage American art industry, and to assist wealthy manufacturers in stealing artistic designs." We trust that the House will reject the Senate bill.

## ARE EXPERIMENTAL TESTS OF TURBINE WHEELS TRUSTWORTHY

We answer to this query that they can be made so. The conditions necessary are simple and easily established, but so far as we are aware they bave never been carried out in any series of tests yet made in this country.
It is conceded by competent hydraulic engineers that no turbine wheei will utilize the same percentage of water power under all heads. Some wheels do their best at high heads, others show greater proportional efficiency with low heads. To make a turbine that shall perform the best with a given fall of water, it should be constructed with special reference to the conditions under which it is to be used; but to do this in every instance would make the cost of this class of wheels too gieat; therefore manufacturers attempt o construct them so as to give the best average results under varying heads.
It is obvious, then, that to know what a turbine will do, with a given number of inches of water and a given fall, it must be tested under those particular conditions. It is not perhaps practicable to test wheels for all heads and with
widely varying quantities of water; but for all heads, ex widely varying quantities of water; but for all heads, ex
cluding fractions of feet, and with quantities of water vary ing from large to small within the limits found in ordinary practice, this might be done; and until it is done, being close ly observed, the pablic will know little in regard to the mer its of different wheels in the market
There is no question that a friction brake properly con structed can be made to indicate accurately the power of a given wheel under any particular set of circumstances; but if the conditions are changed, the results obtained in the first instance cannot be a sure guide to what may be expected the second. When the wheel overcomes the friction of the brake, it is performing work just as much as though it wer sawing lumber or grinding wheat. There is, therefore, in our opinion, no force in the statement made by some that the only true test of a wheel is what it. does in the perfor mance of useful work. Work is work, whether it is usefu or not, and the scientific measure of work is the foot pound not a bushel of wheat or a thousand feet of lumber. So far from discouraging such tests, we are disposed to encour age them; but we insist upon it that turbines should be tested under different heads, and that the wheels should be finished in the style of those actually put in the market.

## TUNNELLING UNDER CITY STREETS---THE ATMOSPHER

 IC RAILWAYDuring the past year, an eight foot tunnel has been con structed under the streets of Cincinnati, $O$., fordrainage pur poses, by méans of the novel boring machine, illustrated on page 154, Vol. XXII of our paper. A vertical opening or shaft was first made on Sycamore street, near Hunt street, and carried down to the intended bottom grade of the tunnel Two of the boring machines were then lowered into the shaf and set at work boring in opposite directions, the tunne being laid up in brick as fast as the machines advanced, the earth being removed at the shaft. The tunnel extends from Abigail street along Sycamore street to Court street, where it makes a sharp turn into Court street, along which it passes to Broadway. The crown of the tunnel is some twenty feet below the street surface, and on its route passes under two canals, the Miami Canal and a branch or raceway. This method of boring has peculiar advantages for city uses, as it permits the construction of tunnels beneath the streets of cities without disturbing the surface or the usual travel of vehicles, while the only earth to be handled is a body equal the exact size of the tunnel.
The Cincinnati boring machines were constructed and op erated substantially on the same plan as the larger machin used in building the Broadway Underground Railway tunnel now existing in this city.
This tunnel, it will be remembered, extends from th Broadway Bank, at Murray street, passing under Broadwa northerly to Warren street, where, on a curve of 50 fee radius, it turns into the Company's passenger station. Thi railway is worked on the atmospheric plan and has been in practical operation for sume two years. Thousands of passengers have enjoyed the atmospheric ride under Broadway,
finding it an agreeable and novel method of travelling. In fact, the Broadway Underground Railway is one of the at tractive curiosities of the city. By means of a large blowin engine, a current of air is made to traverse back and fort through the tunnel, and this current, impinging against the ends of the cars, carries them along like a boat before the wind. The car in use is of about the same size as the or nary street car, having seats for twenty.two passengers.
The Company are applicants before the Legislature for the privilege of enlarging and extending their works, so as to carry passengers from the Battery, under Broadway, to Ha lem river, a distance of nine miles. The present working section of railway was built for the purpose of demonstrating the practicability of placing a railway under Broadway with out injury to adjoining property ; and in this respect the wor is a complete success. It was alleged and generally believed that the foundations of buildings, as well as the water pipes, as pipes, sewers, etc., would all be damaged by such a rai way. In answer to this, the Company set to work with on f the boring machines above alluded to-the design of $\mathrm{Mr}^{-}$ . E. Beach, of the Scientific American-and built a rail way tunnel under Broadway, passing below water pipes, ga pipes, sewers and the foundations of some of the heavie buildings. The thing was done in a few days, with the en tire travel of omnibus and other vehicles passing over the heads of the workmen, and on its successful completion al reasonable objections to the construction of a ailway under this thoroughfare were removed. In fact, so strongly in favor of its building have the leading property owners become that they now present themselves as rivals before the Legislature, and ask that the right of construction may be given to them and not to the Transit Company, which has be gun the work and at a heavy outlay of money demonstrated its desire and ability to execute it with success. The Legis lature is not likely to do such an act of injustice, and there reason to believe that the necessary authority to proceed with the work will be shortly granted to the Beach Transit Com pany.

## A MUNCHAUSEN COMET.

A European journal recently published a discovery (?) by a Professor Plantamour, whom it mentions as a well know Genevan astronomer, that a comet is now approaching the earth, that a collision between the bodies may be expected on the twelfth of next August, and that, if the predic tion be verified, the destruction of the world is certain to oc necessity to speak. Of Professor Plantamour we do not ind any
ist ; and our readers' patience need not be tried by a lengthy and serious consideration of his theory. But we must express some astonishment at the number of journals who have given space to discussion of the subject ; and we respectfully uggest that some public provision be at once made for he education, in the physical sciences, of newspaper editors and writers.
The eccentricity of the orbits and the varying periods of he recurrence of comets have long given to these bodies a prominent place in the sidereal phenomena; but the idea of danger from their approach or of destruction by contact with hem is not compatible with the enlightenment of the nineteenth century. In the year 1699, the Elector of Darmstadt informed the world that a dangerous eclipse was about to take place, but the calamity did no mischief. We are no onger to be scared by an eclipse; but the ignorance and folly of the celebrated autocrat have still their representa tives in the Genevan Professor; and the public who thankfully received the Elector's warnings were little less instructed than those who read the predictions of the comet destruction, and who find nothing in them contrary to their knowledge or repulsive to their intelligence. There may be some readers of the Scientific American to whom a recap itulation of a few facts concerning comets will be useful, and to such we present the following:
Comets are bodies of such extreme tenuity that the plan ets, the Earth among others, have frequently passed through them without producing any other effect than an auroral glare, changing the color of the sun's light on the planet while the period of transit lasted. Many secondary bodies, such as Jupiter's satellites, have been engaged in Lexell's comet without having their positions or periods affected in the least. We have already pointed out, in an article on his subject on page 279 of Vol. XXV., that the Earth passed hrough the comet of 1861 ; and this well known fact might f duly considered, have hindered this Plantamour from gaining notoriety by talking nonsense, and quieted the fears of the writers engaged on many daily journals. While however, no comet of whatsoever magnitude has been ob erved to consist of a sufficient mass of matter to influence the smallest planetary or steliar body in the slightest, nearly every one which visits our field of observation is changed in its course by the attraction of stars infinitely less in pro portion than itself. This is further evidence, perhaps no needed by our readers, that a comet is composed of matter so impalpable that some of the largest, such for instance as he one of 1843 which was $200,000,000$ miles in length, hav not sufficient aggregate gravity to render their influence of ny importance in an astronomical calculation. We therefore think that the comet "scare" is not worthy of a mo ment's serious attention ; and we regret that so many of our otemporaries can fill their columns with matter so insulting to the understandings of their readers.

## THE COMMON LAW OF TRADEMARKS

An interesting decision has recently been delivered by the Supreme Court of Louisiana, touching the right of a manu facturing firm to the exclusive use of a peculiar name by hich its goods are known to the public.
A firm in Holland sells a peculiar preparation of gin, known by the original makers' name, with a sonorous and fanciful title. The defendants häd manufactured an imitation of thi gin during the last ten years and sold it in bottles resem bling those in which the original is sold, and labelled so lik them as to be "colorable imitations." The Court expressed itself convinced that the original article was pure and exact ly what it professed to be, while the imitation was adulterat ed. It was shown that the foreign manufacturer had devised the bottles and labels in 1851, and that he had used them ever since. A lower court had thrown out a claim for dam ages and merely issued an injunction restraining the defend ant from the use of the personal name, but allowing the use of the peculiar name given to the gin. The Supreme Court eversed this judgment, ordered an injunction against any mitation of labels or bottles, and allowed fif teen hundred dollars as damages, with costs in both courts against the defendants.
Among the peculiar features of this case was a claim by the defendants that they had used the imitation label for ten years without interruption, and that they had gained a cus tomary and prescriptive right to it. The Court said that the damages could not be a-sessed for more than one year back but the claim that use for ten years gave the defendants a right to the trade mark could not be allowed. Another claim of the defendants, that the words on the label were not new, was also rejected, the Court saying: "His combina tion of those words is proved to have been new, and it is proved to indicate the origin and ownership of the liquor and the defendants have no right to filch this combination, or any important part of it, in such a way as to mislead the purchaser as to the real origin and ownership."

## Floating Fire Engines

Among the many means now available for promptly extinguishing fires, there are none more useful in our business towns than the floating engines now in use in New York Baltimore and elsewhere. In the firstnamed city especially the proximity of nearly all parts of the city to one or the other of the rivers, and the enormous accumulation of valu able merchandise all along the water's edge, point out the foating engine as the most ready and accessible implement for the purpose. The facility with which it can be brought o the scene, the instant supply of water, and the great powe obtainable from the engines, which need not be limited in size or capacity, are additional recommendations.

## LABOR AND. PERSONAL CLEANLINESS.

Our attention has been called again to this subject by a statement from a committee of the Board of Health, on the condition of the street cars and the liability of their com. municating disease to passengers. Referring to the line skirting the East river, which runs past many large manufacturing establishments, slaughter houses, gas works, etc., the statement referred to asserts that the cars are constantly kept in a filthy condition by workmen who enter them covered with grease and grime, and reeking with perspiration from with grease and grime, and reeking with perspiration from
their work. We have ourselves before noticed this fact, their work. We have ourselves before noticed this fact,
and have endeavored to stimulate a greater regard for perand have endeavored to stimulate a greater regard for per-
sonal cleanliness among workmen, but we fear with little avail.
While dirt, and dust, and soiled raiment, are inseparable from some kinds of useful toil, they are admitted even by those who endure them, to be very disagreeable concomitants of labor. Their needless infliction upon others is, to say the least, a very unhandsome thing on the part of those who could, by a little effort, cleanse themselves before crowding into a vehicle for public use, and it is a matter of just complaint. We see, however, a spirit manifested by workmen which indicates that one who tries to avoid contact with them in their besmirched state is regarded by them with disfavor. Not
long since, entering a Third avenue car, we saw three men, long since, entering a Third avenue car, we saw three men,
covered from head to foot with black oil, who threw themselves into seats as though it was a good joke to soil any one's clothes that were decent. A gentleman, who quietly rose and passed to the seat opposite to avoid their contact, was abused by them, and tauntingly asked why, if he thought so much of his dress, he did not take a carriage and ride home like a gentleman.
Now it was evident this gentleman did not avoid there men simply because they were workmen. To have done this, would have forfeited his claim to be called a gentleman. It was
the dirt, of which they were the neety vehicles, he wished to escape. If morksên wish to le regarded with respect they should avoid making themselves nuisances. One of their own craft, in cleanly garb, would have shunned these dirty and unmanly fellows.
There is no excuse for a workman, in any business, who enters a public conveyance, or even as a regular thing walks through crowded thoroughfares, in a condition that is dis gusting to people of cleanly habits. Blackened hands and may be left hanging in shops, or, if it be needful to carry them, they may be rolled and wrapped up so as not to be offensive to sight or touch.
There is a great lack of true manly pride among certain classes of workmen. Of unmanly pride, they have overabundance. They profess to be proud of their calling, proud to belong to the great army of producers-in this they are right; they are proud of the power of their associations, and scornful of luxury and wealth, which they claim oppress them with burdens too grievous to be borne. Were they equally proud of their personal appearance and scornful of that which is degrading in their habits, they would command more respect for their rights'as members of society, and be able to enlist the sympathy of many who now stand aloof from them. Drink and dirt are the two most degrading habits of working men. No man can possess self-respect who is disrespectful to others, and no man is respectful to others who can willingly annoy them by exposing them to personal unclëanliness.
We are far from applying these remarks to all workmen, or even to the majorily of them. We know many whose avocation is of a sooty order, but by whose side we would as soon sit in a car as ride next the sprucest dandy that pro. menades Broadway. We only ask those to appropriate what we have said, who, upon reflection, find it fits their case.

## measuring the heat of combustion.

It has been shown, in several former articles, how the ac-
eptance of a unit of heat, as a radical measure for the deterceptance of a unit of heat, as a radical measure for the determination of relative amounts of caloric, has had most important results in placing the subjects of latent heat and specific heat in a clear light, subjects which otherwise would al-
ways have remained enveloped in much obscurity. Still more important, however, is the application of this unit to more important, however, is the application of this unit to
determine the results of combustion of different substances, determine the results of combustion of different substances,
as it settles, in the most rigorous manner, the comparative value of different kinds of fuel. At a time when steam is applied in so many and so diverse directions, or in other words, in an age when heat is continually and universally being converted into motion, the subject of investigating the nature and results of diverse kinds of combustion is of course of the utmost importance. It is an investigation of the amount of caloric or potential force hidden in the fuel, which hidden force is only changed into visible force by the intervention of evaporating water, expanding air, etc., and so the unit of heat may be directly connected with the unit of power.
In most cases, combustion is a chemical combination of the fuel with atmospheric oxygen, and in all cases it is a chemical process, by which the latent heat of dissociation is set free (see page 21, current volume). The conversions taking place always form new compounds; for instance, we convert
hydıo hydroren into HO (water), carbon into CO (carbonic oxide), or $\mathrm{CO}_{2}$ (earbonic acid), sulphur into $\mathrm{SO}_{2}$ (sulphurous acid), phosphorus into $\mathrm{PO}_{5}$ (phosphoric acid) sodium into NaO (soda), magnesium into Mg (magnesia), iron into $\mathrm{Fe}($ (ferric oxide),
etc. The amount of heat produced varies with the nature etc. The amount of heat produced varies with the nature
of the substance, but depends more on the amount of oxygen of the substance, kut depends more on the amount of oxygen
consumed than on anything else; so we find that the combusconsumed than on anything else; so we find that the combus-
tion of one pound of coal gives as much heat as that of three
pounds of sulphur, while chemistry proves that one pound of coal is able to combine with nearly as much oxygen as of coal is able to combine with nearly as much oxygen as
three pounds of sulphur can do. The comhustion of one pound of coal produces, however, only one quarter of the amount of heat produced by the combustion of an equal weight of hydrogen; but here again analytical chemistry teaches that, in the combustion of three pounds of carbon, no more oxygen has been converted into $\mathrm{CO}_{2}$ than in the com bustion of one single pound of hydrogen into HO, because the weight of $O$ is six times that of $H$; six pounds of hydrogen, therefore, combine with $6 \times 8$ of oxygen, while six pounds of carbon combine only with $2 \times 8$ of oxygen.
Practical experiments with different kinds of fuel have shown, however, that this estimate of the heat produced by
the amount of oxygen consumed is not strictly correct; the amount of oxygen consumed is not strictly correct; and
that other circumstances must be taken in account in order to explain the discrepancies. The principal influence on the result is the nature of the product of combustion, its gaseou or vaporous or solid condition, latent or specific heat, etc. We communicate here a table, giving the units of heat pro duced by the combustion of one pound-of different substances, obtained by practical trial, and the amount of water which each of these substances may convert into steam, making the supposition that the latent heat of steam is 962 units of heat, and that some 150 units are required to heat the water from the ordinary temperature to the boiling point.
table of the dnits of Heat and ayount of
combustion of foel

## Hydrogen

Hydrogen
Marsh gas
Marsh gas
Petroleum
Paraffin
Olefiant gas Oil of turpentine Spermaceti Stearic acid Ether
Wood charcoal Gas coke
Anthracite coal
Bituminous coal
Alcohol Sulphur

## SCIENTIFIC AND PRACTICAL INFORMATION.

## METALLIC DUST IN FACTORIE

The injuries to health, arising from infinitesimal metallic particles inhaled by the breath into the lungs in cutlery and other works, are especially serious in the operation of dry rinding, used in the manufacture of steel forks. Mr Charles Stodder, of Boston, has recently made an investiga tion into the quality of a similar dust produced in the pro cess of polishing fire arms in the United States arsenal, at Springfield, Mass.; and he found that it consisted of a few organic fibers, some minute crystalline fragments, and about 66 per cent of iron and steel dust. . He makes a useful and practical suggestion that magnets be placed near the grinding surfaces to withdraw the iron dust from the air breathed by the workmen; and the simplicity and feasibility of the device will ensure it a trial.

Cabinets for uhe study of mineralogy.
The Department of Public Instruction of New York city has recently approved a specimen cabinet of mineralogical specimens, compiled for the use of teachers. Such a collection, if properly and judiciously selected, may be made avail able for laying the foundation of a highly practical technica education; and we should be glad to see similar object teaching introduced into other branches of knowledge. The
specimens were chosen and arranged by Professor E. C. H. Day, whose name is familiar to all readers of the Scientific AMERICAN.

## WINE GROWING IN AMERICA.

There is little reason to doubt that a large proportion of the territory of the United States is suited for the cultiva tion of grapes from which wines, not only in practically un limited quantities but of the highest excellence, may be pro duced. California takes the lead of all other States in this culture and manufacture, and exhibits great variety of qual ities and flavors in her productions. A writer in the Over land Monthly catalogues these as follows, according to the lo calities in which they are respectively cultivated: Sonoma county is best adapted to produce white wines, resembling those of Germany; the upper part of Napa valiey and certain portions of Santa Clara county will make excellent clarets; the Sacramento valley, near the foot of the inclosing hills, is destined to produce our future sweet muscats; E Dorado county is best adapted to the production of wine re sembling the far famed Burgundy; Solano county produces a wine which is a natural port; San Joaquin and Stanislaus counties give wines which closely. resemble, both in flavor of from five to six years before this taste is sufficiently developed; Anaheim and certain portions of Los Angelos county produce light white wines, which very closely resem ble those of Chablis, in France, and they, too, must be som four years old before this pe suliarity shows itself distinctly and the last two years should be in bottle.
THE BEHAVIOR OF CADMIUM, IRON, AND TIN UNDER THE ACTION OF NITRIC ACID.
It has been observed that iron acquires, by being placed in nitric acid, a peculiar condition of surface enabling it to re-
sist the action of the strongest acid; and a still more re-
markable and important phenomenon has been observed which is that iron so treated will form a galvanic circuit with ordinary iron, the treated metal being decidedly negative to the latter. Dr. Schönn produces further evidence of the changed character of the iron by showing that it refuses to reduce copper from the solution of its salts. He shows, also that cadmium, in strong nitric acid, remains unacted on if platinum wire be coiled around it; but on the removal of the wire, the cadmium is at once attacked by the acid. Tin exhibits similar characteristics. The result of the experiment with iron points out electrical action as the cause of these effects, which, on further investigation, may give us some new light on the subject of electrolysis.

OBTAINING ABSOLUTE ALCOHOL.
A German savan has recently improved on the well known method, employed by Mendelejeff, for obtaining absolute alcohol. Alcohol of '792 is boiled with quicklime, the pieces of the latter projecting above the surface of the liquid, for half an hour more, with a condenser inverted so that the iquid may return by its own gravity to the flask. The con denser is then reversed, and the alcohol redistilled. If the alcohol contains more than 5 per cent of water, the process must be repeated two or three times. * The vessel should only be half filled with the pieces of lime, as the rapid formation of hydrate of line may break it to pieces.

## elisee reclus.

It was with much pain that we read the news of the condemnation of this eminent French geographer to a term of demnation of this eminent French geographer to a term of
deportation; and we shall not be accused of political bias deportation; and we shall not be accused of political bias
when we express our regret for his defection from the ranks of science to follow a chimera. Among the idiosyncracies of of science to follow a chimera. Among the idiosyncracies of
the talented and misguided man may be mentioned the union in one mind of the blind cruelty of the commune, and a humanity which forbade to eat meat for the reason that it is not lawful for man to slay his fellow creatures. Reclus is a naive of the south of France, and was educated at Neuwied and subsequently in Berlin. His contributions to the Revue des Deux Mondes are well known for their learning and lucidity of style. Petitions on his behalf have been addressed to the Committee of Pardons, Versailles, having been signed by Sir Charles Lyell, Sir John Lubbock, Sir Henry Rawlinson, Professors Owen, Duncan, Tennant, Forbes, Carpenter Richardson, Darwin, and many others. The pleadings of these men will hardly be ignored by the government of such a nation as France, and it would be a graceful act for the sci entists of America to forward a similar petition, which possibly might set Professor Reclus once more free to pursue his studies and teachings for the benefit of mankind.

## LEAD POISONING

The painful effects of poisoning by lead are not by any eans confined to painters, white lead manufacturers, and others whose trades bring them into constant contact with his deleterious metal. There are some persons whose obsti nacy allows them to use it, in cosmetics and hair washes, in spite of the warnings of the medical profession; and the evil is augmented by the fact that such preparations may be used for years with impunity, and the palsy, paralysis, and other effects do not appear till the whole system is thoroughly impregnated. One medical man writes to a contemporary to say that he has one patient who has been paralyzed for nearly three years, her vision is imperfect, and her memory is gone; and another victim to this criminal practice has contant torture in her eyes, and is obliged to stay in a dark room. Many similar cases have been reported; but the prac tice still continues, and now Dr. J. M. Crocker publishes an account of a man, aged 55 , who was afflicted with what ap peared to be muscular rheumatism, affecting mainly the delwid and other muscles of shoulders. When first visited, he verely fring from pains which he had felt more or less se crippled. Dr. Crocker ordered cotton batting to affected parts, lemon juice and opiates internally; and the patient made quite a rapid recovery, but when seen in the month following, he was suffering from an almost complete paralyfollowing, he was suffering from an almost complete paraly-
sis of extensor muscles of fingers and hands, with dropping of wrists. He could readily and forcibly grasp, but found difficulty in letting go. Subsequently, upon inquiry, it was discovered that for fifteen years he had used a hair renewer, made by himself, of three teaspoonfuls lac sulphur and two teaspoonfuls sugar of lead to a pint of water. With this he had drenched his head and scalp as often as once a week. Under use of iodide of potassium and galvanism, he has made a good recovery, the hair dressing having of cours been discontinued.
the mineral resources of south carolina.
Mr. A. C. Laughlin, of Columbus, S. C., informs us that corundum is found in South Carolina in inexhaustible quantities; this mineral is specially adapted for spindles and piv ts of watches, and other fine machinery where the wear is constant. Sapphires and garnets are frequently found, some of the latter being perfect specimens of crystallization. Magnesian iron ore is very abundant, but is as yet almost undeveloped. Mica is another substance yielded by the soil of that state, and is daily coming into increased use. Mr. Laughlin speaks most favorably of the South Carolinian gold fields, and states that the precious metal can be obtained therefrom with great facifity.

ONE cubic inch of water weighs 03617 lbṣ. Qne cubic foot of water weighs $62 \frac{1}{2} \mathrm{lbs}$. One cabic foot of icé $\&$ weighs $58 \frac{1}{2}$ bs. One cylindrical inch of water weighs 02842 lbs. One cylindrical foot of water weighs $49 \cdot 1$ lbs.
Mr. H. E. Colton, an occasional contributor to this paper is now engaged on the World as agricultural editor.

What they think at the White House of the United. States Watch Company's MARION WATCHES.
The fo
retary:
$\underset{\text { Exective Mansion, }}{\substack{\text { Easeington, D.C., October 13th, } 1871 .}}$ Dear Sir-My watch has kept excellent time since I have carried it. Yesterday, in some unacc juntable way, the crystal was broken. Will you please re place it, and oil the works? they have never been oiled or exam-
ined since the watch left the factory. I expect to be in New York a day bout Thursday or Friday of next week, and I shall call at your place, Maiden Lane, for the watch. $\quad$ (Signed) Yours very truly,
HORACE PORTER. F. A. GLless, Esq. (Signed) The Watch referred to above, is No. 27,935, Stem Winder, Trade Mark
( John W. Lewis-manufactured by the United States Watch Co., (Giles Wales \& Co.,) Marion, N.J."-and has been carried by Gen. Porter for ove a year. We are glad to see that our offcials in high places appreclate fine American mechanism, and set the example of patronizing
instead of sending our gold abroad for inferior articles.

## Examples for the Ladies.

Mrs. T. M. Scullin, Troy, N. Y., has used her "dear friend," a Wheeler Wilson Machine, since 1858 , in dress and cloak-making. The last six months she earned $\$ 332$, and the year before, $\$ 417$.
Mrs. C-, of New York, has used a Wheeler \& Wilson Machine since 1857
never averaging less than $\$ 700$ a vear, and for the last five years $\$ 1,000$. She ased the same needle during 1870, and earned with it over $\$ 1,000$.

For Irritation of the Scalp, apply Burnety's Cocoatne night and morning.

## 

The Chargefor Insertion under this head is One Dollar a Line. Lf the Notice
exceed Four Lines, One Dollar and a Half per Line will be charged.
Dry Steam, dries green lumber in 2 days; tobacco, in 3 hours and is the best House Furnace. H. G. Bulkley, Patentee, Cleyetand, Ohio To Ascertain where there will be a demand for new Machin ery, mechanics, or manutacturers' supples, see Manufactoring News of
United States in Boston Commercial Baletin. Terms 84.00 a year. Manufacturers and Mill Supplies of all kinds. Greene,Tweed \& Co., 18 Park Place, New York.
The "Safety" Hold Back for Carriages prevents runaway accidents. See Sci. Am. Feb. 24, 1872. Undivided Interest, or State and Lord's improved Screen or Separator-also Watchman's Time Detector For particulars, address Geo. W. Lord, 222 Arch St., Pbila., Pa Scale in Steam Boilers. We will remove and prevent Scal
in any Steann Boiler, or make no charge. Geo. W. Lord, 232 Arch Street, Philadelphia, Pa
Walrus Leather for Polishing Steel, Brass, and Plated Ware Greene, Tweed \& Co., 18 Park Place, Ncw York.
The Exeter Machine Works, Exeter, N. H., manufacturers of Sectional Boilers and Steam Engines, will soon open, in Boston, Mass., a
centrally located sales room, in connection with their works; and are centrally located sales room, in connection with their works; and are
willing to take the agency ot a few first class Machines and Tools no
already introduced in that city.

For Diamond Turning Tools for Trueing Emery Wheels and Grindstones, address Sylivan Machine Co., Claremont, N. Hamp.
Standard Twist Drills, every size, in lots from one dirill to ${ }^{10,000}$, at a manufacturer's price. Sample and circular mailed for 25 c .
Hydraulic Jacks and Presses, New or Second Hand, Bought and sold, send for circular to E. Lyon, 470 Grand Street, New York.
All kinds of Presses and Dies. Bliss \& Williams, successors to Mays \& Bliss, 118 to 122 Plymonth St., Brooklyn. Send for Catalogue. Brown's Coalyard Quarry \& Contractors' Apparatus for hoisting M. Presses, Dies, and Tinners' Tools. Conor \& Mays, late Mays \& Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.
Over 1,000 Tanners, Paper-makers, Contractors, \&c., use the
In the Wakefield Earth Closet are combined Health, CleanliEnameled and Tinned Hollow-Ware and job work of all kinds. Warranted to give eatisfaction, by A. G. Patton, Troy, N. Y. For Circular of the largest variety of Wood Planing and Mitre Dovetailing Machinery, send to A. Davis, Lowell, Mass,
Rubber Valves-Finest quality, cut at once for delivery; or moulded to order.
Place, New York.
Best and Cheapest-The Jones Scale Works,Binghamton,N Y Grist Mills,New.Patents. Edward Harrison, New Haven,Conn Taft's Portable Hot Air Vapor and Shower Bathing Apparatus Address Portable Bath Co., Sag Harbor, N. Y. Send for Circula
Mining, Wrecking, Pumping, Drainage; or Irrigating Machin-
ery, for sale or rent. See advertisement, Andrew's Patent. inside page.
For Steam Fire Engines, address R. J. Gould, Newark, N. J. For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsbargh. Pa., for 1ithograph, etc.
Belting as is Belting-Best Philadelphia Oak Tanned. C.W. Arny, 301 and 303 Cherry Street, Philadelphia, Pa.
Boynton's Lightning Saws. The genuine $\$ 500$ challenge. will cutive times as fast as an ax. A 6 foot cross cut and buck saw, 86 . E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

Peck's Patent Drop Press. Milo Peck \& Co., New Haven, Ct. Vertical Engines-Simple, Durable, Compact. Excel in economy of fuel and repair. All sizes made by the
Indianapolis, Ind. Kend for cuts and price list.
Millstone Dressing Diamond Machine-Simple, effective, du rable. For description of the above see Scientific American, Nov. 27th
1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y. Presses,Dies \& all can tools. Ferracute Mch Wks,Bridgeton,N.J. For 2 \& 4 Horse Engines, address Twiss Bros.,New Haven, Ct Opium Eaters-If you wish to be cured of the habit, address T. E. Clarke, M. D., Mount Vernon, Ohio.

Blake's Belt Studs. The best fastening for Leather or Rub ber Belts. 40,000 Manu
Park Place, New York.

Wanted-An agent to sell territory for a new and valuable patent. Address, for circular and terms, P. O. Bq又 773, New York. Hoisting Engines. Simplest, cheapest, and best. Send to John A. Lighthall, Beekman \& Co., Office 5 Bowling Green, New York. L. \& J. W. Feuchtwanger, 55 Cedar St., New York, Manufacturers of Silicates, Soda and Potash, Soluble Glass, Importers of Chemicals and Drugs for Manufacturers' use.
New \& Improved Bolt Forging Machines, J.R.Abbe,Prov.,R.I. File Grinders' Grindstones, coarse grit-Mitchell, Phila., Pa Independence Grindstones-J. E. Mitchell, Phila., Pa. Well auger which will bore at the rate of 150 ft . per day. Send 10c. for circular to W. W. Jilz, St. Joseph, Mo.
Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parta of the country, Canads, Parties wishing to go S. W. with cotton or woollen machinery, address Isaac Sharp, Evening Shade, Sharp County, Ark.
Wanted Situation, by a Draughtsman-competent to design any kind of Engines or Machinery; or would be fonzd expert in carrying Address E. M. Box 157, Mansfleld, Ohio.
A young man desires a situation in a Civil Engineer Corpsunderstands leveling. Good refereaces. Address Engineer, Camptown For Sale-A $2 \frac{1}{2}$ H.P. Stationary Engine. Address J. Abbot Fitchburg, Mase
Wanted, to correspond with owners of Patents-Picture Frames, Hangers, or other light metal work-view to manufacturing.
Address H.'J. Dorchester, 618 North Main Street, St. Lonis, Mo. For the best Match Splint Machinery made, address H. M. Underwood, Kenosha, Wis.
Manufacturers of Spoke and Last Machines, send description and price list to William Graham, Smiths Falls, Ont.
Parties desiring articles prepared for the press, describing really meritorious and useful inventions or processes, may find it to their advantage to communicate with Richard $\mathbf{H}$. Buel, Engineer, 7 Warren Street, New York
Get your steam boilers and pipes covered with the best nonconductor in the world. Call for Circular. Asbestos Felting Company
The paper that meets the eye of manufacturers throughout the סnited States-Boston Bulletin. 8400 a vear. Advertisements 17c. a line.

## Motessfquervie3.

IWe present herevoitita a serves of inquirites embracing o variety of toptcs of Treater or less gensral interest. The questions are simple
pref er to elicit practical answers from our readers.]
1.-Cutting Glaziers' Diamonds.-Can any of your correspond
w. K.
2.-Fluid and Liquid.-Will some one tell me the proper and fine distinction between a fiuld and a liquid? Can a substance be both
once? Tassume that the difference is gleat, and wouldilke to have other at once? rassume t.
opinions. $-\mathbf{H}$. W. H.
3.-Coloring Shells.-Is there any way of coloring these bright red ? $-\mathbf{C}$. H.
4.-Hydrogen Gas.-Is there any process yet discovered by which illuminating gas can be made over into pure hydrogen? Has the netallic base of hydrogen ever been discovered.?-E. X.
5.- Nitric Acid in Battery.-Is the nitric acid, in the ure; and ifso, about how many, if the acid is put in at about 60 degrees Fahr. ?-E. $\mathbf{x}$.
6.-Frozen Water Main.-Will some of your readers lease inform me which is the quickest and cheapest way to thaw out 150
feet offrozen water main, 4 feet under ground?
C. H. $J$.
7 -Conpression or WOOD PuL
7.-Compression of Wood Pulp.-Is there any way by which wood pulp can be compressed so as to be in
out destroying the elasticity of the wood?-H. B.
8.-FAST Colors.-Will some of your readers inform me ow I can makea dye oflog wood and copperas "fast" so that it will not rub ff?-F. W.
9.-Brass Colored Paint.-Can any one tell me if there
10.-Elastic Cementr.-I have broken an india rubber gas bag; will some one please give me a recipe for a good, durable elastic cement, sultable for mending it? $-W$. M. s.
11.-W.B. D., of N. J.-Pleasegive us the title of the book you ref
nient.
12.-Battery for Plating.-I would like to know how to make a good galvanic battery for plating with gold aind silver. I want
some one to tell me how to get up the cheapest and best for that kind of
work.-W. B. J.
13.-Cracked Flute.-Will some one please inform me ow to keep a flute from cracking, and how to stop cracksthat have already ppeared?-A. E. T.
14.-Tanning Buffalo Hides.-Can any one inform me how the Camanche Indians tan the hides of buffaloes, so that the leather
does not get hard and horny, nor does thehair come out?-B. F. B.
15.- Painting Iron Bath TUb.-Will some one inform me what kind of paint I can use for painting my iron bath tab, that will adhere and not scale off in a short time? I have had it painted several times
with pure white lead mixed with raw and boiled oll; but it scales off.-C.
A. H .
16.-Discolored Glass.-Last summer I had some large glass panes put in my front windows; they have a smoky appearance. It
seems to be on the surface and not all through the glass. Is there oothing that will remove it? It is not smoke; if it were, I could remove it with tur-pentine.-W. G. E.
17.-Stains on Marble.-What is the best method by Which weather, tobacco, grease, iron rust, and other stains can be removed
from marble ; and by which the original polish can be restored ?-A. P.
18.-Painting Sheet Iron.-Will some of your correspondents give me a recipe for some kind of paint or substance for coating
19.-Heating by Steam.-How large a boiler will it need to heat a building 6 axso feet. and four stories high? How canl calculate the
size of a boiler required to heat any particular building?-J. C. 20.-Microscopr.-l have a microscope (non-achromatic lenses) Which, though it shows a transparent object clearly enough, gives
little more than the outlines of an opaque one. How can this difflculty be vercome? will a condenser mote the
21.-Matches for Molding.-Can any of your readers form me how to make sand and onl matches to mold from, and how to preent plaster matches from softening with work?-O. K.
22.-Letters for Pattern Makers' Use.-What kind ofmetal is used, what are the proportions of mixture, and what is the best way to make, letters, fig
their work ?-J. M. S.
23.-Pin Spots in Steel.-How can I treat steel so as to often the hard spots or pins in it? I have bars of the finest steel I could purchase in New York, but it all has had spots in in. I have tried many dif-
ferent ways to soften them and failed. How can I make steel as soft as posferent ways to soften them and failed. How
sible without hurting its quality ? $-H$. M. H.
24.-Iron Castings.-Is there any process by which soft on castings can be made from old castings, without the addition of new on?-H. м. H.
25.- Suction Fan.-What is the best shape for the wings of a suction fan, intended to draw the shavings from four or five planing
aachines? What should be the shape of the spouts, and the proportionate izes of inlet and o.atlet?-J. E. G.
26.-Carbon Battery.-In your paper of Jan. 6th, 1872, there are directionsfor making a carbon battery, and also for making the carbon plates. .I have been experimenting in electricity, and I was anxious
to try the difterent kinds of batteries, so I tried to made the plates allright, but when I came to set the battery to work, it would not go; and 1 have failed to make it go. Can any one give me deffite instruction as to what are the component parts and quantities neces.
27 -Tempering Steel.-Is there any way in which I can bring a large number of small steel articles to a uniform degree of hardness, ther than the slow process of "drawing?" Will dropping them into some E. в. т.
28.-Burning Charcoal.-I am engaged in the manufacfeet in length, set up endwise, two tiers high, to form a conical shaped pit and covered with earth in the usual manner. I have experienced difficulty and covered with earth in the usual manner. I have experienced difficulty loss of 8 to 15 per cent in "uncharred butts" left in the pit. Will some one give me the best mode ot burning? Also, tell me if any have tried or seen
ovens used similar to cooking ovens for burning charcoal?-B. C. C. 29.-Measuring Flow of Water.-How can I ascertai now much water would flow over a given point, in a given time (say one minute) in a creek? The minimum of water flowing in the creek is 45 square
inches. Its descent is as much as 20 feet in 30 rods. inches. Its descent is as much as 20 feet in 30 rods. The plan given in
your valuable paper a year or two ago for this purpose is useless to me, be cause there are so manyshort turns and obstructions (fallen trees) in the cause there are
creek.-C. B.
30.-Plastic Slate Roof.-Is there any way of repairing plastic slate roof which has, in three and a half yea s, become so cracked
nd torn as to be exceedingly dangerous? The roof originally consisted of a heavy coat of felt, covered with some composition which is now, with the a heavy coat of felt, covered win
felt, highly inflammable.-J. M.

## Gujutrs to Couregpoudeuts.

SPECIAL NOTE.-This column is designed tor the general interest and instruction of our readers, not for gratuitous replies to questions or a purely
business or personal nature. We will publish such inquiries however, business or personal nature. We woll publish such inquirieof however,
vohen paid for as auvertusements at 1 (vo a line, under the head of "Businefs and Personal.
LL reference to backnumbers must be by volume and pape.
F. B., of Conn.-Your question about fire from steam pipes has been repeatedly answered in these columns, both in editorial articles
and answers to queries. We do not wish to reopen the subject at pres. and an.
sent.
D. B. H., of S. C.-We have met with no explanation of the statement that the eyes are affected in ice boating when running with the
wind at high speed. We have, in our own experience, suffered no such inconvenience.
W. K. R.-Sound is the vibration of the air; the rubbing of a gobletwith wet fingers produces vibration in the glass which communi. cates it to the air and to the ear. Let him.
listen if he hears anything.-J. A. L., of 0 .
Voltaic Pile.-Let T. F. G. take disks of copper, zinc, and woolen cloth of any size, soak the cloth in a solution of sal ammoniac,
then pile them up in the following order: copper, zinc, cloth, and so on then connect the outer disks with a copper wire. The larger the disks and the greater their number, the greater is the intensity of the current.J. A. L., of O.

Voltaic Light.-It will take a battery of forty cells of Grove's elements to make an electric light of any considerable size. If, however, you have a battery of angther kind, you can take as follows;
Forty-fle Bunsen's, fifty-flve Daniells', or seventy-five Smee's. Grove's battery is the cheapest and best for the more striking effects of electricity. The carbon pencils should be made of the same kind of coke as the carbon in Bunsen's battery. Brown
Raising Numbers to Fractional Power.-T. M. N., query No. 6, Feb. 24. The best way to raise a number to the power of a maction is to tale the logarithm of the number from a table of logarithms, corresponding to that product. The number, expressed in whole num bers and decimals, will be practically accurate.--.-.
Breaking of Cast Iron Pulleys.-The explanation of C. M. R.'s broken pulley is this: Cast iron is always crystalline, and wrought iron often becomes so by constant jarring. That pulley was crystalline
in the interior while the surface was not. This caused the interior to expand or rather to attempt to. So long as the surface was whole, the ind terior was bound, so that it could not expand freely. But when the surface was broken the tension was removed, the piece expanded fully, and
became too large to be replaced.-.--
arbonic Acide: Gas in Wells.-With regard to carbonic acid gas in wells, the most simple plan to get rid of it is to get a blacksmith's bellows-an old one could be borrowed in.j日lmost any town-and
a tin or lead gas or steam pipe. Attach it to the nozzle of the bellows and a tin or lead gas or steam pipe. Attach it to the nozzle of the bellows and
run it to the bottom of the well; so long as the bellows is worked the well will be free from gas. $A$ well digger in this place barned shavings in a well he was di ging every hour; still his workmen were so affected they were about abandoning the work, when the contractor came to me to see if $I$ could tell him how to get rid of the gas; I told him of the bellows; be borrowed one and set a boy to working it, and his men worked for

Speed of Circular Saw.-D. S. B. inquires as to this, and
 saw to run as a proper speed, with some sllght variations under certai con ititions. This rule has been generally adopted. But N. B. would run it about 19.500 I I assert that this is a random gues, without any practi-
cal demonstration; and, if put into practice, some one will get their


Tempering Steel Bits.-If H. G. will put in six quarts of sort wate ounce of pulverized corrosive sublimate, , wo ounces of pulverized sal ammoniac, and two handsfull of common salt, he will
have no trouble in making his steel hits hard enough and toagh enough. Let him heat the e itst to a cherry red only, and plunge them in and not
draw any temper. W . M., The appian Way.-Can you tell me the age of the Appian Way, and whether it was made of stone or asphalte?-L. -Answer: The
Appian Way (Tia Appia) extended from Rome to Capua, and was built by $\Lambda$ ppius Cacens the censor, in the year b.c. 312 . It was made by frs driving piles into the swampy ground to atay a solid foundation; then a
layer of stones about the size of hen's eggs, then a course of rubble work In lime cement, then one of brokea bricks and pottery, set also in cement, then a pavement of the hardest stone, fitted together with the greatest nicent. At the end of the rood towards the clity of Rome, the e tone nsed
is a basaltic lava.. Two thousand and more years traffc has done litte to Is a basaltic lava. Two thousand and more years traffic has done Mittle t
wear this road way, and the solidity of its construction is a standing re proach to the mud road makers of the present day.
Brittleness of Horse Hoofs.-If E. E. S., query 18, February 24, 1872 , will tie a woolen cloth saturated with vinegar and water
(equal parts) losely around the hoof two or three nights out of every week, he will. And that the hoof will become Boft and piliabie. Do not let the cloth touch the hair. If the frog is hard, put a aponge soaked with
weak soft soap in the bottom of the foot. At certain seasons of the year. I put this on an all my horses feet to porevent brittlieness.0. Thist treatment is
simple and clean, and instead of conveying disease (as many other prepasimple and clean, and instead of conveying disease (as many other prepa.
rations do) will prevent and cure fever in the feet, and oftencarry off dis-ease.-J. A. F., of Mass.
Balancing Slide Valves.-In No. 8, current volume, you express doubts whether Western engineers balance only the ports in their
silde vilves. Having had some ilttle experience this way myself, I should not hesitate to assert that any slide valve, having a greater amount of

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Brewing Light Ales.-In answer to J. A. R.'s query, No. 9, page 138, Vol. XXVI., I would say: Let him take an ordnary frkkn, put in
a false bottom,
full of holes, about one inch above the real bottom. Then lay a layer of cleau straw over the holes. Then put in eight quarts of
good malt and pour on it four gallons of hot water a a ter that has leached good malt and pour on it four gallons of hot water; after that has leached
through pour on two gallons more hot water, and after that one gallon cold water; ; then boil the liquid of the three leachings thrityminutes, add-
ing one quart good molases and fori ounces good hops. Stir it well;
then strain it in thalf pints good yeast. Strif it well and let tit tand until it it rise and beeging to fall, then sklm off the yeast on top and save it for a future brewing.
Bottle in strong bottles and set in a dark place; and you will have an ex. cellent table beer. Lessen the quantity of malt if you want a weake beer. This beer has bee
1ids.-C. s. P., of Mass.
Foul Air in Wells.-I occasionally find damp or foul air in wells. My plan for remoring it is if there is a pump in the wellj to pump water down the well on one side. The water going down one side
forccos the air up the other, creating a circulation. $I$ have tried other plans, such as throwing burning straw down the well and throwng ho
stones down; but had very poor suceess compared to that with the pump stones down; but had very poor success compared to that with the pump.
ing, as described above. Where there is no pump. I tie a common basket to a line, and operate it up and down the went
tion, and so answers the purpose.-J. W. H.

## Declined.

mymunications upon the following subbjects theve been rececived a
by the Editor, but their publication is respect fuly declined:
Geometrical Problem.-L. G.
Proportioning Toothed Wheels.-T. H.
Small Pox.-W. H.
Sugar Manufacture.-C.
Testing Water Wheels.-N. f. b.-G. C.-W. W.h.
Testing Water Wheels.
Zodiacal Light.-S. b. C.
Answers.-C. P.-S.-H. B.-F. C.-H. B. B.-C. C. W.-
G. M. T.-W. H. R. - G. P. - W. H. B. - M. - C. F.-P.-
H. D. I.

Notes and Queries.-C. V. R.-W. H. K.-C.-W. T. J.-
D. S. H. -I.-G. K.-G. M. T.-F

Fecent gmerican and fateigu eqtents. Under thts headito we stall pubush
nent home and foreaon vatents.

STrism $^{\text {Bonukr.-Michael Smart, of New York city.-This invention re }}$ lites to an improvement tin steam boflers whereby the etseam in quilckly sep
arated from the water, and the danger of explesion is reduced, while at the same time the heat of compustion is more fully utilized than in other boil ers. The linevenion consists principaiiy in the application of a steam arch
evesel above the collditrical bedy of the boiler, and in it its connection with
 Elizcrrio CARriage. -Lawrence $W$. Coe, of $\Delta u$ burn, N. Y. Y.-It it intend-
ed to provide carriages adapted for being propenled by magnetic engines directly applied to the hitod axle to which the wheels are to be keyed, so that the turning axle will turn the wheels; and for so applyligg the exgine it is
necessary that the frame, to which the shell or trame of the engine must he connected, be arranged directly on the axle withount springg, for any vibration of the enine, except with the axile, would interfere with the proper we capable of sprinsting, it is mounted at the rear on springs which are mounted on the axle independent of the engine frame, which is also mount ed on the axle but without springs; and at the front of the box or body it is
hinged to the trame. In malifing.very short turns in narrow streets where a inged to the rame. In malining.very short turns
carriage has to be backed ap to the curbstone,
rlages having the steering apparatus. arranged in the common way, to turn the whels nearly around a half circie to bring them from where they stop
in backing up to the right position for going forward. The inventor there. fore proposes to have the hounds circular and provide the lower one, which is sapported on springs, with cogs all the way round, and mount a hand
shaft and pinion on the eupere one, which is suspended rigidy from the carI lage frame, so that the wheels may be turned wholly around, by which, in sach cases, they may be brought into the required position much quicker
 and to ft them on the ends of a 1 long hub, against collarg, springlngthe disks
very nearly or, in some cases, entirely together near the peripheries, which
are beveled and carved outward for the reception of india rubber tires.
The parts riveted together are attached to a concave or square grooved metal tire, in which the india rubber tire 18 placed. The disk are clamped
agatios the collars by nuts screwing on the hab. This hub is preferably aganast the collars by nuts screwing on the hub. This hub 1 s preferably
made of wrought iron or steel and fitted $u p$ by turning in a a lathe, but it may made of wrought iron or steel and fitted up by turning in a lathe, but it may
be made of mallieabbe cast metal. Instead of applying the brakes to the inm of the wheels, as is common in land carriages, but which cannot we be done when india rubber tire is used, a friction wheel on the axle and
friction band is used with actuating levers for working it one end of sait and beling connected to the carriage frame and the other to the lever he usual way of arranging brakes of this character
Travpling Bac.-Jacob Lagowitz, of Newark, N. J.-This invention hat Tor its object to furnish an Improved mode of making traveling bags, etc.,
y means of which the cover of the frame, the cover of the bag and the Ining may all be sewed at the same time, and with a sewing machine and consists in the mode of making the bag, as hereinafter more fully described.
In making traveling bags in the old way, the edges of the cover, or the fram In making travelling bags in the old way, the edges of the cover, or the frame and the edge of the cover of the bag, were brought together apon the inside,
nad sewed by hand. The edge of the lining was then brought over the seam hus formed and sewed by hand, thus requiring two rows of hand sewingal round each half of the bag. In making a bag in accordance wth this in edge of the frame and turned outward. The edge of the cover of the ba and the edge of the lining are then brought together and placed upon the nner side of the eages of the frame cover, a narrow strip of the linigg be
 chine, the free edge of the
dges of the cover and lining.
Brdsh for applyirng BLacising to boors and Shozs. - Nathan Eisen le and convenient brush nd for varions other uses; and it consists in constructing the brush proper or the parts rigidy connected therewih, so that tsall be aapted to be at ached to the nozzle of a can. With this brush the blacking can be applied the same time without danger of solling the hands.
Car Window.-William McCaull, of Philadelphia, Pa.-This invention has Cor its object to improve the construction of the windows of railroad cars street cars, ett., so that they may be more convenient and rellable in use ard more satisfactory in operation than when arranged in the ordinary man
er. It consists in an elastic cord and adjustable plate in combination with the box, stile pulley, and the sash or blind of the window, so that, when the ash or blind is lowered, the cords are put under tension, and when
he elasticity of the cords shall close the sash to its proper place.
Gophrr Trap.-John Bowman, of Santa Cruz, Cal.-This invention con
ists principally in providing the outer end of the trap with an appliance hereby the interior can be made light or dark at will. The gopher's habit Wh to repair whatever damage is done to its burrow, to close holes that may
be made by outsiders, and open such that have been closed. The trap can e adjusted to suil etther plan, and made dark when ope ole, to cause the attempt at reopening, and light when put into a closed passage to attract the animal's attention and attempt at reclosing. The in
vention further consists in a peculiar arrangement of spring, trigger, and winging gate, all being so made that the trap cannot easily get out of order and will be convenient for use and inspection.
Well Auger.-Francis Spees, of Tabor, Iowa.-This invention furnishes an improved auger for boring wells and for other earth boring purposes. than the lower part, so as to ream out or enlarge the hole, part of the dir eing thus received upon the upper part of the worm, thus diminishing the iction of the dirt upon the worm, and, consequently, the power require the lower end of the enlarged part of the worm, to shave off the sides of the hole and leave them smooth. The hole may also be reamed out by a pro-
jecting yertical knife, the ends of which are bent in ward and are attached to the flange or thread of the worm. By this construction, when a hard stratom of earth is found, the knife may be detached and a smaller hole bored out or enlarged to the desired size. A combination, with the stem, of the igid section of the worm, an angulay bit, and
ures upon which a patent has been obtaned.
Ruling Pre.-Elliot Ingram, of Springfield, Mass.-This invention ha forits object to improve the construction of ruling pens, in such a way that
when different colored inks are used the inks may not become mixed while When different colored inks are used the inks may not become mixed while
the rulingmachine is being used; and it consists in the combination of a the rulingmachine is being used; and it consists in the combination of a
guard or shield with the pen, as hereirafter more fully described. The pens re constructed with grooves to conduct the ink to the paper in the ordina
y manner. Wi h the ordinary pens, the ink is liable to run back along the shank to the clamps, and along the clamps to the next pen so that the dif.
ferent colored inks pecome mixed. To guard against this, \& guard or shield attached to the shank of the pen. To guard against this, \& guard or shield fferent colored inks becoming intermingled or mixed. The guard o securing and operating the pens.
drof Leaf attachment for Sewing Machine Tables.- Evelyn. F rench, of New York oity.- This invention has for its object to provide and nicely fitted to whichever table or kind of table it may be applied. The
invention consists in the application, to the devices which fasten the leaf to nvention consists in the application, to the devices which fasten the leaf to
the table, of a pair of hinged springs that insure the flush position of th the table, of a pair of hinged springs that insure the flush position of the
leaf when swung up into a horizontal position.

Mile Coolerr.-Charles A. Douglass, of Franklin, N. Y.--Thisinvention onsists of milk troughs within water troughs in gangs or series, preferably ne above another, with water aud milk discharge pipes and adjustable ap
paratus for regulating the hight of the water surrounding the milk troughs. A high, narrow, and iong frame is adapted to support a series of wate prted above discharging nozzle for each water pipe, with. a short vertically adjustable
tube, tightly ftting the nozzle and extending above the bottom so that the lube, tightly fitting the nozzle and extending above the bottom so that the water that escapes must pass through it fromlthe upper end, is adjusted high
er or lower and will vary the hight of the water accordingly. Branch water scape pipes lead into a main pipe which conveys the water. hrough the bottoms of the water troughs water tight and fitting the nozzle so as to prevent leakage around them. Both the water and milk branch ipes are provided with funnels at the upper ends, to insure the receiving o y as the troughs must be frequently taken down to be cleaned. This is claimed to be a simple and efficient cooling apparatus for holiding milk to obtain the cream.
Potato Digakr.-William W. Speer, of Pittsburgh, Pa.-This is an im roved machine for digging potatoes and separating them from the soll wit of arms pivoted or hinged to a shaft and biturcated or slotted to receive the ranks of another shaft, and also in adjustable bent bars in combination with the frame, crank shaft, slotted arms, shaft, shovel, and axle.
Folding Table.-Alfred C. Ballard, of Winooski, Vt.-This invention e folded into a small space for convenient transportation; and constits principally, in the application of drop leaves, which can be folded under he box or rame of the ta ble top, and in their combination with folding legs. n this manner, the upper part of the table can be conveniently folded int uch manner that they can be folded into the same. When they are told ogether, and the leaves also folded against and under the box, the entire table will be no larger than the box with the thickness of the leaves added
to its width and depth. When the legs are swung down for supporting the drop leaves, when extended, are supported on suitable piroted or hinged

CAR BRAEE.-George H. Reynolds, of Parsons, Kansas.-This car brakei
constructed that the weight of the caboose or rear car of the train may eemployed to apply the brakes to all the other cars of the train. It consts in a shaft with the bumper head chain wound around it, with other mechanism and chains, rods, etc., combined with the brake mechanism of a
train of cars in such a way that the brakes will be applied to all the cars of the train with the full force required to draw the rear car. The force re quired to draw the rear car may beincreased by applying the brakes to the
said rear car in the ordinary manner. This device is designed especially for eight trains, but may be applied to other trains, if desired.
Drvice for Looking Nuts.-Samuel B. Lowe, of Chattanooga, Tenn.lateshaving end slots and lips to lock the two end nuts, and also two cenal apertures to receive the two midale nucs which hold a Aish plate to its rall, are not new; but this construction compels these lock plates to be rigid
and unadjustable, while by employing a separate and independent plate for very two nuts each becomes adjustable, and it is no longer required that he middye ruts should be always placed in one arbitrary position. A plate avingionly a long slot and two long arms at each end, to adart it to be apled ajustably to a palr of nut, construtes the lmpe toment.
Trolling Hook.-George Sinclair, of Chicago, Ill., assignor to himself ad Charles E. Sinclair, of same place.-Thts invention relates to a new trolling hooks; ind consists in orming, on the wpoons or wheels styles of trolling hooks; and consists in forming, on the spoons or wheels, wedge The advantages of this mode of fastening are, first, that the hook can be removed when worn or useless and replaced without difflculty; and that, of soldering.
Stop Motion for Drawing Frames.-Daniel W. Hayden, of Wauregan, onn.-This invention consists of a combinatior, with the drop catch lever and trumpet and the stop wheel heretofore used for throwing off the belt for
topping the machine when the "end" or "sliver" breaks, of a weighted atch lever arranged in such manner that it holds the trumpet guide for the sliver in the working position, and is thrown into contact with the stop
wheel to stop the machine in case the trumpe is unches on the sliv
Self Sealing Pail.-Chas. A. Marshall, Cleveland, Ohio-This invenon consists in providing a pail (adapted to various uses but designed chiefly or transporting milk and other liquids) with a cover which may be tightly ecured by means of a detachable screw hook connecting with a screw eye
the bottom of the pail. This means of securing the cover is easy to apply t well as cheap and safe, while it does not render the pall unadapted to use ithoutit.
Raliroad track Cleaner.-Alexander Blakely, Fairfield, Iowa.-The Invention consists in removing the sand which is spread in front of locomotive wheels to produce traction, by means of a brush arranged in rear of the hindmost drive wheel and rotated by said Wheel. This brush is raised or
lowered, and held to or away from the track by simple and couvenient lowered, and
mechanism.
Tool for Cutting Sheets gf Wet or Pabted Paper, Woven Fabrics erather, Zinc or Lead.- John F. Bright, Washington, D. C.-The inven-
ion consists in a new tool for cutting leather, woven fabrics, zinc or lead, with consists in a new tool for cutting leather, woven fabrics, zinc or lead,
It is provided with a gage and clamp by which it is enabled to cut with great accuracy and uniformity. It is adapted to be used as an independent tool or is readily artached to a bar, pitman or lever of
any cutting machine. It was declared by the Patent offlice to be entirely ny cutting machine. It was declared by the Patent ofice to be entirely of invention.
Dropping Attachment for Harvesters.-Byron Seneff, Chillicothe hio.-The invention consists in a peculiar mode of dropping the bundles
grain from an inclined slide, without scattering, of uniform size and with the straws even. . The effect of this is to save much grain that is usuallylost y scattering and by dropping from the bundle, as well as to enable it to rashed with more facility and thoroughness,
SURface Blow-off for Marine Boilerss.-Benton C. Davis and John T.
Hardester, Baltimore, Md.-The invention Hardester, Baltimore, Md.-The invention consists in effectively and eco-
nomically discharging the scum from a marine boiler, ty blowing steam and water from the centre the scum from a marine boiler, ty blowing steam and ater from the centre of the water surface, and drawing to a common cen-
Harvester.-George S . Grier, Milford, D $\in 1$.-The invention conslists in ill automatically fold when going under the platform and be erected as ey ascend to the top. Its simplicity secures durability and cheapness of construction while its efflciencr is unmistakable.
Mrtal for Brake Shors for Railway Cars, eto.-Wm. Mcionway. Pittsburgh, Pa.-The patentee produces a very close grained, tough and
durable brake shoe by suitable admixture of pig iron, malleable cast iron durable brake shoe by suitable admixture of pig iron, malleable cast iron
and steel. 5 thas been practically tested and found to exceed the common and steel. 5 thas been pract
hoe in durability as 20 to 1 .
Sewing Machive.- Quinten M. Youngs, Utica, N. Y.-This invention cons.sts in having the pulley, on the main shatt of a sewing machino, 80 arranged
that tit may be locked with the shaft drive it in the ordinary operation of
the machine, and unlocked to run loose and not work the machine when it is required to use the driving belt or the said pullev for working the bobbin winder, and thus avold having to remove the work from the machine and
readjust it again each time a bobbin is to be wound, besides saving the readjust it again each time a bobbin
unnecessary running of the machine.
Fanning Mill.-John Drummond, Trenton, Mo.-This invention relates tmprovements ed to work them more efflciently than they can be as at present arranged. ancankement; with the shoe suspended in the pecnitar manner, of a lever, he shoe in different directions, said lover and shaft beicg actuated by the faus shatt, are the features on which a patent has been issued.
Machine for Drying Paper, Wadding, etc.-Elihu C. Wilson, Meday, Mass., assignor to himselrand Edward Eaton, same place.-This invenondless beltnear the bottom, and linto which which the bat is carried by an bove the bat aud caused to impinge upon the upper wet surface in an erealy distributed way, and then escape at the opposite end, eari ylag off the moisture in an efficient manner. The size or paste used for stiffening the bats to adapt themfor waddings, and which it is the particular object of this achine to dry, will be applied to the bat just previous to entering the case, ise application belng made in auy approved way. This plan of drying
is claimed to be much better than by the calender rollers, for in that case the et side of the sheet is run upon the roller and the damp air necesarily orced through the bat to the outside. This destroys the crispness of the interiors of the mass, ayd thereby very greatly injures the quality of the goods. The improved plan of drying is applicable alike to drying paper,
woven cloths, and the like. Steamboat Chimney.-william J. Hamilton, Cairo, Ill.-The obiect of this invention is to provide suitable and convenient means for lowering and
raising the top or upper sections of jointed steamboat chimneys. The paratus is operated from the deck entirely. The device is designed to be ridges which frequently span navigable streams. Its an to pass under the desice for the same purpose now in use will, it is claimed, be readily under-
eleotromagnetic annungutor.-Charles E. Chinnock, of Vew York city, assignor to Edwin Holmes, manufacturer of burglar alarm telegraph ppliances for houses, stores, etc., 7 Murray street, New York a automatic indicator for electromagnetic alarm or call apparatus, and the indicator is set in motion. lirongh inauaible or ourer signais $n$ henever first indicate the locality at which the operating current was established and subsequently start the alarm, and is equally well applicable to hotel annunciators and similar apparatus for showing the number of rooms and calling the attendant. The numerons features of the invention are em-

Colinary Boilirs. - Joseph Gibbs, Opelousas, La. - This invention consists in a boiler having a wide flange adapted for supporting it on the top of
pots or saucepans of different sizes, so that the body of the boiler sets down pots or saucepans of different sizes, so that the body of the boiler sets down
on the pot or saucepan to be heated by the water boiled therein, with which on the pot or saucepan to be heated by the water boiled therein, with which boiler is combined a circular weight, adapted to rest on the top of the flange, and press it down upon the edge of the pot so hard as to prevent the
Folding Chatr.-Charles Marcher, New York city.-The object of this Folding Clair. - Charles Marcher, New York city.-The object of this
invention is to so construct a chair that it may be tolded up to occupy but iftle space when it is not in use, or when packed for transportation or storing away. It is particularly useful for steamer and steamboat travelers. The back and the front leg pieces for each side of the chair are in one piece, and are pivoted to the rear legs. A track of metal, or other suitable material, is rigidly attached to each side of the seat. A metallic plate is rigidly inward, so as to bear and traverse on the track when the chair is folded up or extended for $u$ ee. A shoulder forms a stop for the traverse pin when the chair is extended. The bottom is pivoted to the lower part of the back. The arms of the chair are pivoted to the seat. There are slots in the arms, and pins in
Combined Table, Sofa, and Bed.-David Katzenstein, New York city. This invention relates to a new article of furniture, which can be used as a table, sofa or chair, and bed, as occasion may require, and which, at the same sists in a new comy simple in construction and convenient to handle. It contutes the table top, the sota ree cusaloned plates, of whe the bed botto according to the position in which it is placed. The bed clothes can be kep in a drawer while the device is used as a table or sofa

## [OFFICIAL.]

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5,608.-SUspension Eyelet.-G. W. Averell, New York city.
5,609. - Knifr Handle.-M. Chapman, Greenfield, Mass.
5,610 to 5,618 .-CARPETs. -Otto Heinigke, New York city.
5,610 to 5,618 .-CARPETs. - Otto Heinigke, New Yore
5,619 to $5,623 .-$ Carpers.-H. Horan, Newark, N. J.
5,624 to 5,630.-CARPETs.-L. G. Malkin, New York cit
5,631.-Carpet.-W. Mallinson, Hallfax, England.
5,632.-Soda Fountain.-G. F. Meacham, Newton, Mass
,633.-Carpat. -J. J. Patchett, Halifax, England.
5,634.-Bird Cage Hook.-A. Wunder, New Haven, Conn.
5,655.-Iron Bracket.-M. D. Jones, Boston, Mass.
5,655.-Iron Bracert.-M. D. Jones, Boston, Mass.
5,636.-Carpet.-A. McCaMum, Halifax, England.
5,637.-Ceiling Ornament.-G. Protin, New York clty.
5,637.-Ceiling Ornalient.-G. Protin, New York
5,638.-Clock CAse.-P. B. Wight, New York city.
TRADE MARKS REGISTERED.
 683 to 687.-Photocraph Albums.-W. W. Harding, Philadelphia, Pa.
688. - CLoth and Paper. - The Manhattan Cloth and Paper Company, New

691.-Gin.-Adams \& Taylor, Boston, Mass.
692. - Whisky.-Adams \& Taylor, Boston, Mass
693.-GIN.-Adams \& Taylor, Boston, Mass.

SCHEDULE OF PATENT FEEB:

Patent solicitormo 3y Park Rew. Now York.
APPLICATIONS FOR EXTENSIONS.
Applications have been duly filed, and are now pending, for the extension
of the following Letters Patent. Hearings upon the respective applications
are appointed for the days hereinafter mentioned:
20,356.-Protractor.-J. Lyman. May 8. 1872.

20,649.-V APor Lamp.-A. M. Mace. June 5, 1872.
20,692.-Grindina Mili.-B. A. Beardsley. June 12, 1872 .

20,411.-Harvestre Rake.-D. O. De Wolf. May 15, 1872 .
20,447.-Whitewash Brush.-D. W. Shaw and W. McGraw. May 15, 1572 20,447.-Whitewash Brosi.-D. W. Shaw and W. McGrane
20,542.-Stone Crusher.-E. W. Blake. May 29,1872 .

Value of Extended Patents.
Did patentees realize the fact that their inventions are likely to be more productive of proft during the seven years or extension than the first
toll term tor which their patents were granted, we think more would avail tull term tor which their patents were granted, we think more would avail
themselves of the extension privilege. Patents granted prior to 1861 may be themselves of the extension privilege. Patents granted prior to 1861 may be
extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent oflce, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assiznees under the frrst term having no rights under the extension, except by special agreement. The Government tee for an extension is 8100 , and it is neeessary that good professional service
be obtained to conduct the busine is before the Patent Ofllce. Full informabe obtained to conduct the busine ss efore the Pas
tlon as to extensions may be had by addressing
,

## Inventions Patented in England by Ameri [Compiled from the Conmissioners of Patents' Journal.]

From February 9 to February 15, 1872, inclusive.
Gas Engine.-G. B. Brayton, Boston, Mass,
Metalitic Cans, ETO.-H. W. Shepard and R. Seaman, New York city. Molds, CoRrs, ric.-W. Haineworth, Pittsburgh, Pa.
Mower and reaper.-W. Sprague, South Kingstown, R. I.
Postal Cards, etc.-A. L. McCrea, Washington, D. C
Propelinina Veserls.-W. Condell, New York city.
Proprilinal Vessejls.-W. Condell, New York city.
Refrigerator.-J. Gravensline, Phila., Pa., D. W. C. Taylor, N. Y. city.
Sewing Machine. - Singer Sewing Machine Company, New York Srwing Machink. - Singer Sewing Machine Company, New York city.
Stian Genirator, etc.-A. G. Buzby, Philidelohia, Pa.

## FOREIGN PATENTS---A HINT TO PATENTEES.

It is generally mueh better to apply for foreign patents simultaneously With the application in the United States. If this cannot be conveniently
done, as little time as possible should be lost after the patent is issued, a the laws in some foreign countries allo $\pi$ patents to any who first makes the application, and in this way many inventors are deprived of valid patents for their own inventions. It should also be borne in mind that a patent is issued in England to the first introducer, without regard to the rights of the
real inventor; therefore, it is Important that all applications should be real inventor; therefore, it is important that all applications should be
entrusted to responsible agents in this country, who can assure parties that their valuable inventions will not be misappropriated. The population of Great Britain is $31,000,000$; of France, 37,000,000; Belglum, 5,000,000; Austriag
$36,000,000$; Prussia, $40,000,000$; and Russia, $70,000,000$. Patents may be secured $36,000,000$; Prussia, $40,000,000$; and Rassia, 70,000,000. Patents may be secured
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is the closing inquiry in nearly every letter，describing some invention Which comes to this office．A positive answer can only be had by presenting
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of persons experienced in patent business，and have all the work done over of persons experienced in patent business，and have all the work done over
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