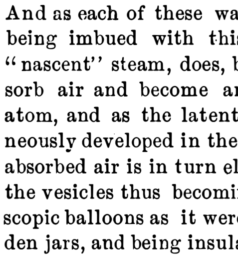
Correspondence

On the Formation of Clouds.

MESSRS. EDITORS :—Throughout nature we see the peculiar affinity that air has for water, and, in fact, most liquids, it would seem clear that this must be due to some more direct and powerful cause than ordinary endosmic action, which latter, in fact, like capillary attraction, would seem to be an effect better expressed than in the case of either term as the "attraction of surfaces;" for, as a boulder thoroughly pulverized will float in the atmosphere, would we call this endosmic action, much less capillary attraction? This remark is made as bearing upon the wonderful phenomenon of water in the form of clouds being elevated and sustained in the atmosphere, at an altitude where the gravity of the water must preponderate 1,000 fold. The cohesive qualities of ice are well known, yet a piece of ice suspended in an atmosphere or air current of its own temperature rapidly disappears. But it will be evident at once that this evanescence of the ice cannot be due to heat in the common sense of the term, and only to a very trifling extent to the mechanical impact or attrition of the air current. It is that the atoms of air act by induction upon the atoms of the ice, because of the difference of their specific electricities, and thus they unite in a species of electro-mechanical combination (the ice being disintegrated parnicle by particle, even perhaps without immediate or simultaneous fusion), and if this view be correct it will at once be evident and consistent that water in a liquid state would be still more readily absorbed or lifted in suspension by the air even in a state of rest, and much more rapidly and extensively when either or both (the air and the water) was in motion or agitated in contact wlth the other. The rapidity with which evaporation takes place under such conditions without any important elevation of temperature is well known, though the latter enhances immensely the rapidity and extent of the combination. Now, when water atoms are so held in suspension in the air and the solar rays act upon them, each water atom becomes, as it were, a burning lens to its contiguous neighbor, and aids its conversion into an atom of "steam," or water imbued with what is termed latent heat, the solar ray or some property of it being thus converted into the something that is popularly expressed by that term. And as each of these water atoms, at the instant of being imbued with this latent heat, or becoming "nascent" steam, does, by an electrical affinity, absorb air and become an inflated vesicle or cloud-atom, and as the latent heat, so called, is simultaneously developed in the form of free electricity, the absorbed air is in turn electrized and highly rarefied, the vesicles thus becoming not only so many microscopic balloons as it were, but so many minute Leyden jars, and being insulated become instantly polarized, yet mutually repellant; the similar equatorial electricity of the vesicles preponderating, in this respect—repulsion—within certain limits of juxtaposition over their polar attraction, which must likewise exist, and the vesicles arrange themselves in the relations shown thus :—



This figure represents four vesicles and their polarities, the plain lines between them representing lines of repulsion, and the dotted lines lines of attraction. The latter causing their aggregation in the form of a cloud, and the former preventing the actual contact of its constituent vesicles. It would seem necessary to this part of the theory and the reconciliation of the observed phenomena, to assume that, initially, the polar forces of attraction between the vesicles preponderates; but when the vesicles have aggregated within a certain proximity, their compound mutual inductive forces cause or enable the equatorial repulsions to balance the polar attraction. An isolated cloud, it may necessarily be inferred, becomes polarized as a whole, and its upper and lower surfaces relatively positive and negative, according to the relative electrical condition of the air-stratum above or the earth below.

The commotions and changes of forms in clouds, particularly the nimbus, are only observed to take place to any material extent and with rapidity when the cloud has a corresponding motion of translation, and may be attributed to the varying inductive influences of different air-strata, or currents in unequal electrical conditions, through or near which the cloud is passing.

It is deemed that the foregoing is sufficient to suggest to the meteorologist and electrician deductions as to any other of the various sub-laws governing the various phenomena connected with the formation of clouds and their dispersion, whether from gradual absorbtion or sudden deposition in the form of rain, hail, &c.; it being remarked, in conclusion, that the gradual or sudden discharge of a cloud by the removal of its electricity, permits the collapse of its vesicles (previously supporting the pressure of the atmosphere) into mere water drops with corresponding rapidity, and gravity does the rest—it rains.

WILLIAM MT. STORM.

Tempering Steel Tools.

MESSRS. EDITORS :—In a recent number of the SCIENTIFIC AMERICAN I noticed an inquiry in relation to hardening cast steel articles, and keeping them straight during the operation. The conditions most favorable in preserving the shape of steel articles, during the process of hardening, is uniformity of thickness in their entire length and breadth, also uniformity of heat, and the application of the hardening medium to all parts alike. If the articles are long they should be dipped, while heated, perpendicularly in the direction of their length, and should not be swayed from side to side. Even with these favorable conditions success is beyond the skill of man unless the metal is homogeneous. The remedy which I have recently discovered is within the reach of all. It consists in a mode of straightening the hardened steel article. I apply a gentle heat to the concave side of the hardened article and pressure upon the opposite side. I have taken a piece of steel about five inches long, an inch wide, and one-fourth of an inch thick, which had been sprung in hardening over one-fourth of an inch, and by the method described have brought it straight without drawing the temper below a pale straw color.

I have also succeeded in making cast steel very soft by annealing, without injuring its qualities for working. In using steel thus treated for small tools I hammer it cold. This treatment seems to increase its conducting power, and causes it to harden at a low temperature. When I can use a dry grindstone in grinding the article into shape I do not heat it in the fire, as by the ordinary method of dipping it into oil or water to harden it, as by proper management I bring the tool up to the proper heat on the grindstone by the friction, about the time it is reduced to the shape desired. I have in this way finished small drills three-eighths of an inch in thickness, at the rate of one in five minutes.

E. BURROUGHS.

Chicago, Ill., Dec. 22, 1862.

MESSRS. EDITORS :—In the "Notes and Queries" of the SCIENTIFIC AMERICAN of December 6th there is an inquiry from G. S., of Connecticut, respecting the best method of tempering large flat tools without springing them. Those who have had much communication and business with smiths know that each claims to possess a secret by which he can harden and temper tools better than any other person. Copperas and salt dissolved in water forms a very common hardening medium among them. It is pretty well known that the quicker steel is cooled the harder it becomes, and all the mixtures used in water are chiefly to cool the metal rapidly.

Having been employed in a manufactory of edge tools and in another where mill picks were made, I have endeavored to learn something of the art of tempering tools of all kinds, from a cold chisel to a trip hammer. Thousands of mill picks were made annually at one of these places, and these were all tempered by one man, who was so noted for his skill in this line that I have known of picks being sent to him for dressing and tempering from west of the Mississippi. He told me that the great secret of his art was in "preparing the steel right." When a large thin tool or a mill pick is hammered more on one side than the other, or flattened considerably at one heat and then narrowed at another, it cannot be hardened and tempered without cracking or springing at the corners. The steel should be heated equally for hammering and for tempering, otherwise the contraction will be unequal when it is [illegible] The best way of heating large thin tools for h[illegible] is dipped into this and retained until it is heat equally throughout; and as the temperature of the lead is known and equal, it is a safe medium for heating tools.

Warm water, which has been proposed by some persons, is not a suitable medium for hardening tools. In proof of this assertion being correct, take a large die of about twenty pounds in weight, heat it for hardening, and then plunge it into a tub of cold water, and it will come out soft. The steel contains so much heat that its surface is kept hot until the surrounding water becomes hot, and then it will not become hard. Dies are hardened by permitting a stream of water to fall upon their surface. Many other articles can be hardened in no other manner.

H. WHEELER.

Silver Creek, N. Y., Dec. 24, 1862.

[Files are hardened by heating them first in a bath of molten lead, then plunging them into cold salt brine. Before heating they are coated with a paste of flour and salt. Anvils are hardened as described by our correspondent for dies. We have seen many anvils hardened, and the cold water was always permitted to fall upon their surfaces from a hight of several feet. Mr. Henry Diston, of Philadelphia, who is distinguished for the manufacture of flat steel tools, informed us that the best way to temper dies was to hold them slightly inclined, and allow the cold water to fall from a head upon their faces.—EDS.

Rifles and Projectiles.

MESSRS. EDITORS :—I am exceedingly pleased to see the Rifle question still discussed in your valuable journal. "R. H. R.," of Indiana, and "J. D.," of Chatham, C. W., have raised the question of different sized bores and balls for rifles—a very important one indeed. It seems to me that neither of them are exactly right, while both are partially so. The first is in favor of the small bore, and the latter, large ones. I agree with "J. D.," as to the small bore answering for short, but not for long distances, because of the want of sufficient weight of metal in the ball, and want of room in the chamber to burn sufficient powder. But cannot this be overcome? I think it can. He evidently goes upon the supposition that the balls of the large and small bore guns shall be made of of the same shape, and consequently that their relative weight shall be in proportion to their diameter, or that of the bore. In other words, if I understand him, he takes as his standards of comparison, round balls. But why need we adhere to the same shape of balls in large and small bore guns? In fact we do not. Almost every variety of shape has been already tried, amounting to, at least, a thousand in number.

Now, my idea is this, that the ball of a small bore gun, by changing its form, may have the required weight and quantity of metal, without increasing its diameter, and consequently without increasing its atmospheric resistance. It being admitted that the resistance is in proportion to their respective diameters, it follows, of course, that with two balls of equal weight, propelled by equal power, the ball having the least diameter (provided it be not reduced to too great an extent) will meet with the least resistance, and, therefore, go furthest. Now, if this be correct, as I believe it is, then all we have to do is to use the small bore, and increase the length of the ball sufficiently to give it the required weight, in fact, to make it resemble a short bolt, rather than a sphere in shape. Of course, care must be had, that the front end of the ball be of the best form for cleaving or penetrating the air, and also that the front portion be heavier than the rear, in order to secure its keeping point foremost during its flight. I anticipate the objection to this, suggested by "J. D.," namely, want of room in the chamber to burn sufficient powder to create the required projecting force, and the effect of side wind in varying the long ball from its direct course. I propose to remedy or avoid the first objection by enlarging the chamber sufficiently to contain and burn the required quantity of powder. I am aware that this involves several very nice questions; as, for instance, the best shape or form of the enlargement of the chamber, the resistance of the diverging walls of the chamber, &c. Yet, when we [illegible] in mind the fact that the gas produced by the combustion of the powder operates in the same manner [illegible] other expansive forces, this objection will not be found to exist in practice. It may be that the force exerted upon the ball at the instant of combustion may be less than in the ordinary-shaped chamber, but if so, it will continue to operate for a greater length of time, and to a greater extent of the passage of the ball through the barrel, which I believe would be an advantage, for these reasons: 1st, the ball will start with less initial velocity, and thus avoid the danger of stripping; 2d, the force will continue to be exerted upon the ball during its entire passage through the barrel, which we know is not ordinarily the case, in long barrels. This will secure the use of longer barrels, thus ensuring greater accuracy of sight and aim, and consequently of range. The other objection, of the effect of side winds, will be counterbalanced by the increased velocity of the ball, or partially so, at least. This is a difficulty against which we have to contend in all projectiles, and can only be overcome by a thorough understanding of the whole subject, and a nice calculation, at the time of firing—depending upon the force of the wind, the length of range the extent of area presented to the wind, and the velocity of the ball.

This whole subject is one of great interest to me, and I believe to the public at large. I should greatly rejoice to see Congress make an appropriation sufficient to conduct a series of experiments which should settle, not only these, but all the other vexed questions in regard to the best style of gun, and ball—including length of barrel, kind of twist, size of bore, &c. RIFLEMAN.

Washington, D. C., December 20, 1862.

The Size and Pitch of Machine Screws.

A correspondent having seen an article in this journal lately, upon the above subject, sends us the following sensible and practical remarks:—

MESSRS. EDITORS:—The "Pitch of Machine Screws" is the title of an article in your paper of the 13th ult.; and as I experience the troubles therein set forth daily, I will give you my views on this matter. I find, on comparing the number of threads per inch given in your article for several diameters, that they do not agree with the Whitworth standard, now used by the best machinists and bolt-makers in Philadelphia and other cities, [a mistake; look again.—EDS.] and also adopted by Haswell, Scribner, and other compilers of works for mechanical engineers. As some of your readers may not have the list of sizes of heads and threads, I will copy it:—

Diameter..........	$\frac{1}{4}$	5-16	$\frac{3}{8}$	7-16	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
No. of threads per inch........	20	18	16	14	12	11	10	9	8	7	7	6	6
Short diam. of head and nut..	7-16	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{5}{8}$

Depth of nut....About the same as the diameters.

Another trouble exists in the screw quite as important as the pitch of the thread, viz., the diameter. The bolt manufacturers conform their taps and dies to suit the iron, instead of adopting some standard measure or parts of an inch of their own; for the reason, probably, that the rolling mills fill orders for 1-inch iron, but in a tun there will be found some rods which will exceed the proper size by one-sixteenth of an inch. This should not be the case, and consumers of iron should insist on having iron of the size ordered. They should not change their tools to suit inaccurate rolling-mills. The machinist is now compelled to have two sets of taps and dies—one set to suit the bolts manufactured, the other to conform to standard measurements. This practice involves trouble in the shop; as the taps are marked alike, the workmen will use the rough-bolt tap where it was intended to use the standard one. We have found it less trouble to use the bolt-makers' size, and conform the finished screws to it. I hope, however, some arguments may induce the bolt manufacturers and machinists to adopt the Whitworth standard of diameters, or some other equally good, as well as an even number of threads to the inch. Some of the bolt manufacturers are large consumers of iron, and require the full capacity of a rolling mill for their supplies. They could easily demand to have the iron made of the proper size to finish to the standard. The iron merchants would certainly find it to their interest to supply the sizes called for

New York, Dec. 17, 1862.

[illegible] Gas.

AT a late meeting of the London Chemical Society, Mr. Parrett stated that some time ago, while MM. Buff and Wöhler were making some experiments upon electrolytic decomposition, they employed a plate of the metal aluminum as the negative terminal of the battery for the decomposition of water; and as soon as the electric current was established, they were surprised to find that, instead of pure hydrogen gas being evolved, as is usual with a platinum plate, a gas was evolved which inflamed spontaneously. Upon investigation, this gas was found to be composed of hydrogen and silicium, the latter being an impurity in the aluminum plate. Several processes have recently been adopted for preparing this gas. Silicated hydrogen and the silicate of magnesium were found to furnish the best materials for producing it. Dr. Hoffman recommends the following mode of making it:—Take 80 parts of fused chloride of magnesium, 70 parts of silico-fluoride of potassium, 40 parts of sodium cut into small pieces, and 20 parts each of the chloride of potassium and sodium. These ingredients are mixed together dry, placed in a clay crucible, and quickly heated to redness. The product thus obtained is a silicate of magnesia (Mg^2 Si.). When this is triturated in a mortar with hydrochloric (muriatic) acid, it gives off an abundance of gas, which keeps up a lively combustion in the mortar. A bottleful of this gas, prepared by Dr. Hoffman, was let off by a tube through a trough containing dilute hydrochloric acid, and as it escaped in bubbles at the surface of the liquid, these inflamed immediately and spontaneously when they came in contact with the atmosphere. Each bubble produced a white flame, like that of phosphoreted hydrogen. The combustion formed flakes of silica, which resembled fumes of burning zinc. This is one of the most dangerous gases, and further investigation may prove that many mysterious fires, directly attributed to spontaneous combustion, may be due to it. Dr. Hoffman believes it is a marsh gas of the silicon series.

Every new discovery in science, while it extends the domain of useful knowledge, also opens up a wider and grander prospect for future exploration. What triumphs are due to recent chemical research, and yet how very little is known of nature's grand operations! The discovery of this new inflammable gas may be a golden wedge which will cleave and open up some of nature's deepest mysteries.

Iron-works in America.

The manufacture of iron in the United States may be divided into three departments—first, the blast furnaces using anthracite coal, charcoal, raw or coked bituminous coal; second, bloomeries or mountain forges, which turn ore or cast iron into blooms or malleable iron; and third, rolling mills converting these into bar, rod, sheet and nail-plate iron, and into rails. In 1857 the works of these kinds amounted to about 1,131, namely, 121 anthracite furnaces, 500 charcoal and coke furnaces, 300 forges, and 210 rolling mills; and the entire production of iron was about 783,000 tuns, a decrease upon the previous year of 73,235 tuns, for in 1856 the total domestic produce of pig and of rolled and hammered iron was 856,235 tuns. In 1859 there were only eight States of the Union destitute of iron-works—Mississippi, Louisiana, Florida, Texas, Iowa, Minnesota, California and Oregon. The remaining twenty-five were employing 560 furnaces, 389 forges, 210 rolling mills; in all, 1,159, producing 840,000 tuns—an increase, in two years, of twenty-eight works and of 57,000 tuns of iron. In 1856 the Pennsylvanian iron-works produced 243,484 tuns of anthracite iron; in 1857, 237,318 tuns; in 1858, 185,000 tuns; and, in 1859, 286,332 tuns. To this may be added the production of charcoal iron, amounting to 39,500 tuns. The fall in the manufacture of 1858 was caused by the crisis of the previous year, produced by over-speculation in the West. The quantity of iron of all kinds, used in every form of manufacture in the United States, was calculated, in 1856, to be 1,330,548 tuns. Of this quantity 817,356 tuns were rolled and hammered iron, 298,275 tuns of which were imported, the remaining 519,081 tuns being domestic produce. The domestic pig iron consumed in the same year was 337,154 tuns, and of foreign 56,403. [illegible] marked increase in the production of the Pennsylvanian rolling mills; large orders were received for rails from the South and West. The railroads in those parts of the Union had originally been mainly constructed of imported rails, of a cheap and inferior quality, which had very soon become unfit for use, and it was soon discovered to be better policy to pay a higher price for more durable iron. The larger rolling mills for railway iron in Pennsylvania are the Cambrian Mills at Johnstown, the Phœnix Iron Company at Phœnixville, the Montour Mills at Danville, the Lackawanna Mills at Scranton, and the Rough and Ready at Danville. The production of rails in 1859 was 104,350 tuns; in 1858, 65,500 tuns; in 1857, 70,000 tuns; and, in 1856, 76,300 tuns. During the latter part of 1857 the mills were wholly or partially closed. The activity of the iron manufacture in Pennsylvania continued during the first part of 1860, but since October in that year it has of course experienced a severe check. Many of the mills that had stopped work through the secession movement have again resumed active operations, especially those devoted to the rolling of plates. The demand upon them for Government iron-plated vessels has been greater than the capacity of such mills to supply.

Wonders of the Atmosphere.

The atmosphere rises above us with its cathedral dome arching towards heaven, of which it is the most perfect synonym and symbol. It floats around us like that grand object which the apostle John saw in his vision, "a sea of glass like unto a crystal." So massive is it that when it begins to stir it tosses about great ships like playthings, and sweeps city and forest like snowflakes to destruction before it.

And yet it is so mobile that we have lived for years in it before we can be persuaded that it exists at all, and the great bulk of mankind never realize the truth that they are bathed in an ocean of air. Its weight is so enormous that iron shivers before it like glass, yet a soap ball sails through it with impunity, and the tiniest insect waves it aside with his wing. It ministers lavishly to all our senses. We touch it not, but it touches us. Its warm south wind brings back color to the pale face of the invalid; its cool west winds refresh the fevered brow and make the blood mantle to our cheeks; even its north blasts brace into new vigor the hardened children of our rugged climate.

The eye is indebted to it for all the magnificence of sunrise, the brightness of midday, the chastened radiance of the morning, and the clouds that cradle near the setting sun. But for it, the rainbow would want its "triumphant arch," and the winds would not send the fleecy messengers on errands around the heavens; the cold ether would not shed snow feathers on the earth, nor would drops of dew gather on the flowers. The kindly rain would never fall, nor hailstorm nor fog diversify the face of the sky; our naked globe would turn its tanned and unshadowed forehead to the sun, and one dreary, monotonous blaze of light and heat dazzle and burn up all things.

Were there no atmosphere, the evening sun would in a moment set, and, without warning, plunge the earth into darkness. But the air keeps in her hand a shield of her rays, and let them slip but slowly through her fingers, so that the shadows of evening are gathered by degrees, and the flowers have time to bow their heads, and each creature space to find a place of rest, and to nestle to repose. In the morning, the garish sun would at one bound burst from the bosom of the night, and blaze above the horizon; but the air watches for his coming, and sends first but one little ray to announce his approach, and then another, and then a handful; and so gently draws aside the curtain of night, and slowly lets the light fall on the face of the sleeping earth, till her eyelids open, and like man she goes forth again to labor until evening.—*Quarterly Review.*

English Iron-clads.

The progress of the *Royal Sovereign*, an English line-of-battle ship, cut down to be fitted with Capt. Coles' revolving shields, is thus described by the London *Engineer* :—

The *Royal Sovereign* shield-ship, being converted at Portsmouth, is making rather more satisfactory progress now than a short time since. The massive timber beds on which the towers, guns, and shields will revolve, are very forward, the foremost bed, in fact, being finished, and the manner in which it has been put together reflects the highest credit on the shipwright department of the yard. The circular rims of these beds are formed of bent strips of American white oak. The central iron cylinders, one of which will be fixed in the centre of each bed, as a supporting pivot for the guns and shields, have been commenced in the smithery, but each cylinder will take some weeks in its manufacture, owing to the want of the requisite mechanical means for carrying out such unusually heavy and peculiar work. In building up each cylinder two plates are first forged, each plate being 7ft 6 inches in length, 3ft. 7 inches in width, and 4 inches in thickness. They are bent, each longitudinally in a semicircle. After this last operation has been completed under the Nasmyth hammer, they are conveyed to the steam factory to have their edges bevelled, for welding, which is carried out in the smithery with "binding" iron. The rough cylinder thus completed, is afterwards turned inside and out in the lathes of the steam factory. No. 1 cylinder of the *Royal Sovereign* has gone through about one-half of this process. 210 hands are now employed upon the ship, chiefly on the beds for the guns and shields, fixing the iron beams of the upper deck in readiness for receiving the plating and planking, and the fitting of the main deck. The external planking round the stern is now completed, and a gang of men are employed, under the direction of the officer who has charge of the ship's conversion, working overtime to get out the molds for her after armor plates as quickly as possible. The machinery for bending her plates is not yet in working order, but it has now reached such a stage that hopes are entertained of its being available in about ten days or a fortnight. The building which contains the hydraulic machinery and the annealing furnaces for preparing the plates has been built at the north end of the yard, near the shed under which the *Royal Alfred* is being converted from a 90-gun line-of-battle ship to a 40-gun iron-plated frigate. Workmen are now employed in preparing the launching ways and cradle for the launch of this ship, which is ordered for January next. Upwards of 200 hands are employed upon her, but great delay has taken place owing to the non-delivery of her iron beams and upper deck plating by the contractors. It is almost needless to say that as yet she has none of her armor plating attached to her sides.

Proposed Submarine Battery for New York Harbor.

Among the numerous plans of harbor defense which have been suggested to us, one by Mr. James Cochrane, of this city, possesses considerable novelty. This gentleman proposes to sink iron pipes between the forts at the Narrows, in New York harbor, or at other convenient points, from which charges of powder may be exploded under passing ships—the operator being within the pipe or tunnel, and informed by telegraph, or otherwise, of the position of the enemy's ships. An objection arises to this plan from the possibility which might arise of the tunnel being destroyed as well as the ship or battery. Since water is a non-elastic fluid, the force of the explosion would be severely felt, and it is doubtful whether such a plan could be safely adopted. We should like to receive plans and descriptions of other methods for protecting our cities from invasion by a foe.

Explosion of a Submarine Torpedo.

The Union gunboat *Cairo*, while ascending the Yazoo river, on the 11th of December last, ran on to a sunken torpedo which exploded, and so shattered the vessel at the point of contact that she sunk fifteen minutes afterward in forty feet of water. The character of her injuries is such that she cannot be raised even if the stage of water would permit it, and she will prove a total loss to the Government. No lives were lost by the catastrophe. The *Cairo* was one of the first fleet of seven iron-clads built for the Western rivers, carried ten guns, and was one of the staunchest of the fleet. She took part in the battle of Fort Donelson, Feb. 16, 1862, and in the bombardment of Island No. 10, in the Mississippi river, in March and April. This is only remarkable as being the first instance on record of one of those machines operating successfully.

A Naval "What is It."

At the Brooklyn navy yard a queer nondescript, which was commenced last summer at the yard and left in *statu quo* ever since, is to be finished at once and launched. The New York papers state that on Tuesday the employes of the yard and a few privileged visitors were thrown into excitement by the appearance in the yard of a weapon as singular as the nondescript itself. It is a gun of the strangest aspect imaginable, and seems capable of discharging 60 pounds of shot. It is made of brass or composition, and its breech and muzzle rest on a frame or pedestal of the same material as the gun. There are none of the ordinary appliances for firing a cannon attached to it. And this irregular arm is to be the battery of the "What is It." The "What is It" is a huge box near fifteen feet high and twelve feet wide, or thereabouts. It is caulked so as to be almost air-tight, and has an internal diameter of about twenty-four feet, and looks very like a tunnel inside. The gun will be within, and although, in firing it will protrude through the port-hole, a porch or "portico" covers its muzzle, That is all that can be known of the "What is It," which may be a submarine battery, with an air-gun, or a Delano infernal machine, for all the outside public may know.

MISCELLANEOUS SUMMARY.

Artificial Legs distributed among Disabled Soldiers.—A Washington dispatch states that on Tuesday, for the first time, artificial legs were distributed among the soldiers who have lost their pedal extremities in the service of their country. These patients are all congregated in one hospital, the St. Elizabeth. The soldiers were much pleased with the new aids to locomotion, and many amusing scenes occurred among them while trying on the artificial legs. The first individual who tried one was lustily cheered by his companions as he paraded through the wards of the hospital. All the patients will be supplied in the course of a few days. No artificial arm and hand have as yet been adopted by the Medical Department.

Obituary.—We regret to learn that Mr. John Marshall, so long and favorably known as an engineer of skill and experience in this city, recently lost his life in China by the explosion of a defective boiler on board of an English steamer. Mr. Marshall had been for many years in the employ of most of our large steam lines, but of late, since the introduction of American traders in Chinese waters, he has resided wholly in those parts. Mrs. Marshall, who recently arrived out, was so much prostrated by the accident and her loss that she also was taken ill and died shortly after. In Mr. Marshall's death the country and company have lost the services of an efficient and energetic officer.

A Good Record.—The steamship *Bienville*, of the blockading squadron off Charleston, has been under steam 380 days out of 420 days, the period of time which elapsed before she left her station for repairs. This is most creditable to all of her officers, and it affords a remarkable contrast to the performance of those miserable transports which so nearly went to the bottom with all their passengers.

A Chinese stove, one of the curiosities taken from the Emperor's summer palace at Pekin, has been exhibited in London. It is a fine specimen of enamel-ling, consisting of a basin-like foundation, with a broad flat rim inclining upwards, upon which rests a dome-like arrangement formed of three bands and crowned by a brass knob, and from the lower portion of the basin three curtain or apron-like parts are pendent between elephant heads.

Before the war broke out, 5,000,000 persons were supported in England by cotton, 30,000,000 spindles employed in the production of the yarn, and the capital absorbed exceeded $750,000,000. Four-fifths of the cotton consumed in England—800,000,000 pounds—were American.

Manufacturing Items.

Manufacturing Profits.—The Everett Mills Company, Lawrence, Mass., lately held a special meeting, at which a report was read. The capital of the company is $700,000, and the profits, up to last November, were $138,000, or over 19 per cent. The materials and goods on hand cost $215,000, and if sold at present prices would yield a very large profit.

New Foundry.—The *Commercial Bulletin* (Boston) states that a company has been formed, called the Boston & Fairhaven Iron Company, with capital stock of $30,000, of which $10,000 have been subscribed by citizens of Fairhaven. Having secured a good location, the company commenced vigorous operations last week. They purchased the old cotton factory on Laurel street, Fairhaven, known as the Acushnet Mill, which is 72 feet long by 40 wide, and 2½ stories high. To this, brick extensions are to be made on each side, viz., one story, 12 feet high and 40 feet long. A short railroad track will be laid from the rear of the works to the Fairhaven Railroad.

New Woolen Mill.—The Kennebec (Maine) *Journal* says that the erection of the new woolen mill of Colonel Thomas S. Lang, of Vassalboro', affords a remarkable instance of business energy. This mill is 200 feet long and four stories high, and required 400,000 bricks, &c. In twelve weeks from the time that Mr. Lang gave the orders for these bricks they were made, burnt and laid.

Thrifty Cotton Mill.—The Baltic Cotton Mill of A. & W. Sprague, on the Shetucket river, Conn., seven miles from Norwich, is 954 feet in length, in which there are in operation 1,334 power looms, with other machinery to match. Nine hundred and thirty-four of these looms are in one room. All the machinery is new, and comes forth from the workshop of the manufacturer with all the latest improvements. There are now employed about 900 hands, who earn $12,500 per month, and manufacture at the rate of 12,480,000 yards a year.

A Big Shaft.—The Nashua Iron Company, Nashua, N. H., have lately forged a shaft for a new side-wheel steamer. Its length is 28 feet 8 inches; diameter 21 inches; weight 29,340 lbs. This company uses a steam hammer, the head of which weighs six tons. The shaft of the steamer *Golden Gate*, that was lately lost in the Pacific, weighed 54,000 lbs.

INTERNAL REVENUE STAMPS UPON PATENT DOCUMENTS.

United States Patent Office,
Washington, D. C., Dec. 15, 1862.

Notice is hereby given, that the following rules have been adopted for the purpose of conforming to the requirements of the Act of Congress of July 1st, 1862, entitled, "An Act to provide Internal Revenue to support the Government and to pay Interest on the Public Debt," and of the decisions of the Commissioner of Internal Revenue.

1. A stamp, or stamps, of the value of *one dollar*, will be required upon all Powers-of-Attorney dated after the First Day of January, 1863, authorizing an attorney or agent to transact business with this office relative to applications for Patents.

2. All assignments of Patents, whether stamped or not, will be recorded, and the fact whether or not the instrument recorded is stamped will be noted upon the record.

3. No assignment directing a patent to issue to an assignee, or assignees, dated after the 1st day of January next, will be recognized by this office, unless every sheet or piece of paper, upon which such assignment shall be written, shall have affixed thereto a stamp of the value of *five cents*.

D. P. Holloway, Commissioner.

A Scientific Problem.

That "pioneer of the penny press," *The New York Sun*, maintains its issue at one cent per copy and with undiminished size, in spite of the high price of paper and materials. Its proprietor is evincing a degree of combined spunk and liberality for which he ought to be rewarded in the hearts of the great public, if not in his own pocket. *The Sun*, moreover, is one of the most interesting and readable papers which falls into our hands. It has *the news* of the day without unnecessary repetitions and prolix details. Its present daily circulation is between 60,000 and 70,000 copies.