eaten up by the lady bugs, and the leaves recover. This blistered leaf is one of the symptoms of the disease called the yellows.

Mr. Bergen and Mr. Williams thought that the blistered leaf occurs in trees not affected with yellows.

THE WAY TO USE BONE.

The President inquired if any one could tell him the best way to apply ground bone.

Professor Mapes replied, "Let a man who knows all about the trade tell you that it is almost impossible to get any pure ground bone in this city."

Mr. Ely:—I bought mine of Peter Cooper, and he gave me his guaranty that every particle of it was pure bone; I have examined it carefully with a glass and am satisfied that it is an unadulterated article.

Professor Mapes:—I have not a doubt of it; you have cited the only exception that I could have named. Peter Cooper's treatment of bone gives a pure phosphatic result, but if our farmers used as much bone manure as they ought, Mr. Cooper could not supply one-tenth part of a single county. More than 99 per cent of the crushed bone sold in this market comes from the soap makers. They buy the bones with a good deal of meat on them, and boil them down till they are so soft that you can mash them right down with your foot. Then they mix, as they say a "little" lime with the bones so they will crush. The "little" lime is generally a good deal, and the bones contain all the gelatin, which is of no use to a farmer if he has 10,000 tuns of it. Bones prepared in this way are uncommonly rich if they contain 30 per cent of phosphate of lime.

Mr. Bergen:—You have not said how you would apply crushed bone.

Professor Mapes:—I would add to it from one-fourth to one-third its weight of agricultural sulphuric acid; which is sulphuric acid as it comes from the lead before it is concentrated. The principal expense in manufacturing sulphuric acid is in the process of concentration, and it is foolish for the farmer to pay for this when he wants it diluted. Then I would mix it with compost in order to spread it more evenly over the land. A few years ago the farmers of England were in the practice of applying what they called inch bone to the land—that is, bone in pieces an inch in diameter. They spread it at the rate of 400 bushels to the acre. At length some one suggested half-inch bone, and it was found that 250 bushels of half-inch bone would produce quite as well as 400 bushels of inch bone. Then the experiment was made of grinding it to meal, when 50 bushels proved as efficient as 400 bushels of the coarsest application. Finally Liebig showed how five bushels might be made as productive as any of the previous applications. His plan was the treatment with sulphuric acid and compost as I have described. The only difference is that while the small application is efficient for three or four years, the effects of the coarse bone applied in large quantities are observed for fifty years or more. But the interest on the cost of 400 bushels would, of course, much more than pay for five bushels once in three years.

A Sea-going Turret Ship to be Built in England.

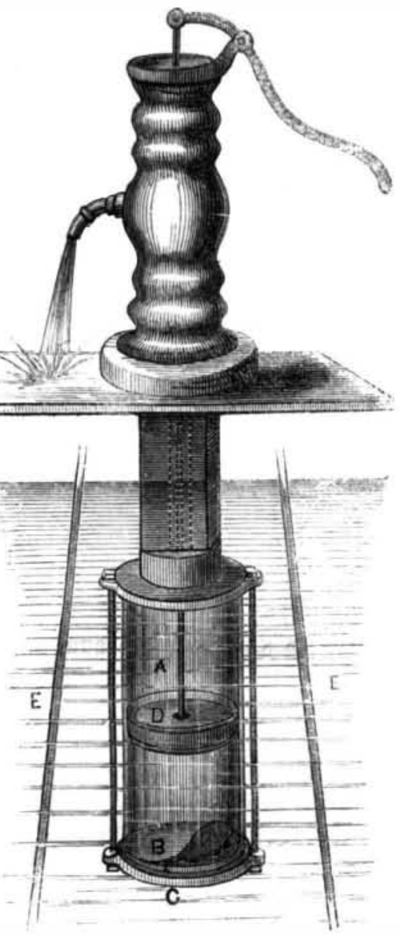
The London *Engineer* of April 28th says:—"In accordance with the instructions issued from the Admiralty to captain Cowper P. Coles, R. N., and to the Master Shipwright's Department of Portsmouth Dockyard, the chief draughtsman of the Portsmouth yard has prepared a set of drawings, under Captain Coles's supervision and direction, of a sea-going turret ship embodying Captain Coles's ideas in full of the turret principle as applicable to a sea-going ship. The vessel is designed to carry 600-pounder guns or 'Big Wills' in her turrets, and the drawings, complete in all their details, were sent in to the Admiralty by Captain Coles during the first week in the present month."

CURTAIN PINS.—In England a pin used for fastening curtain to rods, or for similar purposes, which is in appearance like a common diaper pin, with an eye in the middle of the shank or back, so that the pin may be run through the material hooked like a diaper pin, and leave a ring at the top to suspend the curtain by. The advantage is that the rings can be taken off in a minute when the curtain is washed, need no sewing, and last forever.

CARLETON'S SUBMERGED GLASS PUMP.

A good pump for domestic purposes is an exceedingly valuable thing, for being used constantly, and, by persons who are unacquainted with the care of machinery, it requires to be strongly made, free from complexity, and not liable to become deranged. The manufacturer of the pump here shown claims that all these points are obtained in his invention, and, that having been in use in a large part of Maine for some time, it has demonstrated its merits in a practical manner.

It is claimed for this pump that by constructing the cylinder of glass, corrosion is obviated, and the wear which results from this cause, as well as the injury to the water drawn, is not experienced. It is entirely submerged, and by allowing the water to be drawn off from the tube above the chamber and



below the surface, freezing of the contents of the tube never occurs, neither does the pump lose water. It is not liable to derangement from leakage, for as the pump lifts its water instead of raising it by atmospheric pressure, or "suction," as it is erroneously called, no injury beyond a slight loss of water would ensue if the tube above the chamber was cracked all the way up. Since the valves are always under water and attached without nails, they and their fastenings cannot be prematurely destroyed by the alternate action of the air and water. This pump can be used in wells of any depth, and is sold at a low price.

The construction of it is similar to all other pumps; A being the glass chamber, half an inch thick; B, the lower valve of leather, confined by being held between the valve-seat, C, and the chamber, A, and D the upper valve in the piston. All the fastenings and working parts of iron, where they are under or in water, are of galvanized iron, and in other respects the pump is strong and well made.

This invention was patented on January 7, 1862, through the Scientific American Patent Agency, and is manufactured by G. E. Carleton, at Dayton, Ohio. For further information, address him at that place.

AN arrangement has been invented in Philadelphia to prevent horse cars running over anybody. The inventor attached it to a car and then laid down on the track, and was thrust aside without injury.

IT is a remarkable fact that the late President had not a blood relation, save his two boys. Mrs. Lincoln has relatives, but her husband had none living.

RESISTANCE OF VESSELS IN WATER.

As we have had frequent inquiry of late for information of the kind conveyed below, we reprint the following article from Bourne, which will be found interesting:—

Q.—How do you determine the resistance encountered by a vessel moving in water?

A.—The resistance experienced by vessels moving in water varies as the square of the velocity of their motion, or nearly so; and the power necessary to impart an increased velocity varies nearly as the cube of such increased velocity. To double the velocity of a steam vessel, therefore, will require four times the amount of tractive force, and as that quadrupled force must act through twice the distance in the same time, an engine capable of exerting eight times the original power will be required.

[This statement supposes that there is no difference of level between the water at the bow and the water at the stern. In the experiments on the steamer *Pelican*, the resistance was found to vary, as the 2·28th power of the velocity, but the deviation from the recognized law was imputed to a difference in the level of the water at the bow and stern.]

Q.—In the case of a board moving in water in the manner of a paddle float, or in the case of moving water impinging on a stationary board, what will be the pressure produced by the impact?

A.—The pressure produced upon a flat board, by striking water at right angles to the surface of the board, will be equal to the weight of a column of water having the surface struck as a base, and for its altitude twice the hight due to the velocity with which the board moves through the water. If the board strike the water obliquely, the resistance will be less, but no very reliable law has yet been discovered to determine its amount.

Q.—Will not the resistance of a vessel in moving through the water be much less than that of a flat board of the area of the cross section.

A.—It will be very much less, as is manifest from the comparatively small area of paddle board, and the small area of the circle described by the screw, relatively with the area of the immersed midship section of the vessel. The absolute speed of a vessel, with any given amount of power, will depend very much upon her shape.

Q.—In what way is it that the shape of a vessel influences her speed, since the vessels of the same sectional area must manifestly put in motion a column of the same magnitude, and with the same velocity?

A.—A vessel will not strike the water with the same velocity when the bow lines are sharp as when they are otherwise; for a very sharp bow has the effect of enabling the vessel to move through a great distance, while the particles of water are moved aside but a small distance; or, in other words, it causes the velocity with which the water is moved to be very small relatively with the velocity of the vessel; and as the resistance increases as the square of the velocity with which the water is moved, it is conceivable enough in what way a sharp bow may diminish the resistance.

Q.—Is the whole power expended in the propulsion of a vessel consumed in moving aside the water to enable the vessel to pass?

A.—By no means; only a portion, and in well-formed vessels only a small portion of the power is thus consumed. In the majority of cases, the greater part of the power is expended in overcoming the friction of the water upon the bottom of the vessel; and the problem chiefly claiming consideration is, in what way we may diminish the friction.

Q.—Does the resistance produced by this friction increase with the velocity?

A.—It increases nearly as the square of the velocity. At two nautical miles per hour, the thrust necessary to overcome the friction varies as the 1·823 power of the velocity; and at eight nautical miles per hour, the thrust necessary to overcome the friction varies as the 1·713 power of the velocity. It is hardly proper, perhaps, to call this resistance by the name of friction; it is partly, perhaps mainly, due to the viscidity or adhesion of the water.

Q.—Perhaps at high velocities this resistance may become less?

A.—That appears very probable. It may happen that at high velocities the adhesion is overcome, so that the water is dragged off the vessel, and the friction thereafter follows the law which obtains in the case of solid bodies. But any such conclusion is mere speculation, since no experiments illustrative of this question have yet been made.

Q.—Will a vessel experience more resistance in moving in salt water than in moving in fresh?

A.—If the immersion be the same in both cases a vessel will experience more resistance in moving in salt water than in moving in fresh, on account of the greater density of salt water; but as the flotation is proportionably greater in the salt water the resistance will be the same with the same weight carried.

Q.—Discarding for the present the subject of friction, and looking merely to the question of bow and stern resistance, in what manner should the hull of a vessel be formed so as to make these resistances a minimum?

A.—The hull should be so formed that the water, instead of being driven away forcibly from the bow, is opened gradually, so that every particle of water may be moved aside, slowly at first and then faster, like the ball of a pendulum, until it reaches the position of the midship frame, at which point it will have come to a state of rest, and then again, like a returning pendulum, vibrate back in the same way, until it comes to rest at the stern. It is not difficult to describe mechanically the line which the water should pursue. If an endless web of paper be put into uniform motion, and a pendulum carrying a pencil or brush be hung in front of it, then such pendulum will trace on the paper the proper water line of the ship, or the line which the water should pursue in order that no power may be lost except that which is lost in friction. It is found, however, in practice, that vessels formed with water lines on this principle are not much superior to ordinary vessels in the facility with which they pass through the water: and this points to the conclusion that in ordinary vessels of good form, the amount of power consumed in overcoming the resistance due to the wave at the bow and the partial vacuity at the stern is not so great as has heretofore been supposed, and that, in fact, the main resistance is that due to the friction.

Correspondence

Red of Sorgho.

MESSRS. EDITORS:—Some papers give, as a new discovery, the fabrication of a red coloring matter obtained from the stalks of the sorgho. This fact is not new, as the process to obtain it was described by Mr. Winter in the *Bulletin de la Societé d'Encouragement*, June, 1860, and I reproduced it in the *Industrial Chemist*, June, 1862, page 12. As it must interest many of your readers to know how to prepare it, I send you a copy of the article in question:—

"It is a fact long known that the sorgho contains a red coloring matter. The following is the process used by Mr. Winter to extract it: The trunks of the sorgho are stripped of their leaves and reduced to pulp in a rolling mill, and well pressed to extract the juice from them. This juice is used to make sugar or alcohol. The ligneous tissue is left some time to itself; it begins to ferment rapidly. Care must be taken that the fermentation is not too active, because by an elevation of temperature it will undergo putrid fermentation. When the operation has proceeded well, the mass, after fifteen days, has acquired a red or red-brown color. Stop the fermentation in drying well, and grind the matter to divide it.

"To isolate the coloring matter, infuse the powder in cold water, which dissolves a little coloring matter. Press the mass very strongly, and put it to macerate in a weak caustic lye. Filter, press and saturate the alkali by sulphuric acid; the coloring matter is separated in red flakes, which are collected on a filter, washed and dried. That color is nearly pure, very soluble in alcohol, alkalies, weak acids, etc.

"To dye wool and silk with it, use the ordinary tin mordant. The dyes made with that will resist the action of the light and a bath of soap moderately warm. The extraction and uses of that coloring matter are known and practiced in China, where the culture of the sorgho is carried on on a large scale."

Hoping this information will lead to the use of this coloring matter in industry, I remain, gentlemen, yours truly, H. DUSSAUCE.

New Lebanon, N. Y., May 8, 1865.

Copper Cartridges Unreliable in Cold Weather.

MESSRS. EDITORS:—My attention has been recently called to a fact which I had not previously observed, but of the truth of which I am entirely convinced, and one that constitutes a very serious objection to the fixed ammunition which has come into such general use in the form of copper cartridges having the fulminate in the base. The fault I allude to is, that in cold weather they are very liable to miss fire. My conviction of this fact rests but partially on my own observation, for I have never used this ammunition in the field; and though I have experimented freely with it, my trials have been conducted in a shooting room, where a tolerably even temperature was preserved; but the testimony I have received comes to me from such varied and respectable sources that I cannot doubt its truth.

During last winter I received numerous letters from correspondents in Canada complaining of ammunition I had sent them for the Spencer, Ballard and Wesson rifles, saying that a very large proportion of the cartridges missed fire. An officer of the English army who had sent to me for a Spencer rifle and ammunition, wrote me that the gun was so much liked that he should have had orders for a number but for the defects of the ammunition, of which, on an average, one cartridge in four missed fire, and that unless I could send him some that were more reliable he would send to England and get Eley to make them for him. Similar complaints reached me from others, and puzzled me greatly, as being so contrary to my own experience, as I had found them almost invariably reliable. It is only within a few weeks that the explanation was suggested to me in a letter from a gentleman who wished me to get him a Maynard rifle, as his experience with the copper cartridges had put him out of conceit with the guns which used them. He says:—"If the temperature is many degrees below the freezing point they are entirely unreliable. I have known five or six cartridges in succession to miss fire, though taken from the same lot which, in ordinary temperature, never missed."

This opened my eyes at once to the source of the trouble my Canadian correspondents had experienced, and on communicating with them I find the statement confirmed by several who have had the opportunity of making the trial at different seasons. The most natural explanation seems to be that a change of temperature causes a condensation of the moisture in the air contained in the cartridge, which so dampens the fulminate as to destroy its explosive power. But, whatever may be the cause, the fact comes to me from so many sources and from men who could have no interest in making misstatements, that I cannot doubt it, and as it is one which interests every man who uses a gun it ought to be known. The trouble of capping is a trifling matter compared to the annoyance of continual missfires.

H. W. S. CLEVELAND.

Danvers, Mass., May 6, 1865.

Washing Wool with Glycerin.

MESSRS. EDITORS:—In reading an article in No. 15, current volume, of your valuable paper, on "Applications of Glycerin," I notice that it is used by "manufacturers of woolen goods" in place of oil. As soon as I read the article I procured some from one Gasco, and tried it for oiling wool for carding. It seemed to work well, except that it gummed up the cards more than oil will do, and the cards would not clear of wool as readily as they ought. I reduced it with water but it did not seem to obviate the difficulty. Can you inform me if anything is mixed with the glycerin to make it applicable to lubricating wool? If not I fear I shall not be able to do anything with it. I was really in hopes when I read the article that the difficulty of scouring woolen goods could be obviated.

J. H. SMITH.

Newark, Ohio, May 10, 1865.

[We have no knowledge on this matter further than was stated in the extract referred to. Perhaps some of our readers may give the information sought.—EDS.

Paper on Damp Walls.

MESSRS. EDITORS:—Will you be kind enough to inform me what I can do to keep paper on damp walls. I thought of saturating good hardware or manilla paper in coal tar, and drying, and then put it on the wall, and if it dried, have the wall paper put over it. A SUBSCRIBER.

Louisville, Ky., May 3, 1865.

[Perhaps some of our correspondents can give the desired information.—EDS.

Iron Manufacturers among the Africans.

The nodules of ore are generally smelted in the forests, and brought in a lump to the smith, who by means of stone anvils and stones as sledge hammers, converts it into a long rod; and finally, by a hand vice and grease from a small pot he carries, it is tied between two posts and drawn till it becomes a thread. It is now fit, after being once heated, for being twisted nearly, with the finger and thumb, round a few hairs from the tail of a cow, or the thicker hair of a giraffe. In this state it is worn in rings ornamenting the ankles of men and women, fifteen of them costing one string of beads, value one half-penny, and fifteen copper or brass ones being double price. Iron hoes, adzes, grass hooks, small knives, pincers, etc., are all made up by the natives, in the above rude way, and this is the extent of their knowledge in iron work.—*A Walk across Africa, by Captain Grant.*

Novelty in Iron Smelting.

On Thursday, April 27, in the presence of Sir R. Brisco, Bart., Messrs. W. Galloway, Jr., W. Higgins, and others interested in iron smelting and founding, a new and very successful system of smelting was exhibited at Messrs. Woodward's, Queen Foundery, Ancoats, Manchester. The ordinary method of smelting iron is by blowing through two or more tuyeres a powerful blast of air into the cupola which has been charged with pig iron and coke. To produce the blast in the cupola exhibited on the old method, a 4-ft. fan, requiring eight horses' power, was employed. By the new method. invented by the Messrs. Woodward, that fan, and all its usual accompaniments of shafting, strapping, oil, and wear and tear have been dispensed with. The cupola shown was 2ft. 4in. diameter, and of the usual hight. At its upper portion, immediately above the part where the charge is put into the cupola, a steam pipe $1\frac{1}{2}$-in. bore, is inserted into a wrought-iron chimney, about equal in length to the depth of the cupola below. The action of the jet of steam thence projected is to create a partial vacuum below it, and, as a consequence, a strong draught of air through the mass below. The working of the furnace is described as follows:—"The fire is lighted and the charge thrown on in the usual manner, after which the door at the charging hole is closed; the steam is then turned on and admitted into the funnel. The column of steam now rushing along carries or draws with it a quantity of air from below, thus producing a partial vacuum immediately above the fuel and metal to be acted upon. All being closed at the top the only place left for the air to enter is ten openings at the bottom, through which it flows in one constant and unbroken stream, acting on all parts of the fuel alike, thus securing a general and uniform heat throughout the furnace, consequently a more perfect combustion of the fuel." It was stated that the new method saves a large quantity of coke, and that a much better kind of casting is now obtained from a common class of pig iron than could possibly have been got formerly. For smelting a tun of iron little over a cwt. of coke is required, while the bringing down of the molten metal is performed much quicker. An advantage to persons outside the works is the absence of glaring blaze and shower of fiery sparks always found in the old method. In fact a little steam issuing from the chimney top, or top of the cupola, was the only external indication that the blast furnace was at work. The extreme simplicity of this invention strikes one with wonder that so valuable a discovery had not been made long since, especially when we remember that in our locomotives a jet of steam has long been projected into the firebox to increase combustion, and by its aid to raise steam from a pressure of 30 lbs. to one of 120 lbs. in twenty minutes. Another advantage of this invention consists in its easily allowing cupolas to be worked in situations where it is inconvenient to have