STEAM PLOWING IN ENGLAND.

We have received the November number of the Wisconsin *Farmer*, one of the most ably-edited and neatest in appearance of its class. If our agricultural interests do not make great progress during the next ten years it certainly will not be through lack of practical and scientific information, afforded by the press devoted to their development. The editor has lately returned from abroad; during his visit he witnessed a trial of steam plows, and has published a graphic account of it, the principal part of which we reproduce for the benefit of our readers :—

Just before reaching the spot, a short turn in the road brought us up suddenly before an iron monster, with heart of fire and breath of steam, snorting and dashing up the hill, like the very devil of the olden time! A shout and a bound, and we left the road to his unembarrassed progress. This singular looking creature proved to be Aveling's agricultural locomotive engine. It had been sent a mile distant for wood and water, and when its wild scream first startled us, it had in train several tuns of these essentials, though moving up the steep grade with all the majestic ease of an elephant drawing a light barouche. We afterward saw it climbing steep hills in a stubble field, with its train full of curious spectators. A single engineer directed its movements with perfect facility, causing it to make graceful curves or short turns as occasion required or pleasure dictated.

This engine has a patent extra-large boiler fitted with thirty-seven 2¾-inch tubes, external plates of the best Butterley iron, fire-box and tube plates of Bowling iron, with extra stays for high pressure. The fire-grate measured 31 inches by 34, and is suitable for wood or coal fuel. The cylinder, 10 inches in diameter, is surrounded by a jacket and placed on the forward part of the boiler; by which arrangement priming in ascending steep inclines is prevented. The crank shaft is of common iron. The engine is fitted with improved governor, reversing link motion, patent tender and water tank, under foot-plate, driving chain, and gear, steam-pressure gauge, extra lock-up safety valve, steam jet blower, firing tools and wrenches, driving wheels 5 feet 6 inches in diameter, 12 inches wide, patent steerage and screw break for descending inclines. It is remarkable for simplicity and power—being capable of drawing 10 tuns up an incline of 1 foot in 6 and is easily managed by any ordinary engine-driver.

But what of the steam plowing? The two prominent plows in England are those of Fowler (of Cornhill), the original inventor of the steam plow, and of Messrs. J. & F. Howard, of Bedford. Both of these, together with others, engaged in this trial. Fowler's came first in order and shall, therefore, be first described.

As we entered the field the engine and windlass were stationed on the left headland, the self-moving windlass on the right. Between these the plow—which consists of a diamond-shaped iron frame, on wheels, but so bent in the middle that one end is up in the air while the other is on the ground, and of 8 plows, 4 on each end of the frame—is pulled backward and forward; 4 of the plows being so pointed as to work in one direction, while the other 4 pointing in the opposite course are waiting to do their work when the machine returns. In this way all turning about is avoided.

The engine appears like an ordinary locomotive farm engine, except that it has, under the boiler, a clip-drum for hauling the plow. The rope used is made of wire and is kept from dragging on the ground by simple supports easily handled by a strong boy.

The anchor consists of a "sheave" or clip-drum on three disk wheels, which by cutting into the ground prevent the whole concern from being dragged toward the engine. Upon the top is placed a box into which weights may be placed to cause the disks to sink deeper than they otherwise would, if required.

The soil in which this plow was working is a gravelly loam, not particularly favorable to success, yet good enough. The work was well done—the furrows well turned, and about 6 inches deep. Time required to plow an acre, about 75 minutes.

This plow also operated a cultivator, similar in construction to the plow, but with seven cultivator teeth or scarifiers instead of the four plows. It did its work well.

The Howard apparatus differed from the preceding in that the engine was stationary during the plowing of a given field. Instead of the clip-drum for winding and unwinding the rope, it has a separate reel resembling the hose cart which belongs to a common fire-engine. This reel is placed alongside the engine and operated by a shaft and wheel gear, which passes over the top of the two wheels which support the drum. The power is communicated to the plow—which resembles Fowler's—by means of a wire rope aided by four pulleys anchored to the ground; two of said anchors being located at the two corners of the field towards which the plowing is being is being done, and the other two so stationed as to enable the engine to pull the plow back and forth—themselves being moved up as the work progresses. This plow likewise did good work.

But the great question arises—is steam plowing in England economical? To this we are bound to reply: No, we think not. The best work that we have ever heard of either of these plows doing was ten acres in ten hours; and this is remarkable success. Six to eight acres per diem is probably the average. And when we consider the cost of the apparatus—$1,500 to $2,000; though the engine may be used for other purposes—the wear and tear of ropes and machinery, the consumption of fuel, the number of men employed and the liability to delays by breakage and other derangements, it looks to us like small results for the investment.

Such work as we saw could have been done equally well by four men with each an ordinary Yankee plow and one span of horses and at an expense of, say, $10; while here were employed an expensive engine—costing more than eight horses and of much less general use on the farm—a horse and cart to supply fuel and water and eight men. But it is furthermore fair to infer that on a trial such as this was, more and better work would be done than would be practicable as the average; so that it is probably more nearly correct to offset three men with plows against the steam apparatus, instead of four. Such being our premises, we cannot get the consent of our judgment to endorse the steam plowing of England as economical, unless it be on very large estates and under peculiar circumstances. We stick to the idea, however, and shall continue to hope for its full realization, at some day, on our glorious western prairies.

Sulphur in Coal Gas—Red Lime Salt.

The following extracts from the London *Journal of Gas Lighting* are portions of a paper read by the Rev. W. R. Bowditch, F.C.S., before the Royal Society :—

Gas which has been purified at the gas-works by lime, and which contains 20 or 30 grains of sulphur in 100 cubic feet, may be passed for a considerable time through a tube containing cold slaked lime without producing discoloration; but, if the same gas be charged with a minute quantity of bisulphide of carbon vapor and passed through the same lime-tube, the lime becomes yellow and green from the decomposition of the bisulphide of carbon.

If, instead of passing the gas through lime, it be passed through triethyl-phosphine, the beautiful red crystals which this base gives with bisulphide of carbon are not formed; but, if the base be dissolved in alcohol or ether, and the gas passed through this solution, the red crystals are formed, as Dr. Hofmann first proved. The alcohol or ether dissolves out the bisulphide of carbon from the hydrocarbon compounds of which it forms a part; and, when it is thus dissolved, it reacts with triethyl-phosphine.

Naphthalin, benzole, and other fluid hydrocarbons condensed from purified gas yield sulphide of hydrogen and other sulphureted compounds by simple distillation, yet these do not produce the well-known red crystals with triethyl-phosphine. They may, moreover, be digested for weeks in an alkaline solution of oxide of lead without producing any sulphide of lead. Under similar treatment, bisulphide of carbon yields hydrosulpho-carbonate and sulphide of lead in a few hours.

If the sulphureted fluid hydrocarbons condensed from gas be mixed with ammoniacal alcohol and heated, and an alcoholic solution of acetate of lead be then added, a black precipitate is formed after some time, which evolves sulphide of hydrogen upon addition of an acid. In this case, neither hydrosulpho-carbonate nor hydrosulpho-cyanide of ammonia is formed; yet it is well known that both are formed when bisulphide of carbon is added to ammoniacal alcohol. The erroneous view of the action of heated hydrate of lime upon the sulphur compounds in gas arose, I think, from the generally-received opinion that the blackening of lead salts by a gas is a proof that that gas is sulphide of hydrogen—joined on the fact that sulphide of hydrogen is one of the compounds produced by the action of the heated lime. If the sulphide of hydrogen had been separated from the mixture of gaseous compounds produced, the truth would have been apparent; but as, I believe, all experimenters have failed to separate them, the subject was obscure. After having failed in many processes devised by myself and suggested by others, I at last removed the sulphide of hydrogen, and showed that the blackening of lead salts is no proof of the presence of sulphide of hydrogen. Ordinary purified gas was passed over heated hydrate of lime, then through a considerable quantity of well-washed hydrated peroxide of iron, over lead paper, and subsequently through moist slaked lime. The peroxide of iron was slightly blackened, and withdrew every trace of sulphide of hydrogen: the lead paper became black, and the slaked lime yellow. This yellow lime gave a primrose-colored solution with water, which precipitated lead and silver salts brownish-red, thus showing the presence of impure hydrosulpho-carbonate of lime.

To be certain of the absence of sulphide of hydrogen, some of the yellow lime was treated with hydrochloric acid, and the gases evolved thereby were conducted into a solution of potash. The potash solution gave no reaction with nitro-prusside of sodium, showing the absence of sulphide of hydrogen, and when boiled with nitric acid gave no precipitate with a salt of baryta.

The hydrochloric solution of the lime contained a sulphur salt, which was obtained as sulphate of lime when nitric acid was added and the whole was boiled.

The blackening of the lead-paper in this case could not be due to sulphide of hydrogen, a that compound was absent. Nor, I think, is it due to the hydrosulpho-carbonic acid which passed over, and in contact with, the lead-paper, and was arrested by the lime. The red compound which this acid produces with lead salts is said to turn black rapidly; and the red compound produced by a lead salt and those of Berzelius and Zeise undoubtedly does so blacken, as also does that produced by a salt of lead and an alkaline pentasulphide. I have, however, obtained a red lead salt by the reaction of crystallized hydrosulpho-carbonate of lime and basic acetate of lead, which remained red after drying in the air at ordinary temperatures and exposure for weeks to the free atmosphere. I, therefore, conclude that the blackening of the lead-paper in the above case was not due to hydrosulpho-carbonic acid, but to some unknown or unsuspected compound.

In order to understand this matter fully, I commenced some investigations into the reactions of bisulphide of carbon with metallic oxides and other compounds, a portion of which I have now the pleasure of submitting :—

Slaked lime and bisulphide of carbon are mixed in a close vessel, and allowed to stand for three or four days. The lime at first becomes of a pale primrose color, which gradually deepens to a fine lemon yellow. Water added to the yellow lime gives a solution of a gold color, which precipitates salts of lead and silver reddish-brown and salts of mercury brown. These precipitates become black upon standing a short time. If the yellow solution be allowed to remain for a few days in contact with the lime, crystals are formed which will be very small and so distributed through the lime as merely to give it a fine salmon color. This lime-salt is of a bright ruby color, and it may be obtained in beautiful crystals.

Some of the reactions of this salt are remarkable; and more than one will exhibit the liability to error from the use of any but the most perfectly crystalline, dry, and clean specimens. Baryta-water added in excess throws down from an aqueous solution of the pure salt an amorphous, red, insoluble precipitate quite as brilliant in color as vermilion. If this be washed directly after precipitation, the color is retained for a considerable period; but, if left in the mother-liquor, it soon darkens. The washed salt dries a brick-dust red.

A very offensive suffocating gas is evolved during the decomposition of bisulphide of carbon by lime, which is injurious, if not poisonous; and, having suffered severely from breathing this and other noxious compounds derived from the same source, I think it right to call attention to it. I have formed a gas of similar properties by passing bisulphide of carbon and hydrogen together through heated lime, and should not be surprised if it prove to be the long-sought simple sulphide of carbon.

Slightly ammoniacal alcohol breathed from a cloth appears to be the best restorative for the severe depression caused by respiring the offensive gases and vapors above named.

The Destruction of Iron-clad Vessels-of-War.

It will be remembered by our readers, that an account appeared in this paper a short time since, concerning a new invention for destroying iron-clad ships, which was copied from an exchange. The inventor, Mr. Whittaker, of the United States sloop *Kearsage*, was sent to report to the Secretary of the Navy, and it would seem from the following statement that his invention had been approved and was about to be tested :—

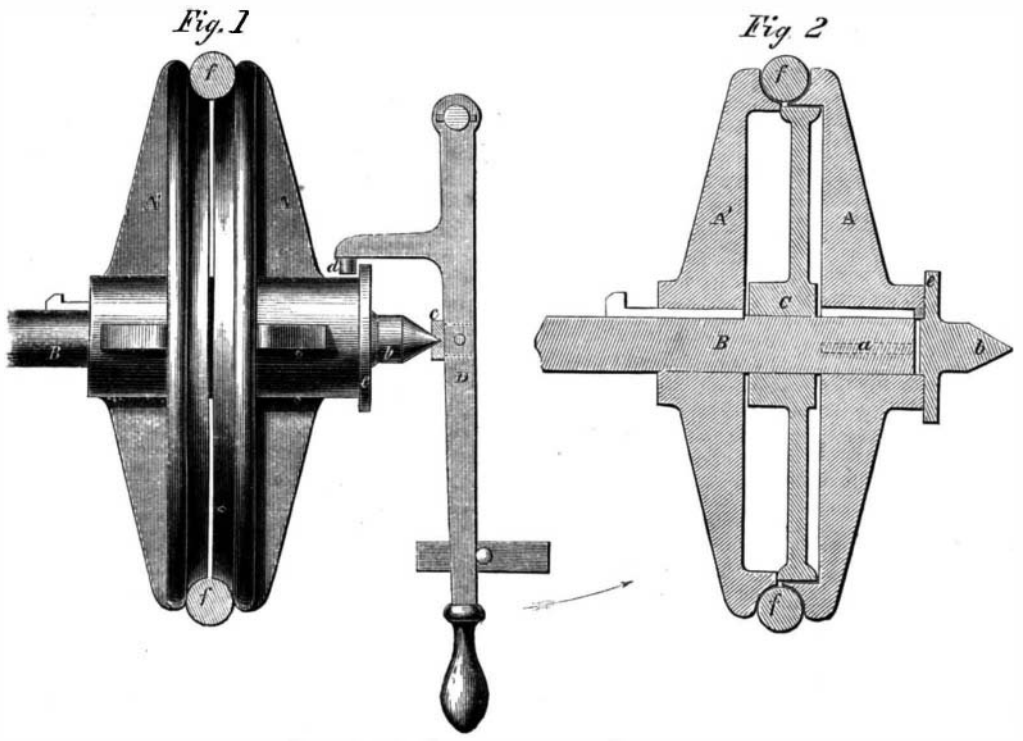
Iron-clad steamer *Ozark*, 2, now in course of construction at Mound City, eight miles above Cairo, Ill., is about 110 feet in length, will have four propellers, and a turret, twenty feet in diameter, for two large guns. The boilers are in and the armor put on for about sixty feet on both sides. First Assistant Engineer James W. Whittaker is examining the vessel, with a view to apply his new invention for the destruction of iron-clad boats of all kinds, having been ordered there by the Secretary of the Navy for that purpose. It would not be proper to explain what the nature of this invention is; suffice it to say Mr. Whittaker has letters from chief engineers in our navy and other scientific men, including Captain Ericsson's principal engineer, wherein they express their utmost confidence in the plan, and recommend a trial speedily. Commander Porter is said to be highly delighted with it, and gratified that he is to have the opportunity of first testing it.

THE Robinson arms manufactory, at Richmond, is at work night and day—casting cannon, manufacturing Sharpe's rifles and other arms, large and small, for the Confederate Government.

Improved Patent Clutch Pulley.

We illustrate herewith an ingenious device for shifting a belt from a fast to a loose pulley, as also for obtaining in a slight degree, a variable speed. Fig. 1 represents the invention; in it A A^1 are two pulleys. The one marked A^1 is keyed fast to the shaft, B; the other wheel, A, slides upon a feather, as shown in Fig. 2 by the dotted lines, *a*. Between the two wheels, A A^1, in Fig. 2, runs another pulley, C, which is fitted to revolve loosely upon the shaft. Attached to one end of the wheel, A, is a steel center, *b*, the point of which takes against a depression, *c*, in the lever, D. At right angles with the main part of the lever an arm extends which has a small pin, *d*, fitted with a friction roller projecting downward; this works against the collar, *e*, on the center beforementioned. The other end of the lever is secured at the top to the framing of the machine, or to the floor as desired. These constitute the working parts of the invention. The operation of it is simple. When it is desired to stop the lathe or any other tool that is driven by the belt, *f*, the handle is thrown over in the direction indicated by the arrow; the small pin, *d*, then strikes against the collar, *e*, and lets the belt down on the wheel, C, which, being loose, of course transmits no motion. Or, if it is necessary to run quite slowly or to start easily, the driving surfaces opposed to the belt upon the wheels, A A^1, may be lessened by increasing their relative distances apart to any required degree. The inventor states that this has been found a very excellent pulley for driving knitting machinery or other tools of that class.

Patented Sept. 15, 1861, by John Shinn, of Roxborough, Pa., and further information may be obtained by addressing him or Mr. Wm. Adamson, of Philadelphia.



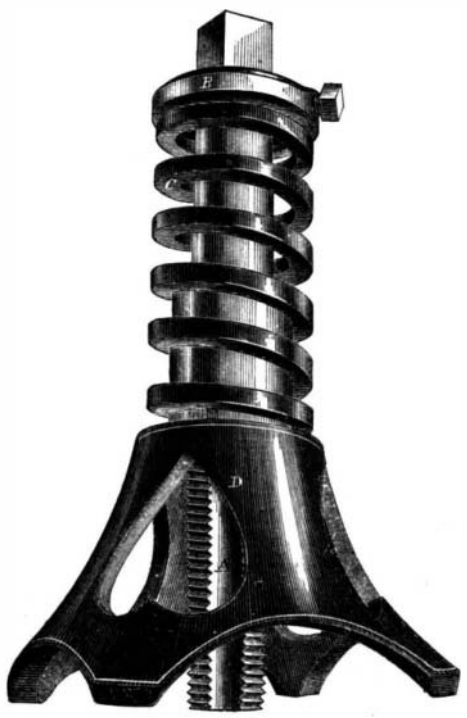
SHINN'S PATENT CLUTCH PULLEY.

"ARGYLLITE"—A NEW MINERAL.

A very interesting description of a new mineral is given in the November number of *Newton's London Journal of Arts*, by Lewis Thompson, M.R.C.S. For some years past a nickel mine has been worked on the estate of the Duke of Argyll, at Inverary, Scotland, and during its working several holes or borings were made to discover the extent of the vein. From these borings different kinds of minerals have been obtained and submitted to analyses, and were found to consist of sulphurets of copper, nickel, lead and arsenic, with the exception of one sample, which was detected by the Duke of Argyll himself, while on a visit to the mine, and who noticed that it possessed the power of reflecting light. It was found in very small quantities, but curiosity being excited to discover what it was, a portion of it was sent to Mr. Thompson for analysis, who discovered that it was composed of lead, vanadium and sulphur—a combination which, he says, was never before noticed. The crystals are very small, but by the aid of the microscope they were found to be twelve-sided or dodecahedrons. This discovery recalled a circumstance to Mr. Thompson, of a peculiar kind of copper ore which he had noticed twenty years before, and which was obtained near Fowey, in Cornwall. This ore had always to be smelted by itself at Swansea, and the copper obtained from it could not be rolled in sheets. The cause of this was not examined into at the time, but as the ore contained well-formed crystals, resembling galena, mixed with the copper, the thought occurred to Mr. Thompson that it might be the same kind of ore as that obtained at Inverary. Specimens of this ore were now subjected to careful analysis, and were found to contain lead, 60.8; vanadium, 20.5; sulphur, 18.7=100. The specific gravity is 6.04; the color is a dark lead-gray, with considerable luster. The form of the crystals is a rhombic dodecahedron. Before the blowpipe it decripitates slightly; with borax it affords a beautiful bluish-green bead in the reducing flame. It is acted upon with boiling nitric acid, and affords a bright blue solution. Very small quantities of it have as yet been obtained, but mineralogists may now be led to search for large deposits of it, which, if obtained, will prove valuable to those who may own the mines. Vanadium forms a beautiful dark blue color on silk, with tannogallic acid, and it is stated to be very permament. A sufficient supply of this metal has not yet been obtained to introduce it into the useful arts.

HADLEY'S PATENT TAP GUIDE.

We present our readers this week with an illustration of a device for guiding taps, patented through the Scientific American Patent Agency. It is, we think,



quite an original idea, nothing of the kind ever having come under our notice before. We have, however, often seen the want of such an apparatus, and can cheerfully recommend it as being a very useful tool. It is very light and simple in its action. A cast-iron stand, D, having a hole through its center to admit the tap, A, is provided with a spring, C, and a collar, B. When a hole is to be tapped, the stand is placed upon the work and the tap screwed as usual into the metal; as it is drawn in it presses against the collar, C, and this, through the spring beforementioned, throws the stand square up against the job, thus preventing any variation from a direct line. This invention is especially applicable to cylindrical surfaces, such as steam boilers, where it is impossible to get a square up to the shank of the tap, and it would be found useful in almost every operation for which taps are used, aside from machine-work. The inventor assures us that a very great saving of time—as we can readily imagine to be the case—is effected by this simple but efficient device. Further information can be had of the patentee, Mr. William Swain Hadley, at the office of the *Ledger*, Philadelphia, Pa.

Effects of Frost on Iron.

Mr. David Kirkaldy, of Glasgow, in a recently-published work detailing his experiments in testing the strength of iron and steel, also describes some experiments to test the effects of frost upon metal. A bar of Glasgow best bar iron, of $\frac{3}{4}$-inch diameter, was forged into ten bolts, and six of them were exposed all night to intense frost, in the month of December, 1860, then tested next morning when the thermometer stood at 23° Fah. The other four belts were kept warm all night and protected during testing. Three of the ten bolts were tested with gradual, and seven of them with sudden strains. With gradual strains the bolts exposed to frost gave way with 54,385 lbs. strain; the unfrozen bolts stood a strain of 55,717 lbs.—a difference of 2.3 per cent in favor of the latter. When submitted to sudden strains the difference was 3.6 per cent in favor of the unfrozen bolts. The frozen bolts had been covered with a layer of ice, but their temperature was much higher than that experienced in America. In Canada, where the temperature is very low during winter, one of the chief machinists on the Grand Trunk Railroad informed us that the effects of frost were destructive, almost beyond comprehension, upon their locomotives. Fine fibrous iron is the least affected in its strength by frost.

SIR DAVID BREWSTER ON THE PATENT LAWS.

We would direct attention to the elegant address of the venerable Scottish philosopher, Sir David Brewster, on another page. He points out in a graphic manner the absurdities of Sir William Armstrong in advocating free trade in inventions as compared with free trade in manufactures and natural products. The latter is free trade with the consent of the producers, the former is trading in the products of others against their consent. The one principle may be in perfect accordance with equity, the other certainly is not. The scientific attainments of Sir David Brewster have gained for him a world-wide reputation. He has always been a friend of the mechanic and inventor, and his object in bringing this subject before the University of Edinburgh was to enlist the judgment of educated persons on the side of right. He informed his audience that it was his firm belief that "every educated man has a substantial interest in a due protection to inventors." This sentence deserves to be written in "letters of gold."

A Hint to Oyster-eaters.—When too many oysters have been incautiously eaten, and are felt lying cold and heavy in the stomach, we have an infallible remedy in hot milk, of which half a pint may be drank, and it will quickly dissolve the oysters into a bland, cream jelly.—*Exchange.*