OPERATIONS IN CUMBERLAND COAL---TO THE PUBLIC PRESS.

In the discussion which has for some weeks past occupied the public prints respecting the rapid, and, as it is alleged, unreasonable and unnecessary advance in the price of coals, the hardship imposed upon the consumers is ascribed to a monopoly or a combination of coal interests, which, ignoring every element of fairness and justice, seizes upon one of the primary necessaries of life, and speculates upon it, not only to the serious detriment of commerce and manufactures, but to the cruel disregard of the helpless poor.

Upon this *assumption* of facts a wholesale and indiscriminate assault has been made upon the coal interests of the United States, and both in the public papers, and by public meetings a demand has been made for the repeal by the next Congress of the existing tariff upon foreign coal; namely, $1·25 a tun, for the avowed purpose of punishing the capitalists, who, it is claimed, have sought to enrich themselves without regard to the necessities of the people.

The undersigned do not propose to enter upon the consideration of the tariff question, nor to make any appeal for special legislation. The English and Welsh coals cannot pay the freight across the ocean and compete with American anthracite or bituminous. They are now selling by the cargo at the minimum of $16 the tun, and even if the tariff of $1·25, gold, did not exist, their current price would be $14 or $15. They can be used therefore only by the very wealthy who can afford to pay for luxuries, and they in no way affect the question.

The Nova Scotia coals, it is well known, are not suitable for steam generating nor domestic purposes. They do not therefore materially interfere with the bituminous and anthracite coals, being imported mainly for gas manufacture, and if the duty were removed the effect would be not so much to injure the coal interests of the United States as to deprive the Treasury of a considerable revenue for the benefit, not of the public, but of the gas companies.

The coal which principally competes with anthracite, and is used in its stead, for all manufacturing purposes, is known in the market as "Cumberland," or "George's Creek coal."

The undersigned, representing companies mining this coal, whose principal offices are in New York, but with agencies in all the Atlantic cities from Baltimore to Portland, and in behalf of stockholders interested to the extent of upwards of twenty millions of dollars, make the following statement of facts, namely:

1. Out of 852,000 tuns of coal mined and shipped between the 1st of January and the 31st of July, 1869, from all the mines in Allegheny county, Md., the companies they represent have mined and marketed 622,000 tuns.

2. These companies have not, during the present season, entered into any arrangement, or combination, or understanding *of any kind whatever*, in respect to the prices of coal, which at the opening of the season were $5 at Baltimore and $4·75 at Georgetown, per tun of 2,240 lbs., delivered free on board; upon which figure no advance has since been made, notwithstanding the rapid increase in the price of anthracite and its great scarcity in the market. And here we state as a fact of general interest that, at no time within the last two and a half years has Cumberland coal varied from these prices to a greater extent than fifty cents per tun; although during the same period the price of anthracite has fluctuated nearly 100 per cent.

3. There have been no strikes at their mines, no advance in wages, nor any disturbance to the industry of the Cumberland coal region. The business has been conducted with entire regularity and without any complaint from consumers, upon an increased demand and production of about 60 per cent above last year. This healthy condition of business has enabled them to keep their coal in market at the prices named at the shipping ports and to deliver coal in the harbor of New York at any time, since the first day of May, at not exceeding $7·25 the gross tun, when discharged direct from vessel or barge to consignee.

4. While the Pictou or Nova Scotia coals (by the introduction of which after the duty shall have been removed, a millennium of cheap fuel is expected to commence) are unsuited for the uses already mentioned, it is well known that the Cumberland coal can be substituted for anthracite for domestic purposes, and is unequaled by anthracite, Nova Scotia, or English coals for steamship and railway purposes, and for the various manufactures of iron and glass. This fact, well known in this country, is published under sanction of the British Parliament in their Blue Book of 1866, entitled "Reports from Her Majesty's Secretaries of Embassy and Legation respecting Coal," page 151, as follows:

> Nearly all American coal is of very excellent quality.
>
> The anthracite gives out a very great, perhaps a somewhat dry heat, but it burns with a bright blue smokeless flame.
>
> The soft bituminous coal is admirably fitted for open fire-places, such as are used for wood, from its caking together in a solid mass. In evaporating power Cumberland bituminous coal holds the highest place among American coals, and is highly valued as a generator of steam for ocean steamers.
>
> The Cunard line, for instance, use it exclusively. A curious fact showing this superiority of the Cumberland coal for steam navigation (see Taylor's coal statistics) was elicited some few years back, when the comparative speed of the Collins and Cunard lines was under discussion.
>
> On a comparison of the time required to cross the Atlantic by these two lines of steamers, it came out that the Cunard line, steamers of British build, were swifter on the eastern passage than the Collins line, steamers of American build.
>
> On the western passage quite the reverse took place.
>
> Many sought to explain the difference between these vessels as to their respective superiority in their eastern and western passage by their different powers in going with or against the wind. When these steamers used the same coal (Welsh) the American ships proved themselves the faster, but they could not compete with English ships when these ships used Cumberland coal, for then they surpassed in speed the American ships using the anthracite coal.

In conclusion, the undersigned, feeling their responsibility alike to the owners of the vast interests committed to their care, and to the public—equally interested as the consumer of this product of prime necessity—appeal for the confirmation or criticism of this general statement to the great steamship lines sailing from this port, to the principal railway companies of the Eastern and Middle States, who are entirely familiar with the premises, and to the great manufacturing interests which have used the coal in all parts of the country; and in the consciousness that they have acted fairly, considerately, and forbearingly toward the people, they claim for the Cumberland coal interests the just judgment of an enlightened public opinion, so that, at least, they may not be sacrificed because of alleged misdeeds with which they have no connection and for which they are not directly or indirectly responsible.

BORDEN MINING CO.—By William Borden.
CONSOLIDATION COAL CO.—By C. H. Dalton, President.
CENTRAL COAL MINING AND M'F'G CO.—By Harry Conrad, President.
AMERICAN COAL CO.—By G. P. Lloyd, President.
CUMBERLAND COAL AND IRON CO.—By Wm. M. Richards, President.
HAMPSHIRE AND BALTIMORE COAL CO.—By E. S. Bolles, Vice-President.

New York, August 10, 1869.

Mode of Working the French Cable.

A few of the members of the Scientific Association, which closed its session at Salem last week, have been making a visit to Duxbury, the terminus of the newly laid French Cable. What they saw is pleasantly told by the Boston *Advertiser*, from which we make the following extracts:

"In an old but well preserved clapboard mansion of that quaint old town were found the headquarters of this new and wonderful highway. The visitors were cordially welcomed by the manager, Mr. Brown, and were at once brought into the presence of the flitting, flame-like image which indicated, in symbols, on a graduated screen, the thoughts working at that instant on the other side of the Atlantic. Interpreting the fitful tremor of the image, or line of light, one inch in length, and one eighth of an inch in breadth, the youthful interpreter, who did not look the wizard that he was, calmly read, for transcription by his assistant, a message in which occurred, at intervals, the words 'New Orleans'—'Citizens'—etc., etc. While inspecting the apparatus the members of the party received the following message fresh from France, sent expressly to them:

"'TO DUXBURY, FROM BREST—Time 5:20 P.M., [Paris Time.]

"'The company present their compliments to the gentlemen assembled at Boston, and hope to be able to send them news of the great international boat race that will be gratifying to both nations.'

"The usual rate of transmission is about ten or twelve words per minute. Looking for the mechanism by which these wonderful results were obtained, the inquiring visitors observed, on their right, placed on a marble pedestal, a medium-sized spool of silk-covered copper wire, said to consist of several thousand turns or convolutions, in the center of which spool, suspended by a single silkworm fiber, was a minute mirror attached to a little magnet made from a piece of watch spring. From a lamp, properly placed and shaded, a beam of light was thrown upon this mirror, and from the mirror was reflected, two hundred times enlarged, upon the graduated screen in front of the interpreter, the flame-like image already mentioned. In transmitting, from Duxbury to Brest, the operator, with his right hand, makes use of two keys or springs, one of which, being pressed, causes, at Brest, a deflection in a similar mirror, sending the image-flame to the right, while pressing the other key deflects the mirror at Brest in the opposite direction, sending the image to the left. Its indications are thus interpreted; a jerk or flitting once to the left and then once to the right denotes the letter *a*; a flitting once to the right and then three times to the left, denotes the letter *b*; and thus, letter by letter, the words are spelled.

"Passing into an adjoining room, the delicate instruments used for testing the electric conduction of the cable are shown, among which are condensers and batteries, rheostats and shunts, bridges, switches, and plugs, and, crowning all, the wonderful astatic galvanometer of Sir William Thompson. But possibly it would weary our readers to tell of ohms and megohms, farads and megafarads, volts and microvolts, and all the terminology of conduction, resistance, electrostatic capacity, and continued electrification. It may, however, gratify them to learn that the insulation of the deep-sea cable, between Brest and St. Pierre, has more than doubled in efficacy during the short month which has elapsed since this cable was first committed to the embraces of Old Ocean—as is evinced by the fact that, soon after it was laid, the insulation resistance rose to 2300 megohms, and has since been gradually increasing until it is now 5000 megohms per nautical mile. This improvement in the insulation of the deep-sea cable is believed to be mainly due to the coldness or diminished temperature to which it is subjected at great ocean depths. The insulation resistance of the portion of the cable connecting Duxbury and St. Pierre is much less, namely, 1500 megohms per nautical mile.

"If one would inquire of a cable electrician—what is a meghom? he might, with propriety, be told that it is a million ohms. Should he still further inquire—but what is an ohm? a suitable reply would be, it is the yardstick of the electrician by which he measures the electric condition of conductors, and which may be represented by a round wire of pure copper one-twentieth of an inch in diameter and 240 feet in length, at the temperature of 60 degrees of the Fahrenheit thermometer; while a megohm, by which he measures the resistance of insulators, is a unit, the length of which is a million times as great."

The Want of Chemical Knowledge Among Druggists Illustrated.

A forcible illustration of the great lack of chemical knowledge among dispensers of medicines is found in the following case, an account of which is given in the *American Journal of Pharmacy*.

A correspondent of that journal informs the editor that a few months since he suffered severe personal injury by the explosion of the ingredients of a prescription composed of the chlorate of potassa, tannic acid, and oil of Gaultheria. The journal referred to says, "it appears that this mixture had been repeatedly dispensed without ignition, but on this occasion the physician called and requested double the quantity to be prepared, and the pharmaceutist accidentally used, on this occasion a new wedgewood mortar, with rough surface, first powdering the chlorate and then adding the other ingredients, and continuing the trituration—when a violent explosion occurred, injuring his hands and burning his face and eyes seriously. Our correspondent believed that the physician was aware of the explosive nature of the mixture, as he is reported to have said immediately afterward, 'that he knew that the mixture as ordered would explode,' he being the first physician called in. If this was true, it leaves an inference of motive in regard to the prescriber not to be envied. It would have been quite right to have given a caution to have saved himself from the charge of ignorance or design. Our correspondent, smarting under the effects, may be warped in his feelings toward the prescriber. With this we have nothing to do, but may embrace the occasion to offer to our readers, who are not posted in such matters, a caution, that any organic substance, having a large equivalent of loosely combined elements, like sugar, tannin, several of the glucosides, and other neutral bodies, should always be mechanically united with chlorate of potassa with great caution, and the chlorate should be powdered alone and then mixed with the other ingredients, separately powdered, on paper. Physicians, where they require such mixtures, and themselves are aware of the danger, are not without culpability if they prescribe at random, without due precaution, on the presumption that every dispenser is a thorough chemist. If, as is more frequently the case, they prescribe in ignorance of the incompatible character of the ingredients, they, of course, are not to blame. When such ingredients can be mixed without damage, every apothecary ought to be able to do it, yet ignorance of particular reactions, in such a case should not necessarily be considered unjustifiable ignorance. We have had this accident to occur under our own supervision, but the operator being aware of the liability, used precautions that enabled him to escape uninjured."

Liquid Glue.

The preparation of liquid glue is based upon the property of the concentrated acid of vinegar and diluted nitric acid to dissolve the gelatin without destroying its cohesive qualities. Dumoulin has given the following recipe. He prepares his "liquid and unalterable glue" by dissolving one pound of the best glue in a pint of water, and then gradually adding three and a half ounces of nitric acid of 36° Baumé. Effervescence takes place under generation of nitrous gas. When all the acid has been added, the liquid is allowed to cool.

Von Fehling has analyzed various kinds of liquid glue, the better kinds of which only became liquid by placing the bottles in tepid water; the more inferior kinds, however, were liquid at the ordinary temperature.

Russian glue—white, opaque, and solid at the common temperature—was found to consist of 35·6 per cent of dry glue; 4·1 per cent of sulphate of lead; 1·4 per cent of hydrated nitric acid; 58·9 per cent of water. Total 100 parts.

It may be prepared by softening one hundred parts of the best glue in one hundred parts of warm water, and then adding slowly from five and a half to six parts of aqua fortis, and finally six parts of powdered sulphate of lead. The latter is used in order to impart to it a white color.

Pale "steam glue" consists of 27 per cent of dry glue; 1·9 per cent of sulphate of lead; 2·5 per cent of hydrated nitric acid; 68·6 per cent of water. Total, 100 parts. It is prepared by dissolving one hundred parts of glue in double its weight of water, and adding twelve parts of aqua fortis.

Dark "steam glue" contained 35·5 per cent of dry glue; 3·5 per cent of hydrated nitric acid; 61 per cent of water, and can be obtained from one hundred parts of glue, one hundred and forty parts water, and sixteen parts of aqua fortis. This liquid glue exhibits a greater cohesive force than that prepared after Dumoulin's recipe. However, still better kinds of liquid glue or mucilage are obtained by dissolving gelatin or dextrin in acetic acid and alcohol.

MUCILAGE FOR LABELS.—Macerate five parts of good glue in eighteen to twenty parts of water for a day, and to the liquid add nine parts of rock candy and three parts of gum arabic. The mixture can be brushed upon paper while lukewarm; it keeps well, does not stick together, and when moistened adheres firmly to bottles. For the labels of soda or seltzer water bottles it is well to prepare a paste of good rye flour and glue to which linseed oil varnish and turpentine have been added in the proportion of half an ounce of each to the pound. Labels prepared in the latter way do not fall off in damp cellars.

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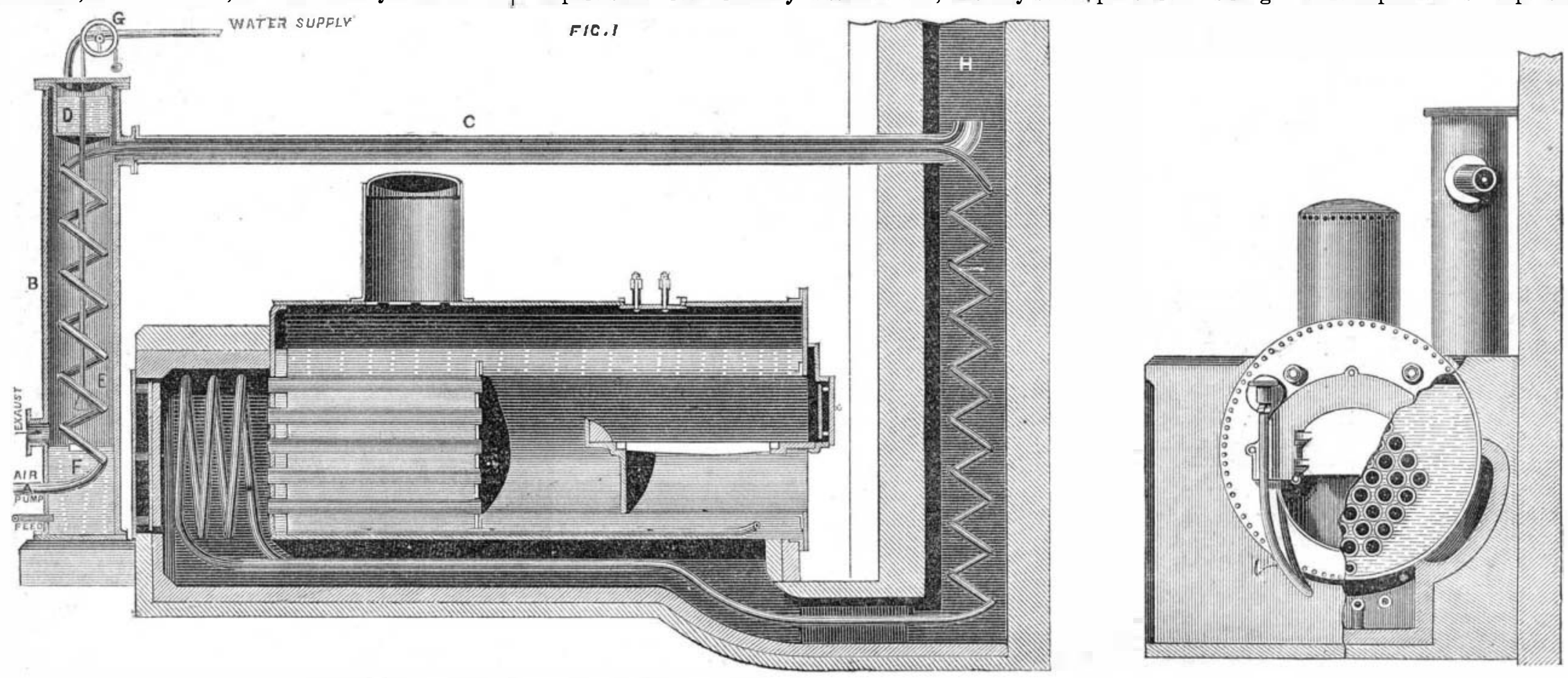
The Aero-steam Engine.

We illustrate herewith, from *Engineering*, the arrangements of boiler and air-heating pipe used in connection with Mr. George Warsop's aero-steam engine now being worked at Nottingham, and which was described in the paper read by Mr. Richard Eaton, before the British Association at Exeter, the middle of August, a review of which will be found in another column.

The pipe, A, through which the air is forced into the boiler by the action of the air pump is of iron and is $1\frac{1}{16}$ inches in diameter outside and $1\frac{1}{4}$-inch bore. On leaving the pump the pipe is first led to the heater, B, shown on the left of the engraving, wherein it is exposed to the exhaust steam. The heater consists, as will be seen, of a cast-iron cylindrical vessel placed in a vertical position and provided with two branches—one near the bottom and the other near the top—through which the exhaust steam respectively enters and escapes from the casing. At the top of the heater is placed a small cylindrical tank, D, exposed at the bottom and sides to the exhaust steam, and perforated around the upper part of the sides, so that in the event of its receiving an excess of water the latter may overflow and fall to the bottom of the heater. Through a stuffing box at the bottom of the tank there passes a tube with a rose, E, at the lower end, this tube being carried by a float, F, which swims in the water at the bottom of the heater, as shown, and, by means of a cord passing from the top of the tube, works a cock, G, which regulates the supply of water to the tank at the top of the heater. The action of this heater will be readily understood without further explanation, and we need merely add that it furnishes a steady supply of hot feed water at a temperature of from about 195° to 200°



WARSOP'S AERO-STEAM ENGINE---BOILER AND AIR-HEATING ARRANGEMENT

The air pipe, A, after leaving the heater just described, passes along the exhaust pipe, C, to the chimney, H, and descending the latter spirally, as shown, passes into the flue beneath the boiler. Here it is led backward and forward, as shown in the plan, and after making several convolu tions in the smoke box, is led back to the front of the boiler, where it ommunicates with a valve box, H (Fig. 2), containing an ordinary light clack valve. The object of this valve is to prevent water from entering the air pipe when the engine is stopped. From the valve box a pipe, J, is led down within the boiler to the bottom of the latter, this pipe being perforated at intervals on the upper side. The perforations are placed closer together at the further end of the pipe than they are at the end at which the air enters, and by this means an equabl e distribution of the air at the different parts of the boiler is insured.

The lengths of the various portions of the air pipe are as follows: In feed-water heater12 feet; in exhaust pipe 13 feet 6 inches; in chimney and flues, including coils in smoke box and under boiler, 58 feet; total, 83 feet 6 inches. The total external surface exposed by this pipe is thus about $36\frac{3}{4}$ square feet.

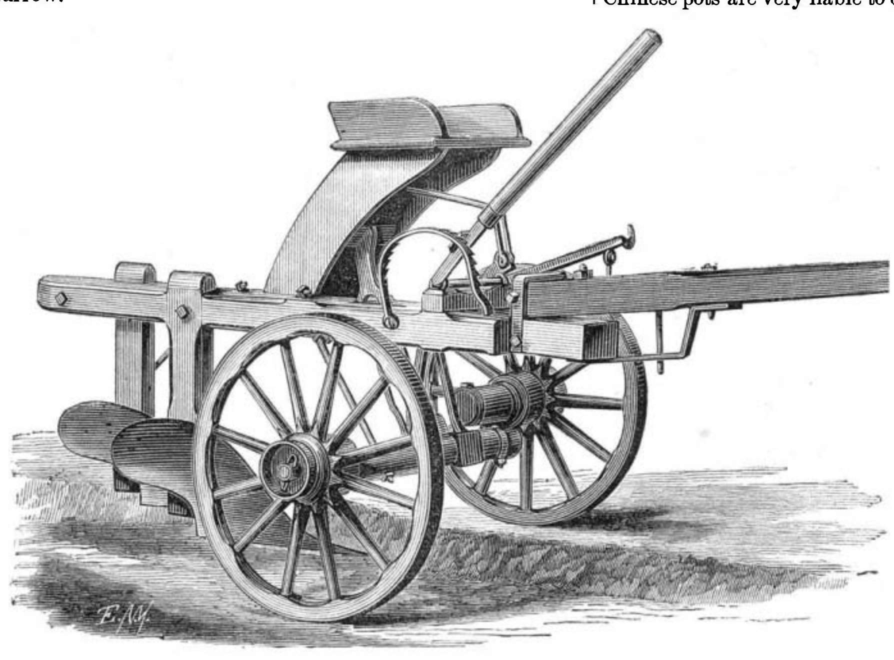
The principal dimensions of the boiler are as follows: Length 8 feet; diameter of shell 3 feet 6 inches; diameter of fire-box flue 2 feet 2 inches; length of fire-box and combustion chamber 5 feet; and length of tubes 3 feet. The tubes are 41 in number, most of them being $2\frac{5}{8}$ inches, and some of them $2\frac{5}{16}$ inches diameter. The total effective heating surface exposed by the boiler is about 130 square feet.

Testing Bees'-Wax.

It appears that both yellow and white bees'-wax is met with in the trade largely adulterated with paraffine. In order to detect this, the following process is recommended by the *Chemical News*: 2 grms. of the wax to be experimented upon are placed in a test tube; and there is added a solution consisting of 1·5 grms. of solid caustic potassa in about 5 grms. of distilled water, and the mixture boiled, care being taken to shake the test tube now and then, whereby a thorough though not quite clear mixture is produced. When the fluid has cooled so far down as nearly to reach the point of solidification of the wax, from 6 to 8 grms. of light oil of petroleum is gradually added, and this thoroughly incorporated with the entire mass, so as to form an emulsion, from which, if well made, the light oil does not separate. Next, an excess of an aqueous solution of acetate of lead is added, which is mixed with the mass by stirring with a glass rod. The addition of this lead salt causes the separation of the light oil of petroleum, and in it will be dissolved any paraffine present in the wax. The same operation is twice repeated with the contents of the test tube, that is to say, petroleum is again and again added, and allowed to separate; the separated petroleum is placed into a retort, and the light oil removed by distillation. Pure yellow wax loses, by this process, from 14 to 16 per cent; but wax has been met with which lost 57 per cent in weight; the specific gravity of the residue of adulterated wax was 0·88. When it is desired to obtain the paraffine in a pure state freed from any dissolved wax, this may be effected by cautiously decomposing the wax supposed to be adulterated with paraffine, by means of fuming sulphuric acid, which does not affect paraffine.

Improvement in Truck Plows.

The object of this invention is to provide improvements in trucks of truck plows calculated to facilitate the management of the plows connected with them, in guiding and adjusting them so as to take more or less land, and also not only to regulate the depth of the furrow, but to enable the plows to be elevated entirely out of the ground when desired: also to enable the body of the truck to be leveled either when both wheels are running on the surface in making the first furrow, or in the subsequent running of one of the wheels in the furrow.



MICKELSON'S TRUCK PLOW.

The engraving is a perspective view of this plow from the mold board side.

The tongue is pivoted to the body of the truck by a vertical bolt, and extends rearward into a yoke, having set screws through the sides for swinging up against the sides to hold the tongue at any required angle to the body, so that the lateral draft of the plow may be governed in cutting wide or narrow furrows. These set screws hold the tongue rigidly in the position to which it is adjusted.

Another set screw regulates the hight of the front end of the tongue. The axle is made in two parts, hinged together, so that one part may, so to speak, roll around the other, and bring the parts supported to the same position of level when both wheels rest on the same plane, as when one of them is in the furrow. This movement is accomplished by a lever which is firmly attached to the inner of the two pintles which form the hinge uniting the two parts of the axle. This lever being depressed, the change in position is accomplished and maintained as long as desired by means of a hook which keeps the lever depressed.

The elevation of the plows, to adjust the depth of furrow, is provided for, by attaching the body of the truck to the axle by means of a rod bent so as to form a double link; the ends being connected with the axle, and the portion between the two arms of the link fitting in bearings to the rear and above the axle.

When these arms are made to approach the perpendicular over the axle, the body of the truck is raised, and of course the plows are raised with it. This movement is accomplished by means of a hand and a foot lever both attached to a rock-shaft, which by means of a third lever and a link, draws the frame forward towards the axle and raises it by the radial motion of the arms of the double link above mentioned. The parts are all strong and the implement is inexpensive to manufacture. Patented through the Scientific American Patent Agency, Aug. 10, 1869, by M. Mickelson, Ashland Mills, Jackson Co., Oregon. Address as above for further information

Mending Cast-iron Vessels in China.

The Chinese have a way of mending cast-iron utensils, says the *Journal of Applied Chemistry*, that is worthy of note. They frequently employ, for cooking purposes, round pots or pans of cast iron. Specimens of these have recently been sen t to Dr. Percy, Professor of Metallurgy, at the School of Mines, in London. Such vessels are highly prized by the Chinese, on account of their thinness, as they require very little fuel to heat water to boiling. An attempt to manufacture them in Birmingham did not succeed, as they were too thick. The Chinese pots are very liable to crack and break, in consequence of the thin bottoms, and it is frequently found necessary to have them repaired by wandering mechanics, who carry their whole kit of tools on their backs, and call out as they walk the streets, "Any pots to mend! pots to mend."

These mechanics not only mend cracked wares, but also repair such as have holes an inch square knocked in them. The sides of the hole are filed and cleaned with brick dust, the pot is then inverted over a tripod, so that the hands can have full play upon the outside as well as inside. A crucible not larger than a thimble is taken, and a bit of cast iron put into it, and the iron brought to fusion by a charcoal fire in a furnace not larger than a goblet. The melted iron is poured upon ashes on a piece of felt, and introduced under the pot by the left hand, while it is pressed on the top by the right hand, also protected by felt and ashes. The protruding portions of the iron are filed and polished off, and the vessel is tested to see if it is water tight. The price for the job is from six to eight cents.

THE French Astronomer Royal is wisely making arrangements in good time for observing the transits of Venus, which will take place in the years 1874 and 1882. The event is one of considerable interest and value to scientific men, and it is therefore desirable that it should be viewed from those parts of the earth's surface where it can be best observed. The stations fixed upon for 1874 are Oahu (one of the Sandwitch Islands), Kerguelen Island (in the Indian Ocean), Rodriguez (a dependency of the Mauritius), Auckland (New Zealand), and Alexandria. Both the Admiralty and the Treasury have responded with alacrity to the appeal which has been made to them for funds, Mr. Warren De la Rue is of opinion that photography may be used with the utmost advantage in registering the transit.

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