Steam Plowing.

The London *Engineer*, in a recent article on this subject, holds that few appear to comprehend the weight of a traction engine necessary to serve as an anchor, or to counterbalance the resistance of a tilling implement in steam plowing. The weight of a portable engine of the ordinary size, such as is used for thresbing, is about three tuns. It is a common conclusion that if such an engine could be got up so as only to weigh two tuns, the problem of steam culture by direct traction would be solved; and yet at Chelmsford, in the heavy land field, Boydell's traction engine, weighing upwards of nine tuns, was proved to be too light for sustaining the resistance of five plows, each of four horse draft —total, twenty horses—the endless rail or shoe slipping on several occasions, allowing the wheel to turn round without advancing. Moreover, it will have been seen from Mr. McAdam's report of a trial of a similar engine between Thetford and London, that the construction of such engines must be heavier, and not lighter, in order to avoid vibration and breakage. So far, therefore, as experiment will yet warrant a conclusion, traction engines must be heavier, and not lighter than those now in use.

On the steam culture by rope traction the English are also divided as to the tear and wear of the rope and implement, and their compressing action upon the soil. The conclusion is general that less harm will be done in this case on level wet clayey land, during winter, than by horses' feet; but great apprehensions are entertained as to the effect in stubborn, stony land, especially in working over a convex surface. And not only will the tear and wear of the rope be greater in working over a convex surface than over a level one, but the compression of the wheels of the implement upon the soil must also be greater. Again, from the experiments of Mr. Hannam, of Burcot Park, in 1849 and 1850, and those made by others during the past and current year, it is the general conclusion that the wire rope will require to be heavier and not lighter than it now is, and that this will throw greater difficulties in the way of cultivating large fields. Mr. Smith, of Woolston, for instance, says that he must divide a forty acre field into forty divisions of ten acres each, which consequently cuts it up into a greater number of headlands than if the whole field were plowed from end to end; so that, between turning and anchoring, such headlands are consolidated and deteriorated in value, especially clayey lands, during the wet weather of winter.

Reverberatory Furnaces.

An interesting paper on this subject was recently read by C. W. Siemens, of London, famed for his speculations on the economy of heat, before the Manchester (Eng.) Institution of Mechanical Engineers. The subject, as given in a brief report, was a new construction of furnace, particularly applicable where intense heat is required. The furnace, as at present constructed, is applied to the melting of metals. A number of zigzag passages are formed of fire-brick. There are two fires, and the draught to and from each passes alternately along these passages. So nearly is the heat absorbed that what ultimately escapes up the chimney is only at about 200 to 300 degrees Fah. It bad been used for about three months in a furnace for iron and steel, and the result showed a saving of 79 per cent. as compared with the old furnace, turning out the same quantity of metal! Mr. Atkinson, of Sheffield, observed that they had one of those furnaces, and found the consumption to be so small that he had the particulars noted during six days, of twenty-four hours per day; the consumption was 1 tun 10 cwt., while the consumption for the same period by the old furnace was 7 tuns; each furnace doing the same description of work. The furnace had been applied to the melting of cast steel with favorable results. The average of melting steel was generally 5 tuns of coal to 1 tun of steel, but with this furnace they melted a tun of steel with a tun of coal. Besides this, there was no smoke whatever; and if this furnace became general in Sheffield, of which he had no doubt, they would be in a position to vie with any atmosphere in the world. In answer to a question as to whether the changing of the currents in the regenerator—thus letting in cold air upon them after they had been highly heated—did not damage the brickwork, Mr. S. explained that in each case the cold air came first against the part least heated, then against the next, taking up one hundred or two hundred degrees at each stage, and on this account no cracking from contraction took place. It was also inquired how the iron could be improved by this plan? Mr. S. replied that the puddling had not been long tried, but he thought it might arise in this way:—In the ordinary furnace there was a violent draught, but in this the draught was small, and the flame did not cut the iron; it gave an intense heat, with a comparative quiet atmosphere, thus less oxyd of iron was produced. The iron must also be more pure, because fewer particles were carried over to it from the fire. After some further observations, several gentlemen expressed a hope that, as the matter was a subject of such vast importance to all in the iron trade as well as to those who used iron, Mr. S. would take an early opportunity of furnishing further particulars.

Explosive Rifle Bullet.

A few weeks since it was noticed in our columns that Captain S. Norton, of London, had invented an explosive shell for breech-loading firearms; since that period the inventor has sent us some samples of his destructive missles. The following figures represent the shell in section, (fig. 1,) and how it appears when exploded, (fig. 2).

A is the hollow shell, cast with a stub, D, or this may be a wood screw placed in the mold to form a pin for the sabot when cast. B is a hollow chamber filled with percussion pow-

Fig. 1

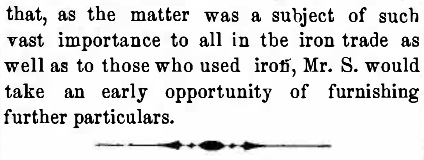
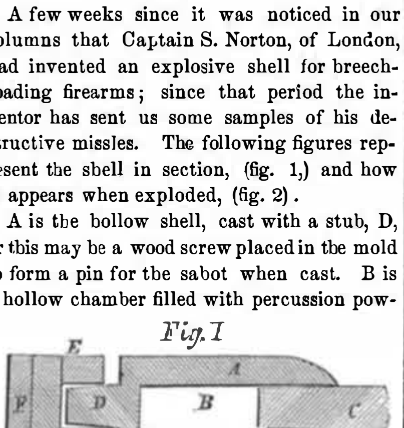


Fig. 2



der, and C is an iron plug fitted in the opening. To the stub, D, is fitted a sabot of cork, E, with two pieces of leather, F, glued to it. The sabot is made of greater diameter than the ball. If employed for a rifled cannon, the elongated shot, A, of cast iron, can be used without injuring the grooves of the gun, as the sabot will fill the grooves and receive the spiral motion in its discharge.

The bullet is formed of lead for common rifles, and instead of an iron plug, C, a small conical glass tube containing the percussion powder may be inserted in the opening of the chamber, B. When the point of the ball strikes, the iron plug, C, ignites the percussion powder, which explodes in the chamber, or if a glass tube is used, it is broken when the point strikes, and the bullet is then exploded. This is a destructive missile either for breech-loading cannon or common firearms.

Sulphur Paint.

A sulphurized oil paint, prepared by subjecting eight parts of linseed oil and one part of sulphur to a temperature of 278 degrees, in an iron vessel, has recently been brought to the notice of the Society of British Architects. This paint, when applied in the ordinary manner, to the surface of a building of stone or brick, or to wood work, effectually keeps out the air and moisture, and prevents the deposits of soot and dirt. It is recommended as cheaper than ordinary paint, and may prove worthy of attention.

Effects of Light.

According to a late writer in the London *Quarterly Review*, there is some law yet undiscovered affecting the operations in the photographic art. Sometimes, on a beautifully clear day, with not a breath stirring, the operator feels confident of success, but something in the air is absent, or present, or indolent, or restless, and the industry which has impelled the attempt to secure a series of views in the open air is rewarded by nothing but a set of almost perfect blanks.

There are four kinds of light, or rather, four kinds of influences in the sun's rays, each separate from the other. First, The light which affects the retina. Second, The heat which effects the nerves. Third, The chemical influence which bleaches colors and produces the artistic delineations of the photograph and daguerreotype; and Fourth, The phosphorescent influence—one of no practical importance as yet. By using different means of refracting and reflecting, these influences can, to a great extent, be separated each from the other. And it would appear that the extent and strength of the photographic influence does not always conform in nature to the strength of what we ordinarily term light.

As respects the time of day, however, one law seems to be thoroughly established. It has been observed by Daguerre, and subsequent photographers, that the sun is far more active, in a photographic sense, for the two hours before, than for the two hours after it has passed the meridian. As a general rule, too, however numerous the exceptions, the cloudy day is better than the sunny one Contrary, indeed, to all preconceived ideas experience proves that the brighter the sky that shines above the camera, the more tardy the action within it. Italy and Malta do their work slower than Paris. Under the brilliant light of a Mexican sun, half an hour is required to produce effects which in England would occupy but a minute. In the burning atmosphere of India the process is comparatively slow and difficult to manage; while in the clear, beautiful, and, moreover, cool light of the higher Alps of Europe, it has been proved that the production of a picture requires many more minutes, even with the most sensitive preparations, than in the murky atmosphere of London.

Poisons and Antidotes.

A distiller in Kentucky publishes a letter in the *Ohio Farmer*, in which he says he has discovered an effective remedy for the hog cholera, which has been prevailing so extensively in the West. His remedy is, as soon as he finds the hogs beginning to get sick or to die, to mix a quantity of arsenic with their food, and that invariably makes them healthy again, the powerful mineral poisons of the arsenic overcoming the vegetable poison in the still slops. We wish to urge the inquiry how far the effect of this double poisoning, neutralizing, etc., affects the character of the meat for food. What laws regulate the poisoning of living flesh? And is it, or not, possible to maintain an animal in tolerable health while its meat is by organic or inorganic poisons made seriously objectionable?

Modification of Wood Bearings.

The bearing for shafts for screw propellers adopted lately by an eminent English engineer, is to surround the shafts with casings of brass, the inner surface of which are grooved so as to receive fillets of wood.—Through the spaces formed between the fillets water is allowed to flow freely between the shaft and the bearing, keeping the whole cool, and acting as a lubricator. Another modification of the invention is to fix the wooden fillets on the shaft, which then rotate with it in the brass bearings.

Making Wood Fire-Proof.

Professor Rochelder, of Prague, has just discovered a new antiphlogistic material, which promises to become of importance. It is a liquid chemical composition, the secret of which is not yet divulged, which renders wood and other articles indestructible by fire. Several successful experiments have been made, and others are promised on a larger scale.

Piscaculture.

The Legislature of Connecticut, at its last session, appointed a committee on the practicability of restoring the salmon to her waters. The Legislature of New Hampshire also appointed a committee on the artificial propagation of fish, and Massachusetts, as we have before noticed, is acting in the matter.

A company has purchased the fishing rigbts of the proprietors of the Saltonstal Lake, in the county of New Haven, with the intention of proceeding to stock it with salmon and salmon trout, by means of artificial propagation. One of the parties concerned is a German, who has practiced the art successfully in his own country. An act has been passed amply protecting the company in this enterprise, and prohibiting, under a heavy penalty, all fishing in the lake after the operation of stocking it shall have been commenced. The company confidently expect to have a million of salmon hatched within a year.

Preparation of Flax Fibre.

An Irish newspaper gives an account of a process for improving the quality of flax fibres. It consists in throwing down upon the flax a small quantity of oil, say about an ounce to the pound of flax, which is done by boiling the flax in an alkaline soap ley, washing with water, and then boiling it in water slightly acidulated with some acid—acetic acid being, perhaps, the most suitable, from its exerting no injurious action upon vegetable fibre. The acid decomposes the soap, the fatty constituent of which is left in the fibre, or, perhaps, a mixture of an acid soap and a small portion of free oil. These enter into and through every part of the fibre. After this treatment it is washed, and is then found to be soft and silky, its spinning quality being thereby much improved and its value very much increased.

Coloration of Poisons.

A late writer recommends that all poisons employed or sold by druggists be strongly colored with carbo-azotic acid, one grain of which is sufficient to impart a distinct yellow to 70,000 grains of water. This acid has the peculiar property of imparting a yellow color to the skin of a person taking it, as also to any food in which it might be mixed. It has been proved not to destroy or in any way modify the beneficial effect of prussic acid in which it had been mingled, and the inference is that it would prove equally inert in other poisons, while it would serve to alarm the user and indicate the poisonous character of any preparation in which it had been mingled either by accident or malice.

Peat.

In the eastern part of Massachusetts some eighty thousand acres are covered with peat, to the depth of six feet four inches on the average. The quantity has been estimated at of 180,000,000 tuns. In other sections of New England and the Northern and Middle States this valuable deposit is in almost inexhaustible abundance. Peat fuel, if properly prepared, rivals in cheapness, light, and warmth, the best qualities of cannel coal.

Pacific Wagon Road.

On the 1st inst., thirty wagons and a large part of the intended force under W. F. W. Magraw for the wagon road expedition, were started out upon the plains from Independence, Mo. This route has been designated by the Department of the Interior as the Fort Kearney, South Pass, and Honey Lake Pacific Wagon Road. The remainder of the party will be started soon.

Mathematics.

A prize of $500 is offered this year by Harvard College to any pupil who shall be decided by the Corporation to have attained the greatest skill in mathematics. The person who offers the prize, which is only proposed for this year, is Uriah A. Boyden, a civil engineer of Boston, favorably known for his success in designing turbine water wheels.

Among the entertainments on the Fourth at Buffalo, was the explosion of some four or five kegs of powder on a rock in Coit Slip, which threw a vast column of water to a great hight, and so shattered the rock that the engineers say it may be got away without further blasting.