

MECHANICAL INVENTIONS.

An improved wagon scale has been patented by Mr. Jacob Mills, of Marshall, Col. The invention consists in constructing a wagon scale of sets of compound levers connected with the bolsters of a wagon having a cross bar resting upon their short arms to support the wagon body and its contents, and having a scale beam connected with the long arms of the said compound levers, so that the wagon body and its contents can be conveniently weighed.

Mr. Jacot Burmann, of Bienne, Switzerland, has patented an improved watch provided with devices for indicating the day of the week and month, the month of the year, and the moon's phases.

Mr. David J. Harrell, of Cochran, Ga., has patented an improvement in motors or mill powers, such as are placed on scows moored in a stream and adapted to be driven by its current. The inventor employs a rotating current wheel, provided with floats or buckets, and placed vertically in the usual way between two boats or floating structures that have like buoyancy and are rigidly connected, so as to move together as the stream rises or falls. He provides an automatic connection between the wheel and the machinery of a mill or factory located on the contiguous bank of the stream, so that no interruption in the operation of the machinery can occur by variation in the height of the water.

An improved spring attachment for whiffletrees, for the purpose of relieving the shoulders of the draught animals of jars or shocks, has been patented by Messrs. Frank S. Wagenhals and Chauncey P. King, of Columbus, Ohio. The attachment may be applied to a double-tree or whiffletree.

An improvement in breech-loading firearms has been patented by Mr. John H. Gramps, of Stone Arabia, N. Y. The invention consists in a breech plate pivoted to swing transversely to the barrel, and in a spring extractor combined with the breech plate.

An improved machine for spinning, doubling, and respinning silk has been patented by Mr. Francis Seymour, of Paterson, N. J. The invention consists in means for automatically throwing the spool-bearing tube out of gear when the thread breaks; also, in improved means for winding the thread solidly upon the spool.

An improved apparatus for concentrating ores has been patented by Mr. Arthur G. Charleton, of Marmora, Ontario, Canada. The apparatus is constructed with a series of settling compartments having inclined bottoms, and a series of divisional compartments having central partitions and side partitions, inlet passages to admit ore, outlet passages for the escape of the water and lighter ore, and discharge passage for the escape of the heavier ore.

An improved three wheeled vehicle, patented by Mr. Lorenzo D. Hurd, of Wellsville, N. Y., is so constructed that the vehicle can be turned in small space, that the whipping of the tongues will be prevented, and the vehicle will not be liable to tip over should the loading be unevenly placed upon them.

An improved railroad signal, patented by Mr. Joseph C. W. Stout, of Farmingdale, N. J., is designed to prevent accidents that occur at night or by day on railroads from the color-blindness of the engineers. Switch signal lights ordinarily present but one point of light, which to those afflicted with color-blindness is with difficulty distinguished from other lights about it, its apparent form being the same with them. This invention consists of a light night signal, presenting an elongated beam or bar of light, and capable of being moved in a vertical plane, and rotated at the same time, so that the beam of light may be presented vertically or horizontally, the intention being to provide a light signal that can, by its shape or form, be distinguished from all surrounding lights.

Mr. William W. Button, of Shenandoah, Iowa, has patented an improvement in railroad snow plows in which hinged and adjustable wings are used. The invention consists in affixing a heavy iron beam to the platform of a flat car and attaching to its extremity a vertical support. To this support is riveted a vertical knife or cutter, extending from within an inch or more of the ground up to any desired height. In the rear of the cutter two wings are strongly hinged to the beam, and held in position and adjusted by chains attached thereto and passing around a windlass, the windlass being fastened to the beam near its interior extremity.

Locking Railway Car Doors in England.

The locking of the doors of railway carriages is one of the mysteries of railway management. No passenger has ever been able to divine why such infinite pains are taken to lock him in. The only result of the process is that if there is an accident he is a prisoner, with a chance of being killed. If, on the contrary, his train arrive safely at his destination, he is still a prisoner, who has to wait till he is liberated, making, meanwhile, spasmodic signals to attract some friendly porter for the purpose, unless, having grown wise by experience, he carries a key himself, and is able triumphantly to emerge. Some people imagine that a regulation of the Board of Trade obliges this extraordinary precaution. No such regulation, however, exists. On the contrary, the greatest diversity of practice prevails on the subject. One company locks its carriage doors on the main line only, another on the branch and main lines both, a third on single lines only, a fourth does not lock its doors at all. And the extraordinary thing is, that the companies that entirely

neglect the custom find no disadvantage whatever in doing so. On the contrary, their porters are able to attend to other matters during the time when they would have been locking and unlocking doors.

The following are the railway companies who do not lock their doors on either side of their trains: In Scotland—the Glasgow and Southwestern, Great Northern of Scotland, Highland and North British. In England—Great Eastern, London, Chatham and Dover and Northeastern. It is hard to see why in these days of falling dividends other companies do not follow their example.—*Pall Mall Gazette*.

On the Estimation of Nickel in the State of Sulphide.

BY ANTONY GWYARD (HUGO TAMM).

Analytical chemists know what a tedious operation it is, after obtaining nickel in the state of sulphide in the usual course of analysis, to have to redissolve this sulphide in acids, to filter the solution, and to precipitate it with a fixed alkali, in the form of an oxide of nickel which it is most difficult to filter and to wash thoroughly. It is in order to simplify these long and troublesome manipulations that the writer has devised the following method, which gives quite satisfactory results for most practical purposes.

Nickel having been separated by the usual methods from the metals which accompany it, is precipitated, as usual also, in the state of protosulphide, NiS, by means of a stream of sulphureted hydrogen. The precipitate collected on a filter, and washed, is calcined while still wet, in a porcelain crucible, until the combustion of the filter is complete. (Strange as it may appear, in these conditions no oxide of nickel is formed.) A little pure flower of sulphur is then thrown in the crucible, which is immediately covered with a well fitting porcelain cover, and the whole is heated over an ordinary Bunsen gas burner, until the excess of sulphur has been driven off. The residuum left in the crucible is a sulphide of nickel, which, after cooling, can be used for the estimation of nickel with as much accuracy as when this metal is weighed in the state of oxide; for, obtained in the conditions which have just been described, and which, it will readily be perceived, are those of ordinary analysis, this sulphide possesses the invariable formula, NiS₂, and a corresponding fixed composition from which the weight of nickel is calculated. This bisulphuret of nickel, thus obtained, is quite black, non-magnetic, and in the shape of a fine powder. This last remark is made in order to call attention to a very curious fact.

When pure oxide of nickel, such as the one obtained for the estimation of nickel, is heated with a little excess of flower of sulphur in a covered porcelain crucible, no bisulphide is formed, but a magnetic sulphuret of nickel is obtained in small semi-fused lumps, with a bronze tinge and luster. In certain cases the formula of this magnetic sulphuret is Ni₃S₄, but, according to the length of time it is heated over the Bunsen burner, its composition varies sufficiently to render it totally unfit for the estimation of nickel. Its color and magnetic properties remain unaltered, but the composition varies.

Similar researches on cobalt would be highly interesting and useful to the analyst, but the writer has not carried on further these investigations.

Luminous Meteors.

At the recent session of the British Association, York, Professor A. S. Herschel read the report of the committee on luminous meteors, in the course of which he referred to the aerolite which fell near Middlesbrough this year, and embedded itself to a considerable depth in the earth. It was estimated that it struck the earth with a velocity of 402 feet per second. There was no doubt it fell at least forty miles. The committee recommended that as the information they had received was of such a miscellaneous character, they should not make any further reports for a few years.

Sir William Thomson said the great majority of meteoric stones, instead of falling to the earth in a solid mass like the one produced, generally got shivered to pieces in the air through becoming so intensely hot.

Prof. Herschel observed that the stone in question had not been exposed to any great heat.

Sir William Thomson observed that in all probability some of the vegetation existing was of meteoric ancestry. The stone in question was not on the earth a quarter of an hour before it was picked up, and it was certain that it came from outside the earth. He also said there was a general consensus of sentimental belief that in many other bodies in the universe there was something like the life on this earth, but that was not a scientific belief; however, science was in what might be called a skeptical condition. Life elsewhere was a possibility, and science only went the length of saying that life elsewhere was not impossible. At the same time he did not say that the sentimental belief might not be as well founded as any scientific belief, but all he could say at present was that such a belief was not founded on scientific grounds.

The Cedars of Lebanon.

The once famous and extensive cedar forest of Lebanon, according to a writer in the Vienna *Politische Correspondenz*, has dwindled down to the dimensions of a mere thicket, numbering about four hundred trees. To save it from complete destruction and preserve it at least in its present extent, Rustem Pacha, the Governor-General of the Lebanon, has issued a special ordinance, containing a series of stringent regulations calculated to check, if not quite to put a stop to,

the vandalism and carelessness of most travelers. It is expressly forbidden to put up tents or other kinds of shelter within the district of the trees, or to light fires or cook any provisions in their vicinity. No one is allowed to break off a bough or even a twig from the trees. It is forbidden to bring any beasts of burden within the district. Should oxen, sheep, goat, or other pasturage cattle be found within the prescribed limits, they will be irredeemably confiscated.

Weldless Ring Plates for Boilers.

J. Windle, of Manchester, has designed a mill to roll weldless ring plates for boilers from 2 feet diameter up to 14 feet, and 4 feet wide. The object of the invention is to avoid the longitudinal seams in boilers, which are necessarily a source of weakness, and this is accomplished by constructing the shell of the boiler of metal rings connected together, and formed by a rolling operation from an ingot of steel, or from a bloom or mass of metal, in a similar manner as when rolling railway tires, the ring being formed without a joint, seam, or weld. In the rolling mill which has been specially designed for this work, a fixed and a movable roller, adapted to roll the required rings, are employed. The axes of these rollers are provided with top bearings, and to enable the ingot ring or mass of metal to be placed in position and the rolled ring to be removed, the upper bearing of the movable roller is arranged to be withdrawn. This bearing is fixed on the outer end of a lever or lever frame, which is hinged to a sliding standard or carriage connected with the carriage which carries the movable roller, the sliding standard being actuated by means of hydraulic cylinders. Vibrating frames are also employed, each carrying two, three, or more rollers in place of one, the upper ends of the studs or shafts being stayed. A number of the carrying rollers are converted, by means of bevel or suitable gearing, with revolving shafts, so that they assist in the carrying round of the ring. In working out this method of rolling a hole is punched in the ingot or bloom, and a mandrel introduced. The mass of metal, with the mandrel in position, is then placed under a steam hammer in a swage, which is formed to confine the metal sideways, so as to produce an extension of the length under the blows of the hammer until a rough cylinder of sufficient length is obtained, but in some cases the ingot is cast in the form of a hollow cylinder, which, when necessary, is elongated in the manner above indicated. These ring plates can be produced in any required shape, and with flanged thickened edges if necessary, and we understand that a company is being formed to put down the necessary plant for the manufacture of boilers and plates on this principle.

The Fatal Worry.

In a leading English periodical, Dr. Mortimer Granville has been discussing a subject which should particularly interest all impetuous brain-workers. Referring to the increasing number of cases of sudden collapse from alleged "overwork," Dr. Granville offers some views which, if not exactly new, are at least not those currently entertained.

Constant warnings are being given at the present time against overwork. But, thinks the author quoted, these are generally misapplied. The brain can be tired by prolonged activity, just as may happen with a muscle. But we find that hard and persistent muscular work does not cause muscular collapse. Each day the reserve forces of nutrition renew the wasted protoplasm, and the frame keeps as strong as ever. So there is no more reason why there should be brain collapse from systematic, though severe brain work, than there is for paralysis or tetanus to strike down athletes or day laborers. And we do, indeed, find that brain workers are, as a rule, long-lived.

The cause of the frequent breaking down of men engaged in the active work of life is referred, therefore, by Dr. Granville, to another source, and that is worry. Doubtless it is no new thing to be told that it is not work but worry which kills. But it is often useful to have general impressions fixed upon a definite and more or less scientific basis. Therefore we follow our author in the expression of his views.

It may be assumed that, as the contraction of a muscle is caused by successive waves of nerve impulses, so the mental activities are made up, after an analogous fashion, of undulations of nerve impulses. In ordinary work, however hard, these impulses are sent out in a regular and rhythmical manner. It is the worry which comes in and disturbs this rhythm, exhausts the nerve force, exhausts further the reserve or recuperative power, and breaks down the man. The strength does not weary of digesting digestible food; but add an unmastered bolus of tough beefsteak three times a day, and there will be trouble eventually. Worry produces a kind of dyspepsia of the mind. It is to the encephalon what a restaurant pie is to the stomach.

The first inference from this presentation of the matter is easy and natural. It is that we should not worry. Such advice is perhaps the most fruitless that can be possibly given. Nevertheless, a diligent inculcation of it, and especially its application in educating the young, may not be without some avail.—*Medical Record*.

NEW METHOD OF PREPARING CHLORINE.—J. Townsend, of Stassfurt, prepares chlorine by mixing a heated solution of magnesium chloride of 40° to 50° Baume with about ten per cent of manganese dioxide, and then exposing it to the action of heated air, whereby the chlorine is liberated, which may be used in the ordinary manner. The process is facilitated by the addition of 25 to 50 per cent of calcium chloride.—*Dingler Poly. Jour.*