SMOKE-PREVENTION AND BETTER COMBUSTION OF FUEL.

We present to our readers a sketch received from a subscriber of a plan for arranging a steam boiler so as to minimize the forming of smoke, and at the same time create the better and more complete combustion of fuel in the furnace.

The method is not entirely new to us, but may be interesting to many. The object of the designer is to permit fresh hot air on the top of the fire, the supply of which can be regulated at pleasure by means of a damper in the inner pipe, which runs from the top of the chimney through smoke-box into the perforated brick chamber on top front of fire.

If the designer would also arrange to feed this air through the bottom of the fire-grates, it would in many cases be an advantage. The idea of closing the draft over bridge wall when the coal is put on, and so force the current through the grate bars downwards and thence into the main flue below the boiler, is not likely to prove a good one, because the heat would be certain to burn the grate bars and damper without accomplishing any good result in the combustion.

We would rather depend upon the fireman to gradually feed the coal and use the hot air on the top judiciously in securing good results.

We give the design as interesting with others already known to steam-users.

COMBINED PORTABLE PUMPING AND DRIVING ENGINE.

We illustrate a new portable pumping and driving engine which has been introduced by the makers and patentees, Messrs. John and Henry Gwynne, of 89 Cannon Street, and Hammersmith Iron Works, London. The novelty of the arrangement consists in placing the engine on a platform in front of the firebox of a horizontal multitubular boiler; and it is claimed that the plan possesses certain advantages over the usual arrangement. We will briefly describe the principal features. 1. It can be used either for pumping or for doing any kind of work performed by an ordinary portable engine. When not required for raising water, the centrifugal pump, as shown in our illustration, is replaced by a driving pulley fixed on the crankshaft. For the pumping engine the makers have adopted their well-known "Inviucible" pump, which overhangs the bedplate, and is arranged so that the branches may be swivelled to suit different sites where the machine may be required to work. 2. It is claimed that by removing the engine from the top of the boiler, the expansion or contraction of the plates is not interfered with, nor is there any tendency on the part of the tubes or rivets to work loose. Further, in the new arrangement, the axis of the crankshaft is in line with the barrel of the boiler, or at right angles to the axle of the carriage wheels; consequently these latter act as an anchor, preventing any tendency on the part of the engine to roll, and insuring a tight belt. A description of the engine itself is unnecessary here, as for years it has been well known for its suitability for working at high speeds. The whole arrangement is such that at any time the engine can be removed from the boiler and used as an ordinary vertical engine. The boiler is fired from the side, and is provided with a full compliment of the best fittings. The boiler and all working parts of engine are of steel.—*Lon. Eng.*

Economical Steam Tramway.—The half year's working account of the Dewsbury, Batley, and Birstal Tramway, the first ever constructed in England, and worked by Merryweather 7 inch engines, shows the total cost of the running of the engines to be 2·57d. per mile, and the total expenses of the whole establishment, including locomotive charges, 5·16d. per mile. This is one of the most economically worked lines in England.

UNDERGROUND HAULING ENGINE WITH DOUBLE DRUMS.

The illustration is presented as giving a neat and compact design for the purposes the engine is intended to be used for. The frames are made of wrought iron plate to which the hoisting drums are attached while the engine is place between the two frames.

STEAM BELL FOR LOCOMOTIVES.

The secondary railways of the rural districts of Austria have neither gates nor guards at crossings, and are as open as tramways. It is therefore necessary to take special precautions to prevent accidents and give warning of the approach of a train at a sufficient distance from the crossing. For this purpose preference is given to bells rather than to whistles, as the latter have the inconvenience of frightening horses. The annexed figure shows the arrangement of the steam bell adopted upon Austrian locomotives. It is of the simplest construction possible. It consists of a cylindrical cast iron reservoir, A, slightly tapering at its upper part and closed by a valve, B, upon which is fixed, at the end of a lever, a hammer, D, which strikes the bell, C. The steam enters through a small lateral tube situated at the lower part of the reservoir. As the aperture to which the valve, B, is applied has a much larger diameter than the steam tube, it results that the steam escapes from the cylinder more rapidly than it enters. Every time the valve opens, the pressure lowers and causes it to fall back, and the hammer is thus made to strike the bell. The valve is provided internally with a collar that allows it to travel a certain distance before the steam can escape, and to thus regulate the fall of the clack and the density of the blow. The latter is still further increased by means of a spring which prolongs the lever, and acts at every rise of the valve in such a way as to accelerate the fall. The starting and stoppage are effected by the simple maneuver of a cock; but since a certain condensation occurs in the cylinder, A, every time the bell is rung, this cock is so arranged that in a position of rest it shall establish a communication of the cylinder, A, with the exterior, through a small aperture, and thus allow all the water of condensation to flow out.

Upon varying the pressure and the aperture of the cock, the number of blows per minute may be made to vary between 130 and 240.—*La Nature.*

CHEAPENING THE COST OF SUGAR.

If the reported new process in the manufacture of cane sugar, said to have been introduced by ex-Gov. Warmoth on his Louisiana plantation, shall prove to be all that is claimed for it, sugar-making in that State will have a new lease of existence. The new process consists of shredding the cane into small fibers before it is pressed. In this condition the juice is more thoroughly expressed, and the yield of sugar increased. It is stated that 195 pounds of sugar has been extracted from a ton of cane which, under the old process, yielding only 138 pounds—an increase of about 40 per cent. It is possible, therefore, that by means of shredding their cane, the planters may be able to maintain themselves against the great fall in prices caused by the production of cheap beet sugar in Europe. At a meeting of planters held at New Orleans last summer, it was stated that the cultivation of the cane in Louisiana must be abandoned, unless some process be discovered that would cheapen the cost of making sugar one cent a pound; that might save it, but nothing else would. If the shredding process shall fulfill, the promises made for it, the cheapening will be more than this; it will be one and a half two cents a pound—and this saving will be of immense advantage to the planting interest of the State.—*Republican.*

Olive Oil.—If fatty oils are cooled down to —20°, and kept at this temperature for three hours, they assume very different degrees of hardness, olive oil being the hardest. To determine this point the author uses a cylindrical iron rod, 1 centimeter in length, and ending below in a cone. Upon it is exerted a pressure measured in grammes until it penetrates into the oil with its entire length. The best olive oil required a pressure of 1,700 grms., while cotton oil required only 25 grms.—*Serra Carpi.*