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A STEAM NAVVY.

The handwork of the "navvy" or navigator has of late years been superseded in many ways; and the invention illustrated herewith will further economize manual labor, as it excavates its own pathway through hills, and fills wagons with the removed earth or stone. Lines of rails are arranged for the wagons so that there is always a train of empty wagons standing on a central road behind the navvy, whence they are drawn over a short jump road into position on the side roads for filling, while the filled wagons run back from the machine on the side roads. The navvy illustrated is capable of excavating and filling into wagons at the rate of 60 cubic yards per hour, two men and one boy being required to work it.

This machine is constructed mainly of wrought iron, so as to withstand the heavy work that it has to encounter. The mode of working it may be briefly described as follows: The engine driver, who has the control of all the moving parts, is directed by the man who has charge of the scoop, and who stands on the circular platform at foot of the jib in front of the machine. When the jib is swung to the position required, the scoop is lowered till the mouth of it rests upon the ground. The man on the circular platform, by means of a foot brake and gear, holds the scoop in that position, so fixing the length of the scoop handle from a pivot or point on the jib. The scoop is now drawn forward by means of a chain and winding drum, thereby cutting all before it, according to the radius described by the length of the scoop handle. As soon as the scoop is filled, the man who has charge of it eases the foot brake, allowing it to come out of its cut. When liftedhigh enough, the jib is then swung round until the scoop is brought over the wagon to be filled; the attendant now by means of a trigger line draws the spring catch bolt, allowing the hinged bottom to drop down, discharging its contents into the wagon. The jib is then swung round again, the scoop lowered, and the operation repeated.

After the machine has excavated all that is within its reach, the anchor screws are slackened off, extra sleepers with a short length of rails are then laid down in front of it, and by means of the propelling gear it is moved forward the required distance. The anchor screws are then screwed down in order to prevent the machine from slipping back when at work.

We are indebted to *Engineering* for the engraving and description of this machine, which is the joint invention of Messrs. Dunbar and Ruston.

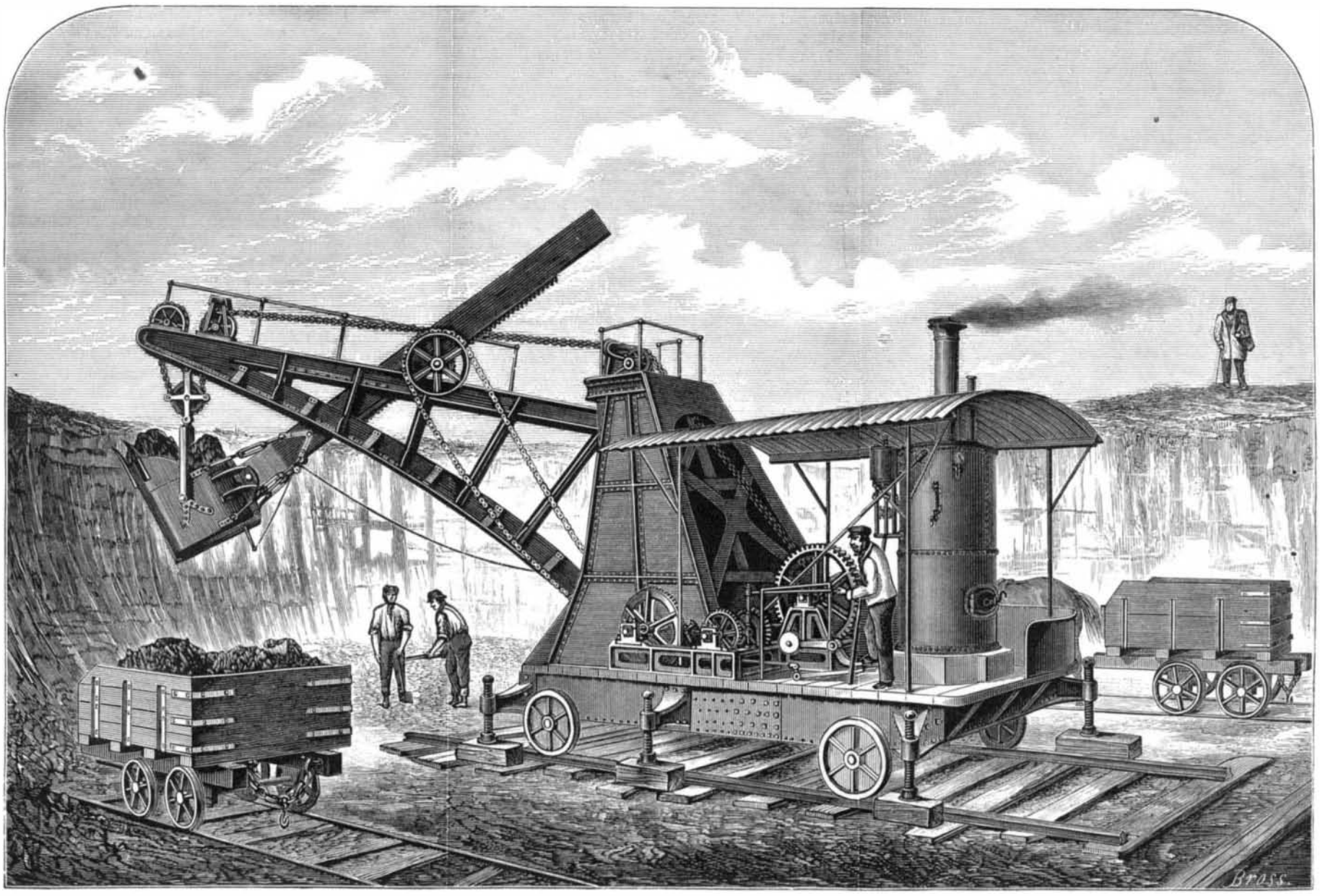
Detection of Adulteration in Butter.

Artificial butter seems at present to be attracting even more attention in Europe than here. R. Godeffroy, of Vienna, after describing its manufacture, remarks that artificial butter has a pale yellow, perfectly homogeneous appearance, does not taste the least bit like tallow or otherwise disagreeably, and melts in the mouth just like real butter. It differs from the latter in lacking the flavor characteristic of the real butter, by its lower melting point, by its smaller percentage of water, and by having a smaller amount of caseous matter, insoluble in ether.

According to Boussingault, rightly made, well washed, and well dried artificial butter contains 13 to 14 per cent of water, while the ordinary market butter of Paris contains from 18 to 24 per cent of water. Moser found only 6·4 per cent of water in artificial butter; but in the market butter of Vienna he found from 14·9 to 20·1 per cent of water.

In pure butter Boussingault found 3·13 per cent of caseous matter, insoluble in ether, and in artificial butter only 1·2 per cent. Moser found that artificial butter melts at 28° C. (82° Fah.), while genuine butter melts at 33° to 36° C. (92° to 96° Fah.). He believed that the melting point furnished a quick and easy method of distinguishing the artificial from the genuine. For this purpose it does indeed offer a certain and not-to-be-despised means of distinction; but it fails to detect the mixture of the two. For the latter purpose, no certain and easy method has yet been found. Angell and Gatehouse have indeed described certain methods of doing this; but they are in part roundabout and circumstantial, in part insufficient. O. Kunstmann recommends that the butter be drawn up by a piece of wick ⅛ inch wide, and lighted; after burning 1 or 2 minutes, let the flame be blown out, and the odor of the smoke and vapor ascending from the wick noted. It is easy to tell by the odor whether the butter is pure or adulterated; but the odor of the vapor is less intense when the butter is adulterated with lard than when tallow has been employed as the adulterant. Dr. O. Bach gives a simple method of butter analysis based on some of the above properties. The only apparatus required are a thermometer and a test tube. In the latter is placed 3 volumes of ether and 1 volume alcohol of 95°. About 15 grains of butter are put into 20 times this quantity of the alcohol and ether mixture, and the test tube placed in water heated to 20° C. (68° Fah.). If the room is heated to this temperature, the warm water is of course unnecessary. At this temperature pure butter is completely dissolved; the salt remains and settles, and its quantity can be estimated from its bulk. The small amount of caseine which is present in pure butter is mostly attached to the sides of the tube; all else is in solution. Butter adulterated with lard, beef tallow, or mutton tallow leaves the latter undissolved at the above temperature; and if the quantity exceeds 10 per cent it is easily recognized. If the butter in question contains less of the foreign fats, it is only necessary to cool the test tube in a stream of water without permitting any water to enter the tube, when the liquid will become turbid from precipitation of the fat. A solution of pure butter can be cooled without getting cloudy. This method is so simple that persons who are not chemists may employ it.

ARTIFICIAL flowers called barometers are being now exhibited in a number of Parisian opticians' shops. They are colored with a material composed of chloride of cobalt. When exposed to sun and dry air the leaves become deep blue; when the air is saturated with moisture they become pinky. All the intermediate shades are easily observed.



DUNBAR & RUSTON'S STEAM NAVVY.