

**BROKEN STONE ROAD-MAKING ---BLAKE'S CRUSHER.**

As the present is the period of the year in which the building of new roads and the repairing of old ones are usually undertaken, the practical information below given, relative to road construction and to a standard machine for the crushing of stone for that purpose, will prove of timely interest. Road coverings, says General Gillmore in his recent treatise on "Roads, Streets, and Pavements," have for their object the reduction of the force of traction to the lowest practicable limit, at the least cost for construction and maintenance. They should be composed of hard, tough, and durable materials, laid upon a firm bed, or upon an artificial foundation from which water is excluded by suitable drainage. Roads, as distinguished from paved streets, may be classified with respect to their coverings as follows: 1. Earth roads. 2. Corduroy roads. 3. Plank roads. 4. Gravel roads. 5. Macadam or all broken stone roads. 6. Stone sub-pavement with top layers of broken stone (Telford). 7. Same, with the addition of gravel. 8. Stone sub-pavement with top layers of gravel. 9. Rubble stone bottom with top layers of broken stone, gravel, or both. 10. Concrete sub-pavement with top layers of broken stone, gravel, or both. With the six classes into which broken stone enters, we have only to deal; and before passing to a brief consideration of their relative modes of construction, we may refer to a standard machine for the crushing of stone which, for several years, has been in extensive use both in this country and abroad, namely, the Blake stone breaker, manufactured by the Blake Crusher Company, of New Haven, Conn.

As will be seen from the illustration, Fig. 2, the construction of the machine includes a massive pitman, F, which is caused to ascend and descend through the eccentric, D, on the fly wheel shaft. This motion of the pitman is applied

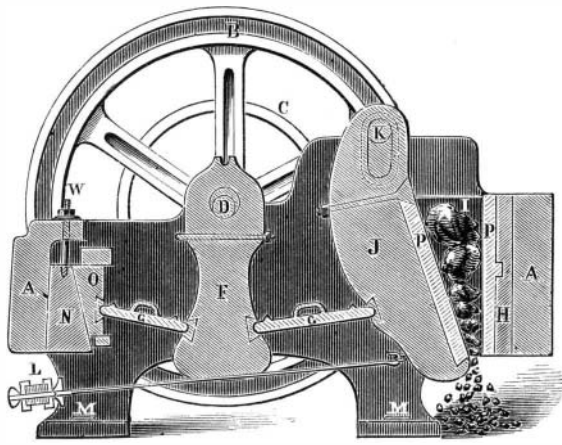


Fig. 2.—BLAKE'S STONE CRUSHER.—SECTIONAL VIEW.

to the toggles, G, one of which presses the movable jaw, J, toward the stationary jaw, H. The jaw, J, when the toggles relax their pressure, falls back, partly through the action of a spring, L. The stone is crushed between the jaws, to which the power is applied obviously to the best mechanical advantage. A method of locating the machine, while in use for breaking stone for road purposes, is represented in Fig. 1. It is placed with its driving engine upon a platform extending from a hillside, and is therefore easily accessible to carts loaded with the stone hewn from the quarry shown in

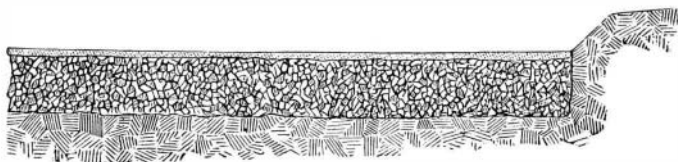


Fig. 4.—THE MACADAM ROAD.

the background. The loads are dumped in proximity to the breaker, and the carts proceed to the spout below, as represented. There they are filled with the broken stone as it escapes from the machine, and are at once driven off to the road bed. While this arrangement avoids considerable handling, still further may be saved by placing the breaker under the platform so that the rocks may be shoveled directly into the jaws, which come on a level with the dumping floor. It is not necessary to plant the machinery close by the ledges. Any point on the route, between the quarries and the streets to be paved, where a good accessible side hill is found, convenient for the erection of the works, will be equally advantageous. The crusher can of course be worked on level

ground, but at a great disadvantage in the handling both before and after the crushing, while no means for an accumulation of the product is afforded. Generally, however, it is estimated that there is no way in which the machine can be so economically located and used as that above described. To the right of the platform is shown an apparatus for screening the product and separating it into two or more sizes. This is not a necessary part of the combination, and is sold separately; but in making macadamized roads it is desirable to use the screening device. The machine is constructed of solid castings of great strength, and such of its parts as are liable to wear out may be replaced without dif-

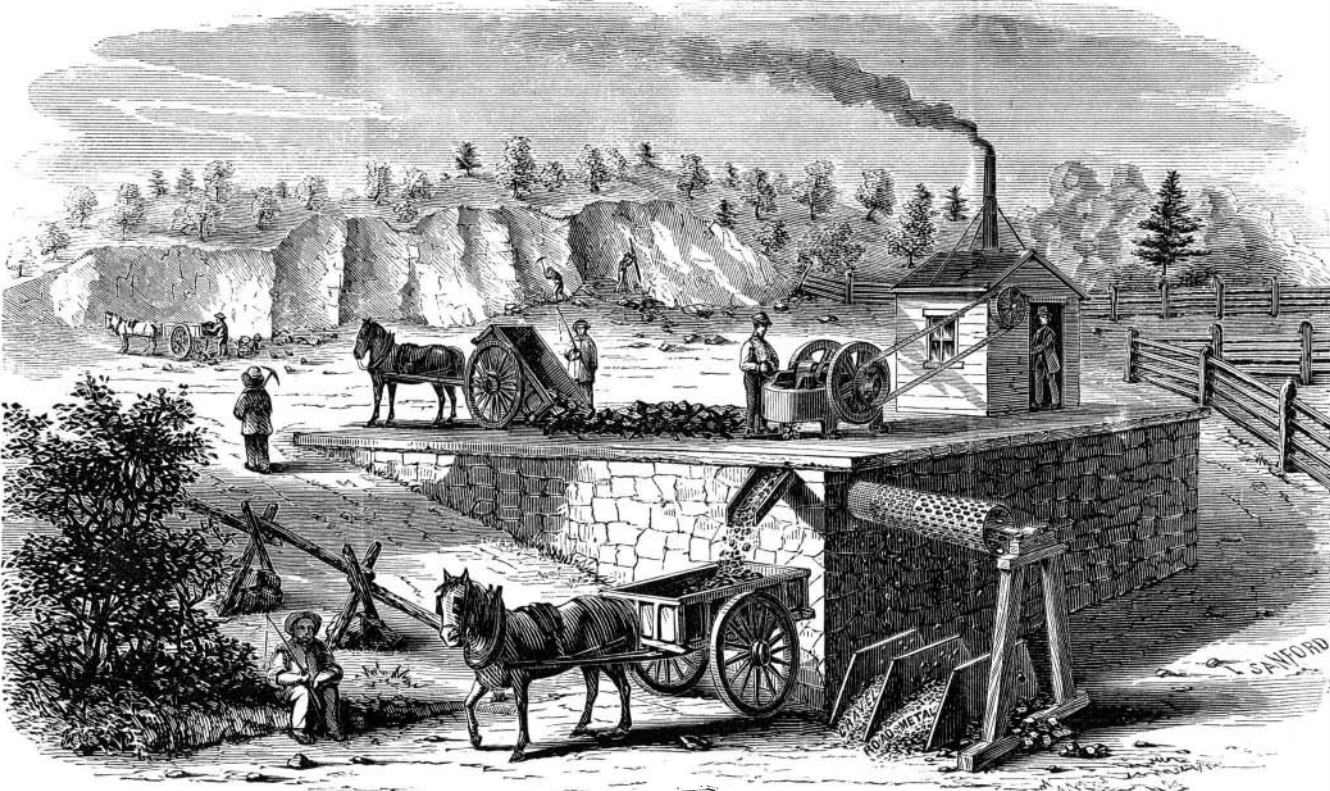


Fig. 1.—BLAKE'S STONE CRUSHER IN OPERATION.

iculty. The proper speed for these machines is about 200 revolutions of the crank per minute. They are made of several sizes, requiring engines of 4 to 12 horse power, and their working capacity varies correspondingly from 3 to 7 cubic yards of broken stone per hour. The best size for breaking road material is one having a capacity to receive stones 8 to 9 inches thick and 14 to 15 inches wide.

Macadam roads, a section of the bed of which is shown in Fig. 4, are constructed of successive layers of stone broken into fragments, the largest of which should not exceed 2 1/2 inches in longest diagonal dimensions. The drainage of the road bed having been provided for by side ditches and (if necessary) by suitable cross drains, an excavation is then made to the sub grade, for the reception of the materials. On made ground it is well to consolidate the bed by ramming. A layer of stone 3 inches in thickness is applied, and spread evenly with a rake. The road is then open to travel in order that it may be compacted before more stone is added. This operation may be hastened by rolling, begin-

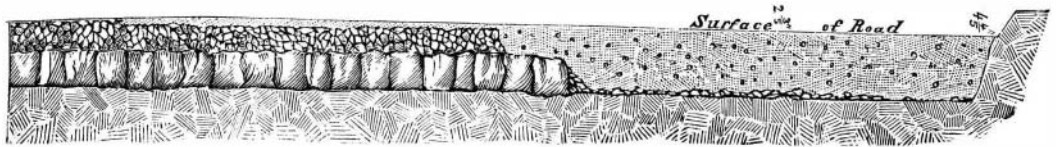


Fig. 3.—THE TELFORD ROAD.

ning with the light and ending with the heavy roller. Ruts must be carefully raked in as fast as formed. As soon as the surface is well compacted, a second layer of stone of like thickness, with gravel or earth at the wings, is applied and rendered solid as before. The top layer is spread and consolidated in the same manner. The roller should pass over every part of the surface, perhaps a hundred times, and if the weather be dry the materials should be kept damp by sprinkling carts. Finally, a binding layer, about one inch in thickness of gravel or the finest pulverized stone, should

center to the sides. One and a half inches of good gravel forms the top layer. It is a good plan to rest the lower pavement on brushwood or fascines, especially where the soil is loose, in order to give a better support and to avoid ruts.

In localities where material cannot be obtained of sufficient toughness for the top layer of broken stone, the road may be finished with three or four inches of gravel, surmounted by a single top layer of stone obtained elsewhere; or if this plan prove costly, a second layer of gravel alone may be used.

To secure firmness and unity of mass on soft ground, a layer of rubble stones, varying in thickness from 3 to 5

inches, and in width and length from 8 to 10 inches, is sometimes used as a foundation to the Telford pavement. When the Telford plan is not followed, a good road can be made as shown in Fig. 5, in which there is a foundation of 6 or 7 inches of rubble to 10 inches of covering. Where motion of the foundation seems possible, the stones may vary in thickness from 3 to 6 inches, in width or depth from 6 to 9 inches along the middle of the road, and in length from 8 to 18 inches. Even flat cobble stones can be used, mixed in with irregular fragments, and it is better to set the stones on their edges.

Difficulty is often experienced, in wet and elastic subsoils, in keeping a foundation of rubble stones firm and in

tact, and in preventing the stones working up and destroying the surface. A remedy is found in the use of hydraulic concrete between the stones, as shown in Fig. 6. The largest stones are laid down side by side and firmly set. The concrete, in which the ballast should be composed of stone fragments not exceeding three quarters of an inch in longest dimensions, is well tamped in



Fig. 6.—RUBBLE STONE AND CONCRETE ROAD.

between the stones. If a thickness of 6 or 8 inches is secured in this manner by one course of stones, this will suffice, and the road may be finished in the usual manner with layers of broken stone or gravel.

The first important matter for a road contractor to consider is the requisite machinery for enabling him to fulfil his contract; and as the popular road of the present day is one in

which broken stone forms a great part of the material, many will be interested in knowing that the most important part of the machinery, necessary for making such roads, can be had of the Blake Crusher Company, New Haven, Conn.

**The Decalcomanic Process.**

The proper way to put on decalcomanic pictures, as ornaments for carriage panels, etc., is to varnish the pictures carefully with the prepared varnish purchased with them, with an ornamenting pencil, being sure to get the varnish on



Fig. 5.—ROAD WITH RUBBLE FOUNDATION.

the white paper. In a few minutes the picture will be ready to place on the panel, and the paper can be removed by wetting it. When thoroughly dry, it should be varnished like an oil painting. Be particular to purchase none of these transfer pictures except those covered with gold leaf on the back, when they are to be applied to dark grounds.

Speaking of sunflowers, the *Maryland Farmer* says: For absorbing malaria, and preventing diseases caused by malarial influences, for prime food for fowls, for a home remedy, sure and safe, for founder in your horses, and for market as a profitable seed to be sold for making oils, be sure to sow sunflower seed.