(No Model.)

B. BUTLER.

HYDRAULIC ENGINEERING.

No. 263,652. Patented Aug. 29, 1882.

Fig. 1.

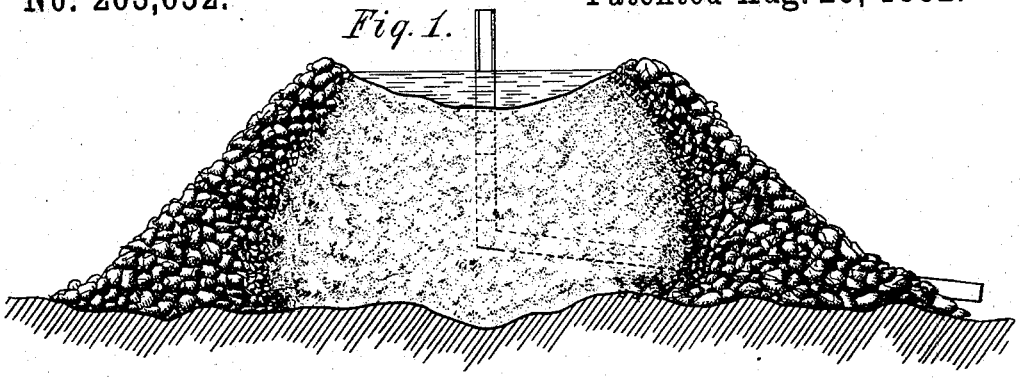


Fig. 2.

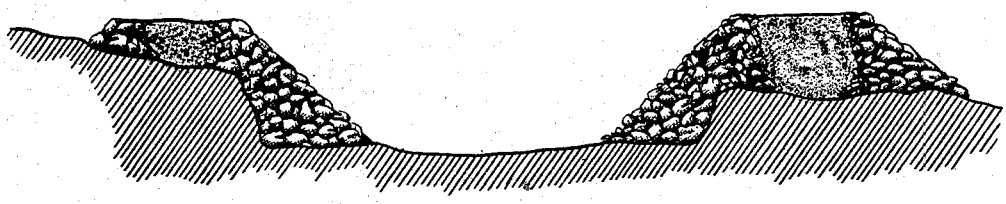


Fig. 3.

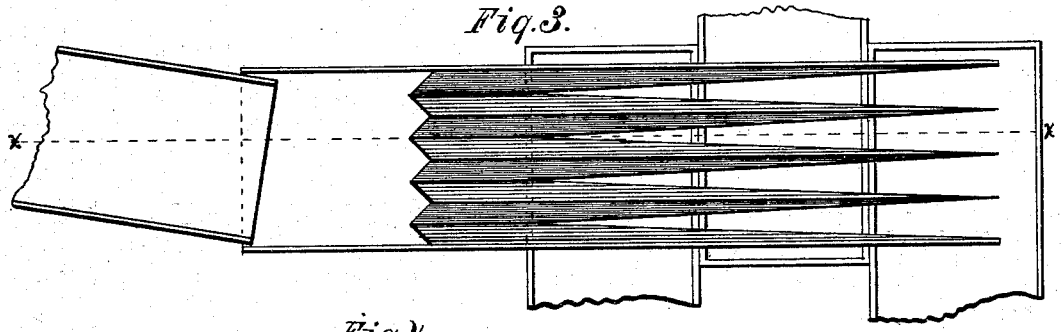
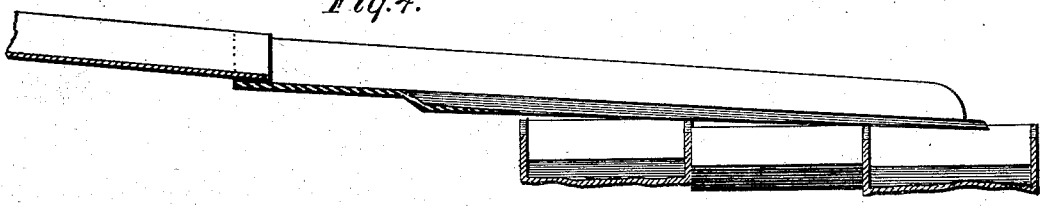


Fig. 4.



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UNITED STATES PATENT OFFICE.

BEAUMAN BUTLER, OF ST. JOHNSBURY, VERMONT, ASSIGNOR OF ONE-THIRD TO ORRIN W. ORCUTT, OF SAME PLACE.

HYDRAULIC ENGINEERING.

SPECIFICATION forming part of Letters Patent No. 263,652, dated August 29, 1882.

Application filed March 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, BEAUMAN BUTLER, a citizen of the United States of America, residing at St. Johnsbury, in the county of Caledonia and State of Vermont, have invented certain new and useful Improvements in Hydraulic Engineering; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in hydraulic engineering, the purpose of which is to attain a comparatively inexpensive and rapid method of removing and conveying earth and separating it into various grades to facilitate the building of road-beds for railways, constructing canals, making land in low or marshy districts, and for various other purposes.

For a full understanding of the nature of my invention reference is made to the following description and claims.

In the accompanying drawings, Figure 1 is a section of a railway road-bed as constructed with the aid of my improved process, and shows a temporary conduit to carry off the water contained between its walls, as indicated in the following specification. Fig. 2 is a similar view of a canal-embankment. Fig. 3 shows a form of separator with bins or receptacles arranged below the same, and Fig. 4 is a longitudinal vertical section thereof on line *x x* of Fig. 3.

To carry my invention into effect I direct a stream or jet of water against a bank or bed of earth to wash or wear away the same, whence the water and earth are directed into a flume extending to any given point, and as the water and earth issue therefrom the latter is separated into various grades, and then deposited into cars or on the land at desired points, or otherwise disposed of. The water-supply may be conducted to the place of washing from a brook, pond, or other natural source above the point of washing, and, if sufficient head cannot be had, artificial means may be used to obtain the necessary pressure. The flume which conveys the washed material to the separators may be an open or closed one, as deemed advisable or necessary, and it should have a slant sufficient to insure the moving of said washed material throughout its length; or, if necessary, force may be used to carry the material on a level. Any suitable mechanism known in hydraulic engineering or mining may be used to obtain the results herein described. As the water and earth issue from the flume the latter is separated into various grades—say into three parts—one composed mainly of stones, another of coarse gravel, and the third of, say, fine gravel and sand, which are then deposited separately into cars on the dump or disposed of otherwise. The separation may be accomplished by any suitable mechanism—as, for instance, several screens of varying fineness, or chutes having slotted or perforated bottoms. The muddy water may be allowed to run to waste, or may be further utilized, as will be presently seen.

When building a road-bed for a railway the coarse material could be so deposited as to form the sides of the bed, when the water could be allowed to run between the banks thus formed to deposit the silt therein; or the water may be conducted to a temporary reservoir formed within the sides of the road-bed, or to a low place from which to draw a supply for a "fill" farther on in the construction of the road, or be elevated by artificial means at the same point, so as to be used a second time.

When a temporary reservoir is made within the walls of the road-bed a conduit can be so arranged as to extend from the reservoir to a point outside of its walls to conduct the water therefrom after the silt has been deposited. In this event the opening in the conduit is maintained at or a little below the surface of the water, whereby the clearest water only will pass off. As the water rises in the reservoir, in consequence of the constant deposit of earth and silt therein, the conduit must be extended, so as to maintain the opening at the proper point.

When building canals in low territory the coarse material would be used to form the banks, while the finer material is deposited to level the land a sufficient width along the banks or form a part of the banks.

In constructing a road-bed in low places, where it is necessary to make a number of fills

or level depressions, the coarse material can be used almost entirely to form the bed, while the finer portion is deposited to fill the low places.

In localities where a natural head of water cannot be obtained to loosen or wear away the earth, or where the use of steam-pumps would be expensive, the earth could be loosened with pick and shovel or in any other suitable manner, and be deposited into the flume, and then be washed with water to the separators. In many cases this method would be less expensive than it would to use wheelbarrows or carts to convey the earth to the place of deposit. Besides, no separation of the earth into grades would take place.

An important feature of my invention is its capability of practical use in hydraulic and other mining in the disposal of waste material. As now practiced, the waste material is either washed to waste lands or to a river to be carried off, or is deposited on dumps by means of cars, carts, or barrows. In these cases quite a large extent of waste land is required; or, where the material is washed to a river, the latter in a dry season becomes more or less clogged or dammed, which, during a freshet or in a wet season, is the cause of considerable damage to low farm or other lands along the banks of the river. With my invention I am enabled to build a wall with the coarse material and deposit the finer material therein, whereby large quantities of waste material can be deposited and retained on a comparatively small acreage.

It will be seen from a general understanding of my invention that the separation of the earth into various grades of coarseness is an important feature thereof.

My invention also becomes important when it is desired to make land in a body of water—as, for instance, to fill an inlet of a river or lake. In making such a fill the coarse material coming from the separator would be carried and deposited in such manner as to build, in effect, a wall or embankment across the mouth of the inlet, when the finer material would be deposited within such embankment. In this event the mud or silt inclosed by the wall would not be forced outward, as would be the case were the fill made from the shore, whereby much less material is required to make the fill. I am enabled to make fills in running water by depositing simply the coarse material therein.

My process also presents an easy way to obtain stones for macadamizing, and, further, for obtaining from gravel-banks that medium grade of gravel known as "ballast," which is so much desired and sought after when constructing railways.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The improved hydraulic method or process of forming earth structures, consisting in arranging and depositing separate grades of soil and stone by first directing a jet or stream of water against a bank of earth to disintegrate and wash the earth into a flume, next conveying the mixed earth and water to a separator, and, lastly, separating the earth into various grades and depositing said grades, substantially as hereinbefore described.

2. The improved hydraulic method or process of forming earth structures, consisting in arranging and depositing separate grades of soil and stone by first loosening or disintegrating earth and depositing it into a flume, next washing the earth through the flume to a separator, and, lastly, separating the earth into various grades of coarseness and depositing said grades, substantially as hereinbefore described.

3. The improved process in hydraulic engineering, which consists, first, in directing a jet or stream of water against a bank of earth to disintegrate and wash the earth into a flume; secondly, conveying the mixed water and earth to a separator; thirdly, separating the earth into various grades of coarseness, and, lastly, depositing the coarse material, so as to form an embankment or wall to retain the finer grades, substantially in the manner and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

BEAUMAN BUTLER.

Witnesses:
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