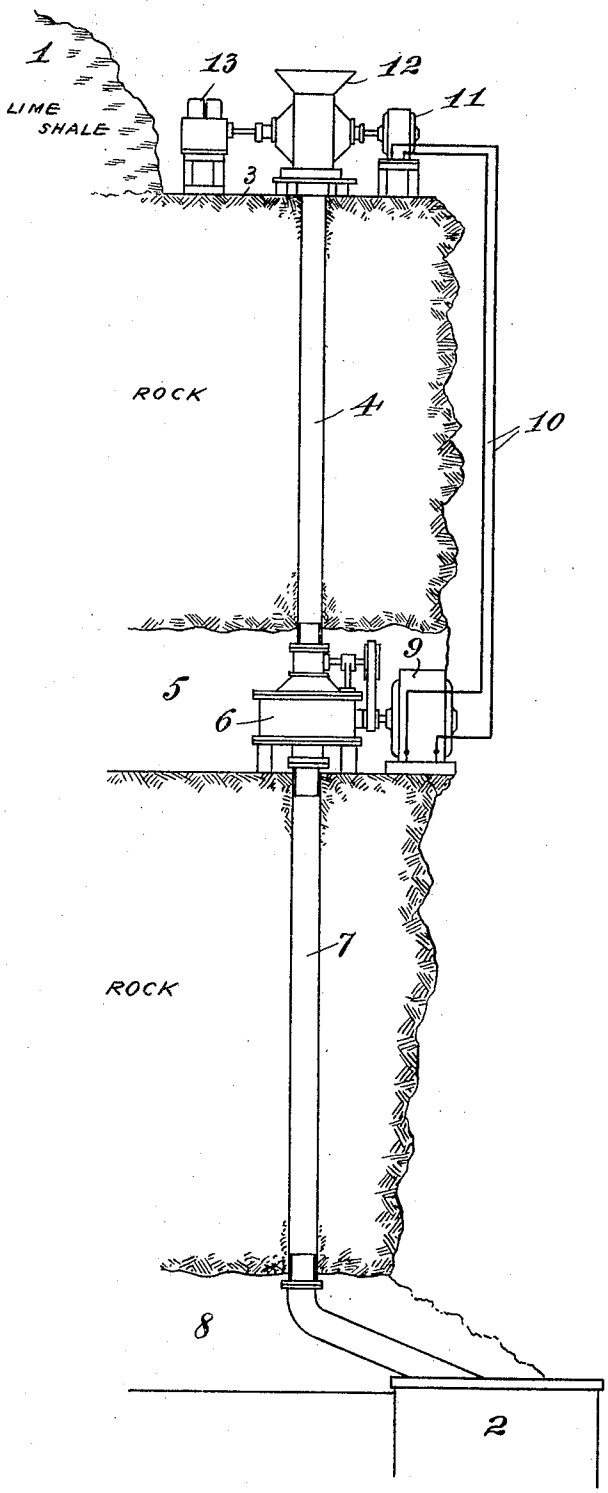
F. G. SHREVES.

METHOD OF CONVEYING MATERIAL AND GENERATING POWER.

APPLICATION FILED JAN. 11, 1918.

1,324,074. Patented Dec. 9, 1919.



Inventor
FREDERICK G. SHREVES
By Louis F. Griswold
Atty.

UNITED STATES PATENT OFFICE.

FREDERICK G. SHREVES, OF DENVER, COLORADO.

METHOD OF CONVEYING MATERIAL AND GENERATING POWER.

1,324,074. Specification of Letters Patent. Patented Dec. 9, 1919.

Application filed January 11, 1918. Serial No. 211,330.

To all whom it may concern:

Be it known that I, FREDERICK G. SHREVES, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Methods of Conveying Material and Generating Power, of which the following is a specification.

This invention relates to a method of conveying material by gravity from an upper to a lower level, whereby the head pressure produced by said material is utilized as a medium for generating power for driving certain mechanism employed.

There are vast natural deposits of material of commercial value in out-of-the-way places or inconvenient locations, particularly in the mountains at high altitudes, distant from power sources and from railroads or other transportation facilities.

Heretofore the expense of mining and conveying such material has been a barrier to its profitable marketing. Therefore the primary object of the present invention is to provide a method for economically mining, preparing or crushing, and conveying material of commercial value, that has been deposited by nature or other agencies, more or less distant above a convenient distributing depot.

A further object of the invention is to provide for utilizing the head pressure for generating power for any purpose desired.

I have conceived the improved method from my connection with actual existing conditions, or from my desire to profitably market large quantities of calcareous material, or lime shale that is deposited in a certain mountainous section of the United States. As similar conditions prevail in many localities, with like natural deposits or with deposits of valuable material of different types, and as it is obvious that the method is universally adaptable for the purposes set forth, under similar conditions, I will take as a foundation for the explanation of my method the said existing circumstances that prompted my invention.

To facilitate the explanation, the accompanying drawing is made a part of the specification, similar reference characters being employed to designate corresponding parts. As the invention has reference to the method and only broadly to the means for carrying out said method, the said drawing is merely diagrammatic.

Referring now to said diagrammatic drawing, 1 represents a bed or natural deposit of lime rock or shale located high up in a precipitous mountain. Assume that it is desired to mine the said shale and convey it to a convenient storage location or distributing point 2 at the base of the mountain. Assume further that the mass of the mountain under the shale bed is of solid hard rock. I first clear away a portion of the shale bed, or tunnel into it to form a shelf 3 on the rock foundation. Next I sink a vertical shaft 4 of predetermined, suitable, lateral dimension. The shaft 4 communicates with a chamber 5 formed in the rock 200 feet, more or less, below the shale bed. A motor 6, preferably of turbine type designed to perform the required functions in combination with the other elements, is located within the chamber 5. The inlet of the motor 6 is connected with the shaft 4, and a shaft 7 provides a discharge from said motor 6, said shaft 7 connecting the chamber with a chamber 8 located at a lower level. In the diagram the chamber 8 is in substantially the same level as the storage bin 2, however it will be understood that the chamber 8 may be located a considerable distance above the bin 2 and equipped the same as chamber 5, a shaft similar to shaft 7, connecting chamber 8 with a lower chamber. There may be a plurality of any number of chambers connected with shafts, the number of units depending on the altitude of the material to be operated on.

The material is crushed or otherwise reduced to a granulated or powdered state and loaded into the shaft 4, the force of gravity carrying said material through the shaft and motor 6. The said motor is located a predetermined distance below the inlet to shaft 4, sufficient for the head pressure of granulated or powdered mass of material in shaft 4, to drive the motor 6. With a motor especially designed for the purpose, sufficient power will be generated to drive a dynamo 9 operatively connected with said motor 6. I will here state that it has been demonstrated that powdered lime shale weighing about 98 lbs. to the cubic foot, with a 200 foot head, carried through a suitably designed turbine motor, will generate about 300 H. P.

Power is transmitted from the dynamo 9 through suitable transmission connections 10 to an auxiliary motor 11 that is connected

with a crusher 12 located at the upper level in proximity to the shale bed 1. The motor 11 may also be used for operating other mechanism employed in mining the material.

A primary motor 13, preferably an internal combustion engine using gasolene as a fuel medium, is connected with the crusher 12, and suitable valves are provided for governing the flow of material through the shafts.

It will readily be seen that the improved method provides for the conveyance of granulated or powdered material by gravity from upper to lower levels, and the installation of co-acting mechanical means, whereby the head pressure produced by said material generates power for driving the operating mechanism.

By utilizing the head pressure as a power medium, light machinery, which is easily handled, can be employed at the shale bed. There is a vast saving in fuel and in the transportation of same, as the primary motor for initially operating the crusher, which is the only member requiring fuel, is not in constant use. While the primary motor is a necessary element of the method when the material has first to be reduced to a powdered state, it is not the master power source.

While I have described my improved method as embodying vertical conveyer shafts drilled through solid rock, the rock formation making the walls of the shafts, it is obvious that the same general principles will prevail if tubes or suitable concrete conduits are employed, said tubes or conduits being firmly anchored and depending from an upper to a lower level and co-acting with suitable motor mechanism as above described. It is also obvious that the power generated can be transmitted and utilized for operating other mechanism, such as for example, conveyers for transporting the material from the storage bin 2 to points remote therefrom.

It is evident that the practical application of the improved method will include the installation of motors and possibly other elements designed especially to meet the requirements. I now have in mind and am about to develop certain inventions along these lines, which will be the subjects for mechanical patents, applications for which I contemplate filing later on.

It will also readily be understood that the improved method is adaptable, not only to calcareous material as described, but to operation in connection with the conveyance of any material of a granular or powdered character, from a higher to a lower level. The same method can be applied to the economical transportation of sand from beds located above a plane where it is desired for use. The same principles may also be applied in handling grain in elevators.

What I claim and desire to secure by Letters Patent is—

1. In the transportation to a lower level of material located at an altitude, crushing or otherwise reducing the material, while at the higher level, to a condition suitable for the operation of a gravity motor, then delivering the material to a lower level and through a gravity motor so as to utilize the head pressure of said material for generating power, and utilizing said power.

2. In the transportation to a lower level of material located at an altitude, crushing or otherwise reducing the material, while at the higher level, to a condition suitable for the operation of a gravity motor, then delivering the material to a lower level and through a gravity motor so as to utilize the head pressure of said material for generating power, and utilizing said power in part at least in the reduction of more of the material at the higher level to the condition suitable for the operation of the gravity motor.

In testimony whereof I affix my signature.

FREDERICK G. SHREVES.