No. 616,537. Patented Dec. 27, 1898.

F. HONIGMANN.

TRANSPORT OR CONVEYANCE OF MATERIALS.

(Application filed Dec. 14, 1897.)

(No Model.)

2 Sheets—Sheet 1.

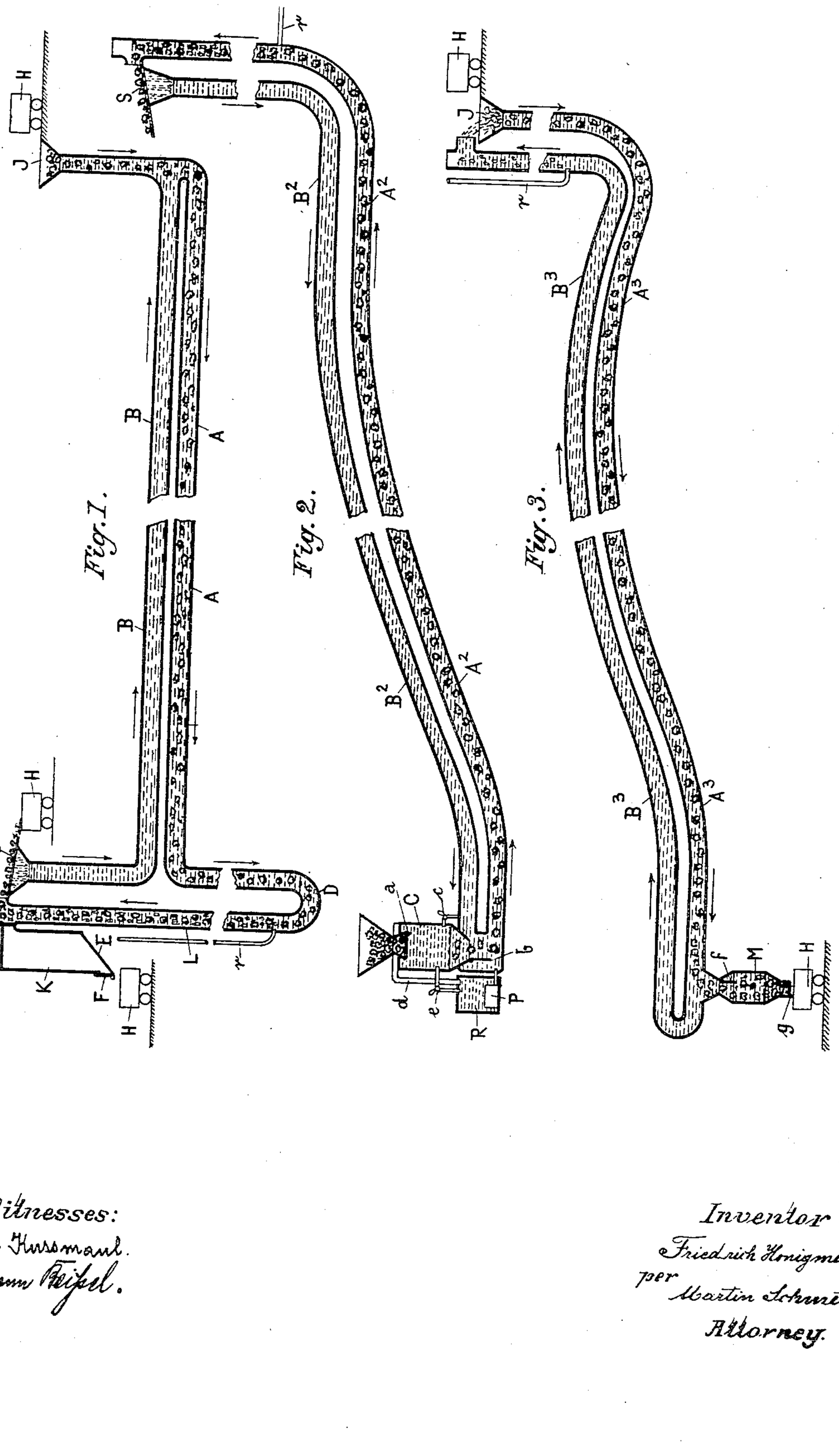

Fig. 1.

Fig. 2.

Fig. 3.

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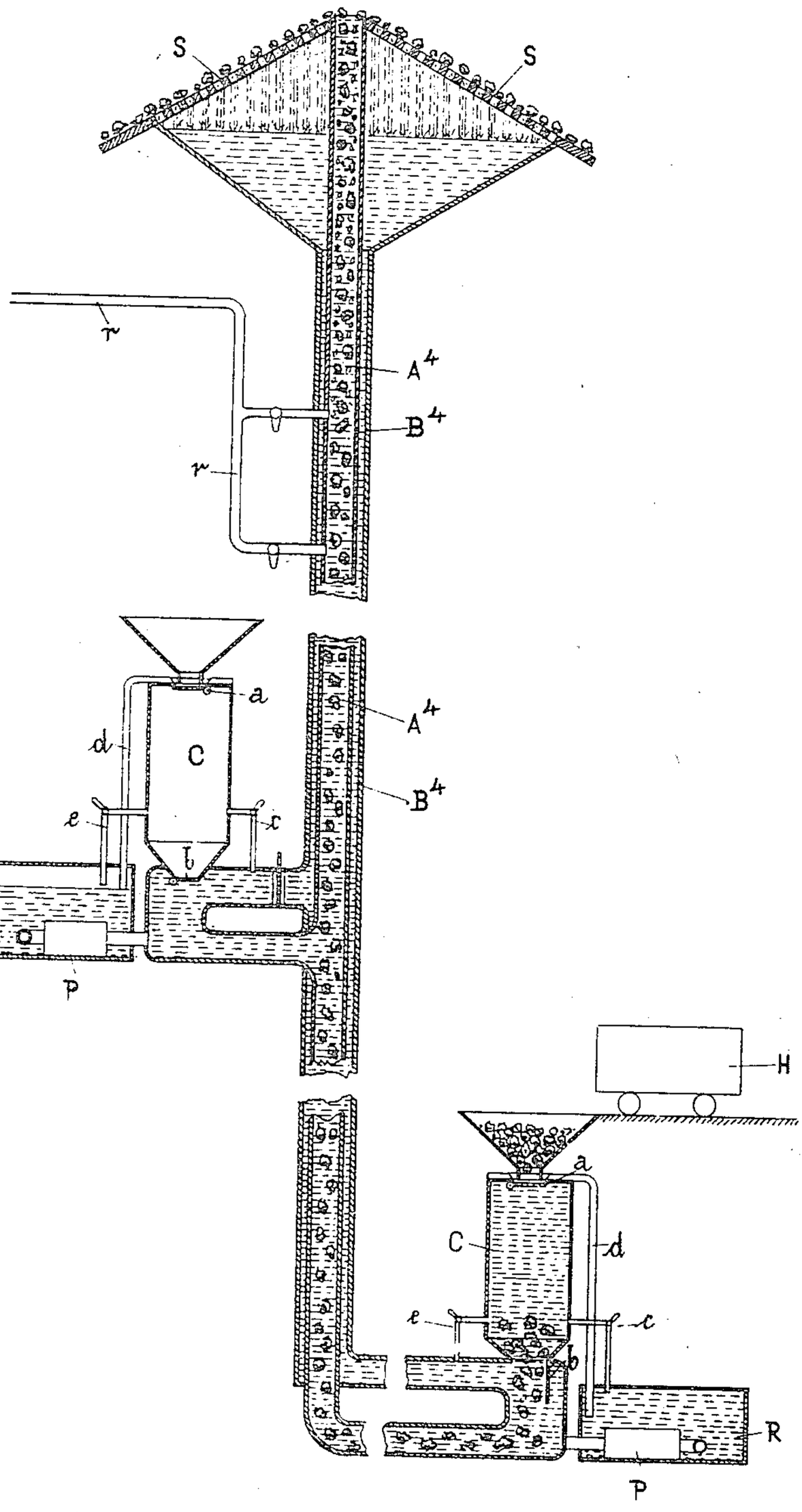
Fig. 4.



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UNITED STATES PATENT OFFICE.

FRIEDRICH HONIGMANN, OF AIX-LA-CHAPELLE, GERMANY.

TRANSPORT OR CONVEYANCE OF MATERIALS

SPECIFICATION forming part of Letters Patent No. 616,537, dated December 27, 1898.

Application filed December 14, 1897. Serial No. 661,812. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH HONIGMANN, mine owner, a citizen of Germany, and a resident of No. 30 Lagerhausstrasse, Aix-la-Chapelle, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in or Relating to the Transport or Conveyance of Materials from One Place to Another, of which the following is a specification.

My invention relates to an arrangment for transporting materials—such as coals, minerals, &c.—with water circulating in pipes; and the object is to provide a simple, effective, and automatic-acting device of this sort, as hereinafter specified.

In the drawings forming part of this specification, Figure 1 represents such an arrangement for the transport of minerals between two places of the same level; Fig. 2, such a one for the transport from a place situated low to one of a higher level; Fig. 3, such a one for the transport from a place situated high to one of a lower level; Fig. 4, such a one for raising minerals from mines.

As shown in Fig. 1, the material to be transported is introduced at J into the pipe-conduit. It is taken up by the current coming from the pipe B and carried along the pipe A to its place of destination, where it is separated from the water by means of a sieve S or falls in the box K. The box K has a sloping floor, as shown at E, below at the place of delivery, and at the top and bottom sides are slide-valves G and F. The slide F remains closed when material falls into the box, and the valve G is opened till the box K is filled. Then the valve F is opened and the valve G closed that the material slides over the sloping floor E in the car H. The current of water returns through the pipe B in order to take up again fresh material at J.

The movement of the water in the pipes is produced by the difference of pressure in the pipes A and B, which can be attained in various ways. The simplest and best is to introduce air through the pipe *r* into the branch of the pipe A, whereby the pressure of water in this branch becomes lighter and constant inflowing of water from the pipe B is caused. In order to attain a higher velocity of the stream in the pipe A, the branch of A is first bent downward, as shown at D, so that a larger quantity of air can be introduced at a greater height in the vertical branch L.

If it is desired to transport the material to a higher level, as shown in Fig. 2, or to raise minerals from mines, as in Fig. 4, then the pipe is provided at the place where the material is introduced with a special filling device. This device consists of a receiver C with two openings or valves *a* and *b*, Figs. 2 and 4, for connecting it to the pipes and for closing the whole. The receiver C is filled with the material to be transported through the opening *a*, the superfluous water from said receiver being allowed to escape. When the filling is completed, the opening *a* is closed and the receiver placed under the pressure of the circulating stream of water by means of the pipe *c*. Then the valve *b* is opened, whereupon the material contained in the receiver C is discharged into the stream and is carried upward through the pipe A^2. The valve *b* is again closed, the pressure in C relieved by opening the cock *e*, and then the valve *a* is opened in order to again fill the receiver C, and so on.

The water displaced from the receiver C by the material introduced and escaping through the overflow-pipe *d* into the reservoir R can be again introduced into the pipe A^2 or B^2 by means of a pump P, this being the work required to lift a corresponding volume of water to the desired height instead of the material transported. The compressed air introduced into the pipe A^2 must also perform the work of causing the water to circulate besides the work required to lift the higher specific weight of the material to this height. If, say, coal of specific gravity of 1.3 is to be transported, 1 part of the work must be performed by the pump and 0.3 parts by the compressed air. If the specific gravity of the circulating water is 1.2, owing to its being dirty, then only $0.1=(1.3-1.2)$ part of the work is to be performed by compressed air.

In case of raising minerals from mines, as shown in Fig. 4, the pipes in the shaft may be arranged so that the pipe A^4, in which the minerals are raised to the surface by the stream of water, may be arranged within the pipe B^4 for the downward flow of water. The

filling device is the same as described in Fig. 2, and it can be arranged at different heights of the shaft, as desired, Fig. 4. If the minerals are to be transported to a lower level, as shown in Fig. 3, then the material is charged at J directly into the stream of water.

The stream flowing downward in the pipe A^3 attains, owing to the material added, a greater pressure than the head of water in the pipe B^3, which does not contain said material after it has been deposited at its destination in the emptying device M, and this excess of pressure alone is sufficient to cause the circulation of the water without necessitating the introduction of compressed air into the vertical branch of the pipe B^3 at *r*.

The emptying device M, discharging the material transported, consists of a box having at the top where the material enters a valve *f* and at the place where the material is discharged a valve *g*. The discharging device is filled with the material transported through the valve *f*, which in this case is opened, while the valve *g* is closed. For discharging the material which is in the box M the valve *f* is closed and the valve *g* opened.

Material can be transported in the manner described to any distance and to any height, and it can be introduced or discharged at any desired place.

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

1. Means for transporting coal and kindred material, comprising a receiving-hopper, a main conveying-pipe connected therewith, filled with water, and having a delivery-opening, a return-pipe extending from said delivery-opening back to a point adjacent the said receiving-hopper, and a pipe to supply air, whereby the water is caused to circulate and convey the material, substantially as described.

2. Means for elevating coal and kindred material from mines, comprising a hopper, a receiving-chamber beneath said hopper and provided with valves, a main conveying-pipe and a return-pipe filled with water, a reservoir adjacent the said receiving-chamber, a pump to empty the reservoir, pipe-and-valve connections between the reservoir and the chamber and water-pipes, and a pipe to supply air to the main conveying-pipe, whereby the water is caused to circulate and elevate the material, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FRIEDRICH HONIGMANN.

Witnesses:

WILLIAM C. EMMET,

JEAN HECKMANNS.