July 6, 1926. 1,591,887

W. O. RENKIN

SUCTION APPARATUS FOR TRANSPORTING FINELY DIVIDED MATERIAL

Filed April 18, 1923 2 Sheets-Sheet 1

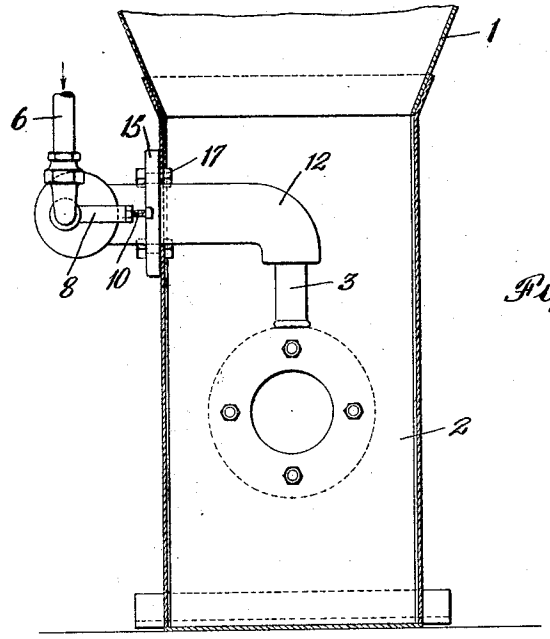


Fig: 1.

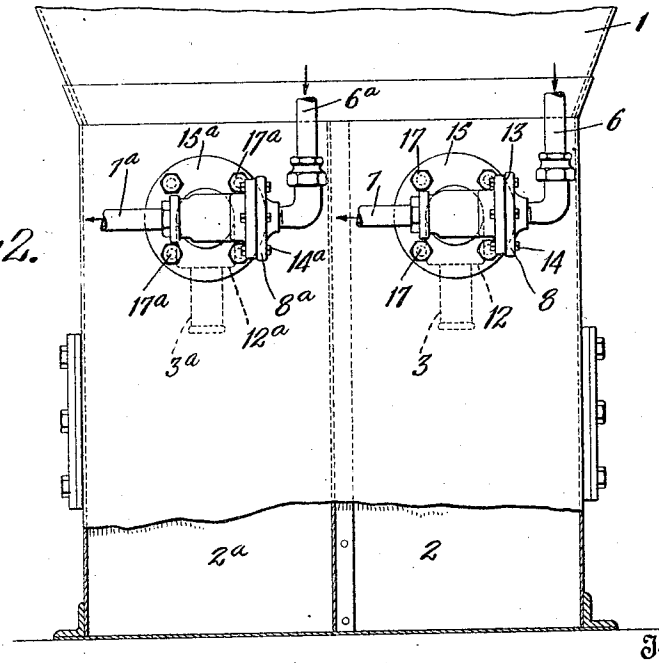


Fig: 2.

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Fig: 3.

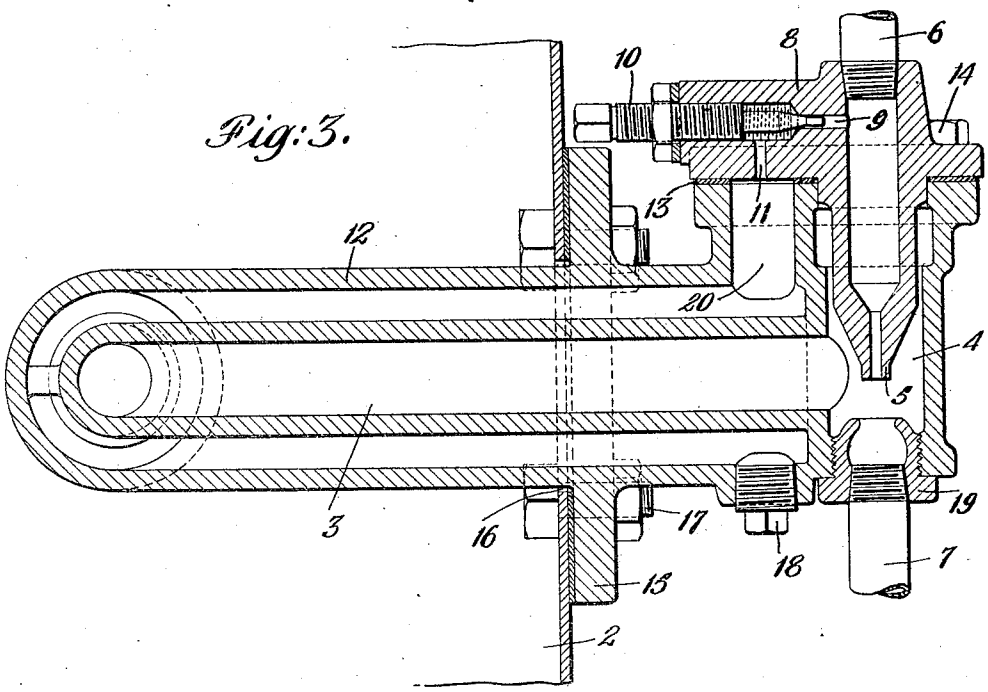
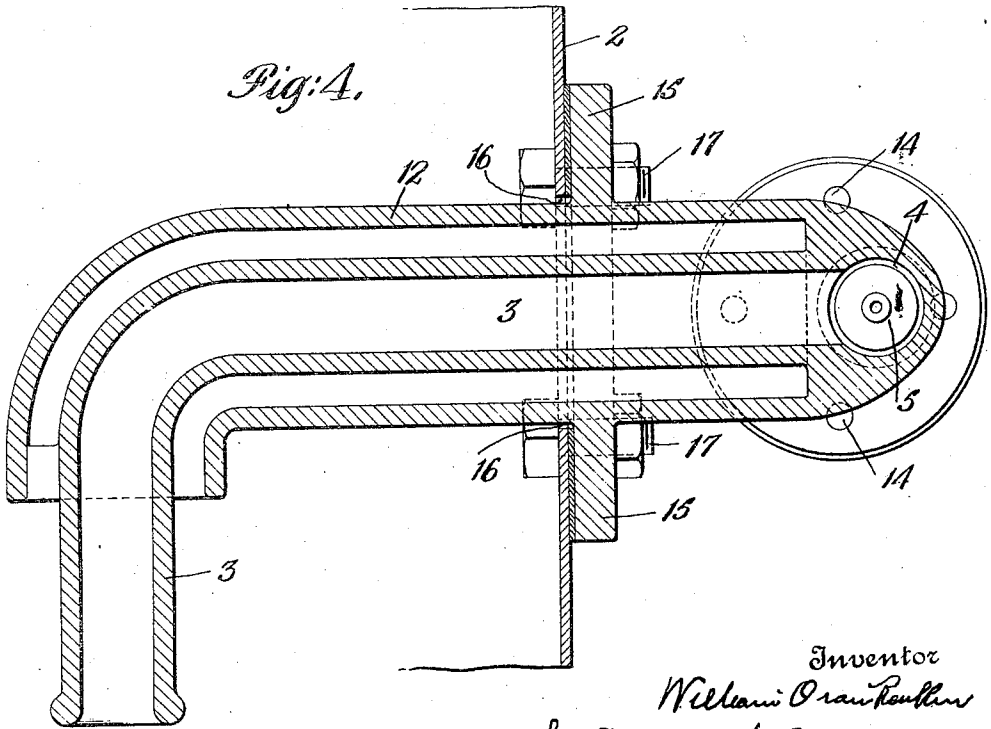


Fig: 4.



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UNITED STATES PATENT OFFICE.

WILLIAM ORAN RENKIN, OF ORADELL, NEW JERSEY, ASSIGNOR TO FULLER-LEHIGH COMPANY, A CORPORATION OF PENNSYLVANIA.

SUCTION APPARATUS FOR TRANSPORTING FINELY-DIVIDED MATERIAL.

Application filed April 18, 1923. Serial No. 632,855.

My invention relates to the handling and transportation of pulverized coal and similar finely divided material, and comprises certain improvements in suction devices commonly called siphons designed for use therein.

In apparatus of this kind the suction is usually created by a compressed air jet operating on the ejector principle, and the material thus sucked out of the storage bin is driven forward by the escaping current of compressed air created by the jet, and thereby delivered through pipes to its destination, which may be the combustion chamber of an adjacent furnace.

One trouble which has been encountered in the use of this type of apparatus is failure or irregularity of action due to the packing together of the powdered coal in the receptacle from which the siphon is drawing. My invention overcomes this by injecting into the body of coal or similar material, a regulated quantity of compressed air, preferably near the point at which the intake mouth of the suction pipe or siphon is located. This "fluffs up" or loosens the adjacent body of coal so that it flows regularly and evenly into the suction pipe. The best form of apparatus at present known to me embodying my invention is illustrated in the accompanying two sheets of drawings, in which:

Fig. 1 is a vertical section through a coal bin equipped with my invention, parts being broken away.

Fig. 2 is a side elevation, parts being broken away and others shown in section.

Fig. 3 is an enlarged detail shown in section on a horizontal plane, of the suction device proper, and

Fig. 4 is a similar section on a vertical plane.

Throughout the drawing like reference characters indicate like parts. 1 is the lower part of tapering bin for holding the pulverized coal, which bin terminates in a two chambered compartment 2, 2^a. In these compartments are the suction pipes 3, 3^a, preferably curved so that their inlet mouths face downward. Preferably this suction pipe is made integral, by casting with the hood or sleeve 12 which is concentric with it and, being shorter, leaves the inlet end of pipe 3 projecting. At the other end of the casting is a transverse passage 4 with which pipe 3 connects and in this is located the compressed air nozzle 5, to which air pipe 6 is connected. This forms an ejector device which will suck in coal through pipe 3 into transverse passage 4, from which it is next ejected by the current of air through nipple or bushing 19 and outlet pipe 7. The described apparatus is inserted through a hole 16 in the side wall of the coal bin and fastened to the said wall by flange 15 and bolts 17.

While a subatmosphere, or partial vacuum, is created in pipe 3 by the ejector action, compressed air, i. e. air above atmospheric pressure, is supplied to the interior of sleeve 12, in accordance with my invention. Preferably this is done by providing compressed air nozzle 5 with an eccentric or projecting flange 8 which overhangs a side opening 20 from sleeve 12, and has a bypass from the nozzle 5 to opening 20, consisting of the two pasages 9 and 11, the junction of which is controlled by needle valve 10. Flange 8 makes an air-tight joint between its passages and passages 4 and 20 by means of gasket 13, which is under pressure from bolts 14.

A second opening in sleeve 12 opposite passage 20 is closed by plug 18, which may be removed when it is desired to blow out any dirt collected in the sleeve.

The foregoing description applies to the apparatus in compartment 2, and also to the duplicate apparatus in compartment 2^a, corresponding parts in the latter being indicated at 6^a, 7^a, 8^a, 14^a, 15^a and 17^a.

In operation the jet of compressed air issuing from nozzle 5, at a pressure of two or three atmospheres, drives some of the air in passage 4 out through pipe 7, thus creating a subatmosphere in pipe 3, so that coal is forced into said pipe by atmospheric pressure and is driven out through pipe 7 mixed with air. The valve 10 is then adjusted to allow a small quantity of the compressed air flowing into nozzle 5 from pipe 6 to bypass to the sleeve 12 and escape through the body of coal in bin 1, in which pipe 3 and sleeve 12 are buried. This loosens up the coal in the neighborhood of suction pipe 3, and allows it to flow evenly and continuously into said pipe, and also, by increasing the difference between pressure inside and outside of pipe 3, accelerates the flow of coal into said pipe.

Various changes could be made in the de-

tails and arrangement of parts herein described without departing from the principle of my invention, the underlying feature of which is facilitating the action of a suction device on a mass of finely divided material by liberating a regulated quantity of compressed air in the interior of such mass and exterior of the suction pipe.

Having described my invention, I claim:

1. An apparatus for transporting finely pulverized coal which comprises in combination, a receptacle for holding said coal under substantially atmospheric pressure, a suction pipe extending downwardly into said receptacle, an ejector comprising a nozzle for a jet of compressed air located exteriorly of said receptacle and connected to the upper, outer end of said suction pipe, and a branch conduit extending from the interior of said compressed air nozzle to the interior of said receptacle at a point adjacent the inlet opening of said suction pipe, whereby a portion of the compressed air from said nozzle is by-passed into the mass of coal so as to be drawn out through said suction pipe with the outflowing coal.

2. In an apparatus of the character described having a receptacle for finely divided material, a suction pipe extending into said receptacle and an ejector device adapted to be operated by compressed air connected to the outer end of the said pipe, the combination, with such apparatus, of a sleeve surrounding said pipe and terminating at a point near the inlet end thereof and a bypass connecting the interior of said sleeve with the compressed air passage of said ejector device.

3. A structure such as set forth in claim 2, combined with an adjustable valve controlling said bypass.

4. In an apparatus of the character described the combination of a casting forming a suction pipe and a shorter, concentric sleeve around said pipe, said pipe terminating at one end in a transverse passage in said casting and said sleeve having an inlet adjacent said transverse passage, a nozzle for compressed air adapted to be inserted in said transverse passage, having a flange overlapping the said sleeve inlet, and having a passage in said flange connecting said sleeve inlet with the interior of said nozzle, a needle valve controlling said last mentioned passage, and means for fastening said casting and nozzle together so as to form an air-tight connection between the two.

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