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2,012,077

PNEUMATIC CONVEYER

Filed Feb. 26, 1932

2 Sheets-Sheet 1

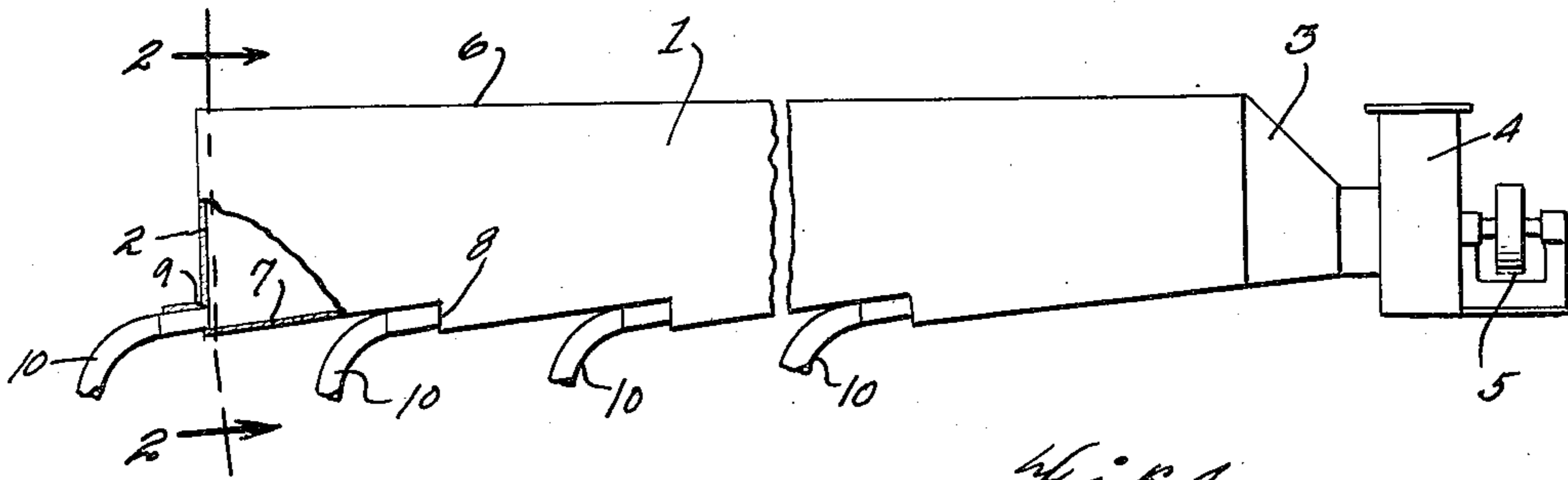


Fig. 1

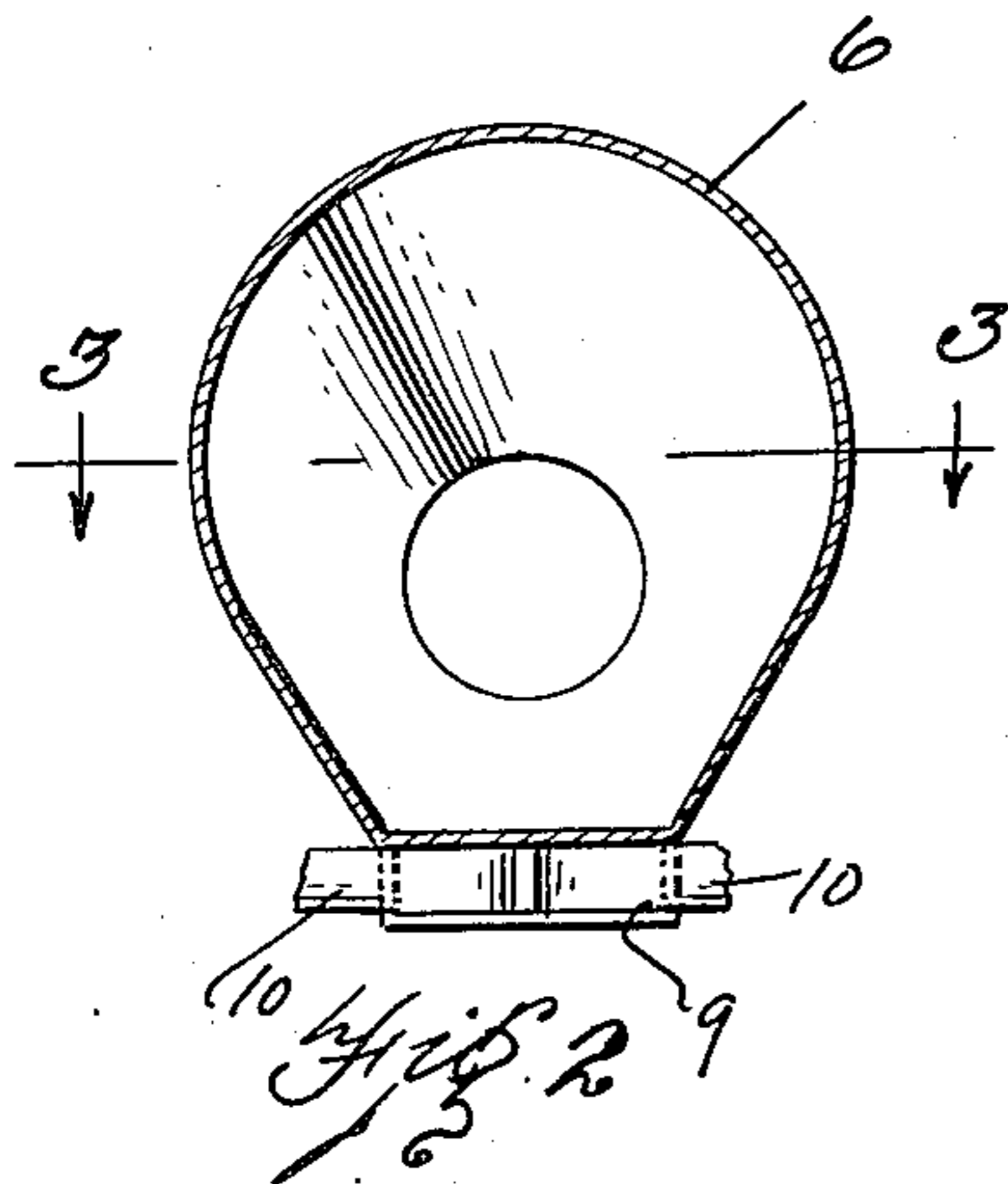


Fig. 2

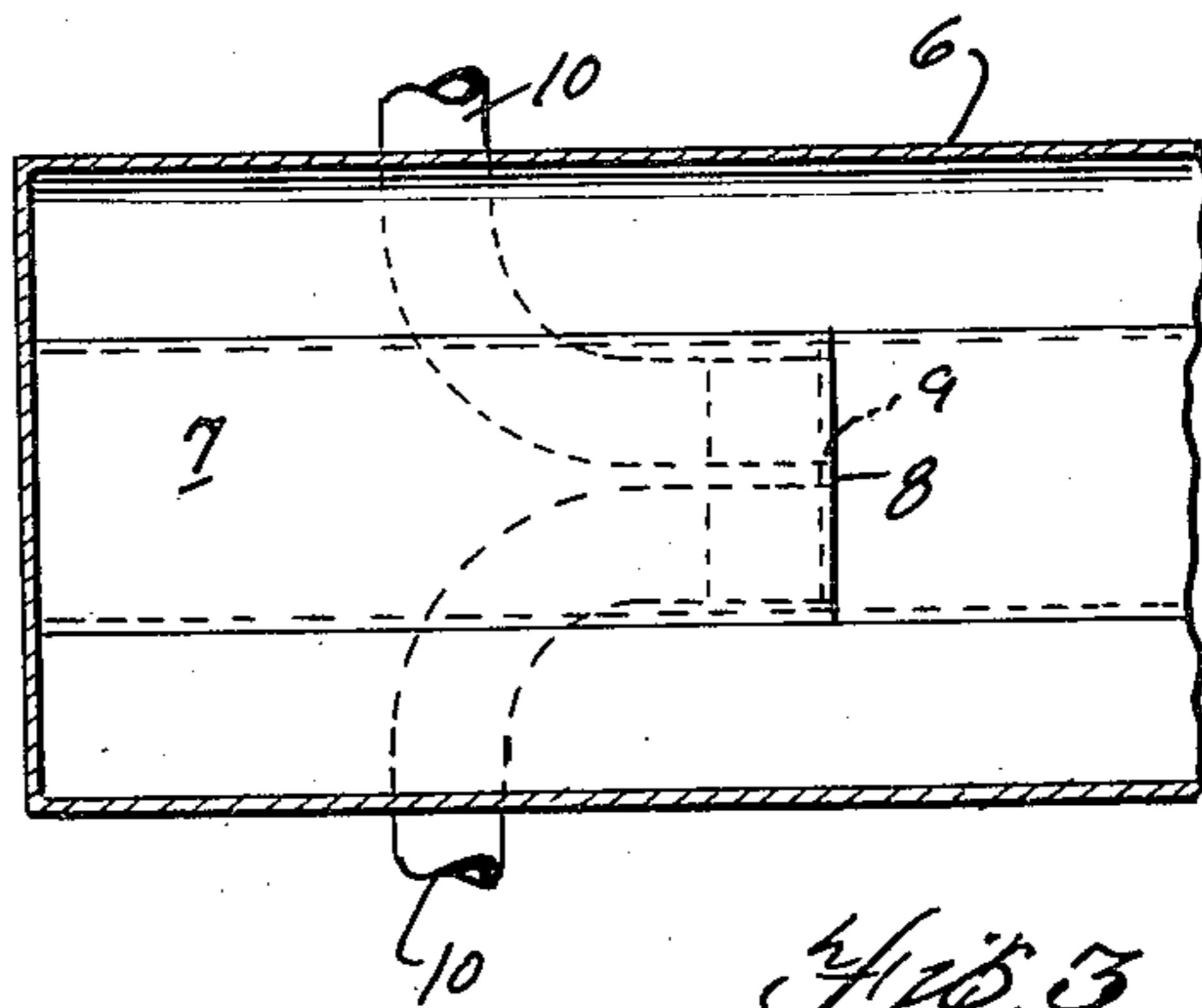


Fig. 3

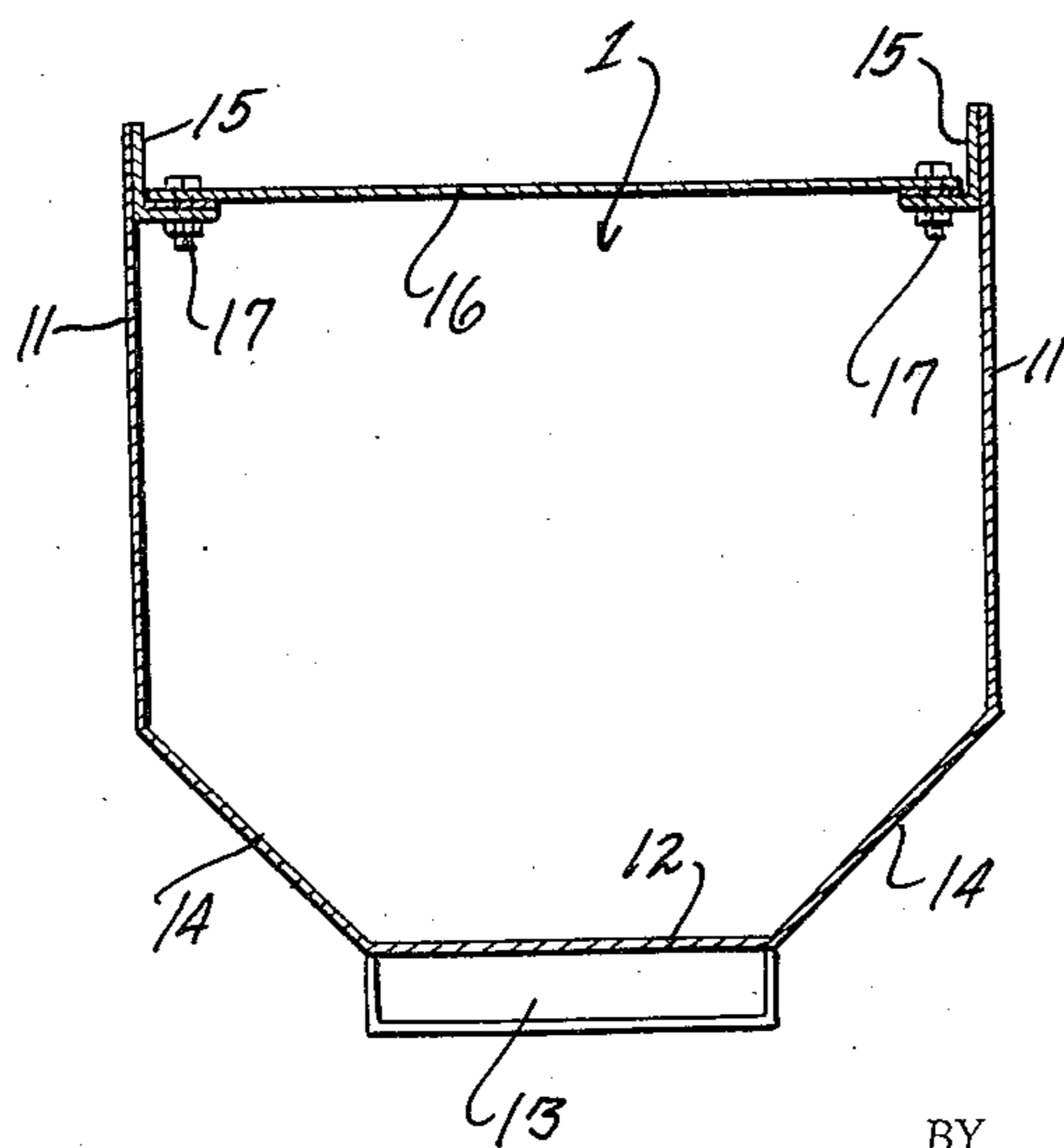


Fig. 4

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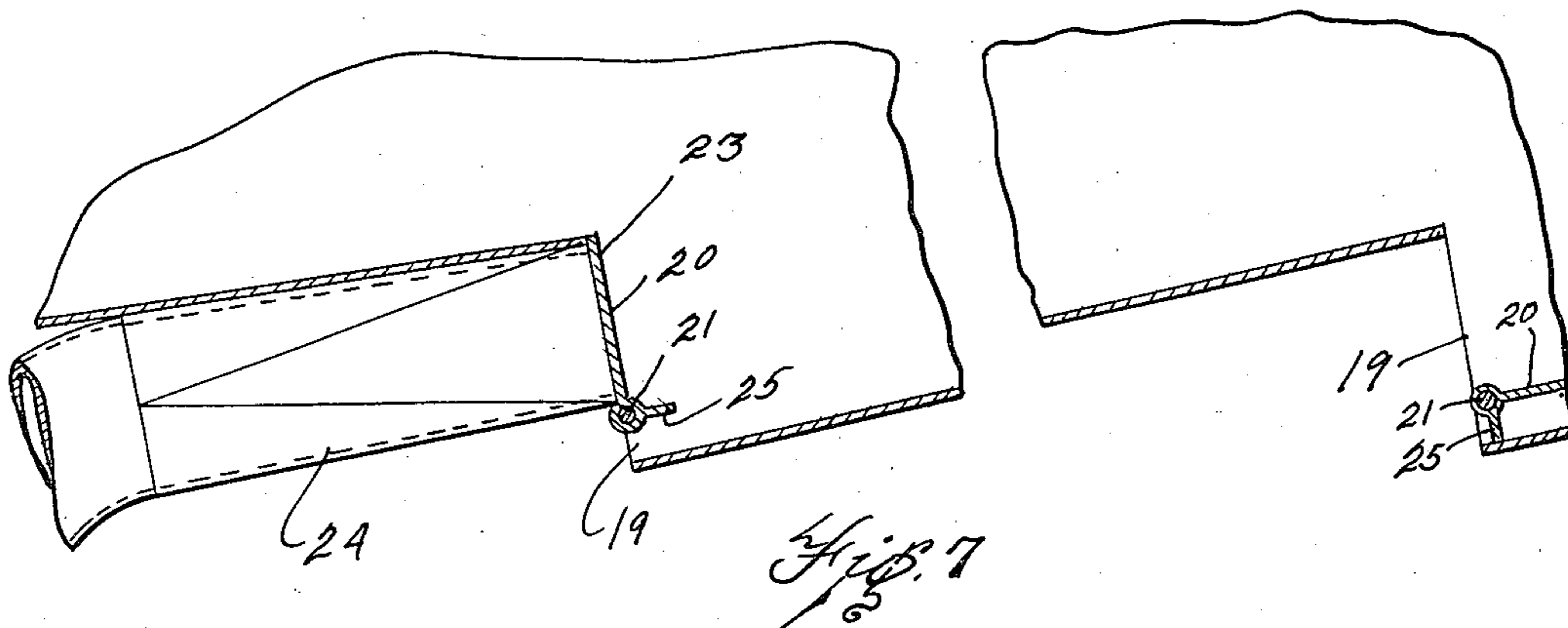
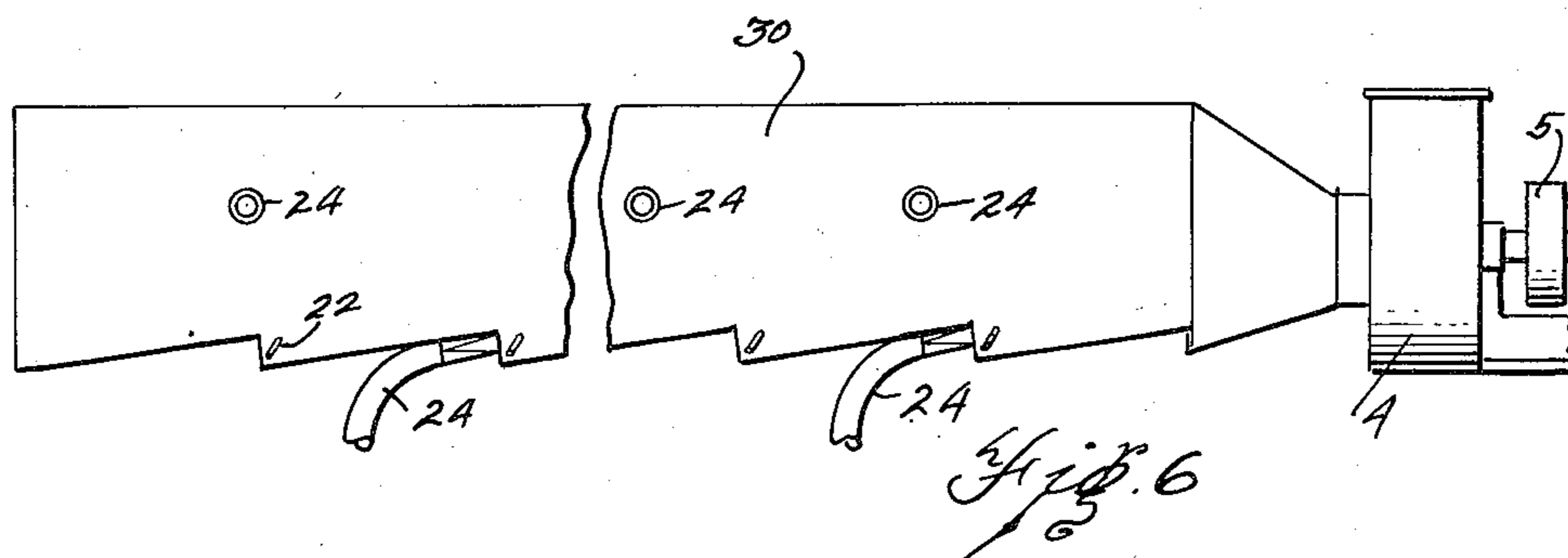
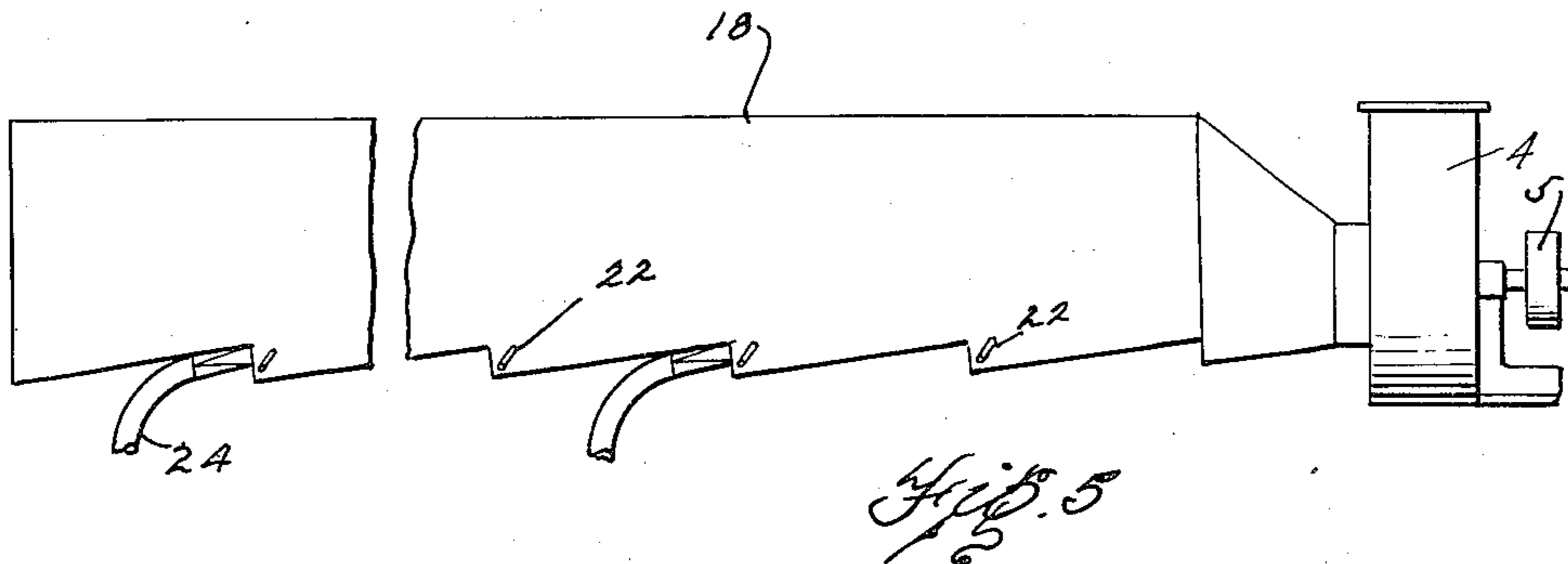
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2 Sheets-Sheet 2



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2,012,077

PNEUMATIC CONVEYER

Frederick P. Bingman, Birmingham, Mich., as-
signor to The R. C. Mahon Company, Detroit,
Mich., a corporation of Michigan

Application February 26, 1932, Serial No. 595,322

6 Claims. (Cl. 302—27)

This invention relates to pneumatic conveyers for the conveying of waste material from various types of machines as, for instance, wood working machines and discharging the same at some de-
5 sired point of accumulation usually to what is termed a "dust collector".

It is heretofore common in the art to provide a conveyer duct or main conduit to which branch pipes leading from the machines productive of
10 the waste material discharge, an exhaust fan being provided at one end of the conveyer for causing the waste material and air to flow from the machine through the branch pipe and thence through the main conduit and exhaust fan to
15 place of deposition.

Some undesirable features exist in such prior known structures in that the material discharg-
ing through the branch pipes into the conveyer or main conduit is discharged usually trans-
20 versely of the main conduit and, while the waste material and air discharging through the branch conduit may flow at considerable speed, the velocity of movement is practically destroyed due to the material striking the opposite wall or side
25 of the main conduit from that through which the discharge pipe opens and to the change in direction of movement of the air stream upon entering the main conduit. The material there-
fore tends to fall and pile up in the bottom of
30 the conduit.

This invention seeks to provide a construction and arrangement of parts in which the material laden air is not changed in its general direction
of travel upon entering the main conduit and
35 the material is "hopped" along the bottom of said conduit by successive propelling impulses of air or material laden air entering the successive openings provided in the bottom of the conduit.

It is further an object and feature of this in-
40 vention to provide a main conduit having a base portion occupying practically a horizontal plane and the provision in the said base of a series of openings spaced longitudinally thereof to at least some of which the discharge pipes from
45 the machines are connected and discharge into the main conduit by influence of an exhaust fan having an intake at one end thereof.

Due to the fact that a number of the branch pipes discharging to a main conduit of this char-
50 acter in a plant is varied from time to time either by reason of the addition of a number of machines to be connected with the main conduit by a branch pipe or that oftentimes only a part of the machines are in operation, it is not neces-
55 sary that all of the openings in the base have a

branch pipe connected to each opening along the base. In such case, movement of the material along the base between branch pipes that are spaced a considerable distance apart is caused
5 by air alone entering the openings in the base between the points of entrance of material laden air thereinto to maintain movement of the ma-
terial along the base from point to point until the material comes to within the influence of the
10 material laden air flowing through the next branch pipe of the series. Provision is also made for closing any of the openings in the base of the conduit and it is a feature and object of this invention to provide a conduit of substan-
15 tially uniform cross sectional area from end to end having a series of openings in the base spaced longitudinally thereof thru which air may flow and to some of which openings branch
20 conduits carrying material laden air are connected to discharge into the main conduit.

It is also a feature of the invention to provide a means for closing any of the branch conduits leading from the machines from which it is de-
sired to remove waste material produced by op-
25 eration thereof and to open an aperture to atmosphere whereby in the event of cessation of operation of the machine associated with such conduit the continuity of flow of material along
the bottom or base of the conduit is not affected.

Another object of the invention resides in the
30 provision of a conveyer of this character in which more or less discharge conduits may be provided therein without detracting from the efficiency of operation thereof.

These objects and the several novel features
35 of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in
40 which—

Fig. 1 is a side elevational view of one form of conveyer.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 2 showing a mod-
45 ified form of construction.

Fig. 5 is a view similar to Fig. 1 showing a modified form of construction.

Fig. 6 is a similar view showing another mod-
50 ified form of construction.

Fig. 7 is an enlarged longitudinal vertical sec-
tional view through the bottom of the conveyers
shown in Figs. 5 and 6.

Referring to the drawings shown in Figs 1, 2
and 3 the conduit 1 has approximately the same
55

cross sectional area throughout its length and the end 2 thereof is closed while the discharge end 3 opens to the blower or suction fan 4, the same discharging to a suitable collector (not shown).

The blower 4 may be operated in any suitable manner such as by the pulley 5 connected to the drive shaft of the fan 4. The upper part of the conduit 1 is formed with the cylindrical portion 6 and the base of the conduit is formed with the portions 7 each sloping upwardly toward the discharge end 3 and each terminating in a vertically extending portion 8 apertured at 9 to receive the branch pipe 10 the same leading from points adjacent various types of machines from which it is desired to remove the waste material to discharge to the conduit. It will be seen that the openings 9 are relatively small as compared to the cross sectional area of the conduit 1 so that when the blower or suction fan 4 is set in motion the same will pull a partial vacuum on the conduit 1 and the air movement along the bottom of the conduit will be considerably accelerated and the waste material will thereby be carried rapidly toward the discharge end of the conduit.

Referring to Fig. 4, I have shown a modified form of the conduit which comprises the vertical side walls 11 the base 12 having the apertures 13 therein, the same being similar to the apertures 9 as heretofore described. The side walls 11 taper in at their lower end toward the base 12 as indicated at 14. The angle irons 15 are suitably secured to the inner faces of the side walls 11 and adjacent the upper end thereof and the plate 16 is secured to the horizontal portion of the angle irons 15 by the bolts 17 so that the plate 16 may be readily removed to permit painting or cleaning of the interior of the conduit.

Referring now to Figs. 5 and 7, the conduit 18 is similar in design to the conduit 1 but each opening 19 in the base thereof has a valve 20 positioned therein. The valve 20 is mounted upon the rod 21 carried in the sidewalls of the conduit 18 and one end of the rod extends through the side walls a sufficient distance to have the handle 22 suitably secured thereto to move the main portion 23 of the valve 20 to close the branch pipe 24 leading from the machines conveying waste material to the conduit 18. The valve 20 may be moved to a position whereby the portion 25 closes the portion of the opening 19 below the rod 21 and uncovers the end of the branch pipe 24 to permit communication between the pipe and the conduit 18. It will be noted, by referring to Fig. 5, that some of the openings 19 have the branch pipes 24 connected thereto and others are simply open to atmosphere. This construction may occur in an installation where there are not sufficient machines in the plant to discharge into the openings 19 but as there is a limit to the longitudinal distance between the openings 19 for normal operation of the conveyer to keep the waste material continuously moving along the base thereof it is necessary to leave some of these openings open directly at atmosphere.

It will thus be seen that if it is desired to close one of the pipes 24 that the aperture below the valve 20 will be immediately opened allowing air from atmosphere to pass through the opening into the conveyer 18 to keep the material continuously moving along the bottom thereof. It will further be seen that if desired additional pipes 24 may be connected to the openings wherein no pipes are now connected.

The construction and arrangement of the valve 20, shown in Fig. 7, may be used in place of the branch conduits 10 of Fig. 1 or other embodiments of the invention disclosed herein.

Referring to Fig. 6, the conduit 30 is similar to the conduit shown in Fig. 5 but in this form of device some of the discharge pipes 24 enter into the side of the conduit as well as in the bottom but the operation of this form of device is exactly the same as heretofore described.

In any of the constructions described, that is, where only a part of the openings in the main conduit are connected by means of branch pipes with waste productive machines or where all of the openings are so connected, waste material is carried into the main conduit through influence of the suction fan connected therewith and is hopped along the base by the stream of material laden air flowing through a branch conduit discharging waste material to within the influence of the stream of material laden air of the next forward conduit or to influence of a stream of air entering the main conduit through an opening therein to atmosphere. By this arrangement of the branch pipes or branch pipes and openings, the material is constantly hopped along the base by the high speed air stream entering the opening or discharging into the main conduit through the said branch pipes and it is desirable to have a considerable number of properly spaced openings and branch pipes due to the fact that, while the material laden air stream at the point of entering the conduit has a comparatively high velocity, such velocity is shortly materially reduced to such degree at least as to permit deposition of the material. By my construction and arrangement of the main conduit and the series of branch pipes and openings through which the material laden air or air alone flows into the base of the conduit at an angle slightly upward toward the longitudinal axis of the main conduit and, as soon as the velocity of the air stream conveying the same has reduced sufficiently, the material drops toward the base and onto another high velocity stream entering the main conduit either through a branch pipe or through an opening provided in the base.

From the foregoing description it becomes evident that I have provided a pneumatic conveyer construction in which the speed of the material is not governed by the velocity of air in the entire conduit but is speeded up in its movement by air taken from atmosphere through openings in the bottom of the conduit.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a pneumatic conveyer, a conduit of substantially uniform cross sectional area throughout its length, the base of the conduit provided with a plurality of longitudinally spaced openings, the wall forming the base being upwardly inclined between each rear and forward aperture of the series at a slight angle to the longitudinal axis of the conduit, a plurality of pipes connected to the openings in the base of the conduit for discharging material laden air into the conduit in a direction onto the respective inclined portions of the base, a fan connected to one end of the conduit for drawing the material laden air into and discharging the same from the conduit.

2. In a pneumatic conveyer, a conduit of substantially the same cross sectional area throughout its length, the base thereof provided with a

plurality of openings, the base of the pipe between the successive openings being inclined to the longitudinal axis of the pipe providing a saw tooth form, a plurality of branch pipes, one connected to each opening in the base for discharging material laden air into the conduit, the arrangement of the branch pipes and openings in the base of the conduit being such that the branch pipes each discharge into the conduit parallel with the adjacent inclined base portion and in the same direction at a slight angle to the longitudinal axis of the conduit, one end of the conduit closed, means at the opposite end of the conduit for drawing the material and air into and discharging the same from the conduit, the branch pipes providing the sole means for admitting air to the conduit.

3. In a pneumatic conveyer, a conduit of substantially uniform cross sectional area throughout its length, the base of the conduit provided with a plurality of vertically extending apertures, the sections of the base between the apertures sloping upwardly from the bottom of one aperture to the top of the next succeeding aperture, a plurality of branch pipes connected to the openings in the base of the conduit for discharging material laden air into the conduit, and means for causing a reduction of pressure within the conduit to thereby cause flow of air and material through the pipes whereby a stratum of rapidly moving air is provided at the base of the conduit to carry the material therethrough.

4. In a pneumatic conveyer, a conduit, of substantially uniform cross sectional area throughout its length, the base thereof provided with a plurality of openings, the sections of the base between the openings sloping upwardly from one opening to the next succeeding opening in succession providing a base of saw tooth form, a plurality of branch pipes one connected to each

opening in the base for discharging material laden air into the conduit, one end of the conduit closed, means at the opposite end for drawing the material and air into and discharging the same from the conduit, the branch pipes providing the sole means for admitting air to the conduit.

5. In a pneumatic conveyer, a conduit having a base portion provided with a plurality of apertures approximately equi-distantly spaced longitudinally of the conduit, a series of branch pipes each being connected to an aperture to discharge into the base of the conduit in a direction approximately longitudinally thereof, said branch pipes being associated at the opposite ends with a source of supply of waste material and air, the base of the conduit between each of the openings in succession being upwardly inclined from the bottom of one opening to the top of the next, and a vacuum producing means connected to the conduit to cause inflow of air and waste material from the branch pipes, the whole providing a construction whereby the waste material discharged into the conduit is moved along the base thereof from one point of inflow of material and air to another to convey the same by successive impulses to the fan.

6. In a pneumatic conveyer, a hollow conduit of substantially uniform cross sectional area throughout its length, the base of the conduit having a plurality of apertures in spaced relation longitudinally thereof, the wall of the conduit from one aperture to the next being inclined upwardly toward the longitudinal axis thereof, pipes for conveying waste material to the conduit each connected with an aperture at the bottom of the conduit, and means for causing reduction of pressure within the conduit and the said pipes to cause movement of waste material through the conduit.

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