Jan. 7, 1936. J. A. FARLEY 2,026,732

PNEUMATIC CONVEYER

Filed July 19, 1933 2 Sheets-Sheet 1

Fig. 1.

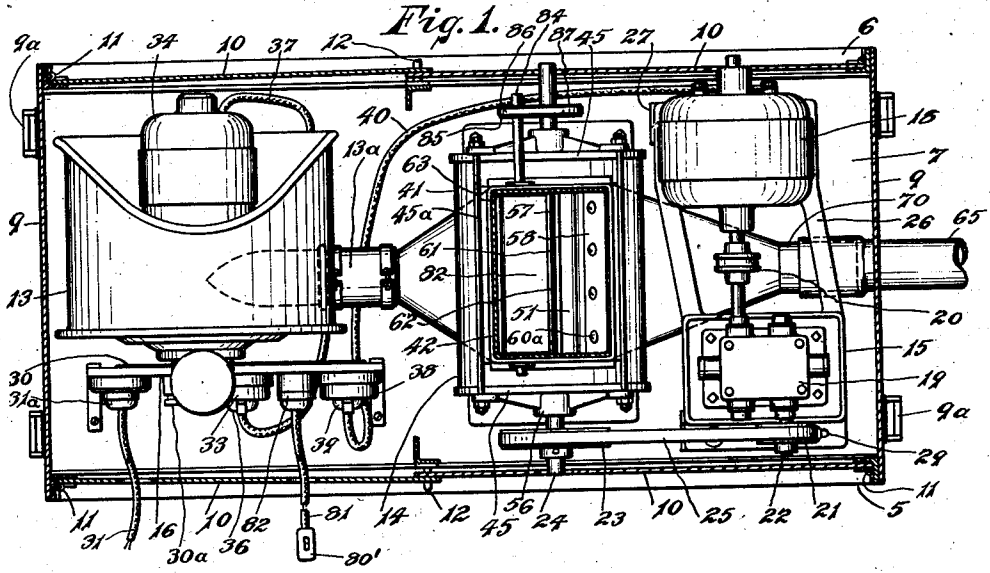
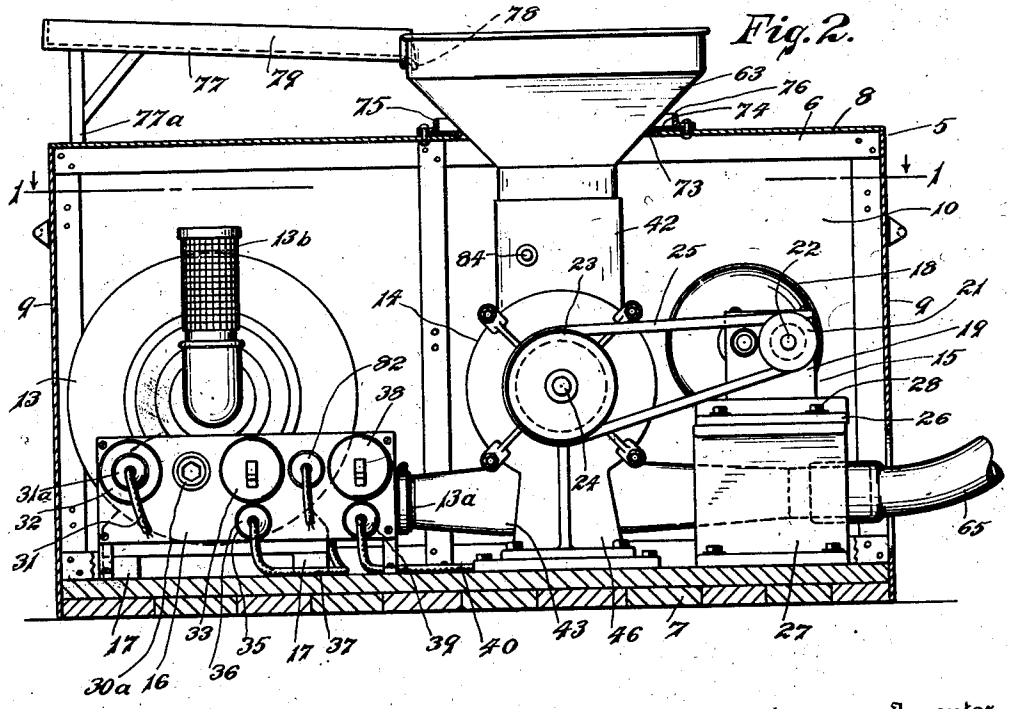


Fig. 2.



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Fig.3.

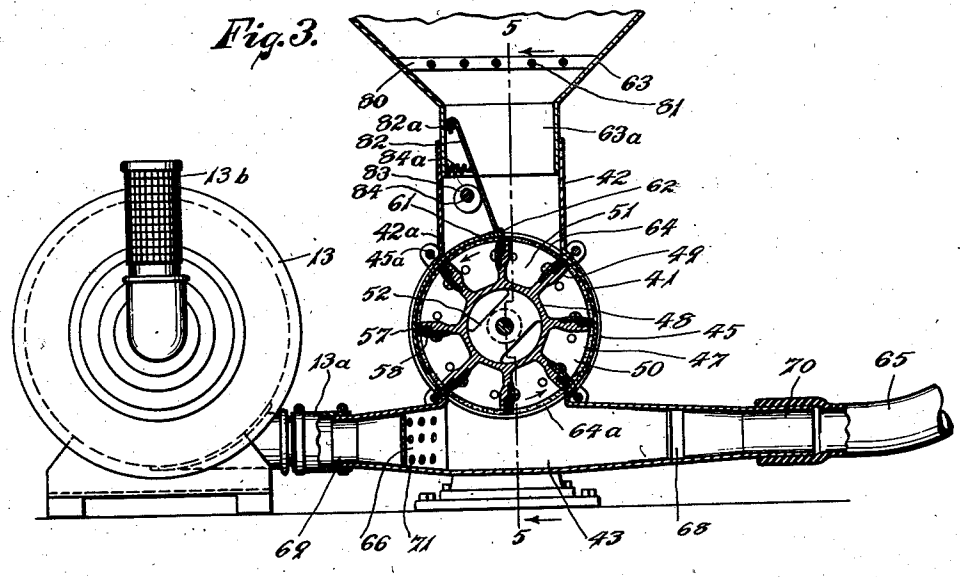


Fig.4.

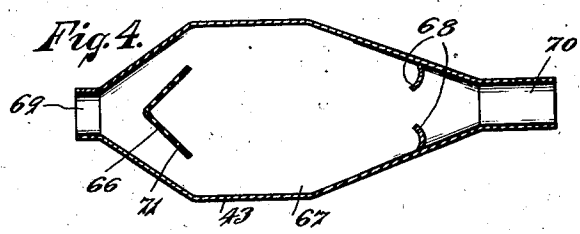


Fig.5.

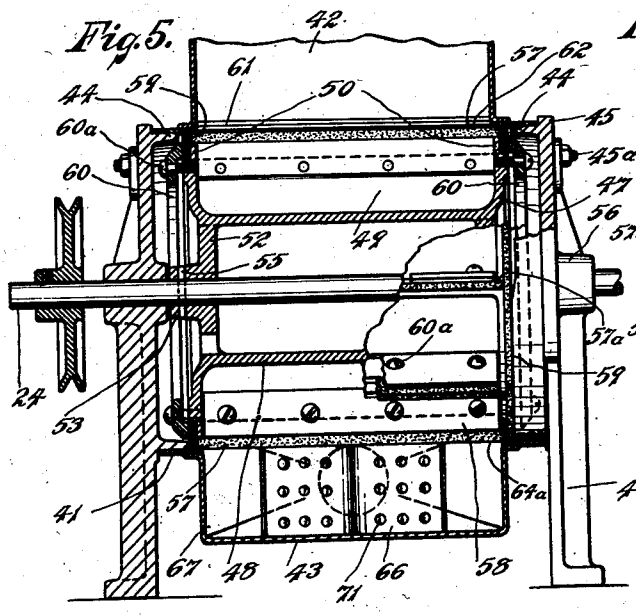
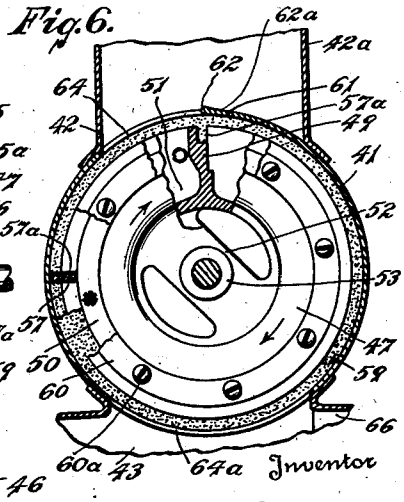


Fig.6.



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PNEUMATIC CONVEYER

Joseph A. Farley, West Hartford, Conn.

Application July 19, 1933, Serial No. 681,124

5 Claims. (Cl. 302—36)

My invention relates to pneumatic conveyers of the type commonly used in conveying materials, such as mineral wool or the like, for delivery at a point where the said material is deposited into the spaces within the walls of buildings for insulating purposes.

This material as manufactured is of a fluffy nature but, for the purpose of economy in the transportation of the same, it is compressed to a substantially compact form.

Before the material is delivered to the air spaces in the walls, it is desirable that the same be broken up to a maximum degree, so that it will be restored to its original fluffy form and thus render it possible to fill the air spaces in a more efficient manner and to provide a filling of uniform intensity.

The material is therefore broken up by hand before it is inserted into the conveyer, in order that it may flow into the feeder of the conveyer.

It has been found that in ordinary conveyers of this type, the material has a tendency to clog at the point where it enters into the feed wheel and also to choke in the conveyer at the point where it enters into the discharge hose. As an object of my invention I have, therefore, provided means whereby said clogging and choking of the material may be prevented.

Some of the several other objects of my invention are, to provide a conveyer of this type which is especially adapted for pneumatically conveying mineral wool or like material, to provide means in the said conveyer for thoroughly breaking up the material before it is discharged at the point of delivery and to provide a conveyer of this type which is compactly contained within a substantially dust-proof and portable trunk like case.

My invention is chiefly contained in the specific construction and arrangement of the various units and parts comprising the conveyer as illustrated in the accompanying drawings in which:

Figure 1 is a plan view of the complete conveyer with the case and hopper shown in section on line 1—1 of Figure 2.

Figure 2 is a side elevation of the same, showing the case in central vertical section.

Figure 3 is a side view showing the blower unit and feeder, the blower being shown in elevation and the feeder in central vertical section.

Figure 4 is a plan view showing the air and mixing chamber in central horizontal section.

Figure 5 is a front view of the feeder showing a major part of the same broken away, in central vertical section, on line 5—5 of Figure 3.

Figure 6 is a side view showing a portion of the feeder housing in central vertical section and the feed wheel therein in side elevation with parts thereof broken away to illustrate more clearly its construction.

As illustrated in the drawings, like numerals denote like parts in the various figures.

The numeral 5 denotes the case which contains my improved conveyer, and which is constructed of side frames 6 that are secured to a floor 7, a cover 8, and end plates 9—9. Handles 9a are provided whereby the complete conveyer may be carried.

This case is provided at each side, for access to the inside thereof, with doors 10—10 which are hinged at 11 near the ends of the case and overlap at the center thereof, so that they may be locked by common staples 12—12 provided on the side frames at each side of the case.

My improved conveyer consists primarily of a plurality of units, such as a blower 13, a feeder 14, a feeder driving mechanism 15 and a control board 16.

The blower 13 may be an air compressor of any suitable type. It is mounted on the floor 7 of the casing by means of resilient supports 17, in order that the vibration from the compressor unit may be reduced to a minimum, and connected to the feeder by means of a hose connection 13a. An air filter 13b is provided at the inlet of the blower.

The feeder driving mechanism comprises a motor 18 and a speed reducing device 19 which is connected to be driven by said motor by means of a flexible coupling 20. A pulley 21 is mounted on the driving shaft 22 of the speed reducing device and is connected to drive the feeder wheel by means of a pulley 23, which is mounted on the rotating feeder shaft 24, and a belt 25. The said motor 18 and speed reducing device 19 are mounted on a base frame 26 which is supported on upright posts 27 and slidably adjustable thereon by means of the screws 28 and slots 29 extending through the said frame in order that the same may be properly positioned to obtain the desired tension in the driving belt 25.

My improved conveyer is intended for operation from any ordinary electric supply socket, such as commonly found in dwellings where the electric circuits are commonly wired for a low amperage which is sufficient to operate the motors of both the blower and driving units of my conveyer.

It is advisable however, in order to avoid the blowing out of fuses in electric circuits, not to start the two motors simultaneously, as the combined starting load of the two motors can, under certain conditions, cause the blowing out of the fuses in the circuit.

In order to avoid this condition, I provide on the control board 16, a series of electric switches and plugs which are especially wired at 30 and fused at 30a for the proper control of the conveyer.

A power supply cable 31 is electrically connected to a receptacle 32 by a plug 31a, and a blower control electric switch 33 is connected to the motor 34 of the blower unit thru the plug receptacle 35, the plug 36 and the electric cable 37.

A feeder control electric switch 38 is connected to the feeder motor 18 thru the receptacle plug 39 and a cable 40.

I will now describe the construction of the feeder unit 14 which comprises essential features of my invention. This feeder comprises a drum 41, a hopper box 42 mounted at the top of said drum, and a mixing chamber 43 mounted at the bottom of the drum. The said drum is supported on the annular flanges 44 of the end plates 45—45, which end plates are supported by leg portions 46 formed integrally therewith, and secured to the ends of the drum by tie bolts 45a.

A feeder wheel 47 is rotatably mounted within said drum. The said feeder wheel comprises a cylindrical center portion 48 from which radiate walls 49 between end flanges 50 that are formed at each end of said feeder wheel to provide buckets 51. The said feeder wheel also comprises center bars 52 on which are formed hubs 53 thru which extends the rotating feeder shaft 24. This shaft is secured to the said wheel by means of pins 55, extending thru the said hubs and the shaft, and is rotatably mounted in the hubs 56 of the end plates 45—45.

In order to prevent the passage of air from the mixing chamber 43 past the feeder wheel, I provide packing strips of a suitable material 57 which are clamped, by means of clamping bars 58, to the outer edge of each of the walls 49 and packing rings 59 which are clamped, by means of clamping rings 60 and screws 60a, at the periphery of the side flanges 50—50, the packing strips 57 extending thru notches 57a in the edge of the side flanges 50 and abutting the sides of the packing rings 59. These packing strips and rings are in contact with the inner surface of the drum 41, thus providing an air tight seal between the mixing chamber 43 and the hopper box 42.

The flanges 44, which extend into the ends of the drum 41 from the end plates 45, are made slightly higher around the lower half of their periphery so that their edges will be in close proximity to the packing rings 59, while a clearance is provided between the upper half of the periphery of the flanges and the packing rings. The air, which is under pressure in the mixing chamber 43, will tend to force the packing rings outwardly in contact with the edges of the flanges 44 thus providing an extra air seal between the lower and the upper halves of the feeder.

I have found that in the use of conveyers of this type, the material has a tendency to clog at the point where it enters from the hopper box 42 into the buckets of the feeder wheel. With the feeder wheel rotating in the direction of the arrows shown in Figure 3 of the drawings, the outer edges of the bucket walls 49 would have a tendency to pack the material against the side wall 42a of the hopper box 42. In order to avoid this condition I have provided a separating plate 61, as clearly shown in Figures 3 and 6 of the drawings, which extends from the wall 42a for a distance across the bottom of the hopper box 42, on the upper part of the drum, and provides a material separating edge 62.

In the operation of the conveyer, the material dropping from the hopper 63, which is preferably made of a rectangular funnel shape, into the hopper box 42, will enter thru the feeder opening 64 into the buckets 51. The rotation of the feeder wheel will cause the material in the buckets to be separated from the material in the hopper box by the separating edge 62, thus eliminating the possibility of the said material clogging between the wall 42a of the hopper box and the edge of the hopper walls. In effect I have provided, substantially, a shearing edge for separating the material in the hopper box from that in the buckets.

As the feeder wheel rotates, the material in the buckets which was received thru the upper part of the drum 41, will drop out of the buckets thru the opening 64a into the mixing chamber 43 where the said material will be picked up by the current of air which flows thru the said mixing chamber and conveyed thru the nozzle 70 and the flexible hose 65 from the end of which it is delivered at the desired point. Although the material is loose when it drops out of the buckets 51 into the mixing chamber 43, it is still in a lumpy form, having been broken from its compressed form by hand only. In order to thoroughly break up this material so that it will be restored to its original fluffy form, I provide a breaker plate 66 within the mixing chamber 43 which is located in advance of the enlarged section 67 of the mixing chamber 43, at which point the material is received, and baffle plates 68 near the discharge end of the mixing chamber.

The air, which is forced thru the mixing chamber by the blower 13, enters thru the inlet 69 of the mixing chamber and is divided by the breaker plate 66 into two streams which are again united into a single stream of air in back of the said breaker plate thus forming swirling air currents, in the enlarged part 67 of the mixing chamber, that will pick up the material dropped by the buckets at that point and thoroughly break it up and mix it with the air which carries it past the baffle plates 68 where the air current is again interrupted, causing a further swirling action before the said air currents and material pass thru the nozzle 70 of the mixing chamber into the flexible hose 65.

It can be readily seen that the lumps of material will be so thoroughly broken up by the swirling action of the air in the mixing chamber that the said material is restored to its original fluffy form before it is discharged from the mixing chamber into the hose 65.

It is here pointed out that in devices of this kind the material has a tendency to accumulate in parts of the mixing chamber in such a manner that it becomes immovable by the air currents. By means of the breaker plate 66 and the baffle plates 68, in conjunction with the particular formation of the mixing chamber, the air currents are so affected that such accumulation of the material will be prevented.

Perforations 71 are provided in the breaker plate 66 in order that some of the air, which is interrupted by the said plate, will pass thru the said perforations and cause a further breaking up action of the air currents while also prevent-

ing accumulation of material in back of the breaker plate.

It will be noted that my improved conveyer is so arranged that it is completely contained within the case 5 thus rendering the conveyer readily portable, the entire device being lifted by the handles 9a on the case as previously pointed out.

As illustrated clearly in Figure 2 of the drawings, the hopper 63 extends thru an opening 73, in the cover 8 of the case 5, into the hopper box 42. Packing strips 74 of any suitable flexible material are secured to the cover 8 by means of clamping strips 75 so that the said packing strips will overlap the edges of the opening 73. When the conveyer is not in use, a cover is secured over said opening by means of engagement with the upwardly extending lips 76 of the clamping strips 75. When the machine is in operation, the cover is removed and the hopper is inserted thru the opening 73 into the hopper box 42. The hopper resting on the edges of the packing strips 74 will completely close the opening 73 thus preventing any material dropping thru the said opening and accumulating on the various parts of the conveyer.

In order to facilitate the handling of the material prior to being deposited into the hopper 63, I provide a table 77 which has a hooked lip 78 that is adapted to hook over the edge of the hopper 63. Said table is provided with supporting legs 77a which rest on top of the case 5.

The top of that side of the hopper at which the table is attached is lower than the top of the remaining sides, and the table is provided with walls 79 at one end and at the side thereof, but open at the end whereby it is connected to the hopper. The material which is to be conveyed is first deposited on the said table. It is then broken up by hand and pushed over directly into the hopper, thus avoiding the spilling of said material.

It has been found that said material, when fed into the hopper 63 at too fast a rate, has a tendency to pack in the hopper chute 63a and hopper box 42, and therefore, prevent the continuous flow of material therethru. To overcome this condition, I provide a material restricting grate 80 having bars 81 in the hopper 63 as clearly shown in Figure 3 of the drawings. This grate will retard, to a sufficient degree, the too rapid flow of material thru the hopper and prevent a sudden accumulation of the said material which might result in packing as above described.

To further insure against the packing of the material at the said point, I provide an agitating plate 82 which is pivotally mounted at 82a in the chute 63a of the hopper and which has its bottom edge in sliding contact with the top of the separating plate 61. The said agitating plate is actuated by means of an actuating eccentric 83 which is mounted on a rotating shaft 84 rotatably mounted in the side walls of the hopper box 42, a spring 84a serving to keep said plate in actuating engagement with said eccentric. A pulley 85 is secured to the said shaft and connected by means of a belt 86 to a pulley 87 on the shaft 24 of the feeder for rotation of the said shaft 84. It can be readily understood that the rotation of the eccentric 83 against the agitating plate 82 will impart an oscillating motion to said plate which will agitate the material in the chute 63a and hopper box 42 and thus prevent the packing of the same therein. The said agitating plate also serves to sweep the material off the top of the separating plate 61 after it has been separated thereby from the material in the buckets.

In the use of my improved conveyer, one operator directs the delivery of the material from the end of the hose 65 to the desired point while a second operator attends to the feeding of the material into the conveyer.

In order that the operator attending to the delivery of the material may be able to control the supply of said material at his end, which may be located at a considerable distance from the conveying apparatus, I provide a remote control switch 80' at the end of a control conduit 81, which is connected by means of a receptacle plug 82 in series with the electrical circuit operating the blower 13 thru the switch 33. When the operator at the delivery end wishes to stop the supply of material, he breaks the circuit thru said switch 80' thus stopping the blower 13. The operator at the feeder end, noting that the blower has stopped, will stop the feeder by the switch 38. When the operator at the delivery end again starts the blower by the remote control switch, the operator at the feeder end will again start the feeder and the operation of the conveyer will be resumed. If preferred, the electrical circuit may be so arranged that the operator at the feeder end can switch on or off both the blower and the feeder motors at the same time, but I have chosen to have the feeder operated by the operator at the feeder end in order to eliminate the starting of both motors at the same time and thus imposing an excessive load on the supply circuit.

It will be readily seen that, by the particular construction and arrangement of the various units and parts as above described, I have provided a conveyer which is readily carried from place to place so that it can be placed at the most convenient location either at the outside or inside of a building, the entire conveyer being of such a size that it can be carried thru any ordinary doorway.

I have also provided a conveyer which is protected from the spillage of the material being fed thereinto and, as a most important object of my invention, I have provided means for preventing the clogging and choking of the feeder together with efficient means for thoroughly breaking up the material before it is delivered to the desired point.

I have further provided efficient means whereby the material being blown thru the mixing chamber, by means of the air currents therein, is prevented from accumulating in any portion of said chamber.

I claim as my invention:

1. In a conveyer of the character described for conveying loose material, said conveyer comprising a hopper, a mixing chamber having an inlet and a discharge opening, an air source for supplying a current of air thru said mixing chamber, an opening from said hopper into said mixing chamber and means for supplying said material into said mixing chamber; a breaker plate in said mixing chamber for breaking and agitating the air current therethru, and baffle plates located before the discharge opening in said mixing chamber for further agitation of air currents.

2. In a conveyer of the character described comprising a hopper, a mixing chamber having an inlet and a discharge opening, an air source for supplying a current of air thru said mixing chamber, an opening from said hopper into said mixing chamber and means for supplying said

material into said mixing chamber; baffle plates located at each side of said mixing chamber and before the discharge opening thereof for agitating the said current of air.

3. In a conveyer of the character described for conveying loose material, said conveyer comprising a hopper, a mixing chamber having an inlet and a discharge opening, an air source for supplying a current of air thru said mixing chamber, an opening from said hopper into said mixing chamber, and means for supplying said material into said mixing chamber; a breaker plate located within said mixing chamber between the said inlet thereof and the opening from said hopper for effecting air currents therein, and means between said breaker plate and the opening from said mixing chamber for further affecting said air currents.

4. In a conveyer of the character described for conveying loose material, said conveyer comprising a hopper, a mixing chamber having an inlet and a discharge opening, an air source for supplying a current of air for moving said loose material thru said mixing chamber, an opening from said hopper into said mixing chamber, and means for supplying said material into said mixing chamber; a breaker plate in said mixing chamber for breaking and agitating the air currents while passing therethru, and means comprising perforations in said breaker plate for preventing accumulation of said loose material in said mixing chamber in a manner whereby the same would become immovable by said air currents.

5. A conveyer of the character described comprising a hopper, a mixing chamber having an inlet and a discharge opening, an opening from said hopper into said mixing chamber, a feeder for delivering material into said mixing chamber, an air source for conveying said material out of said mixing chamber, and means comprising a perforated breaker plate in the path of said air currents for preventing the accumulation of said material in said chamber.

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