March 19, 1940. J. E. WHITFIELD 2,193,849

APPARATUS FOR BLOWING INSULATING MATERIAL

Filed Feb. 1, 1938 6 Sheets-Sheet 1

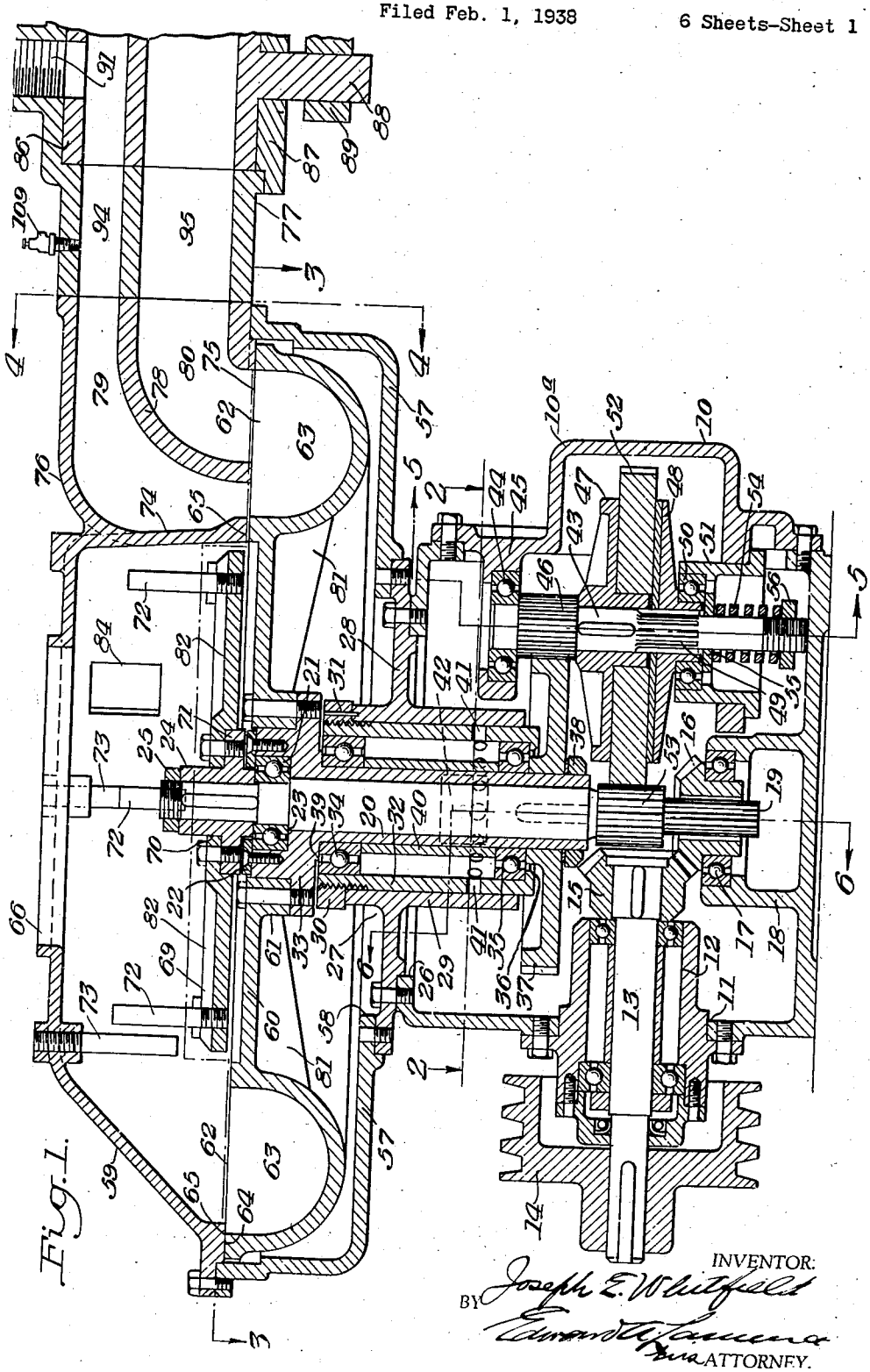

Fig. 1.

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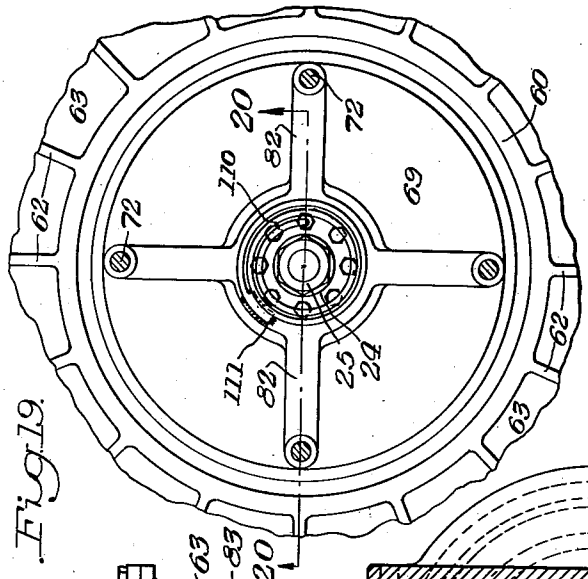

Fig. 1.

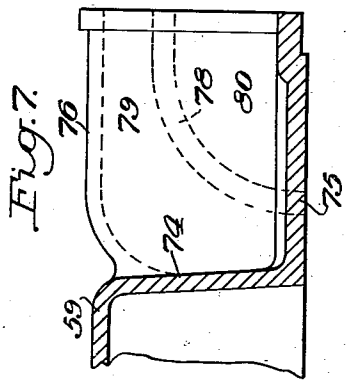

Fig. 7.

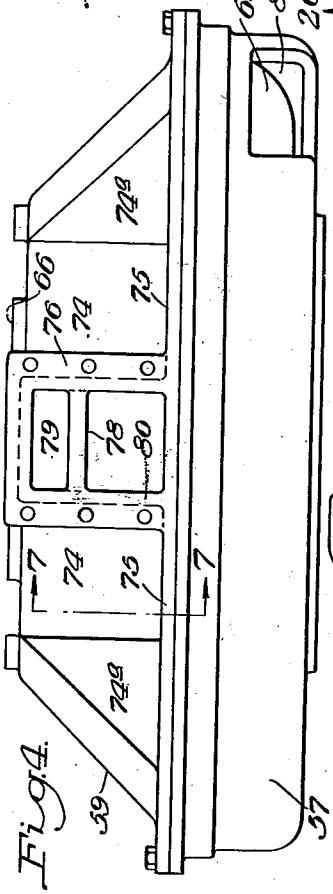

Fig. 4.

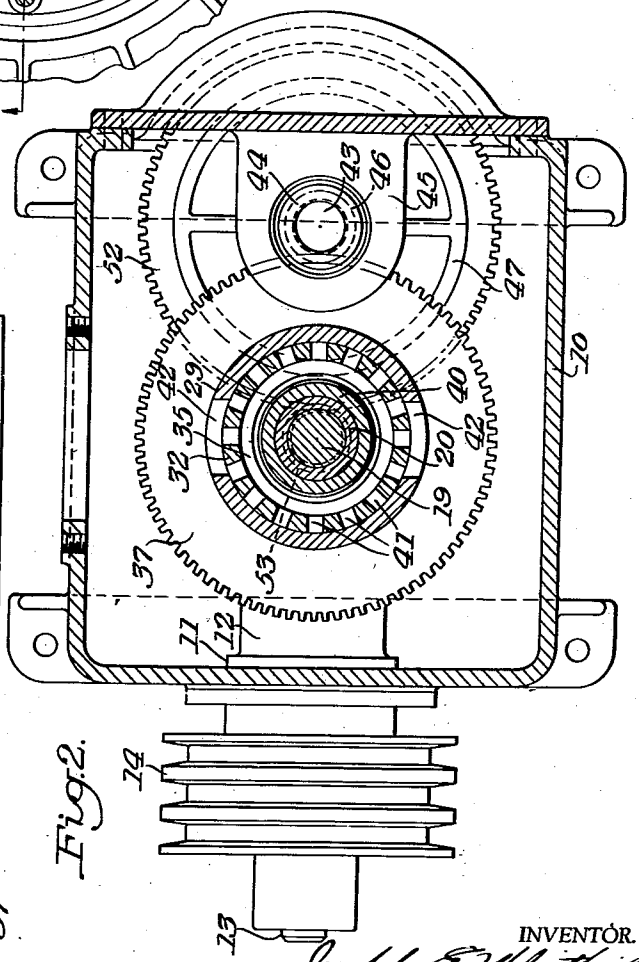

Fig. 2.

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APPARATUS FOR BLOWING INSULATING MATERIAL

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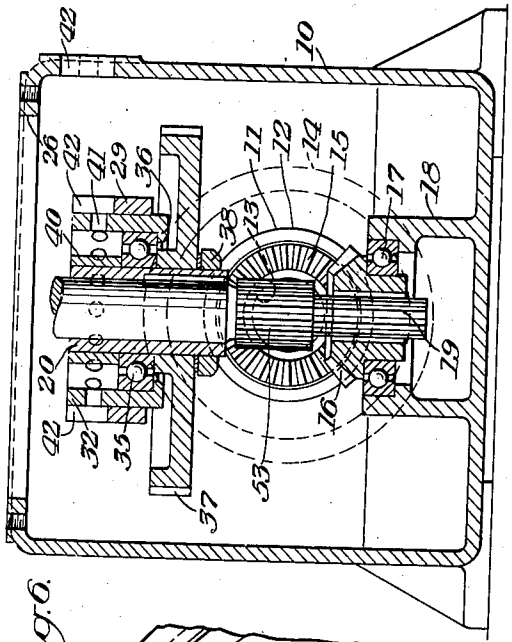

Fig. 6.

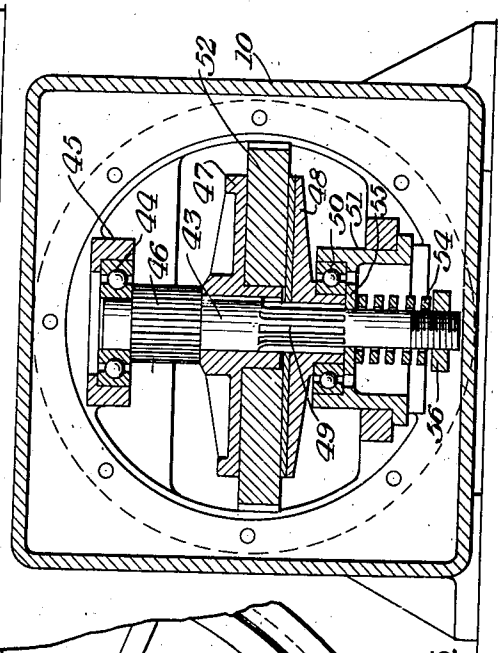

Fig. 5.

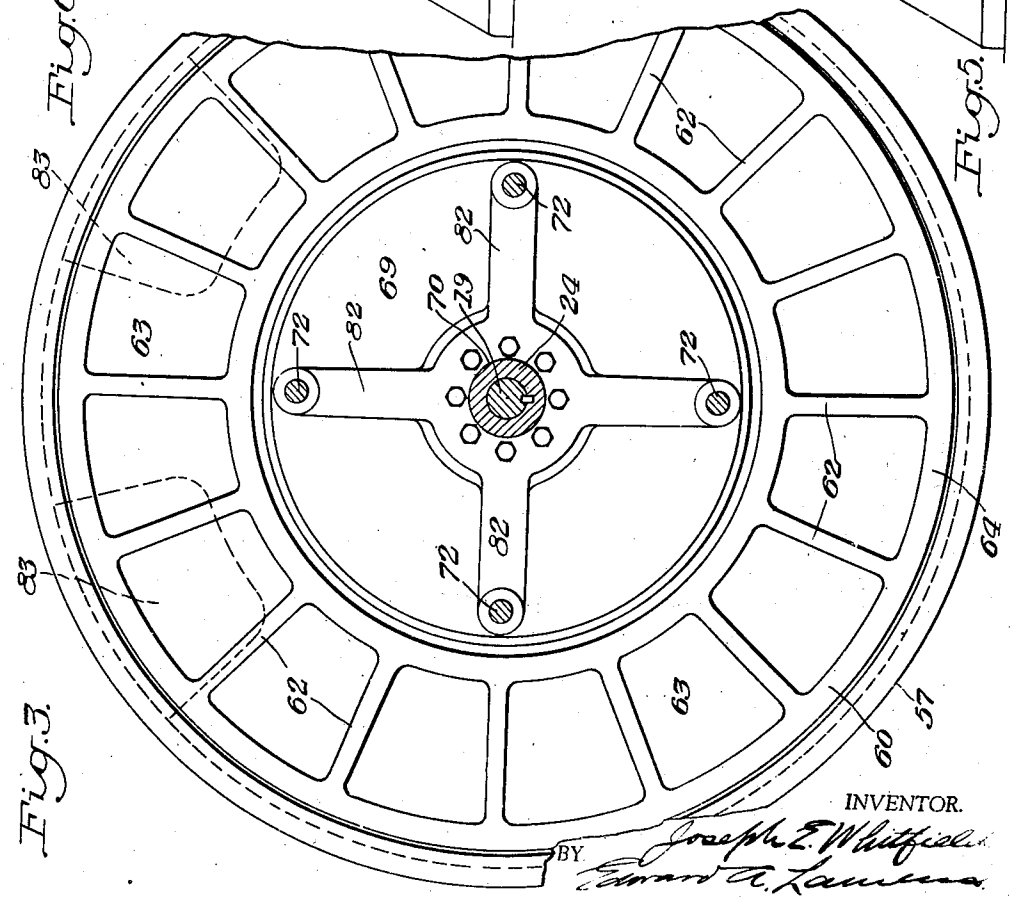

Fig. 3.

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APPARATUS FOR BLOWING INSULATING MATERIAL

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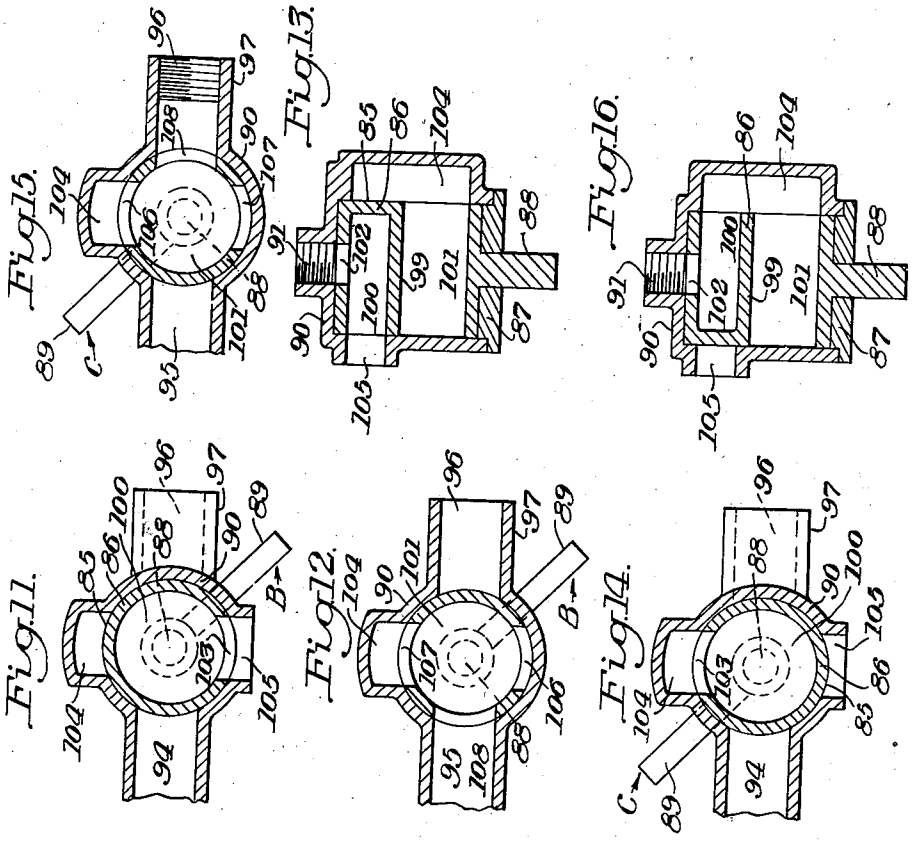

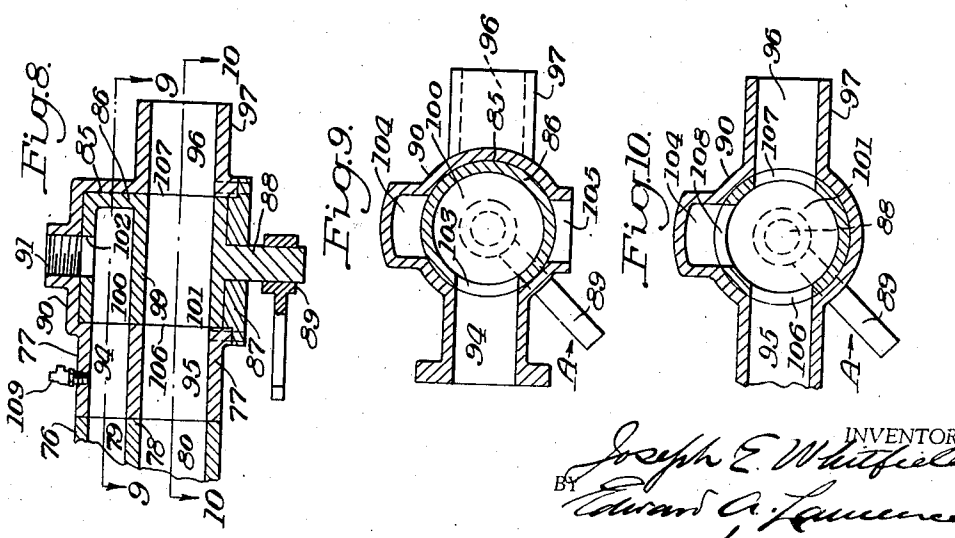

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APPARATUS FOR BLOWING INSULATING MATERIAL

Filed Feb. 1, 1938 6 Sheets-Sheet 5

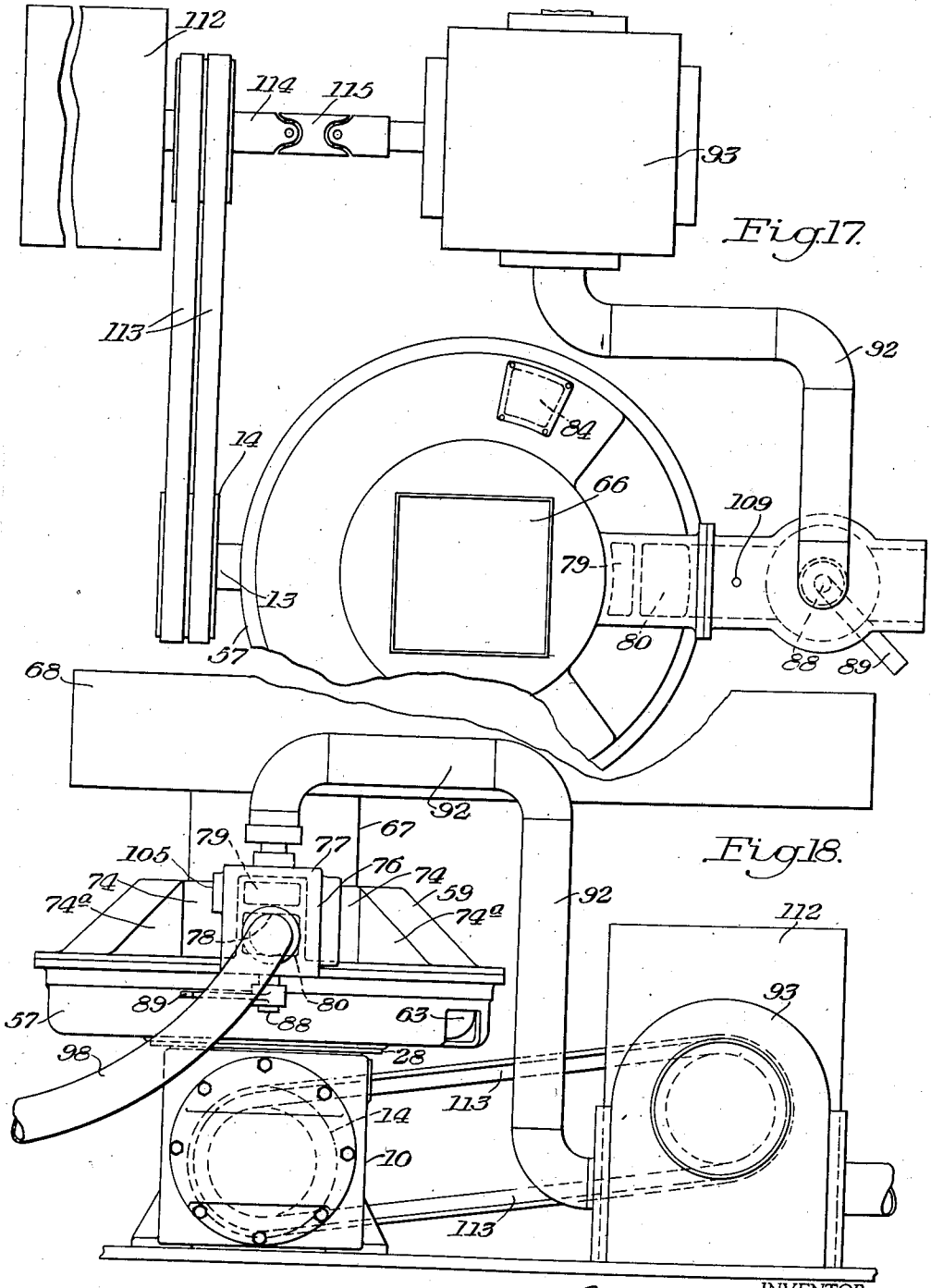

Fig. 17.

Fig. 18.

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APPARATUS FOR BLOWING INSULATING MATERIAL

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Fig. 21.

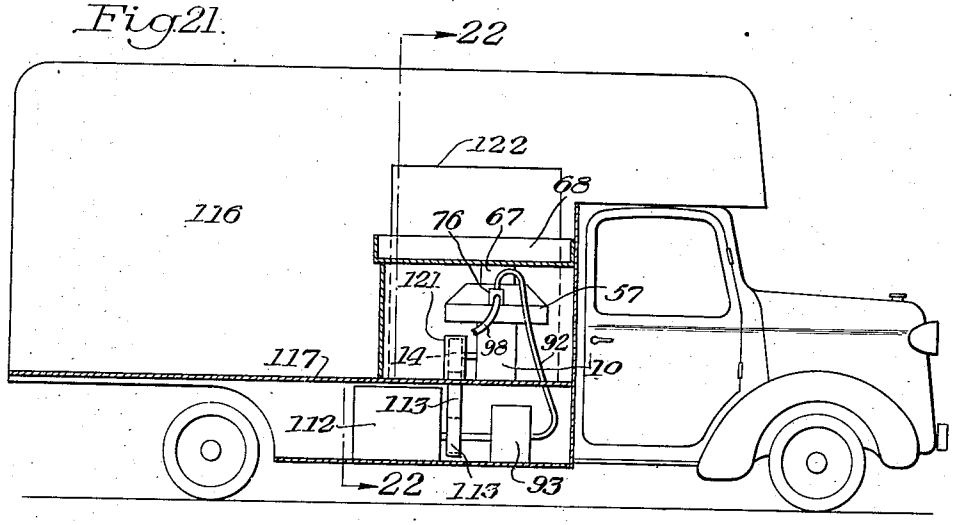


Fig. 22.

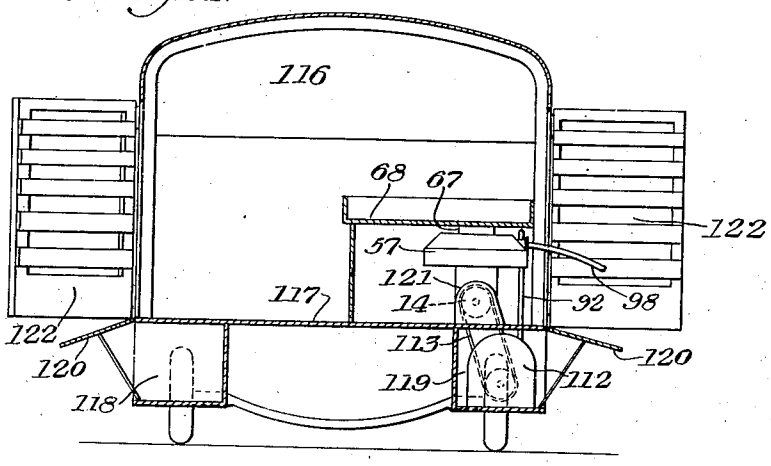
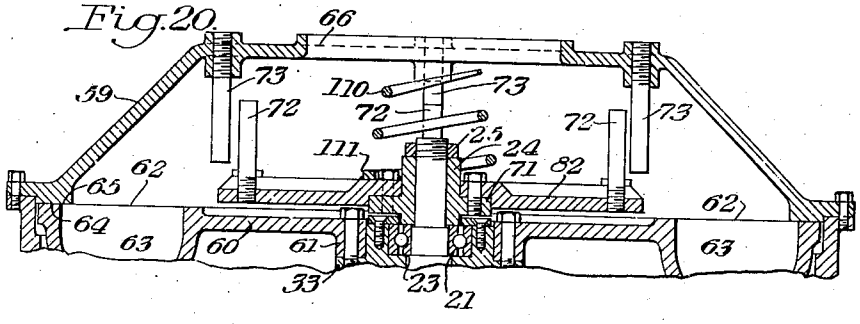


Fig. 20.



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Patented Mar. 19, 1940 2,193,849

UNITED STATES PATENT OFFICE

2,193,849

APPARATUS FOR BLOWING INSULATING MATERIAL

Joseph E. Whitfield, Grove City, Pa.

Application February 1, 1938, Serial No. 188,207

7 Claims. (Cl. 83—11)

My invention relates to apparatus for blowing fibrous material such, for instance, as rock wool, glass wool and other materials which are delivered or discharged by pneumatic pressure, for insulating and other purposes.

For example in insulating hollow spaces, as in the case of the walls of a building already built, it is customary to blow the material into such spaces by means of compressed air which is employed to propel the material through a conduit or hose.

Thus, one of the problems to be solved for satisfactory operation is the furnishing of a supply of compressed air and its proper mixture with the insulating material. This is difficult owing to the fact that the material is usually highly abrasive and comprises particles of large size and also more or less foreign matter. Thus segregation of the particles in accordance to sizes and character must be avoided to assure a substantially uniform distribution of the insulating material over the area to be insulated.

The material is usually of uneven density and frequently includes matted masses and lumps which, to obviate clogging of the hose and to insure a uniform result over a wide area, must be shredded apart and the mass rendered substantially uniform in density and also must be fed at a substantially uniform rate to the hose.

There is also a tendency for the hose to clog when the compressed air is cut off, as when the machine ceases operation.

Again the pressure under which the material is delivered to the space to be insulated or filled must be regulated, as a fluctuating pressure would result in irregular density of the deposited material; too low pressure would result in too little density, while too great pressure would result in too great density and also involves the danger of bulging the walls of the cavity, as for instance the partition walls of a building.

In apparatus embodying the principles of my invention, I provide means for thoroughly shredding the material before the compressed air, to propel the material through the hose, is applied to the material. Again I provide means for causing the shredded material to be delivered to feeder means wherein the material is divided into measured quantities which are individually exposed to the compressed air and driven thereby through the hose.

In the approved embodiment of my invention the shredding mechanism operates, preferably rotates, at relative high speed, and the portioning and feeding mechanism at relative low speed. To insure the proper and uniform delivery of the shredded material to the portioning and feeding mechanism, I provide means for supplying the material to the shredding mechanism under force or pressure.

As there is danger of the feeding mechanism becoming clogged and from this or other reasons resisting operation, I provide novel means whereby breakage or damage from such causes are avoided.

I provide means for automatically controlling the pressure under which the material is driven through the discharge hose, such means being adjustable so that any desired pressure may be obtained and maintained.

I further provide means whereby the discharge of the material from the machine to the discharge hose may be interrupted and compressed air admitted to the hose to blow the same empty and clean, thus avoiding clogging which frequently occurs in the use of the types of machines now commonly employed for these purposes.

For this purpose I provide a new and improved multiway control valve which controls and regulates the admission of compressed air to the machine, the discharge of the material through the hose, and the blowing of material from the hose when it is desired to clean the hose.

My invention also includes novel means for compensating for wear in the feeder mechanism.

Other novel features of construction and also of arrangement of parts will appear from the following description.

In the accompanying drawings, wherein I have illustrated the practical embodiment of my invention:

Fig. 1 is a vertical section through the machine, showing the high-speed shredder, the slow speed feeder and the control valve which regulates the admission of compressed air and the discharge of the insulating material.

Fig. 2 is a view in horizontal section taken along the lines 2—2 in Fig. 1.

Fig. 3 is a plan view with the cover removed, as seen at 3—3 in Fig. 1.

Fig. 4 is a side elevation looking to the left from the line 4—4 in Fig. 1, the control valve not being shown.

Fig. 5 is a view in vertical section taken along the line 5—5 in Fig. 1.

Fig. 6 is a like view taken along the line 6—6 in Fig. 1.

Fig. 7 is a sectional detail taken along the line 7—7 in Fig. 4.

Fig. 8 is a vertical longitudinal section of the control valve, the same being shown in its position for normal operation for discharging the insulating material.

Fig. 9 is a horizontal section taken along the line 9—9 in Fig. 8 showing the valve in like position, the valve lever being shown in its position A with compressed air admitted to the machine.

Fig. 10 is a like view, with the valve in the same position as in Figs. 8 and 9, but taken

along the line 10—10 in Fig. 8, showing the discharge of the insulating material from the machine to the delivery hose.

Fig. 11 is a sectional view of the valve taken along the line 9—9 in Fig. 8 but showing the lever turned to position B wherein the compressed air is cut off from the machine and permitted to escape to atmosphere.

Fig. 12 is a sectional view taken along the line 10—10 in Fig. 8 but showing the valve in the position B, as illustrated in Fig. 11, the air and material being prevented from reentering the machine from the discharge hose.

Fig. 13 is a vertical longitudinal section, taken at right angles to the plane of Fig. 8, showing the valve turned into the same position as illustrated in Figs. 11 and 12.

Figs. 14, 15 and 16 are views similar to Figs. 11, 12 and 13, respectively, but illustrating the valve turned into position C wherein the compressed air is cut off from the machine but admitted to the discharge hose to blow the same free from material.

Figs. 17 and 18 are, respectively, a plan view and an elevation showing a convenient assembly of the machine with the source of power and the blower.

Fig. 19 is a broken plan view, with the casing omitted, showing the feeding disk, the shredding disk and the force feeding spiral or helix.

Fig. 20 is a broken vertical section taken along the line 20—20 in Fig. 19 and showing the casing.

Fig. 21 is a view in longitudinal vertical section showing apparatus embodying my invention mounted in a truck.

Fig. 22 is a sectional view taken along the line 22—22 in Fig. 21.

Referring first to Figs. 1 to 7, inclusive, the base of the machine is formed by the lower casing 10 which is of box form and is provided with a circular opening 11 in one of its vertical walls in which is mounted the bearing assembly 12 in which is journaled the driving shaft 13 having a pulley 14 mounted on its outer end and a miter gear 15 mounted on its inner end. Power may be applied to the shaft 13 as by means of a belt connecting the pulley with a source of power, such as an internal combustion engine.

The gear 15 meshes with a second miter gear 16 disposed on a vertical axis and journaled in a bearing 17 supported on an annular support 18 rising from the floor of the casing 10. 19 represents a vertically disposed shaft upon which the gear 16 is splined so that the shaft will rotate with said gear but is capable of longitudinal movement relative thereto.

20 represents a cylindrical quill through which the shaft 19 extends and is free to rotate therein.

21 is an antifriction bearing, the outer member of which is held in the countersunk upper bore of the quill 20 by means of a ring 22 secured to the upper end of the quill, and the inner member of which is held on the shaft between the shoulder 23 and the lower end of the hub 24 which in turn is keyed on the shaft and held against longitudinal movement relative thereto by the nut 25 screwed onto the threaded upper end of the shaft.

The top of the casing 10 is provided with a circular aperture 26 concentric with the shaft 19 and the quill 20 and through which the shaft and quill extend upwardly. 27 is a top member having a horizontal skirt 28 by means of which said member may be detachably bolted or otherwise secured to the casing 10, and the member 27 is provided with a vertical cylindrical collar 29 concentric with the aperture 26 and extending above and below the same.

30 represents a ring nut mounted on top of the cylindrical collar 29 and secured against rotation thereon as by a pin 31. 32 represents a sleeve whose upper end is threaded to be screwed into the nut and which depends through and snugly fits within the cylindrical portion. It is evident that by rotating the sleeve in the proper direction it may be raised or lowered relative to the casing 10.

Above the bearing 34 the quill 20 is provided with a circumferential flange 33 which overhangs the sleeve and the nut.

The quill 20 is rotatably supported in the sleeve 32 by the upper bearing 34 and the lower bearing 35. The lower bearing 35 is supported from below by the inturned flange 36 at the lower end of the sleeve and the gear 37 which is splined to the quill and held in place by the nut 38 screwed on the exteriorly threaded lower end of the quill. The upper bearing 34 is held against an annular shoulder 39 formed on the under side of the flange 33 and is supported from below by the spacer sleeve 40 surrounding the quill and spanning the space between the bearings 34 and 35.

The sleeve 32 is provided with a circumferentially disposed series of holes 41 into which a suitable tool may be inserted to rotate the sleeve in the proper direction so as to raise or lower the sleeve within and relative to the collar 29, as may be desired. Registering apertures 42, indicated in dotted lines in Fig. 1, in the walls of the casing 10 and the collar 29 are provided for the insertion and manipulation of such a tool from without the machine.

43 represents a vertically disposed jack shaft within the casing 10 and having its upper end journaled in a bearing 44 mounted in the bracket 45. The upper portion of the jack shaft is provided with a series of longitudinally disposed teeth 46 forming a pinion which is in mesh with the gear 37, such teeth being elongated so that said gear may be raised or lowered on its axis without losing its meshed relation with the jack shaft.

Fixed on the shaft 43 below the teeth 46 is the clutch member 47 preferably made of fibre or similar material, and 48 is a similar clutch member slidably mounted on the jack shaft, as by splines 49, below the member 47 but rotating with the shaft.

The depending hub of the clutch member 48 is journaled in the bearing 50 mounted in the cylindrical carrier 51 carried by the inner wall of the casing 10.

52 represents a gear meshing with the circumferentially disposed series of teeth 53 cut on the shaft 19, which teeth are sufficiently long to permit the adjustment of the shaft 19 vertically without unmeshing the gear. The gear 52 is rotatably mounted on the depending hub of the upper clutch member 47.

The jack shaft 43 with the clutch member 47 fixed thereon is urged downwardly by means of a helical spring 54 coiled about the lower end of the shaft between a washer 55 bearing against the under side of the bearing 50 and an adjustment nut 56 screwed on the threaded lower extremity of the jack shaft.

Thus the loose gear 52 is frictionally held between the clutch members 47 and 48 and drives the jack shaft 43 and the quill 20 from the main

shaft 19 but at much reduced speed owing to the ratio between the series of teeth 53 and the gear 52.

For convenience of assemblage and for access to the parts, I prefer to provide the lower casing 10 with a side opening which is provided with the inclosure plate 10a from which the bracket 45 may extend inwardly.

57 represents the upper member which is of dished or pan-like shape having a central opening 58 in its floor and being secured to the skirt 28 of the top member 27.

59 represents the cover which is secured to the perimetral edge of the casing 57 as by bolts.

60 represents a feeder disk having a central depending hub 61 by means of which it is fixedly mounted on the annular flange 33 of the quill 20 so as to rotate with the quill. The feeder disk is contained in the upper casing 57 and is provided with a perimetral trough which depends within the casing 57 and is of substantially semi-circular cross sectional shape. At intervals the trough is divided by the radial partitions 62 forming an annularly disposed series of pockets 63. The perimetral edge of the disk 60 has a flat upper surface 64 which moves in close contact with a flat surface 65 formed on the under side of the cover 59.

It is evident that by the proper vertical adjustment of the sleeve 32 as heretofore described, the surfaces 64 and 65 may be maintained in light sliding contact and any undue wear may be compensated by the adjustment of the sleeve.

The cover 59 is in general domed upwardly as illustrated in Fig. 1 and is provided with a central opening 66 for the downward admission of the insulating material.

In practice the opening 66 is usually connected by the vertical throat or tube 67 with an aperture in a feed table 68, as illustrated in Fig. 18.

69 represents the substantially flat circular shredding disk above and in spaced relation with the feeder disk, and having a central opening 70 which fits down over the hub 24 and is bolted to the circumferential flange 71 of said hub.

The diameter of the shredding disk 69 is sufficiently less than that of the feeder disk in that the perimetral edge of the former is inside of the inner edges of the series of pockets 63. The disk 69 is provided with a plurality of vertically disposed shredding posts 72 arranged in series adjacent its perimetral edge and extending upwardly within the cover. The cover is provided with a similar series of depending fixed posts 73 which are arranged adjacent to but outside the posts 72.

It is evident that as the shredding disk rotates, the material introduced through the feed aperture in the cover will be shredded by the coactive effect of the moving and stationary posts, thus shredding the insulating material and reducing caked or lumped portions thereof.

Again the centrifugal effect of the rapidly revolving shredding disk will cause the material to be thrown outwardly to fill the pockets 63 of the feeder disk.

To insure the delivery of the material to the feeding disk, I provide means, such as a screw conveyor, for supplying the material to the shredding disk, as hereinafter described.

It is further evident that the shredding disk may be rotated at sufficiently high speed to effect the shredding and outward radial propulsion of the material, while the feeder disk is rotated at a much less speed so that ample opportunity will be afforded for filling the pockets with the shredded material.

At one side of the cover 59, the side from which the material is discharged, the cover is not upwardly domed but is formed with a vertical arcuate side wall 74 which clears the perimetral edge of the shredder disk 69 but is inside of the inner edges of the pockets 63 of the feeder disk. From the foot of the vertical wall 74 a flat horizontal wall 75 extends to the perimeter of the cover, thus preventing the introduction of insulating material into the pockets while they traverse this zone of their circular path. The vertical wall 74, the horizontal wall 75 and the domed wall of the cover are connected by the vertical reentrant walls 74a.

Intermediate of this reentrant zone of the cover is the radially projecting portion or box 76 the floor of which is open through the horizontal portion 75 of the cover so that in turn the pockets 63 are brought into registry therewith. The outer end of the box 76 is also open and is squared in a vertical plane for the attachment thereto of the casing 77 of the control valve.

78 represents a curved partition within the box 76 which divides the interior of the same into two passages 79 and 80. The angles in the walls of these passages are rounded to reduce resistance to the inward travel of compressed air through the passage 79 and the outward travel of insulating material through the passage 80. It will be noted that the compressed air is admitted downwardly at the rear or inner side of the pockets and the material is ejected upwardly at the front of the pockets, the curved walls of the pockets facilitating the operation.

To strengthen the feeder disk I prefer to provide its under surface with the strengthening ribs 81 and I also provide the upper surface of the shredder disk with radially disposed ribs 82 whose outer ends provide increased thickness of metal for the threaded holes in which the posts 72 may be screwed.

I also prefer to provide the casing 57 with one or more openings 83 in the floor thereof for the circulation of air for cooling purposes and also for the escape of any insulating material which may work down under the feeder disk (Fig. 4). I also prefer to provide the cover 59 with one or more holes 84 with a removable lid for observation (Fig. 17) and for removing any foreign material that may stop the feeder wheel.

The valve casing 77 is provided with a vertically disposed cylindrical seat 85 in which is rotatably mounted the valve 86 which is maintained in the seat by the removable bottom plate 87 through which the stem 88 of the valve protrudes for the application of means for turning the valve, such as the hand lever 89. The other end of the valve seat is closed by the wall 90 provided with an axial opening 91 threaded for the connection thereto of a pipe or hose 92 (Figs. 17 and 18) leading from an air compressor or blower 93 or other suitable supply of air under sufficient pressure.

The end of the casing adjacent the box 76 is provided with two vertically alined passages 94 and 95, respectively, the upper of which, 94, registers with the passage 79 of the box and the lower of which, 95, registers with the passages 80. The passages communicate with the seat 85. The lower passage 95 is aligned with a like passage 96 extending through the other end of the valve casing and through a tubular extension 97

arranged for connection with a discharge pipe or hose 98 (Fig. 18).

The valve 86 is of cylindrical form to fit the seat 85 and is hollow. 99 represents a partition dividing the valve horizontally into two chambers, the upper 100, and the lower 101, the partition 99 being aligned with the partition which separates the passages 94 and 95 of the valve casing. The top wall of the valve 86 is provided with an axial opening 102 always in registry with the port 91, thus maintaining a supply of air under pressure in the chamber 100. The circumferential wall of the chamber 100 is provided with a port 103 of the same capacity as that of the passage 94 and arranged to be brought into registry with said passage when the valve is turned into its position indicated in Figs. 8, 9 and 10. 104 is a vertical passage open within and formed in the wall of the valve seat 85 and arranged to connect the chamber 100 and 101, to admit compressed air to the chamber 101 when the valve is turned into its position indicated in Figs. 14, 15 and 16.

The circumferential wall of the valve seat is also provided with a port 105, preferably leading to atmosphere, and which is positioned one hundred and eighty degrees from the vertical passage 104 and ninety degrees from the passage 94. When the valve is turned to register its port 103 with the port 105, the compressed air is cut off from the passage 94 and the chamber 101 and escapes to atmosphere (see Figs. 11 and 13).

The circumferential wall of the chamber 101 is provided with three ports 106, 107 and 108 arranged ninety degrees apart, so that when the valve is turned into the position indicated in Figs. 8, 9 and 10 the ports 106 and 107 register, respectively, with the passages 95 and 96, while the port 108 registers with the vertical passage 104, which latter, however, is then closed at its upper end as shown in Fig. 9. The position of the lever 89 when the valve is in this position is indicated by the letter A in Figs. 9 and 10.

Again when the valve is turned into its position indicated in Figs. 11, 12 and 13, the port 103 is brought into registration with the exhaust port 105, thus permitting the compressed air to atmosphere, as shown in Figs. 11 and 13, while the passage 96 is closed as shown in Fig. 12. The position of the lever 89 when the valve is in this position is indicated by the letter B in Figs. 11 and 12.

Again, when the valve is turned into its position as indicated in Figs. 14, 15 and 16, the port 103 is in registry with the passage 104 (Figs. 14 and 16) as also is the port 106 (Fig. 15), while the port 108 is in registry with the passage 96 and the inner end of the passage 95 is closed (Fig. 15). Thus compressed air is blown directly into and through the discharge hose to drive out the material therein and prevent packing and clogging. The position of the valve lever 89 in this position of the valve is indicated by the letter C in Figs. 14 and 15.

109 represents an adjustable automatic pressure relief control valve of any suitable type, communicating with the air inlet passage 94 so that the pressure employed may be regulated to that desired and undesirable rises in pressure avoided.

The pressure regulator is placed after the control valve and before the feeding machine so that it comes into operation only when blowing material in the normal manner. When it is desired to employ high pressure to blow out the hose the regulator, as well as the feeding machine, is by-passed.

In the normal operation of the machine, the control valve is turned into position A. When the blowing material is to be stopped and the engine is allowed to run the valve is turned into position B and the compressed air by-passed to atmosphere. If the hose is obstructed or it is desired to clean out when a job is completed the valve is turned into position C and the compressed air is delivered directly to the hose to blow out the contents of the latter.

In the operation of the machine, with the control valve turned into position A, the material which may be shredded rock such as known as "Rock wool," glass fibre or other suitable insulating or other material in fibrous form is introduced through the opening 66 and is shredded by the revolution of the disk 69 and the coaction of the rotary posts 72 and the stationary posts 73. The rapid rotation of the disk, which may for instance be about one thousand R. P. M., throws the material outwardly and loads the pockets 63 which in turn are brought into registry with the box 76. The compressed air enters the inner side of the pocket through the passage 79 and drives the contents of the latter out through the passage 80 through the hose 98 to the desired destination. The relative slow speed of rotation of the feeder disk 60, say in such case about twenty-seven R. P. M., maintains each pocket in registration with the box 76 a sufficient period for efficiently emptying the pockets.

Should the feeder disk become clogged in any manner or its rotation be unduly resisted or impeded, the friction clutch 47—48—52 will slip and thus prevent breakage.

The feeder disk is maintained in a sufficiently sealed relation with the annular surface 65 of the cover and the horizontal wall 75, by the vertical adjustment of the sleeve 32, to prevent a material escape of compressed air or material from the pockets while they are in discharging relation with the box 76.

Where the material is caked or lumpy difficulty may be experienced in causing it to be fed through the aperture 66 and radially of the shredding disk to the feeder disk, and I therefore prefer to provide suitable means for facilitating such movement. Thus in Figs. 19 and 20 I have shown a screw or helix 110 mounted on the shredder disk 69 and extending upwardly, so as to convey the material downwardly to the shredder disk and by pressure causing it as it is shredded to move outwardly, radially of the shredder disk to fill the pockets of the feeder disk.

As shown the screw 110 extends upwardly in a tapered helix in the direction of the rotation of the shredder disk.

As a convenient means for mounting the screw 110 on the shredder disk, the former may be provided with a flat arcuate base 111 concentric with the axis of the shredder disk and held thereon by the bolts which secure the disk 69 to the hub 24.

In Figs. 17 and 18 I illustrate a suitable stationary assembly of the apparatus wherein the internal combustion engine 112 is connected to the pulley 14 by the belt 113 and with the blower 93 by the shaft 114 provided with universal joints 115.

In Figs. 21 and 22 I show a truck body 116 having a tight floor 117 and two compartments

118 and 119 under the floor, one on either side of the longitudinal center of the body 116. Each of the compartments 118 and 119 is provided with a doorway in its outer wall closed by a door 120. One compartment, 118, is used for storing a supply of tools or other supplies while in the other compartment, 119, is mounted the internal combustion engine 112 or other suitable source of power, and the compressed air blower 93 driven by the engine. The supply of insulating material is stored in the truck body. The compressed air pipe 92 extends up through a tight fitting hole in the floor 117 to connect to the control valve. The pulley of the engine 112 is connected by the belt 113 with the pulley 14 of the blowing machine which is mounted in the truck body on the floor 117. The pulley 14 is shrouded by a tight domed cover 121 which straddles the upper end of the belt and is attached to the floor 117. The table 68 need not be fixedly attached to the truck body but could be hinged, or otherwise detachably fastened, so as to be retracted to provide extra loading space.

For access to the blowing machine I provide the truck body with conveniently positioned doorways closable by doors 122.

Thus I have provided a compact and convenient portable apparatus and, by the separation of the blowing apparatus from the power and compressed air supply, have protected the latter from dust and dirt, and also provided more space in the interior of the truck body for hauling insulating material.

I claim:

1. In apparatus for the purposes described, the combination of a casing, a rotary shredder disk and a rotary feeder disk mounted in superimposed relation in the casing, a quill upon which the feeder disk is mounted, a shaft nested in the quill and upon which the shredder disk is mounted, power-means for rotating the shaft, speed reduction gear mechanism for imparting rotation of the quill from the shaft, and means whereby the quill is released from the gear mechanism when it abnormally resists rotation.

2. In apparatus for the purpose described, the combination of a casing, a rotary shredder disk and a rotary feeder disk mounted in superimposed relation in the casing, a quill upon which the feeder disk is mounted, a shaft nested in the quill and upon which the shredder disk is mounted, power-means for rotating the shaft, speed reduction gear mechanism for imparting rotation of the quill from the shaft, and means for shifting the disks axially to adjust their relation to the casing.

3. In apparatus for the purposes described, a unitary structure comprising the combination of a casing having an opening for the introduction of material, a rotary shredder mounted in the casing and arranged to receive the introduced material and to deliver the shredded material radially, a rotary support mounted in the casing in parallelism with the shredder, an annularly arranged series of pockets carried by the support and arranged to be exposed beyond the perimetral edge of the shredder to receive the shredded material, means connected to the casing for forcibly discharging the material from the casing, the pockets being in turn brought into registration with the delivery means by the rotation of the support, and means for rotating the shredder and the support.

4. In apparatus for the purposes described, a unitary structure comprising the combination of a casing having an opening for the introduction of material in its upper portion, a rotary shredder mounted in said casing adjacent the opening and on a vertical axis and arranged to receive the introduced material and to deliver the shredded material radially, a rotary support beneath the shredder and mounted on a vertical axis, an annularly arranged series of pockets carried by the support arranged to be exposed beyond the perimetral edge of the shredder to receive the shredded material, forcible discharge mechanism connected to the casing into registration with which the pockets are in turn brought by the rotation of the support, and means for rotating the shredder and the support.

5. In apparatus for the purposes described, a unitary structure comprising the combination of a casing having an opening for the introduction of material in its upper portion, a rotary shredder mounted in said casing adjacent the opening to rotate on a vertical axis and arranged to receive the introduced material and to deliver the shredded material radially, a rotary support beneath the shredder and mounted coaxially therewith, said support being of greater diameter than the shredder, an annular series of pockets carried by the support and arranged to receive the material delivered by the shredder, a forcible discharge mechanism connected to the casing and into registration with which the pockets in turn are brought by the rotation of the support, and means for rotating the shredder and the support.

6. In apparatus of the class described, the combination of a casing having an opening for the introduction of material, a horizontally disposed cage member rotatably supported within the casing and arranged to receive the introduced material, a stationary cage member surrounding the rotary cage member and coacting therewith to shred the material and through which the material is ejected by centrifugal force, a portioning member comprising an annular series of pockets outside the stationary cage member to receive the ejected material, means for rotating the rotary cage member and the series of pockets, and pneumatic discharge mechanism with which the pockets register in turn.

7. In apparatus of the class described, the combination of a casing forming a chamber having an opening for the introduction of material, an annular series of spaced projections depending from the casing within the chamber, a horizontally disposed disk rotatably supported within the chamber and arranged to receive the introduced material, an annular series of spaced upstanding projections on the disk inwardly adjacent the depending projections and overlapping the same and coacting therewith to shred the material, a rotary portioning member comprising an annular series of pockets located within the casing beyond the perimeter of the disk to receive the shredded material centrifugally discharged from the disk pneumatic discharge means with which the pockets register in turn, and means for rotating the disk and the pockets.

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