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(54) **Abrasive throwing machine.**

(57) An abrasive throwing machine comprises an enclosure 3 housing particle abrasive projecting means 23 and means for feeding abrasive particles to said projecting means. The projecting means 23 are arranged to project particles through an opening 21 in the enclosure against surfaces to be treated. Rebounding particles return with the enclosure and at least a portion of the rebounding particles are directed along the path 37 extending from the projecting means, adjacent the enclosure wall, to the feed means.

- 1 -

"ABRASIVE THROWING MACHINE"

This invention relates to shot blasting or abrasive throwing machines, more particularly to such machines for blasting a surface, especially a horizontal or inclined surface with an abrasive in order to clean the surface or
5 remove a layer of material from the surface.

Such abrasive throwing machines typically include an abrasive projector mounted within a housing and capable of being fed with abrasive particles, and projecting those abrasive particles through an opening in the housing to
10 impinge at an inclined angle upon the surface being treated. Most of the particles rebound at an inclined angle from this surface and as a result enter a separate housing, normally in the form of an elongate duct, which defines a return path for the spent abrasive particles
15 which travel along the duct to a position where they can be fed again to the particle projector.

One of the problems with such a conventional machine is that the inclination and length of the return duct is such that the machine as a whole extends a significant
20 distance horizontally beyond the opening towards which the abrasive particles are projected. Where, for instance, the surface being treated is a floor bounded by vertical walls it is only possible to treat the floor to within a certain distance of the bounding walls as
25 limited by the extent of projection of the machine horizontally beyond the aforementioned opening.

- 2 -

It has now been surprisingly discovered that it is possible to eliminate all or substantially all the return duct and instead guide the spent particles back to the particle feed means making use of the wall or walls of the enclosure within which the projector itself is housed. In this way it is possible to restrict the horizontal extension of the machine beyond the position of the opening, and thus enable a surface to be treated up to a position much closer to any bounding walls than has hitherto been realised.

According to the present invention there is provided an abrasive throwing machine comprising an enclosure housing particle abrasive projecting means and means for feeding abrasive particles to said projecting means, said projecting means being arranged to project particles through an opening in the enclosure against the surface to be treated whereby rebounding particles return within said enclosure, said projecting means and the wall of said enclosure being arranged so that at least a portion of said rebounding particles are directed along a path extending from said projecting means, adjacent said enclosure wall, to said feed means.

Preferably said particle projecting means are in the form of a single abrasive throwing wheel and more preferably said throwing wheel is mounted with its axis parallel to the plane of said opening.

Preferably said machine is arranged to travel in a direction at right angles to the axis of the throwing wheel, and it is also preferred that the throwing wheel extends across substantially the full width of the enclosure. More preferably the throwing wheel is in the form of a central hub having extending radially therefrom a number of paddles, for instance four such circumferentially spaced apart paddles. Such a throwing wheel is known as a batter wheel.

Preferably the batter wheel is mounted directly over

- 3 -

the opening and the rotary motion of the batter wheel not only acts to project particles through the opening but also assists in projecting spent particles in a direction towards said feed means, said particles being
5 guided in said direction by the forward end wall of said enclosure.

In conventional abrasive throwing machines the quantity of abrasive particles being fed to the throwing wheel is controlled by means of a butterfly valve.
10 However, when the throwing wheel extends essentially across the full width of the machine, it is difficult to control the feed of the abrasive particles uniformly across the width of the throwing wheel and without uniform feed the extent of treatment of the surface would
15 be non-uniform.

In an aspect of this invention, an abrasive throwing machine includes means for feeding abrasive particles to a throwing wheel comprising valve means in which the valve member is in the form of a quadrant mounted so as to be
20 pivotal from a first position with its curved sealing surface sealing a feed hole for the particulate material through a range of positions in which the feed hole is opened to a progressively larger extent. By use of the quadrant and an accurately engineered member defining the
25 feed hole, the latter extending across substantially the full width of the machine, it is possible to feed particulate material uniformly across the full width of material to the throwing wheel.

In another aspect of the present invention, an
30 abrasive throwing machine is provided with mobility means in the form of a caterpillar track arrangement down each side of the machine. Previously abrasive throwing machines have been provided with a single pair of large wheels normally located at the front of the machine and
35 a smaller pair of wheels or castors at the rear of the machine. With such a conventional arrangement it is

- 4 -

necessary that the bottom of the housing of the machine be positioned perhaps about 1½ or 2 inches above the floor. Unless such a clearance is provided, the housing will tend to ground over any significant unevenness of the floor. By providing a machine with caterpillar track arrangements extending down a significant portion of each side of the machine, it is not necessary to provide such a large clearance and consequently it is easier to seal the bottom sides of the machine against loss of abrasive particles. Furthermore, the provision of caterpillar track arrangements enables the extent to which the machine as a whole projects sideways from the housing to the very outermost edge of the wheel assembly, to be decreased substantially. As a result it is possible to operate a machine of the invention much closer to a vertical sidewall to the surface being cleaned than was hitherto possible.

Preferably a sealing side plate is provided, which side plate is mounted on the axles of at least some of the wheels forming part of the caterpillar track arrangement.

An embodiment of the present invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:-

Figure 1 is a longitudinal vertical section through an abrasive throwing machine in accordance with the present invention;

Figure 2 is a rear end view of the abrasive throwing machine of Figure 1; and

Figure 3 shows in detail a section through the caterpillar track arrangement (with the track itself removed) of the abrasive throwing machine of Figure 1.

Referring to the drawings, an abrasive throwing machine 1 includes housing 3 carrying various items of equipment (to be mentioned hereinafter) and being mounted on caterpillar track arrangements 5 for powered

- 5 -

movement in a forward or rearward direction (to the left or right respectively in Figure 1).

5 Housing 3 includes front and rear walls 7 and 9, side walls 11 and 13, top 15 and a part base formed by inclined extensions 17 and 19 of front and rear walls 7 and 9 respectively. Inclined walls 17 and 19 together with side walls 11 and 13 define an opening 21 which extends substantially the full width of the machine and which, in use, overlies an area of floor which is being
10 treated by the machine.

 Within enclosure 3 there is mounted a batter wheel 23 which includes a hollow drum 25 arranged about an axle 27. Extending radially outwardly from drum 23 are four circumferentially spaced apart paddles 29. Each
15 paddle 29 extends substantially the full width of the housing 3 and may comprise a radially inner ^ulug on which is mounted an outer blade, the latter being, in use, subject to wear and being replaceable.

 As best seen in Figure 1 the batter wheel 23 is
20 located with its axle 27 vertically above opening 21 and offset rearwardly from the centre of opening 21. The batter wheel 23 is arranged to be driven by motor 31 located rearwardly of the housing by means of a drive belt 33. In operation, the batter wheel blades sweep
25 out a cylindrical space extending from a position rearwardly close to rear wall 9 and inclined wall 19 of housing 3 forwardly to a position just rearward of the forward limit of space 21 and about a paddle width rearward of front wall 7. Above the batter wheel 23
30 there is mounted within housing 3 a partition 35 which extends from a position close to rear wall 9 forwardly and upwardly above batter wheel 23 and, at its most forward end, it extends vertically upwardly for a short distance to define a passageway 33.

35 Between partition 35 and rear wall 9 there is

- 6 -

arranged a feed hole 39 extending substantially the full width of the machine. Forwardly and rearwardly feed hole 39 is defined by accurately machined valve seating members 41 and 43 and arranged above feed hole 39 is a
5 valve member 45 in the form of a quadrant capable of pivotal movement from the position shown in Figure 1 where the feed hole is closed to a position where the feed hole 39 is completely disclosed or to any position therebetween. The position of valve member 45 is
10 controlled by the operator of the machine and in an open position abrasive particles which have collected in the hopper-like space between partition 35 and rear wall 9 are allowed to drop through feed hole 39 and come into contact with the paddles 29 of batter wheel 23. The rapid
15 rotation of batter wheel 23 causes the abrasive particles to be thrown by the paddles 29 along an initial path defined by the batter wheel 23 and inclined wall 19 towards opening 21. It will be appreciated that, consequently, the abrasive particles are projected
20 through space 21 so as to impinge upon an area of floor located below space 21 at an inclined angle thereto. Most of the abrasive particles rebound from the floor, again at an inclined angle, in a direction towards front wall 7. Together with these rebounding abrasive
25 particles will be other particles of various sizes removed from the floor as a result of the abrasive action. The action of the batter wheel, together with the air flow within the housing (to be described hereinbelow), results in the stream of particles being
30 carried or projected upwardly within the space between front wall 7 and batter wheel 23 through passage 37 into that area of the housing located above partition 35. Within this area there are mounted various further partitions, each extending essentially the full width
35 of the machine. Vertical partition 47 is provided with small holes so as to allow air passage therethrough

- 7 -

and has mounted thereon small partitions 49 which extend at an inclined angle downwardly and forwardly. These partitions 49 have associated with them a series of further partitions 51 which are arranged so as to extend at an inclined angle upwardly and forwardly from a rearmost position each underlying one of the partitions 49. The result is a simple cascade arrangement of partitions which assists in the orderly return and grading of the particles in a downward direction within this area of the housing above partition 35.

Located below vertical wall 47 and the lowermost partition 51 is a further partition in the form of screen 53. This screen extends from a rearmost position at rear wall 9 upwardly and forwardly to a foremost position close to the top of the vertical section of partition 35 so that below screen 53 there is the previously mentioned hopper-like arrangement whereby material passing through screen 53 accumulates naturally above feed hole 39. The screen is such that material passing through it will be mainly fine abrasive particles. The larger particles which have been carried upwardly from the floor being treated will on the whole not pass through the screen but rather slide down the screen and pass out of the housing 3 into outlet duct 55. As can best be seen in Figure 2 the base of outlet duct 55 is inclined so that these particles will tend to slide towards the side of the machine into a suitable receptacle.

There will of course be a gradual loss of abrasive particles during the use of the machine and further abrasive particles may be supplied by a hopper mounted on the outside of the rear wall 9 (indicated by dotted lines 57) into the housing above screen 53.

A fan 59 driven by motor 61 is mounted at the rear of the machine and causes air to be sucked through holes located in the upper part of rear wall 9. As a result air is drawn in to the housing below inclined wall 19

- 8 -

at the base of the housing and follows a path within the housing upwardly through passage 37 over the various partitions located above screen 53 towards the fan 59. As mentioned above, it is the combination of the air flow and the action of batter wheel 23 which carries rebounding abrasive particles and other particles removed from the floor upwardly to the various screens located above the batter wheel.

The machine also carries a hydraulic pump 63 driven by a drive belt 65 extending between pulleys 67 and 69 and which in turn delivers hydraulic power to hydraulic motors 71 and 73 mounted at positions near the base of the machine and appropriate to convey drive to the drive wheels of caterpillar track arrangements 5. A hydraulic fluid tank 75 is mounted at the front of the machine and a housing 77 containing the various electrical controls is mounted directly above housing 3.

Because of the provision of the caterpillar track arrangements 5 the machine as a whole contacts the floor to a much greater extent than would be the case where a forward pair of large wheels and a pair of rear wheels or castors is provided. Consequently the side walls 11 and 13 of the housing may extend to a position very close to the floor (perhaps to leave a gap of only a quarter of an inch or so between the bottom of the side walls and the floor). In order to prevent the sideways outflow of abrasive material from the machine, side seals are provided but these may be of a very simple form having regard to the very small gap to be sealed. The detailed arrangement is best seen in Figure 3 where side wall 11 is provided with a lower plate 81 extending close to the floor. A pulley 83 of one of the caterpillar track arrangements 5 is mounted on stub axle 85 fixed to plate 81. Also mounted on axle 85 is side seal plate 87. This plate extends the full length of the housing and is

- 9 -

provided with a series of oblong holes (with their major axes vertical), each stub axle 85 passing through one of these holes. Plate 87 is loosely mounted, the oblong holes allowing the plate to ride up and down on the stub axles of the caterpillar pulleys in order to accommodate the unevenness of the ground and yet provide good sealing between the interior of the housing and the outside.

The caterpillar track and sealing arrangement located on each side of the machine are such that together they extend only a short distance from the sides of the machine and thereby allow the machine to be used much closer to a bounding vertical wall than conventional machines. This can perhaps best be seen in Figure 2 where the right hand edge of the machine is located only a short distance outwardly of the side wall 11 of the housing.

The forward extent of the machine, as measured from the forward edge of space 21 is located much closer to space 21 than would be the case where a separate return duct is provided for spent particles. Even with the hydraulic tank mounted on the front of forward wall 7 of the housing, a floor can be treated to a position much closer to a bounding vertical wall than was possible hitherto.

CLAIMS

1. An abrasive throwing machine which comprises an enclosure housing particle abrasive projecting means and means for feeding the abrasive particles to said projecting means, said projecting means being arranged to
5 project particles through an opening in the enclosure against the surface to be treated whereby rebounding particles return within said enclosure, said projecting means and the walls of said enclosure being arranged so that at least a portion of said rebounding particles are
10 directed along the path extending from said projecting means, adjacent said enclosure wall to said feed means.
2. A machine as claimed in claim 1 in which said particle projecting means are in the form of a single abrasive throwing wheel.
- 15 3. A machine as claimed in claim 2 in which the throwing wheel is mounted with its axis parallel to the plane of said opening.
4. A machine as claimed in claim 2 or 3 which is arranged to travel in a direction at right angles to the
20 axis of the throwing wheel.

5. A machine as claimed in any one of claims 2 to 4 in which the throwing wheel extends across substantially the full width of the enclosure.

6. A machine as claimed in any one of claims 2 to 5 in
5 which the throwing wheel is in the form of a central hub having extending radially therefrom a number of paddles circumferentially spaced apart.

7. A machine as claimed in any one of claims 2 to 6 in which the throwing wheel is mounted directly over the
10 opening and the rotary motion of the wheel assists in projecting spread particles in a direction towards said feed means, said particles being guided in said direction by the forward end wall of said enclosure.

8. An abrasive throwing machine which includes means
15 for feeding abrasive particles to a throwing wheel comprising valve means in which the valve member is in the form of a quadrant mounted so as to be pivotal from a first position with its curved sealing surface sealing a feed hole for the particulate material through a range of
20 positions in which the feed hole is opened to a progressively larger extent.

9. An abrasive throwing machine as claimed in any preceding claim further including mobility means in the form of a caterpillar track arrangement down each side of the machine.
- 5 10. A machine as claimed in claim 9 in which a sealing side plate is provided which side plate is mounted on the axles of at least some of the wheels forming part of the caterpillar track arrangement.

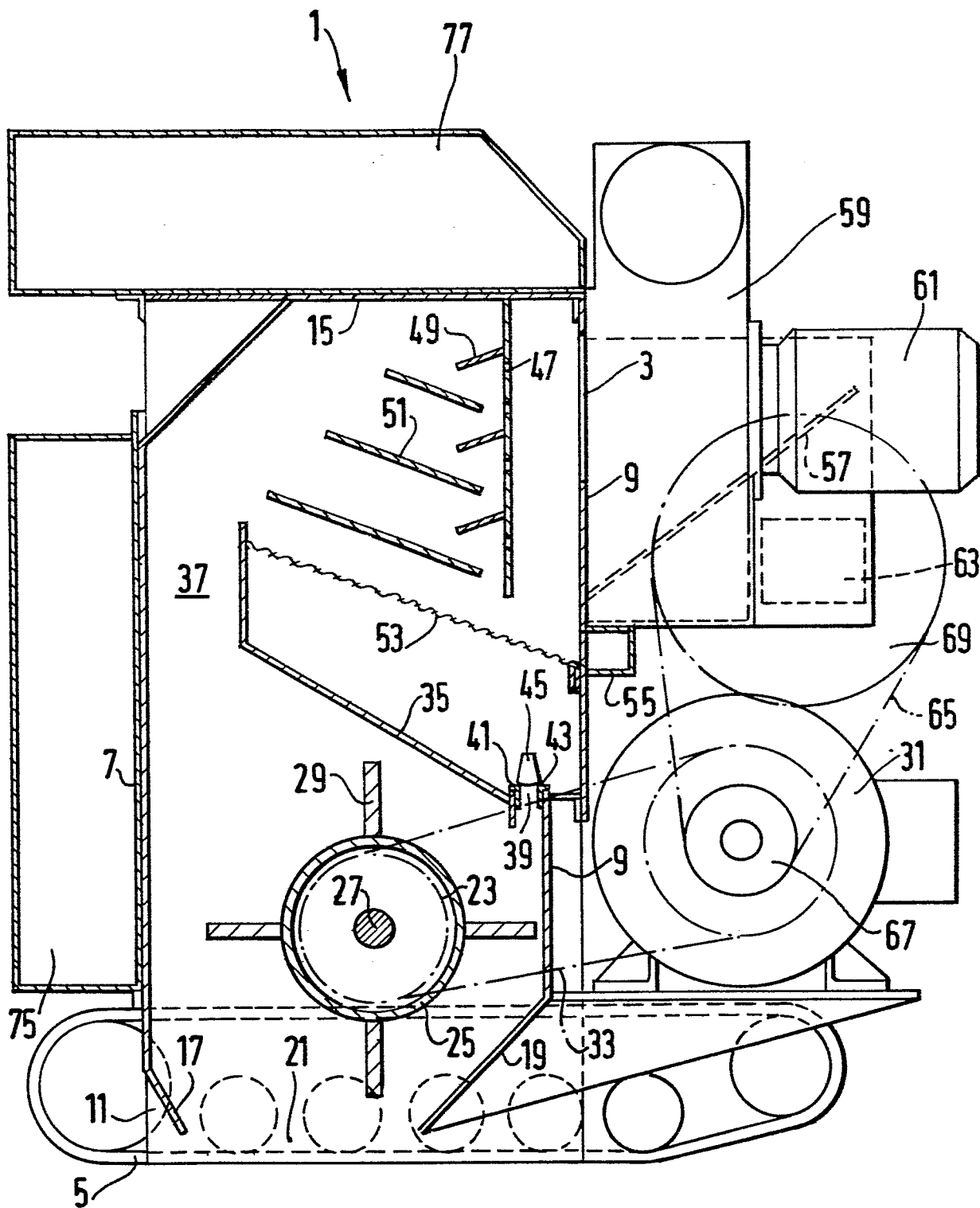


FIG. 1.

2/3

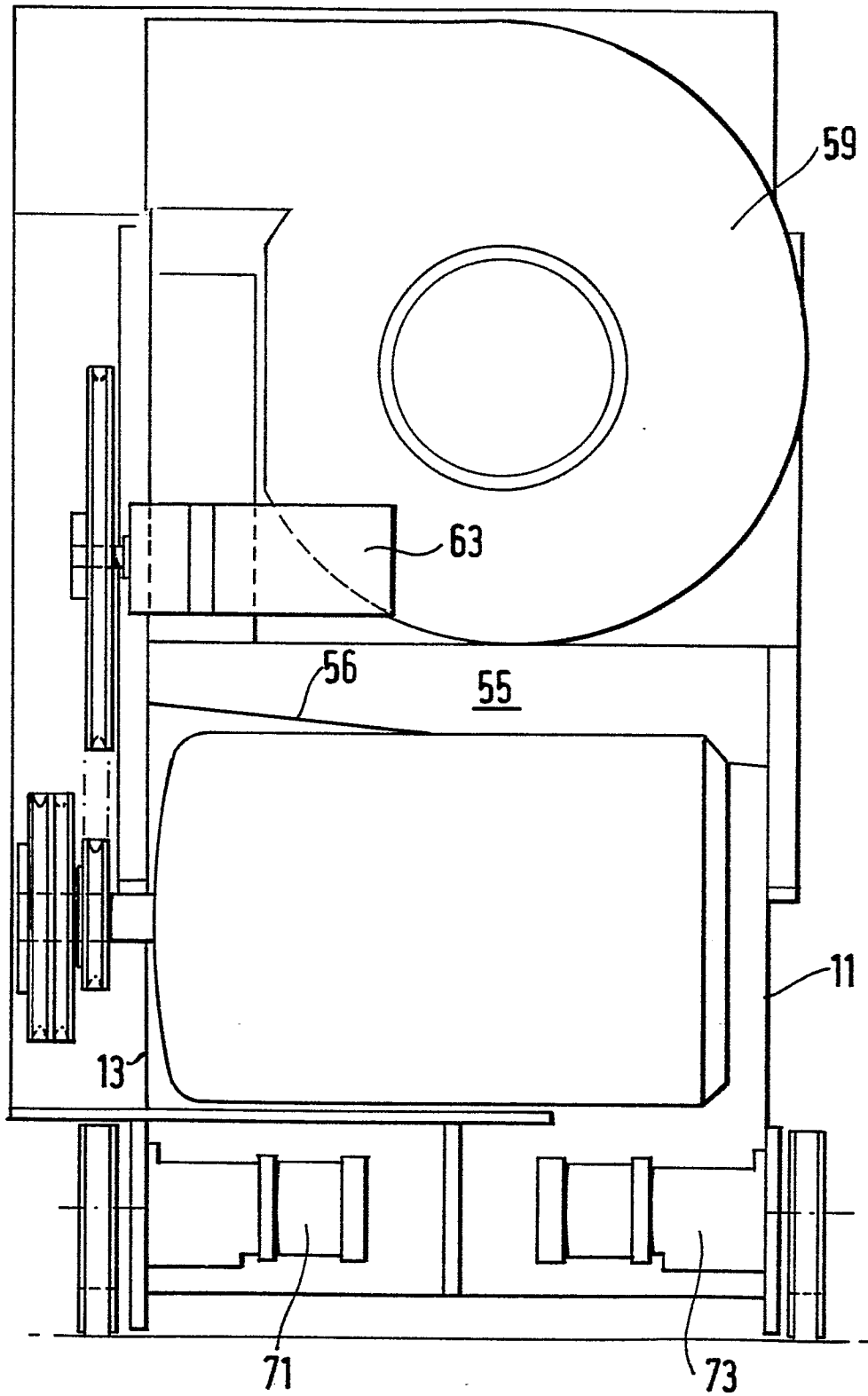


FIG. 2.

3/3

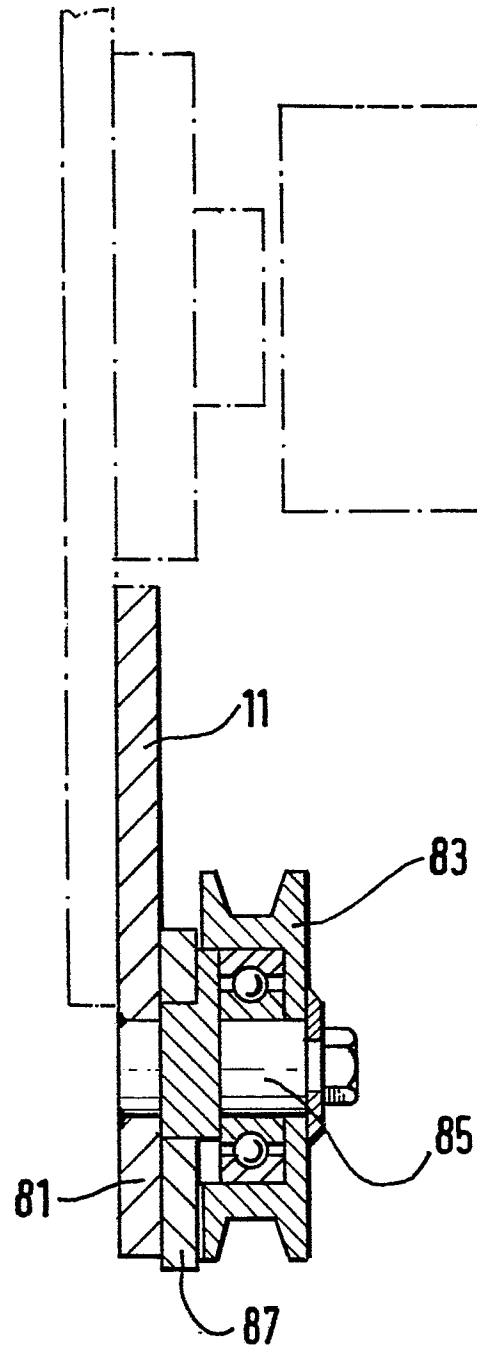


FIG. 3.