Jan. 22, 1935. A. ANDREAS 1,988,676 TURBINE FOR FILLING BAGS WITH FINELY DIVIDED MATERIALS Filed Oct. 1, 1931 2 Sheets-Sheet 2

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This invention relates to machines for filling packages with finely divided material such as cement, and particularly to the construction of the turbine used to feed the material into the packages.

In order to impel the material at sufficient velocity to fill the packages within commercially practical time limits the turbine propeller must be rotated at high speed, thus tending to force dust from the material through joints in the propeller housing and especially through the necessary clearance between the propeller shaft and the housing. Even when stuffing boxes are provided on the housing the dust escapes, and after operation for some time of machines which have an outlet valve on the housing, so that the propeller periodically churns the material against the closed valve, real streams of material can be seen pouring out of the stuffing boxes. Some of this dust inevitably gets into the shaft bearings in known constructions, obviously with very objectionable results. In known constructions the cement also tends to clog the propeller, to prevent its proper operation, and to cause it to do a great deal of useless work. The principal object of the present invention hence resides in the provision of simple and effective means for avoiding these disadvantages, such means including a propeller construction which is easy to build and efficient in operation.

For a description of a preferred embodiment of my invention reference will now be had to the accompanying drawings wherein: Fig. 1 is a vertical section of a construction in accordance with my invention, looking from the side, on the line 1—1 of Fig. 2. Fig. 2 is a section, on reduced scale, taken on the line 2—2 of Fig. 1. Fig. 3 is a vertical section, looking toward the front, on the line 3—3 of Fig. 1, but on an enlarged scale.

There is shown at 1 a hopper in communication with a turbine for feeding finely divided material through spout 3 into a container such as valve bag 4. Hopper 1 is secured to frame 5 by means of bolts 6 which also secure the upper end of baffle 7 to the hopper and frame. Baffle 7 extends outwardly from the side wall of the hopper and has portion 8 carried between its lower end and the side wall of the hopper, this portion being formed with a downwardly facing depression 9. Baffle 7 extends along the major portion of the perimeter of the hopper and meets baffle 10 having a similarly formed extension 11 and an upward extension 10° for preventing material from splashing out of the hopper. These baffles may be secured to the hopper at desired points in any suitable manner. The hopper and propeller casing are preferably formed with flanges 12 and 13, respectively, aligned by wedge-shaped studs 12a and surrounded by elastic band 14 and a coiled spring 15, as described in co-pending application Serial No. 557,866. This type of joint has been found particularly effective in preventing the escape of finely powdered material from between the hopper and propeller housing.

The turbine consists generally of a propeller housing 2 and a propeller which will be more fully described hereafter. Bolted to the propeller housing at 16 is an arm 17 carrying a rotatably supported bag clamp 18 for clamping bag 4 on the nozzle, and a handle 19 connected to arm 20 for positively actuating the bag clamp to release the bag. The propeller housing is bolted to I-beam 21 by bolts 22, and the spout 3 is secured to this propeller housing by means of its flange 23 and bolts 24.

For mounting the propeller shaft 25 there are provided extensions 26 on the propeller casing bolted thereto as at 27, these extensions having suitably attached thereto bearing housings 28 for bearings 30, the housings being located outboard of the propeller housing or in other words, spaced therefrom. Between the propeller housing and the bearing housings and preferably spaced from both are collars 31 made of leather or other suitable material and secured to the shaft in any known manner. These collars deflect dust which may escape from the propeller housing. Stuffing 32 is provided in the bearing housings further to prevent ingress of dust. The propeller housing is formed with extensions 33 surrounding and spaced from the shaft to provide space for packing 34 maintained in place by annular members 35 and screws 36. Cover plates 37 serve to enclose the space between the propeller housing and bearing housings, these plates being secured in place by screws 38.

The propeller housing according to my invention is preferably formed with spaced parallel internal walls 40 of extended area, advantageously to the full extent of the area in which the propeller operates, said walls having suitable openings therein for the propeller shaft. The propeller is best constructed with a hub 41 having sides of extended area parallel to and closely adjacent to side wall 40 of the propeller housing. This hub 41 is a solid block, formed on the shaft or shrunk or otherwise secured thereon so that dust is prevented from getting in between the hub and the shaft. This hub is shown as having 55
curved faces 43 joined by flat surfaces 43, the hub having no reentrant sides in which dust can collect. Blades 44, extending generally radially, are secured to the flat surfaces by means of extensions 45 integral with and formed at an angle to the blades proper. Preferably, the blades are of uniform width, substantially that of the hub and have their outer ends 44a bent slightly rearwardly with respect to the direction of rotation of the propeller. It is advantageous to secure the blades to the hub by means of two or more headed bolts 46, each bolt having a threaded portion 46a for cooperation with threads in the hub and a smooth or non-threaded portion 46b, between the head and the threaded portion, adapted to fit slidingly the opening in the extension on the blade. The blades are desirably constructed so that their edges are close to the walls of the propeller housing and are parallel thereof to, and so that their length is substantially equal to the height of the effective outlet opening 47, at the inside of the housing, and near the bottom thereof.

If desired, the housings formed between the bearings and propeller housing may be filled with grease through plugs 28a, in which case the collars 31 are omitted.

It will be understood that by reason of the very nature of my construction it is not easy for appreciable amounts of dust to work their way to the shaft at the point where it passes through the housing. The large solid hub, particularly in combination with the present blade construction, serves to prevent unnecessary churning of the powdered material, especially adjacent the shaft. Such churning serves no useful purpose and only tends to consume power and subject the machine to wear and tear. The present construction confines the cement or the like to the area in which useful work is done upon it.

What I claim is:

1. In a bag filling machine having a hopper, a spout and a propeller for feeding pulverulent material from said hopper through said spout, a propeller shaft, a propeller casing having spaced walls of extended area in parallel planes including openings therein for the shaft, said propeller being carried on the shaft between the walls and including a hub having plane sides of extended area parallel to the walls and closely adjacent thereto, and a blade secured to the hub, said blade having a flat surface formed thereon and the blade having a portion at an angle to the blade proper, and means to secure said portion to said surface at a plurality of points.

2. In a bag filling machine having a hopper, a spout and a propeller for feeding pulverulent material from said hopper through said spout, a propeller casing having spaced walls of extended area in parallel planes including openings therein for the shaft, said propeller being carried on the shaft between the walls and including a hub having plane sides of extended area parallel to the walls and closely adjacent thereto, and a blade secured to the hub, said hub having a flat surface formed thereon and the blade having a portion at an angle to the blade proper, and means to secure said portion to said surface at a plurality of points.

3. In a bag filling machine having a hopper, a spout and a propeller for feeding pulverulent material from said hopper through said spout, a propeller shaft, a propeller casing having spaced walls of extended area in parallel planes including openings therein for the shaft, said propeller being carried on the shaft between the walls and including a hub without reentrant surfaces having plane sides of extended area parallel to the walls and closely adjacent thereto, and a blade of uniform width, substantially that of the hub, secured thereto.

4. In a bag filling machine having a hopper, a spout and a propeller for feeding pulverulent material from said hopper through said spout, a propeller shaft, a propeller casing having spaced walls of extended area in parallel planes including openings therein for the shaft, said propeller being carried on the shaft between the walls and including a hub having plane sides of extended area parallel to the walls and closely adjacent thereto, and a blade having a portion at an angle to the blade proper, said blade proper extending substantially the width of said hub, and means for securing said blade portion to said flat surface of the hub.

5. In a bag filling machine having a hopper and spout; a propeller; a propeller shaft; a propeller casing having spaced walls of extended area in parallel planes including openings therein for said shaft, said propeller being carried on said shaft between said spaced walls and including a relatively large hub having an impeller blade mounted thereon, the sides of said hub extending through their area extending parallel to and closely adjacent the casing walls and providing a relatively large minimum distance from the surface of said hub to the openings in the casing walls whereby the amount of material tending to escape through said openings is minimized.

6. In a bag filling machine having a hopper and spout; a propeller; a propeller shaft; a propeller casing having spaced walls of extended area in parallel planes including openings therein for said shaft, said propeller being carried on said shaft between said spaced walls and including a relatively large hub having an impeller blade mounted thereon, the sides of said hub extending through their area extending parallel to and closely adjacent the casing walls and providing a relatively large minimum distance from the surface of said hub to the openings in the casing walls whereby the amount of material tending to escape through said openings is minimized.

7. In a bag filling machine having a hopper, a spout, a propeller for feeding material from said hopper through said spout, and a propeller housing connecting said hopper and said propeller, said propeller being carried on a shaft extending through the walls of said housing; means to prevent the escape of dust from said openings in said housing comprising a solid hub without reentrant surfaces whereby a substantially large minimum distance from the surface of said hub to the surface of said shaft is provided the blades of the propeller being affixed to said hub, said hub having plane sides of extended area parallel to the walls of said housing and closely adjacent thereto, shaft supporting bearings spaced from the walls of said housing, deflection collars on said shaft between the walls of the housing and the bearings, and means to enclose the space between the housing and the bearings.

8. In a bag filling machine having a hopper, a spout, a propeller for feeding material from said hopper through said spout, and a propeller housing connecting said hopper and said propeller, said propeller being carried on a shaft extending through the walls of said housing; means to prevent the escape of dust from said openings in said housing comprising a solid hub without reentrant surfaces whereby a substantially large minimum distance from the surface of said hub to the surface of said shaft is provided the blades of the propeller being affixed to said hub, said hub having plane sides of extended area parallel to the walls of said housing.
housing and closely adjacent thereto, shaft supporting bearings spaced from the walls of said housing, and deflecting collars on said shaft between the walls of the housing and the bearings.

8. In a bag filling machine having a hopper, a spout and a propeller for feeding pulverulent material from said hopper through said spout, a propeller shaft, a propeller casing having spaced walls of extended area in parallel planes including openings therein for the shaft, said propeller being carried on the shaft between the walls and including a hub having plane sides of extended area parallel to the walls and closely adjacent thereto, said hub having curved peripheral portions with non-radial flattened portions therebetween, and blades mounted on said hub, each of said blades having a portion at an angle to the blade proper and engaging a corresponding one of said flattened portions, and means for securing said blade portions to said flattened portions.

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