Dec. 15, 1959 W. ARNOLD 2,917,208

FEEDING DEVICES FOR FINELY-DIVIDED MATERIALS

Filed Feb. 28, 1958

FIG. 1

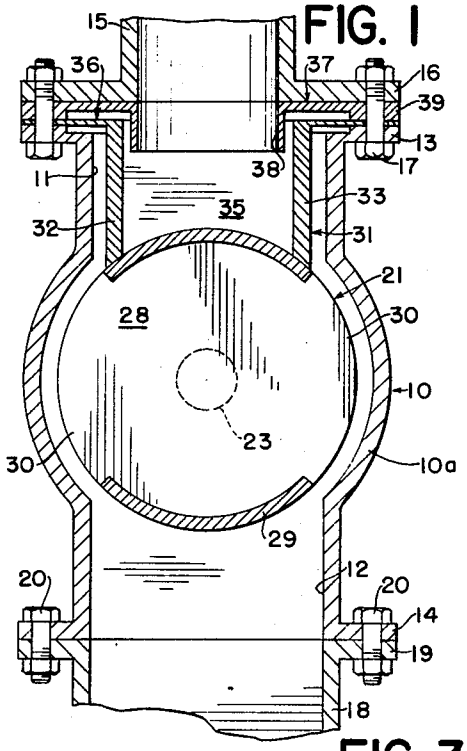


FIG. 2

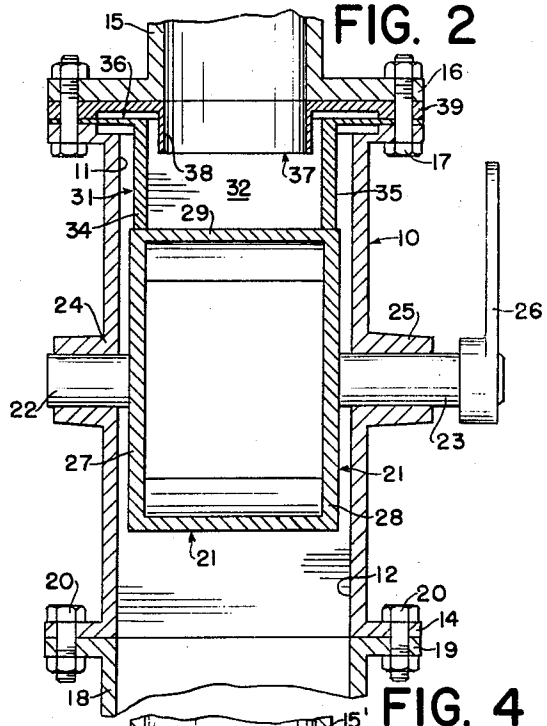


FIG. 3

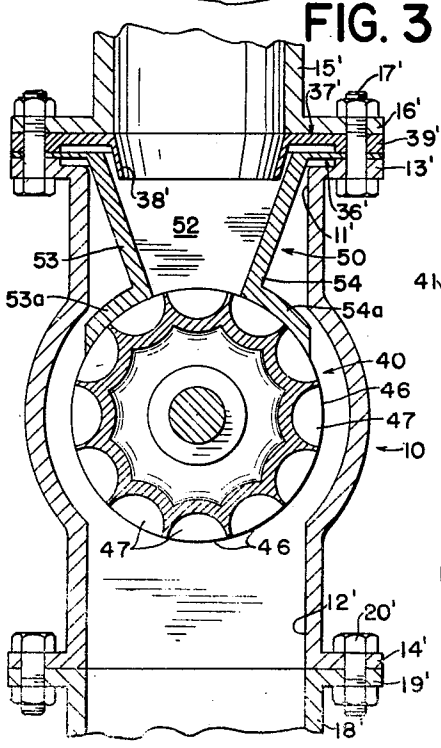
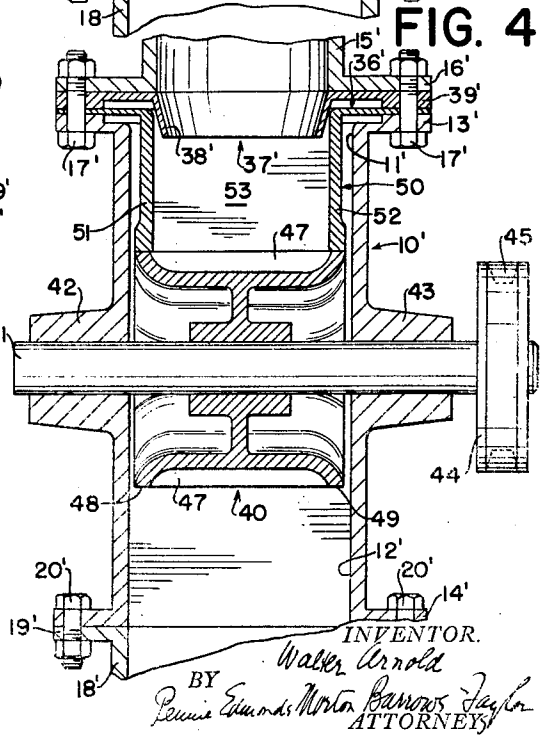


FIG. 4



INVENTOR.
Walter Arnold
BY
Pennie Edmonds Morton Barrows Taylor
ATTORNEYS

United States Patent Office 2,917,208 Patented Dec. 15, 1959

2,917,208

FEEDING DEVICES FOR FINELY-DIVIDED MATERIALS

Walter Arnold, Hamburg-Altona, Germany, assignor to Fuller Company, Catasauqua, Pa., a corporation of Pennsylvania

Application February 28, 1958, Serial No. 718,172

Claims priority, application Germany March 15, 1957

7 Claims. (Cl. 222—368)

This invention relates to devices for feeding finely-divided material and is concerned more particularly with a novel feeding device, in which the movable valve or feeding member is effectively sealed against the passage of the material around it and the sealing means are subject to little wear and thus have a long life.

Feeding devices, such as rotary valves and bucket wheel and roll feeders, are commonly used for feeding pulverulent and fine-grained materials to silos, conveyors, packing machines, etc. In such devices, passage of the material around the movable valve or feeder member is usually prevented by mounting the member at a close spacing from stationary parts, such as parts of the casing of the device. The finer and more fluid the material being handled, the closer must be the spacing between the member and the stationary parts in order to provide the desired seal, and the sealing problem becomes more difficult, when the materials are pulverulent and have been aerated to such an extent that they are highly fluent. The close spacing between the fixed and moving parts, which is necessary for good sealing, is difficult to maintain and the entrance of coarse grains of material into the space may cause the movable part to become jammed.

When the materials being handled are highly abrasive, the wear on the fixed and moving parts of the feeding device is severe, so that the sealing space is quickly enlarged and the effectiveness of the seal is correspondingly reduced. In order to retard such wear, the casings of the devices have been provided at the appropriate places with replaceable inserts of wear-resistant material but the installation and replacement of such inserts are usually laborious and expensive.

The present invention is directed to the provision of a device for feeding pulverulent or fine-grained material, which includes a valve or feeding member mounted for rotational movement within a casing and means yieldingly engaging the member to seal it. The sealing means include a tubular element, by which the material is conducted to the valve member, and the tubular element is supported with one end in contact with the member by resilient means secured to the casing. The device also includes means shielding the resilient means so that the material being fed cannot interfere with the action of the resilient means. With the construction described, the tubular element may be formed to fit the valve member tightly to make a good seal but, since the element is yieldingly supported, jamming of the device is prevented. Also, wear on the element is reduced, since it can yield to applied stresses because of its resilient mounting.

For a better understanding of the invention, reference may be made to the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view through one form of the new feeding device;

Fig. 2 is a longitudinal sectional view at right angles to Fig. 1;

Fig. 3 is a longitudinal view of a modified form of the device; and

Fig. 4 is a sectional view at right angles to Fig. 3.

The new feeding device is illustrated in Figs. 1 and 2 in the form of a rotary valve which comprises a casing **10** having an inlet opening **11** at one end and an outlet opening **12** at the other. The inlet opening is surrounded by a lateral flange **13** and a similar flange **14** surrounds the outlet opening. A supply pipe **15** with a lateral flange **16** may be connected to the casing **10** at the inlet opening by bolts **17** passing through the flanges **13** and **16**, and an outlet pipe **18** with a flange **19** may be connected to the casing at the outlet opening by bolts **20** passing through the flanges **14** and **19**.

The central part **10***a* of the casing between the inlet and outlet openings is enlarged and a valve member **21** is mounted within the enlargement. The valve member is mounted on short shafts **22**, **23** supported in bearings **24**, **25** extending outwardly from opposite walls of the casing and shaft **23** projects beyond the bearing and carries an operating handle **26** at its outer end. The valve member **21** is hollow and comprises a pair of circular disks **27**, **28** to which the shafts are attached, and a peripheral wall **29** having diametrical openings **30** leading to the interior of the member.

An inlet tube **31** is mounted to extend through the inlet opening **11** of the casing and, in the device illustrated, the tube is rectangular in cross-section and has a pair of walls **32**, **33** lying parallel to the axis of rotation of the valve member and another pair of walls **34**, **35** extending transverse to the axis of rotation. The inner ends of the walls **34**, **35** lie in contact with the peripheral surfaces of disks **27**, **28** and the inner ends of walls **32**, **33** are of the same curvature as the outer surfaces of the disks **27**, **28** and of the wall **29**. The dimensions of the inlet tube and of the openings **30** in the valve member are such that, when the valve member is in the position shown in Fig. 1 with the openings lying horizontal, one part of the wall **29** between the openings lies in contact with the end of the inlet tube and closes the tube. The tube is supported resiliently in contact with the valve member by a diaphragm **36**, which has an inner marginal portion secured to the outer end of the inlet tube. The diaphragm extends laterally from the tube and its outer marginal portion lies in contact with the face of flange **13** surrounding the inlet opening of the casing.

An inlet plate **37** having an opening encircled by a flange **38** is mounted with its opening aligned with the inlet opening **11** of the casing and with the flange extending into the outer end of the inlet tube. The plate has a thickened peripheral portion **39**, which rests on top of the outer marginal portion of diaphragm **36**, and, when a supply pipe **15** is attached to the device, the outer marginal portion of the diaphragm **36** and the thickened peripheral portion **39** of the inlet plate **37** are clamped between the flanges **13** and **16** on the casing and tube, respectively. Material supplied through pipe **15** is directed by flange **38** into the inlet tube **31** and the flange prevents the material from flowing laterally into the space above diaphragm **36** and interfering with the operation of the diaphragm.

In the form of the device shown in Fig. 3, the housing **10′** has an inlet opening **11′** at one end and an outlet opening **12′** at the other. The openings are surrounded by lateral flanges **13′**, **14′**, respectively, and a supply pipe **15′** with a lateral flange **16′** can be attached to the casing at its inlet end by bolts **17′** passing through flanges **13′**, **16′**. Similarly, a discharge tube **18′** with a lateral flange **19′** can be attached to the casing at the outlet end by bolts **20′** passing through flange **14′**, **19′**.

A rotary feeding member **40** is supported within the housing on a shaft **41** mounted for rotation in bearings **42**, **43** attached to the side walls of the casing. The shaft carries a pulley **44**, which can be driven by a belt

45 to rotate the shaft. The member 40 is formed with a plurality of openings 46 extending axially and leading to pockets 47 in the member and, at its ends, the member is provided with peripheral surfaces 48, 49, which are concentric with the axis of rotation of the member.

An inlet tube 50 is mounted to extend through the inlet opening 11' and the tube has a pair of walls 51, 52, which lie transverse to the axis of rotation of the member and a pair of walls 53, 54, which connect walls 51, 52 and converge toward the member. At their ends adjacent the member, the walls 53, 54 are provided with flanges 53*a*, 54*a*, which have curved inner surfaces adapted to engage the outer surface of the member between the openings 46. Each flange has a length and a width greater than the corresponding dimensions of an opening 46 so that, when an opening is passing beneath a flange, the pocket, to which the opening leads, is entirely closed. The inlet tube 50 is supported by a diaphragm 36' having its outer peripheral portion in contact with the face of flange 13'.

An inlet plate 37' with a flange 38' is mounted at the inlet end of the casing with the flange entering the inlet tube 50 and the peripheral portion 39' of the inlet plate is thickened and lies in contact with the outer marginal portion of the diaphragm 36'. When the supply pipe 15' is attached to the device at the inlet end, the thickened portion 39 of the inlet plate and the outer marginal portion of the diaphragm 36' are clamped between the flange 13' on the casing and the flange 16' on the pipe by bolts 17'.

In the operation of the device in the forms illustrated, the inlet pipe resiliently engages the surface of the rotary valve or feeding member and provides an effective seal for the member. In the event that coarse grains enter between the contacting surfaces of the inlet tube and the member, the tube can yield to permit passage of the grains and jamming of the member is avoided. The resilient mounting of the inlet tube also reduces wear since abrasive grains penetrating between the end of the tube and the member have less effect on the sealing surfaces. In the event that, after prolonged operation, the effectiveness of the seal is reduced by wear, it is a simple operation to remove the inlet tube, restore it to its original condition, and replace it.

I claim:

1. A device for feeding pulverulent material, which comprises a casing having an inlet opening and an outlet opening, a valve member mounted for rotational movement in the casing between the inlet and outlet openings, the valve member having peripheral surfaces at its ends concentric with its axis of rotation and openings leading to the interior of the member between the surfaces, an inlet tube extending through the inlet leading to the valve member, the inner end of the inlet tube having surfaces extending axially of the valve member and curved surfaces extending along and in contact with the peripheral surfaces on the valve member, a flexible diaphragm surrounding and supporting the inlet tube and having an inner portion secured to the tube and an outer portion secured to the casing around the inlet opening, an inlet plate mounted on the casing adjacent the inlet opening and having an opening aligned with the inlet opening, and a flange on the inlet plate encircling the opening therein and extending into the inlet tube.

2. The device of claim 1, in which the diaphragm is flat and lies between the inlet plate and a plane through the free end of the flange on the plate.

3. The device of claim 1, in which the outer portion of the diaphragm is clamped between the inlet plate and a surface on the casing surrounding the inlet opening.

4. The device of claim 1, in which the casing has a lateral flange surrounding the inlet opening, the outer marginal portion of the diaphragm engages the outer face of the flange, the outer marginal portion of the inlet plate engages the outer side of the outer marginal portion of the diaphragm, and the plate and the diaphragm are held securely in place by bolts passing through the plate, diaphragm, and flange.

5. The device of claim 1, in which the valve member is hollow and has like diametrical openings leading to its interior and the curved surfaces on the inlet tube are at least as long as the distances along the peripheral surfaces on the valve member between the opposite edges of an opening.

6. The device of claim 1, in which the valve member has a plurality of like axially parallel openings leading to respective pockets in its interior, and the inlet tube has flanges at its inner end with inner surfaces extending along and in contact with the peripheral surfaces on the valve member, the inlet tube flanges extending axially the length of the valve member and each flange having a width greater than the width of an opening leading to a pocket.

7. The device of claim 6, in which the inlet tube is square in section and at least two of its walls carrying the flanges converge toward the valve member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,428,241	Pootjes	Sept. 30, 1947
2,538,320	Mylting	Jan. 16, 1951