

Sept. 12, 1950

W. H. MEAD
GRIT FEED VALVE

2,521,931

Filed Oct. 18, 1948

3 Sheets-Sheet 1

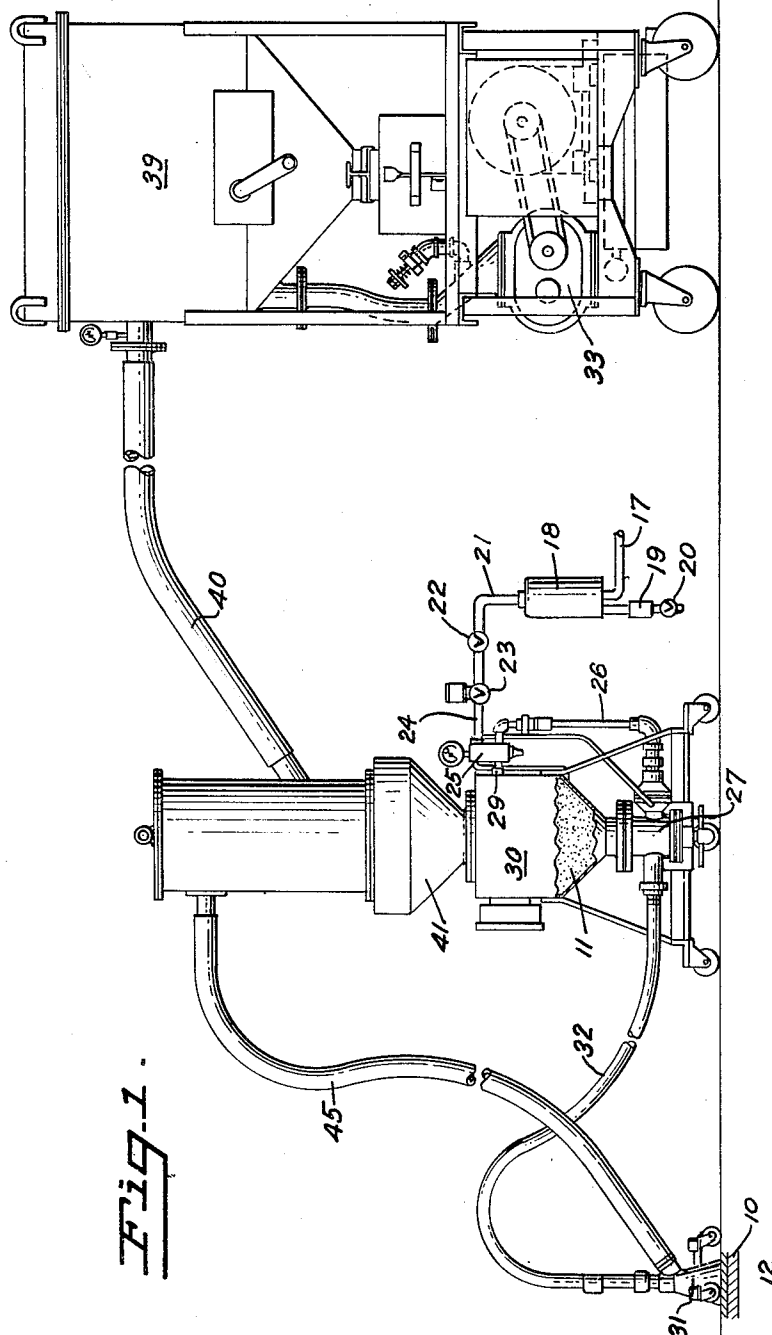


Fig. 1.

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3 Sheets-Sheet 2

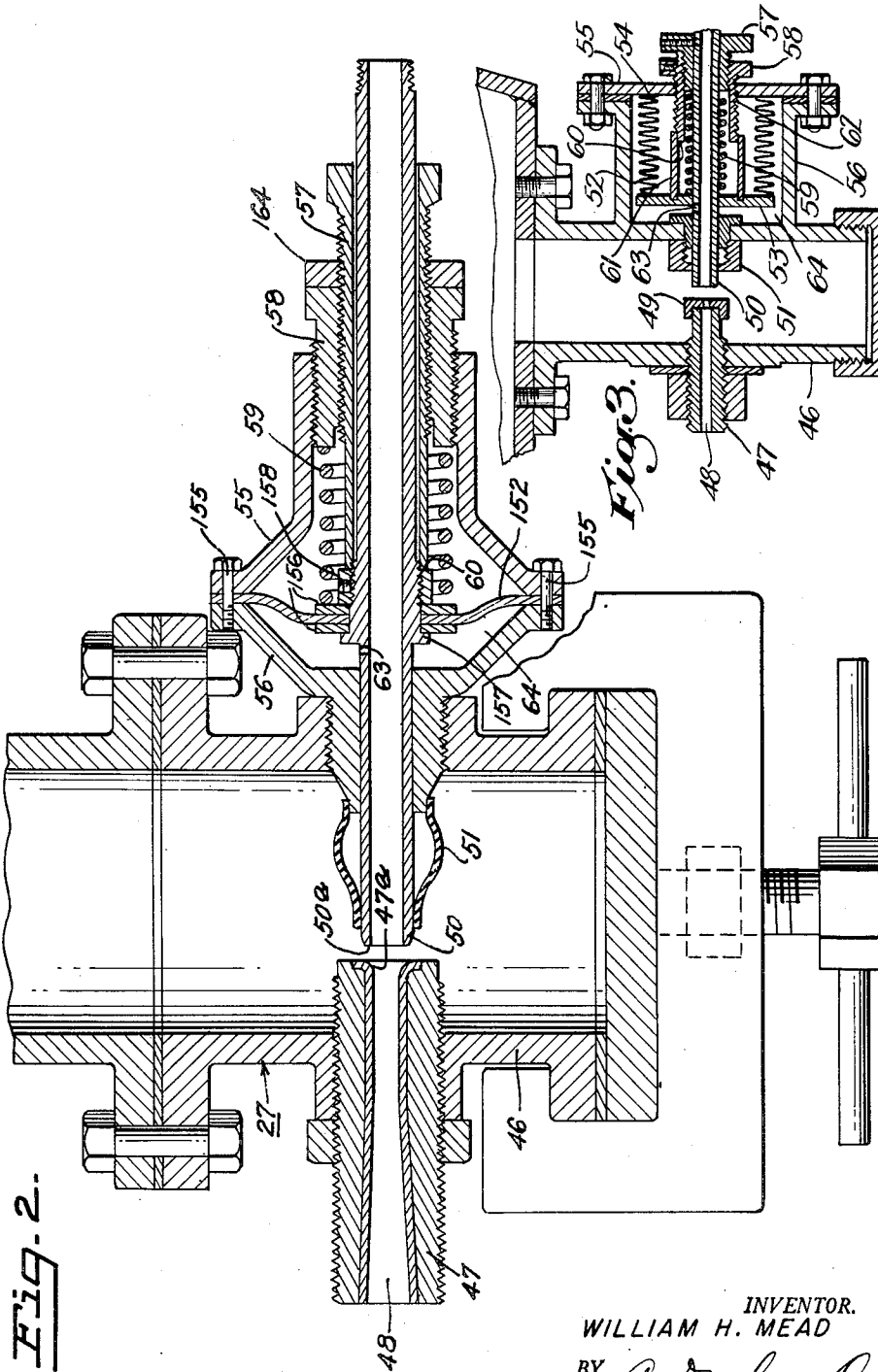


Fig. 2.

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3 Sheets-Sheet 3

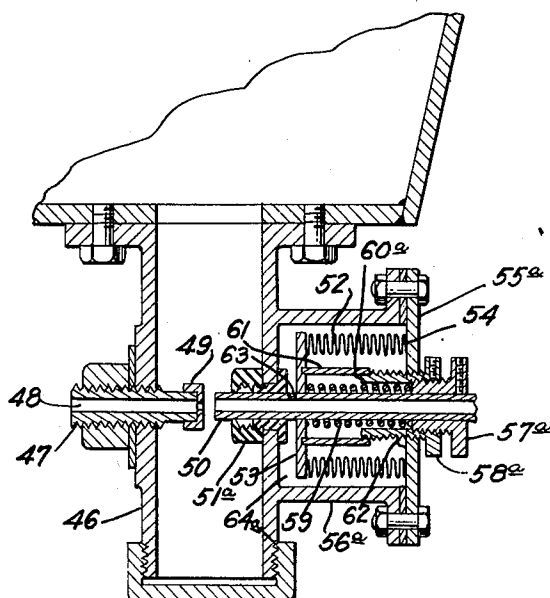


Fig. 4.

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GRIT FEED VALVE

William H. Mead, Oakland, Calif.

Application October 18, 1948, Serial No. 55,243

5 Claims. (Cl. 51-12)

1

2

This invention relates to a grit feed valve, and is useful, for example, as a grit feed valve in a sandblasting apparatus. The instant case is a continuation in part of my application filed August 12, 1947, Serial No. 768,198, which has since become abandoned and which was also a continuation in part of my application filed on August 2, 1945, Serial No. 608,386, which matured into Patent No. 2,455,514, issued December 7, 1948, where the valve is shown in connection with a surface treating apparatus.

An important object of the present invention is to provide a valve for feeding granular material into a conduit through which it will be transported by fluid stream under pressure and in which the outlet conduit is automatically cleared before opening of the valve and again as it is closed.

Another object of the invention is to provide an apparatus which facilitates remote control for introduction of granular material into a fluid stream.

A further object of the invention is to provide an apparatus whereby granular material is introduced into a conduit or into conduits through which an air blast is passing, and the material is controlled in relation to the starting and stopping of the air blast in such a way as to keep the conduits always open and free of any accumulation of material.

Other objects and advantages of the invention will be apparent from the following description of a preferred apparatus, in accordance with Revised Statute Section 4888. This description is not intended to limit the device in size, shape, materials, or arrangement of parts other than as provided in the appended claims. For illustration of the use of the apparatus, it will be described in connection with a surface treating apparatus.

In the drawings:

Fig. 1 is a view in elevation of a surface treating apparatus, with the grit feed hopper being shown partly in section;

Fig. 2 is a view in elevation and cross section of a control valve embodying the principles of this invention;

Fig. 3 is a view in elevation and cross-section of a modification; and

Fig. 4 is a view in elevation and cross-section of another modification.

In the drawings the numeral 10 designates the surface being treated by a surface-treating material 11, in a treating zone 12 beneath a treating head 31. This surface may be of wood, glass,

metal, or some synthetic material and may be covered with paint, rust, or other coating which it is desired to remove. The surface-treating material 11 may be an abrasive or a covering material depending upon the treatment it is desired to give the surface 10. For purposes of illustration an abrasive treatment will be dealt with; and this is not intended to mean any relinquishment of the scope of interpretation of the invention to cover fluid coating or treating materials.

In a surface treating machine compressed air from any suitable source is piped through a conduit 17 to an aridifier 18 which separates the moisture in the air stream and lets it drain into the trap 19 from which it can be emptied through the valve 20. From the aridifier 18 the air passes through the conduit 21 in which is a hand shut-off valve 22 and an electrically controlled valve 23. The valve 22 is to shut off the air pressure if the valve 23 ever needs to be removed for repairs. The air then passes through the conduit 24 into the strainer 25. From here, the conduit 26 conducts the air into the control valve 27, detailed in Figs. 2 and 3. The conduit 29 conducts air at the same pressure from the strainer 25 into the top of the treating-material feed hopper 30 so as to maintain a pressure on the top of the treating material 11 therein. From the valve 27 the air passes to the operating head 31 through the conduit 32.

A suction circuit, operated by the pump 33 sucks air and treating material from the operating head 31 through a conduit 45 back to the separator 41, and out from there through a conduit 40 to the dust collector 39, which filters the dust.

The dust is drawn, as described in my previously mentioned Patent No. 2,455,514, through the separator 41 into the dust collector 39, but as the grit is heavier it falls into the separator hopper 41. From there it is passed by a dump valve into the treating-material feed hopper 30.

Three forms of the valve are illustrated in Figs. 2, 3, and 4. All three forms employ the same principles, and the same reference numerals are used for identical parts. The valve 27 is positioned in the bottom of the treating-material feed hopper 30 so that the treating material 11 will flow by gravity into and fill the casing 46. For purposes of clarity the cut-away view in Figs. 2, 3, and 4 omit showing this treating material. In one side of the casing 46 is positioned the fitting 47 having a bore 48 opening at its inside end into the casing 46 and at its outside end into

the outlet conduit 32. On the opposite wall of the casing 46 a fitting 50 is slidably mounted in a housing 53 having a connecting resilient gasket 51 or 51a to provide a leak-tight fit. Means to actuate the sliding fitting 50 include the diaphragm housings 55 and 56, which are clamped together by the bolts 155. The diaphragm housing 55 preferably is threaded into the casing 46, and the fitting 50 slides within it. The diaphragm 152, protected by the washers 156, is rigidly clamped by the lock nut 158 against the shoulder 157 on the fitting 50.

Two relatively adjustable sleeves 57 and 58 are adjustably secured in the diaphragm housing 56. The sleeve 57 is threaded inside the sleeve 58 and its end 60 abuts the lock nut 158 to stop the movement in one direction of the sliding member 50. The sleeve 58 adjusts the tension on the spring 59, and has a lock nut 164 to hold it in a selected position.

In the form of the invention shown in Figs. 1 and 2, a conduit 28, leads into the diaphragm chamber 64, through the opening 55, this conduit 28 connects to an air strainer 25 which preferably includes a filter to remove any sand and dust from the stream of air passing into the conduit 28. In this way, it is possible to prevent the chamber 64 from filling up with any solid particles which would interfere with operation of the diaphragm 152 or sliding of the fitting 50.

In the form of the invention shown in Figs. 3 and 4 a bleed hole 63 connects the chamber 64 with the bore of the fitting 50 for all positions of the latter.

In all forms of the invention here shown, a spring 59 holds the end 50a of the fitting 50 in yieldable engagement with the mouth 47a of the fitting 47 so that there is a connection between the two bores but none into the casing 46. The parts move into the position shown in Figs. 2 and 3, when the device is in operation. In this latter position the fluid stream moving from the bore 50 into the bore 47 picks up some of the treating material in the housing 46 and carries it along to the head 31. The spring 59 is preferably adjusted to hold the fitting 50 against mouth 47a of the fitting 47 until a pressure of about 80 pounds per square inch is built up in the chamber 64 through the bleed hole 63 which then moves the diaphragm 152 and its connected fitting 50 into the position shown in Figs. 2 and 3.

This means that the fluid medium passing through the conduit 50 in the valve 27 will be used first to clear out the fitting 47 and the conduit 32, because no treating material 11 can enter the mouth 47a from the casing 46 until the fluid pressure reaches 80 pounds. Likewise, when the operator shuts down the device, as soon as the fluid pressure drops below 80 pounds, the fitting 50 will move over and close the bore 48 and the balance of the fluid flow will tend to scavenge whatever treating material is in the bore 48 or the conduit 32. Thus a great advantage of this arrangement is that when the operator wishes to place the device in use, a second operator is not required to move the fitting 50, because it is moved automatically by the diaphragm 152 to expose the hole 48 in the fitting 47 after the line 32 is cleaned out. Moreover, it is moved automatically by the spring 59 to close off the hole 48 from the casing 46 while the air current is still flowing sufficiently to clean out the line 32. The resilient gasket 51 protects the fitting 50 from the blasting action of the grit 11 and keeps it from being eaten away.

The device of Fig. 4 is substantially similar except for the form of the diaphragm. In one side of the casing 46 is positioned the fitting 47 having a hole 48 opening at its inside end into the casing 46 and at its outside end into the conduit 32. A resilient perforated gasket 49 may be secured to the inner end. On the opposite wall of the casing 46 a sliding fitting 50 is mounted in a gasket 51a to provide a leak-tight fit. Means to actuate the sliding fitting 50 include the bellows 52 having its end wall 53 rigidly secured to the fitting 50. The other end 54 is secured to the plate 55a mounted on the housing extension 56a with a leak-tight fit. Two relatively adjustable sleeves 57a and 58a are adjustably secured in the plate 55a. The sleeve 57a is threaded inside the sleeve 58a and adjusts the tension on the spring 59. The sleeve 58a has a reduced end 60a in slidable engagement with a sleeve 61 on the bellows end wall 53. The extent of movement of the bellows, and therefore of the sliding fitting 50, is regulated by contact of the end of the sleeve 61 on the shoulder 62. A bleed hole 63 connects the sealed chamber 64 with the bore of the fitting 50 for all positions of the fitting 50. Normally the end of the fitting 50 is in engagement with the gasket 49 and the fitting 47 so that there is an open connection between the bores but none into the casing 46. The parts move into the position shown in Fig. 3 when the device is in operation. The spring 59 is preferably adjusted to hold the fitting 50 against the gasket 49 until a pressure of about 80 pounds per square inch is built up in the chamber 64 through the bleed hole 63 to move the bellows 52 and its connected fitting 50 into the position shown in Fig. 3. This means that the first air passing through the valve 27 will be used to clear out the fitting 47 and the conduit 32 before any treating material 11 is introduced from the casing 46 through the opening in the gasket 49. One great advantage of this arrangement is that the operator may be many feet away from the valve 27 and a second operator is not required to move the fitting 50, because it is moved automatically by the bellows 52 to expose the hole 48 in the gasket 49 after the line 32 is cleaned out and it is moved automatically by the spring 59 to close off the hole 48 from the casing 46 while the air current is still flowing sufficiently to clean out the line 32.

I claim:

1. A device for introducing granular material into a fluid current, including a housing into which said material is fed; a first conduit leading from said housing to convey material therefrom; a second conduit in said housing relatively movable away from or into contact with said first conduit; a third conduit for introducing said fluid current into said second conduit from where it passes into said first conduit whether said second conduit is away from or in contact with said first conduit; pressure-applying means for urging said second conduit toward said first conduit; and means actuated by the fluid in said third conduit for overbalancing said pressure-applying means so that when the pressure in said third conduit exceeds the predetermined pressure of said pressure-applying means said second conduit will automatically be moved apart from said first conduit and said material will be introduced into said fluid current.

2. A device for introducing granular material into a fluid current, including a housing into which a treating material is fed, conduits leading into and out from said housing, the mouths of

5

said conduits being movable against each other and apart from each other, means for urging said mouths normally against each other, and means operable automatically by fluid passing through said conduits for overcoming said first-named means and moving said mouths apart.

3. In a device for introducing granular material into an air current, the combination of: a housing into which said material may be fed; a first conduit leading from said housing to convey said material therefrom; a second conduit in said housing having means for abutting and separating its end to the end of said first conduit so that the material in said housing may not enter it when said conduits abut and may enter it when they are separated; a supply conduit for introducing an air current through said second conduit into said first conduit whether they are abutting or separated; means for normally urging said second conduit against said first conduit; and counter means actuated by the fluid in said supply conduit for urging said second conduit away from said first conduit, whereby said air current will clean out said conduits before additional material is introduced into said first conduit from said housing.

4. In a device for introducing granular material into a fluid current, the combination of a housing into which said material is fed; a first conduit leading from said housing to convey said material therefrom; a second conduit in said housing relatively movable away from or in contact with said first conduit; means for passing said fluid current from said second conduit through said first conduit in all relative positions of said conduits; a pressure-responsive diaphragm rigidly attached around a portion of said second conduit; walls cooperating with said diaphragm to enclose a chamber on one side of said diaphragm, sealed except for a bleed hole from said second conduit which is in communication with said chamber for all positions of said second conduit; and means for obtaining a predetermined pressure on the other side of said dia-

6

phragm, whereby when the pressure in said chamber exceeds the pressure on the other side of said diaphragm, said diaphragm will move said second conduit away from said first conduit so that material from said housing may enter said first conduit.

5. In a device for introducing granular material into a fluid current, the combination of a housing into which said material is fed; a first conduit leading from said housing to convey said material therefrom; a second conduit in said housing relatively movable away from or in contact with said first conduit; means for passing said fluid current from said second conduit through said first conduit in all relative positions of said conduits; a pressure-responsive diaphragm rigidly attached around a portion of said second conduit; walls cooperating with said diaphragm to enclose a chamber on one side of said diaphragm; a third conduit leading from the air supply line for said second conduit to said chamber; means in said third conduit to clean said air from grit; and means for obtaining a predetermined pressure on the other side of said diaphragm, whereby when the pressure in said chamber exceeds the pressure on the other side of said diaphragm, said diaphragm will move said second conduit away from said first conduit so that material from said housing may enter said first conduit.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,521,931

September 12, 1950

WILLIAM H. MEAD

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 5, after the word "the", second occurrence, insert *diaphragm 152 secured around its circumference between the two*; column 4, line 43, for "valve 37" read *valve 27*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of December, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.