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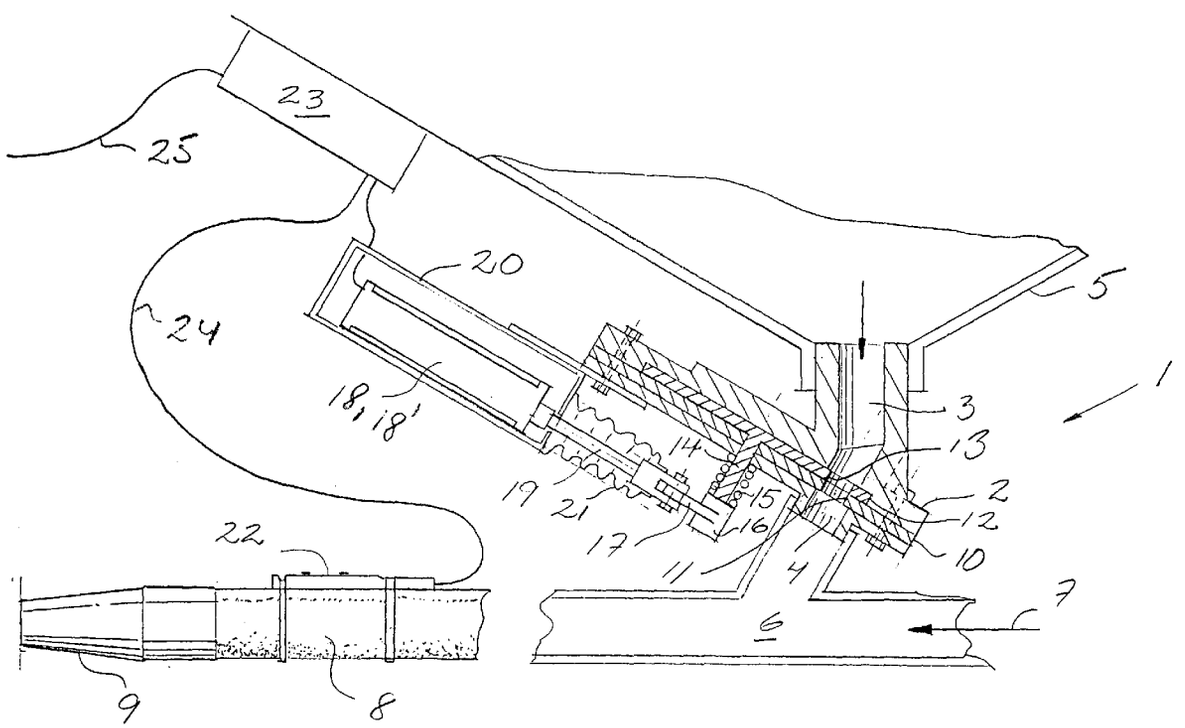
(54) Blast valve

(57) Blast valve comprising a first disc (10), non-pivotally arranged in a cylindrical housing (2) and having an off-centrally positioned through hole (11), a second disc (12) arranged in contact with the first disc (10) and having a correspondingly positioned through hole (13), the second disc (12) being pivotally arranged in the housing (2) and attached to one end of a spindle (14) extending through the wall of the housing (2), the housing (2) having an inlet (13) for blast powder and an outlet (4) for connection to an air conduit (6), the inlet (3) and outlet (4) being in mutual alignment and in alignment with the through holes (11) and (13), respectively, wherein the spindle (14) is connected to a proportionally controlled actuator means (18,18') which actuates the spindle (14) for relative rotation of the discs (10;12), said actuator means (18,18') being remotely controlled electrically by a control means (22) for the continuous adjustment of the blending ratio of air and blast powder.



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Description

[0001] The present invention relates to arrangements on a blast valve, and specifically to a blast valve adapted to be remotely controlled for continuous adjustment of the blending ratio of air and blast powder.

[0002] An optimum blending ratio of air and blast powder is required, in order to obtain the desired effect in blasting. An optimum blending ratio is likewise desired for cost reasons, both in aspects of blast powder consumption and to minimize the costs for collecting and recovering the ejected blast powder.

[0003] A valve is conventionally arranged on the discharge of the blast powder tank, which is pressurized, for adjusting the blending ratio of air and blast powder. A typical valve comprises a cylindrical housing with two discs, one of which is pivotally attached to the end of a spindle reaching through the wall of the housing. Both discs comprise a through hole, arranged near the periphery of the disc, such that the opening area of the valve is adjusted by relative rotation of the discs in way of a shutter. The valve has an outlet which is connected to an air supply in the form of a flexible hose for feeding pressurized air and blast powder to the blast nozzle. When blasting on larger build constructions, such as bridges or industrial sites, the hose may have a considerable length of some twenty or thirty meters.

[0004] Adjusting this conventional valve for an optimum blending ratio is a time consuming and common problem in blasting. The adjustment is performed by rotating the pivotally supported disc by means of an arm, which is attached to the spindle. The adjustment is performed, not only at the beginning of the blasting process, but also frequently during the process. The frequent adjustment may be necessary because of varying water content in the blast powder, causing particles to stick to the "shutter" and thereby decreasing its opened area. Another reason for a frequent adjustment under the blasting process is related to wear on the disc through holes, and yet another reason may be a desire to adjust the blast powder content in adaptation to local variations in the work piece. For these and other reasons, the operator frequently has to make a halt in his work, for manually adjusting the blending ratio on the valve.

[0005] The time consuming adjustment of the valve leads to considerable breakdowns. In order to minimize such breakdowns for adjustment of the blending ratio, excessive use of blast powder is sometimes a measure for compensation, leading to rising costs. An overfeed of blast powder in the order of about 10 % may be frequently found, and breakdowns in the same order may often occur due to stoppage for adjusting the valve in spite of an overdue feed of blast powder.

[0006] Existing remote controls of pneumatic or electric-pneumatic operation are designed to control the opening and closing of the air main valve, and to control the start and stop for the blast powder feed to the supplied air.

[0007] Also, a remote control of pneumatic operation is known for adjusting the valve from a fully closed position to a predetermined operative position.

[0008] The object of the present invention is to provide a blast powder valve of above said type, designed for continuous and proportional remote control of the blending ratio of air and blast powder, whereby the breakdowns related to conventional, disc operated blast powder valves may be substantially reduced.

[0009] The object is met in a valve, having the features specified in the attached claims.

[0010] The invention is more closely described below, reference being made to the attached drawing wherein a partially sectioned, diagrammatic side view of the blast powder valve is mounted on a blast powder tank, and connected to a hose having a nozzle.

[0011] The blast powder valve 1 comprises a cylindrical, two-piece housing 2 having a blast powder inlet 3 and an outlet 4 for discharge of a desired flow of blast powder. The valve inlet 3 is connected to a container or tank 5, where the blast powder is stored under pressure. The outlet 4 is connected to an air conduit 6, through which air is supplied in direction of the arrow 7 for transporting blast powder through a flexible hose 8 to a nozzle 9, from which the powder is ejected at high velocity in order to tear off oxides or other deposit layers. A dead mans handle (not shown) may commonly be provided at the nozzle.

[0012] A disc 10 is non-pivotally arranged in the housing 2. The disc 10 has a through hole 11 positioned in alignment with the inlet 3 and the outlet 4, respectively. A second disc 12 is pivotally arranged in contact with the disc 10. The second disc 12 has a through hole 13, positioned in alignment with the hole 11 of the disc 10. A spindle 14, centrally attached to the disc 12, extends through the wall of the housing 2, and a helical spring 15 operates between the wall outside and a flange 16 formed in the end of the spindle 14, to urge the discs in mutual contact. An arm 17 is extended from the flange 16, in radial direction relative to the spindle and the disc 12. By operating the arm 17, the disc 12 may be rotated in order to adjust the alignment of the holes 11 and 13, thereby adjusting the opening area of the blast powder valve 1.

[0013] According to the invention, there is suggested a remotely controlled actuator means for continuous and proportional adjustment of the blast powder valve. Below, the invention will be disclosed by way of an example, and alternative embodiments will be successively denoted. The attached claims are drafted also to include such embodiments in the claimed scope of protection.

[0014] An actuator means 18, in this embodiment a linear drive means 18, is secured to the valve housing 2. The actuator means 18 is pivotally connected to the end of the arm 17, via a link 19, in order to actuate the spindle 14 for rotation of the disc 12. In exchange for the linear drive means, the actuator may comprise an elec-

tric, hydraulic or pneumatic drive means or a step motor 18' which is in engagement with the spindle 14 through a gear unit (not shown).

[0015] The linear drive means or actuator 18 may be a hydraulic or pneumatic cylinder unit, in the disclosed embodiment though, the actuator means 18 is driven electrically by a reversible motor.

[0016] The actuator 18 is preferably enclosed by a cover 20, the extendable piston 19 of the actuator being protected from dust by a surrounding and sealing sleeve 21. The cover 20 is formed with through holes for electric circuits and/or conduits for air and oil, respectively.

[0017] Near to the nozzle 9, a control unit 22 is mounted on the hose 8. The control unit 22 is connected to a unit 23, which supplies power for the actuator 18,18'. The power supply unit 23 comprises electric-magnetic switches for proportional control of the power supplied to the actuator means 18. In an alternative embodiment, the power supply unit 23 may comprise electric-magnetic controlled valves for air and oil, respectively.

[0018] In a preferred embodiment, the power supply unit 23 for an electrically powered, linear actuator 18 also comprises a power transformer, a battery for drive power and a power charger.

[0019] The control unit 22 is attached to the hose 8 near to the nozzle 9 so as to be easily reached by the operator during the blasting process. The control unit is designed to withstand harsh conditions and rough handling. In the disclosed embodiment, the control unit 22 is a solid body of synthetic material and cast in one piece with integrally formed switches for controlling the actuator means 18. The solid-cast body may be enclosed by a softer and shock absorbing material, such as rubber, and is formed for insertion and securing an electric cable from the power supply unit 23. In the drawing, the cable from the power supply unit is shown at 24, and the power supply unit 23 is connected to the main circuit via a cable 25.

[0020] In the drawing, the power supply unit 23 is mounted on the outside of the blast powder tank, but may alternatively be mounted in other positions, e.g. to the frame work of the blast powder tank or to the air supply conduit. It should be understood, that the cable from the power supply unit 23 preferably is attached to the hose 8 all way up to the control unit 22.

Claims

1. Blast valve comprising a first disc (10), non-pivotally arranged in a cylindrical housing (2) and having an off-centrally positioned through hole (11), a second disc (12) arranged in contact with the first disc (10) and having a correspondingly positioned through hole (13), the second disc (12) being pivotally arranged in the housing (2) and attached to one end of a spindle (14) extending through the wall of the housing (2), the housing (2) having an inlet (13) for blast powder and an outlet (4) for connection to an air conduit (6), the inlet (3) and outlet (4) being in mutual alignment and in alignment with the through holes (11) and (13), respectively, characterized in that the spindle (14) is connected to a proportionally controlled actuator means (18,18') which actuates the spindle (14) for relative rotation of the discs (10; 12), said actuator means (18,18') being remotely controlled electrically by a control means (22) for the continuous adjustment of the blending ratio of air and blast powder.

2. Blast valve according to claim 1, characterized in that the actuator means is a linear drive unit (18), having a piston which is pivotally connected to an arm (17) which extends in radial direction from the spindle (14).

3. Blast valve according to claim 2, characterized in that the actuator means (18) comprises an electric, reversible motor.

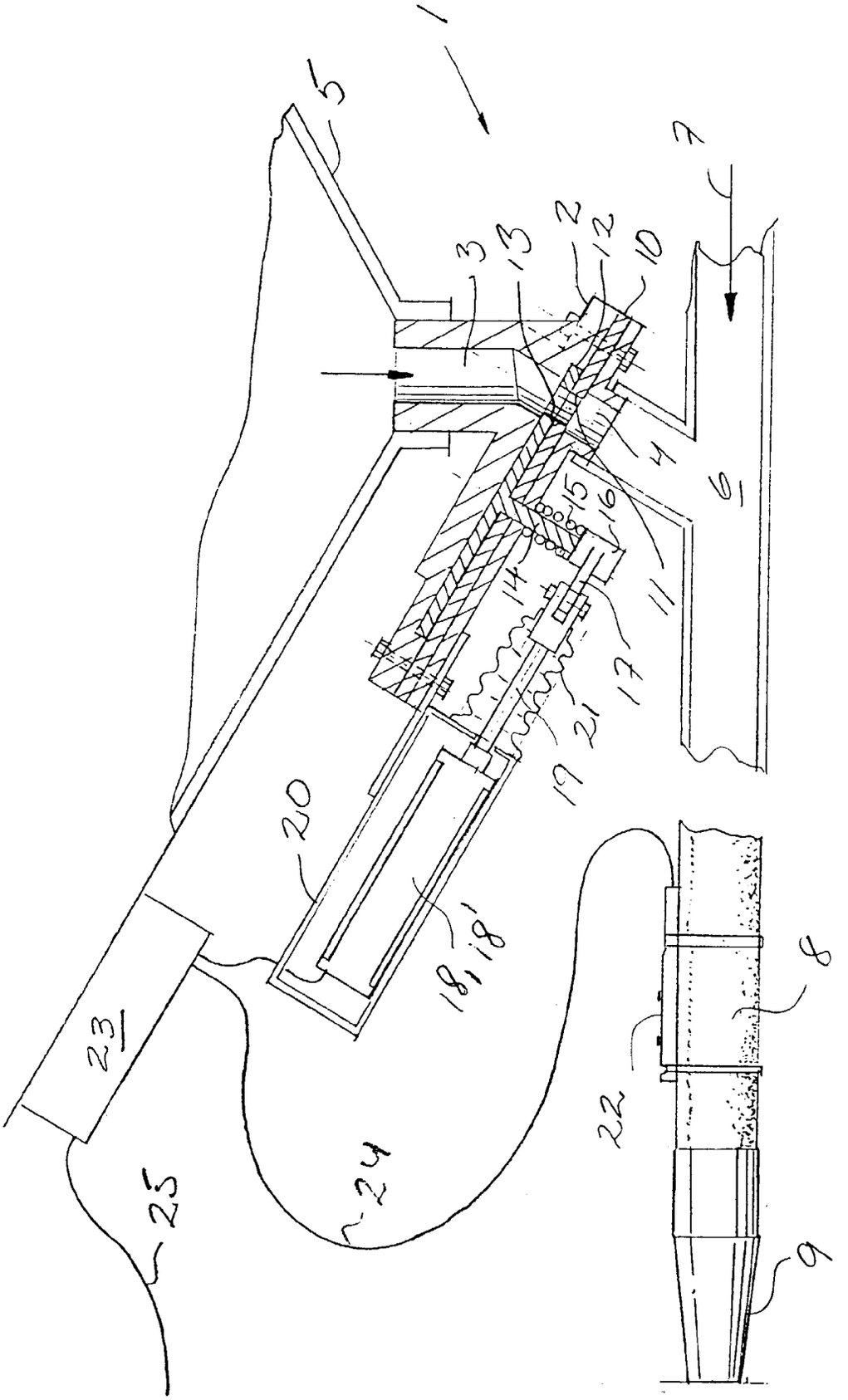
4. Blast valve according to claim 3, characterized in that the actuator means (18') rotates the spindle (14) via a gear unit.

5. Blast valve according to claim 2, characterized in that the actuator means comprises a hydraulic or pneumatic piston/cylinder unit.

6. Blast valve according to any of the previous claims, characterized in that the actuator means (18,18') is enclosed by a cover mounted on the valve, and a sealing sleeve is attached to the cover for enclosing the piston of the actuator means.

7. Blast valve according to any of the previous claims, characterized in that the control unit (22) is a solid body cast in one piece from a synthetic material, preferably enclosed by a shock absorbing material, having integrally formed switches for operating the actuator means (18,18') via a power supply unit (23).

8. Blast valve according to claim 7, characterized in that the control unit (22) operates the actuator means (18,18') via a chargeable, electric power supply unit.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