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[54] **DEVICES FOR EFFECTING AUTOMATIC WATER SPRAYING IN MINERAL MINES**

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[51] **Int. Cl.** **E21d 23/00**

[58] **Field of Search** ..... 61/45 D, 85, 45 A, 45; 60/456; 299/12,

[56] **References Cited**

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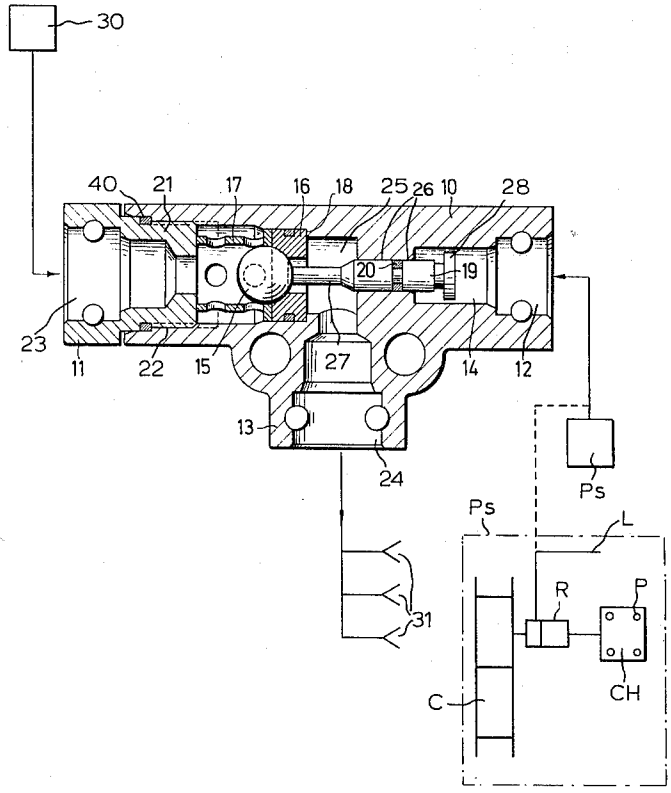
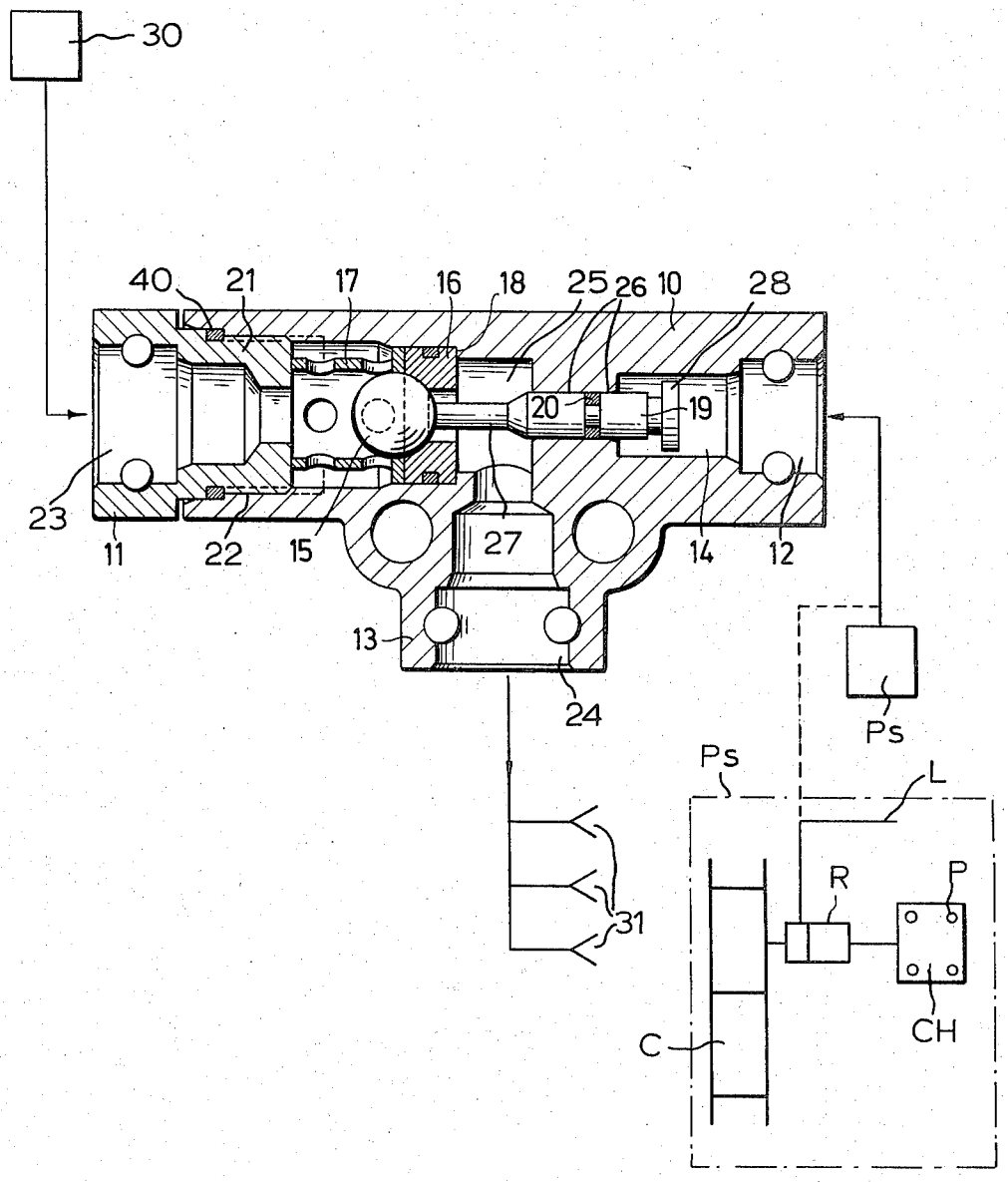
[57] **ABSTRACT**

A device for effecting automatic water spraying in a mine working employing an advanceable roof support system. The device has an elongate body with an inlet for receiving water under pressure and an outlet extending transversally of the inlet for feeding water to spray nozzles. A valve is disposed between the inlet and the outlet and is in the form of a ball urged against a seating by the water pressure.

A plunger which can be moved longitudinally by pressure in a control chamber serves to move the ball away from the seating to allow the water to pass from the inlet to the outlet. The control chamber is connected to receive pressure fluid present only when prop retraction or chock shifting of the associated roof support system occurs.

6 Claims, 1 Drawing Figure

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DEVICES FOR EFFECTING AUTOMATIC WATER SPRAYING IN MINERAL MINES

BACKGROUND OF THE INVENTION

The present invention relates generally to mineral mining installations and more particularly to a device for effecting automatic water spraying in such installations.

It is known, especially in longwall workings, to provide water sprays in order to suppress dust. It is desirable to effect such spraying automatically from time to time during the mining operation. Such spraying can thus be arranged to occur when the pressure in the working chambers of one or more associated props is relieved to effect retraction. This however, necessitates a connection between the prop chamber and an actuating means for a water stop valve. This is disadvantageous since it represents a safety hazard since leakage could occur in the actuating means which would result in a reduced prop setting pressure.

A general object of the invention is to provide an improved device for the above-mentioned purpose.

SUMMARY OF THE INVENTION

According to the invention there is provided a device for effecting automatic water spraying in a mineral mining installation employing an advanceable roof support system with shifting rams and chocks with hydraulically operated telescopic props; said device comprising an inlet for receiving water under pressure, an outlet for feeding water to a plurality of spray nozzles, a valve with a closure element engageable on a seating and operable to open or close communication between said inlet and outlet, the closure element being urged, during use, against the seating by the water pressure, means for displacing the valve closure element away from said seating to open said valve, and a control chamber for receiving hydraulic pressures fluid when prop retraction or shifting of the roof support system occurs to thereby cause said displacing means to open the valve.

In another aspect the invention provides a mineral mining installation having an advanceable roof support system with chocks employing hydraulically-operated telescopic props, rams for shifting the chocks, and a hydraulic control system therefor, a source of water under pressure, a plurality of nozzles for spraying water to suppress dust and a device for automatically feeding water to said nozzles, said device being in the form of a body having an inlet connected to said water source, an outlet connected to said nozzles, a valve with a closure element engageable on a seating and adapted to open or close communication between the inlet and outlet, the closure element being urged against the seating by the pressure of the water to close the valve, means for displacing the closure element away from the seating to open the valve, and a control chamber for receiving pressure fluid which causes actuation of the displacing means, the control chamber being connected to the hydraulic system to receive fluid when prop retraction or chock shifting occurs.

The closure element can be in the form of a ball which is guided by a guide bushing within a hollow body. The bushing can be disposed between the seating and a detachable plug providing the inlet to the device. The displacing means for the ball can conveniently be in the form of a plunger which is guided for longitudinal displacement and has a piston at one end which is located in said control chamber.

In accordance with the invention the pressure necessary to actuate the displacing means and effect spraying only occurs when props retract or chocks are advanced. This involves no connection with the working chambers of the props and hence any leakage within the device would not cause any reduction in the prop setting pressure. A single device of a type made in accordance with the invention can be used for a complete roof support system.

The invention may be understood more readily and various other features of the invention may become more apparent from consideration of the following description.

BRIEF DESCRIPTION OF DRAWING

An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawing which depicts in schematic sectional side view a device made in accordance with the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown in the drawing the device has a main body or housing **10** which is of generally elongate form and receives a detachable plug **11** at one end. The plug **11** has a screw-threaded portion **21** which mates with a corresponding screw-threaded bore **22** at this end of the body **10.** A sealing ring **40** is provided between the body **10** and the plug **11.** The plug **11** is hollow with a central boring **23** with axial portions of differing cross-sectional diameter extending into the device. At the other end the device has a further boring **12** coaxial with the boring **23.** The boring **12** again extends into the device and has axial portions of differing cross-sectional diameter. The inner portion of the boring **12** forms a control chamber **14.** Intermediate the ends of the body **10** there is a transverse or lateral projection **13** which also has a boring **24** which leads into the device and extends substantially perpendicularly to the common axis of the borings **23, 12.** This boring **24** again has axial portions of different cross-sectional diameter. The boring **24** communicates with a further central chamber **25.** The boring **23** constitutes an inlet to the device and the boring **24** constitutes an outlet from the device. Preferably the outer portions of the boring **23, 24** are adapted, as represented in the drawing, to receive connectors.

A valve constituted by a valve closure element in the form of a ball **15** engageable on a valve seating **16** serves to open or close communication between the borings **23, 24** via the chamber **25.** A guide bushing **17** is disposed inwardly of the plug **11** and engages on the plug **11** and on the seating **16.** The ball **15** is guided for axial displacement by the bushing **17.** The valve seating **16** engages on a shoulder **18** and the plug **11** can be screwed into the body **10** to locate the bushing **17** and the seating **16** and urge the latter against the shoulder **18.**

A further boring **26** extends between the chambers **25, 14.** This boring **26** accommodates the main stem of a plunger **19** which is slidably guided within the boring **26** by means of a sealing ring **20** which is accommodated in a circumferential groove in the stem of the plunger **19.** The plunger **19** has an end portion **27** which can extend through the valve seating **16.** This

portion **27** engages on the ball **15** and constitutes a means for moving the ball **15** away from the seating **16** to permit communication between the borings **23, 24.** The other end of the plunger **19** has a piston **28** against which pressure fluid can act to displace the plunger **19** to move the ball **15** from the seating **16.**

A depicted in the drawing in its operational environment the device has the inlet boring **23** connected to a source of water under pressure denoted **30.** The outer boring **24** is connected to one or more spray nozzles denoted **31.** In known manner these nozzles **31** are operably associated with a mining installation and serve to spray water from time-to-time to suppress dust. The nozzles **31** are preferably mounted on units of a roof support system alongside a mineral face of a longwall working in such manner as to effect optimum dust suppression. The nozzles **31** can however be located in other workings or in access roads or gates adjoining the main working. The boring **12** is connected to some source of hydraulic pressure fluid generally denoted PS. This source PS is only active at a certain stage during the mining operation. By way of example the mining installation has a longwall conveyor C which is coupled via a shifting ram R to a roof support chock CH employing hydraulically-operated telescopic props P. The ram R has a pressure line L which conveys pressure fluid to the ram R to effect a shifting sequence when the props P have been retracted. The line L may feed a number of such rams R. This pressure line L then constitutes the pressure source PS for operation of the device. Other arrangements can however be adopted to supply pressure fluid to the chamber **14** automatically at some stage in the mining operation. It is considered dangerous to expose the control chamber **14** to the hydraulic fluid supplied to the working chambers of the props P during extension thereof. Where the props P are retracted hydraulically, i.e., the so-called robbing aid, however, it is feasible to expose the chamber **14** to such retraction fluid. The chamber **14** could also be connected to other parts of the hydraulic system.

The operation of the device is as follows. The pressure of the water acts through the inlet boring **23** to urge and maintain the ball **15** against its seating **16.** Hence, no water is discharged throughout the outlet boring **24** to the nozzles **31.** However, when the ram R is actuated to effect shifting or the props P begin to retract, the pertinent pressure fluid also acts on the piston **28** to displace the plunger **19** inwardly of the device. The movement of the plunger **19** then moves the ball **15** away from its seating **16** against the pressure of the water to allow the water to flow to the nozzles. When the ram R has effected the desired shifting step or the props R have been retracted to their predetermined extent, the active pressure is cut-off and now since the piston **28** is also no longer exposed to the pressure the ball **15** is urged back onto its seating **16** by the water pressure to cut off the water from the nozzles **31** until the next operative sequence occurs.

It is apparent that should leakage of pressure fluid from the chamber **14** occur then although this is problematic it is not a dangerous situation since it would not affect the roof supporting facility of the props P. Also should the pressure acting on the chamber **14** fall due to a fault in the hydraulic system the pressure of the water on the ball **15** will automatically close the valve **15, 16.**

I claim:

1. In or for a mineral mining installation employing roof-support chocks with hydraulically-operated telescopic props, ram for shifting the chocks and a hydraulic control system for operating the rams and the props;

means for effecting automatic spraying of water to suppress dust, said means comprising:

a source of water under pressure, a plurality of spray nozzles, a device having a body, an inlet to the body connected to the source of water, an outlet from the body connected to the spray nozzles, a valve in the body with a closure element engageable on a seating under the pressure of the water to close communication between the inlet and the outlet, means in the body for displacing the closure element away from the seating to open communication between the inlet and the outlet and a control chamber, in the body, for receiving pressure fluid which causes actuation of the displacing means, the control chamber being connected to the hydraulic system to receive pressure fluid when prop retraction or chock shifting occurs.

2. An installation according to claim **1,** wherein the body of the device is generally elongate and the inlet to the body is found by a detachable plug at one end thereof.

3. A device according to claim **2,** wherein a guide bushing is disposed between the plug and the valve seating and serves to guide the valve closure element.

4. An installation according to claim **3,** wherein the closure element is a ball.

5. An installation according to claim **1,** wherein the displacing means is in the form of a plunger which is guided for longitudinal displacement and has a piston at one end which is located in said control chamber.

6. An installation according to claim **5,** wherein the control chamber is disposed at an end of the body remote from said inlet and is coaxial therewith and the outlet is provided within a projection extending transversally of the common axis of the inlet and the control chamber.

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