March 24, 1953 R. R. CROOKSTON 2,632,420

WARNING DEVICE FOR PISTON CYLINDERS

Filed May 1, 1950

FIG. 1.

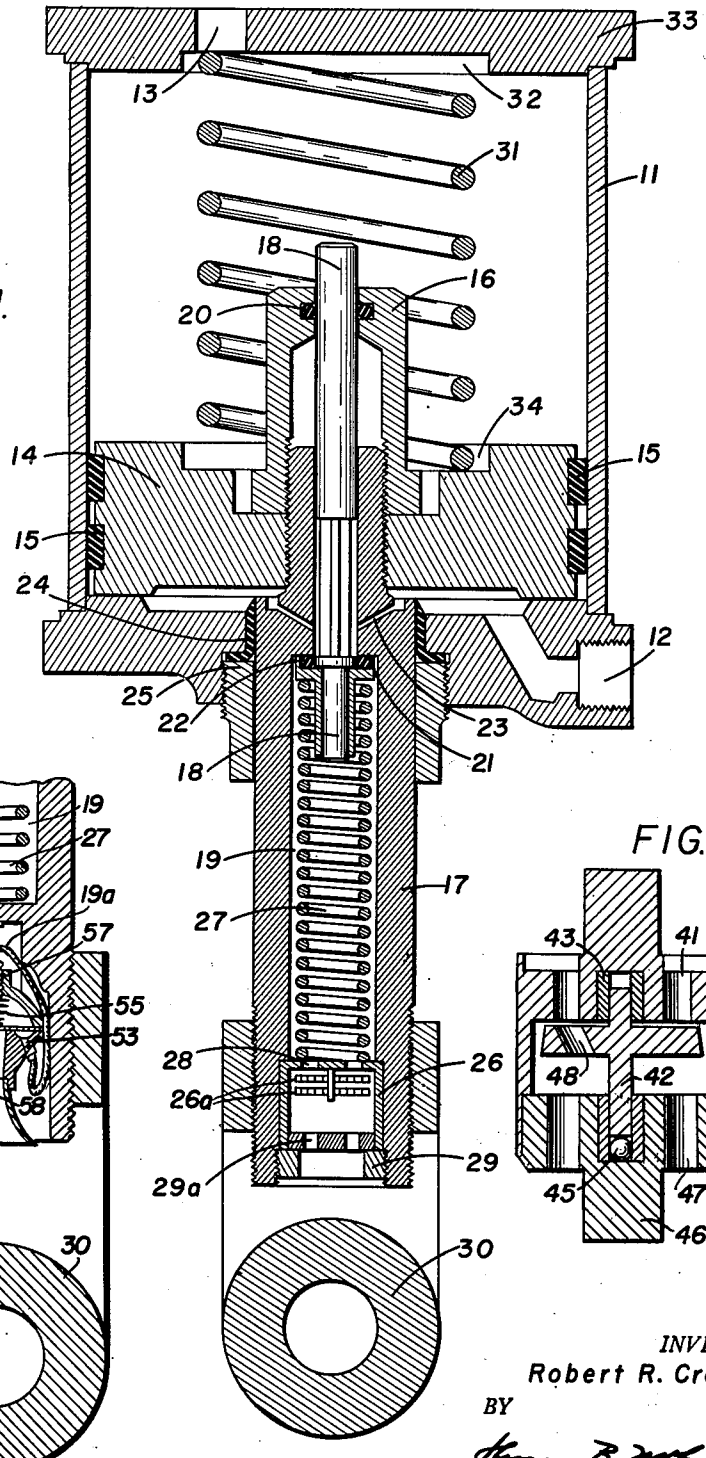


FIG. 3.

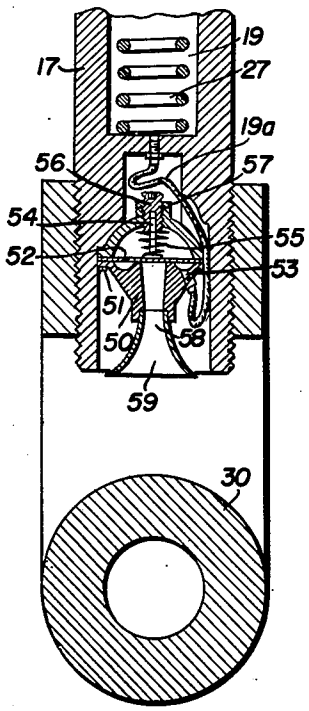


FIG. 2.

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Patented Mar. 24, 1953

2,632,420

UNITED STATES PATENT OFFICE

2,632,420

WARNING DEVICE FOR PISTON CYLINDERS

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Application May 1, 1950, Serial No. 159,170

6 Claims. (Cl. 116—124)

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The present invention is directed to a warning device for piston cylinders. More particularly the invention is directed to a warning device for indicating overstroking of air cylinders. In its more specific aspects the device has to do with a warning device for indicating the necessity of adjusting brakes on drilling drawworks.

Prior to the present invention it has been known to employ air operated brakes on drawworks. In U. S. Patent 2,489,449, issued November 29, 1949, in the name of Robert R. Crookston and in application Serial No. 691,485 filed August 19, 1946, for Robert R. Crookston, now U. S. Patent 2,589,059, issued March 11, 1952, are described apparatus for braking drawworks assemblies. The aforesaid patents for Crookston supra may employ air cylinders for causing actuation of the brakes in controlling the drawworks. However, in employing such assemblies including an air cylinder, the brake lining becomes worn on practically continual application to a rotating drum causing the piston assembly in the piston cylinder to assume an ever increasing stroke. If an air cylinder is employed including the piston which does not have some sort of warning device embodied therein, there is considerable danger of the cylinder parts becoming damaged by the piston overstroking and striking the cylinder head. Operators of drilling rigs have employed warning devices not integral parts of an air cylinder employing a piston member. The drilling crew frequently disconnect such warning devices or make them inoperable by plugging the devices so that the warning signal is not emitted. However, such action appears to be a natural consequence of human behavior since the warning signals are irritating and require the machine to be adjusted to cut off the signal. Of course, a simpler expedient, which has been adopted by drilling crews, has been simply to disconnect the warning signal, leaving the equipment in danger of being damaged by the piston cylinder being moved against the cylinder head.

It is therefore the main object of the present invention to provide a warning device to be used on piston cylinders which is an integral part of the piston cylinder assembly.

Another object of the present invention is to devise a built-in warning device which cannot be disconnected by the operator.

A still further object of the present invention is to provide a device for indicating overstroking of piston assemblies.

The apparatus of the present invention includes a piston cylinder defining an inlet through

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which a gasiform fluid may be injected. Arranged in the cylinder ahead of the inlet is a piston to which is attached a piston arm which may be connected to any machine and for the purpose of illustration may be connected to an air brake for drawwork assemblies as described in the aforementioned patents for Crookston supra, and in U. S. 2,472,467. The piston may have attached thereto a stop member which will allow the piston to travel only a fixed distance in the cylinder to avoid striking the cylinder head. The piston arm which is attached to the piston cylinder defines an elongated conduit or passageway into which is arranged a longitudinal member or an actuating arm which moves slidably therein and is adapted to cause fluid communication between the inlet of the piston cylinder and the longitudinal passageway on actuation by its striking against a cylinder head of the piston cylinder. Arranged in the conduit or passageway remote to the longitudinal or actuating arm is a warning device such as a siren type whistle or an air horn or a simple whistle employing a reed or vibrating assembly which causes a sound to be emitted on the flow of gasiform fluid thereby. The piston assembly is adapted to be urged toward the inlet end of the cylinder by a tension means while the longitudinal member or actuating arm is urged against a seating assembly by a tension means arranged in the longitudinal passageway or conduit intermediate the actuating arm and the warning device. The piston arm is adapted to be attached to a braking assembly as described in the aforementioned patents, supra, to Crookston.

The present invention will be illustrated by reference to the drawing in which Figure 1 is a sectional view of an embodiment thereof;

Fig. 2 is a view showing another embodiment of a warning device for use in the combination of the invention. This figure shows a siren-type air whistle which is of a different design from that of Fig. 1 and which may be substituted for the siren-type whistle of Fig. 1; and

Fig. 3 is a view showing another embodiment of a warning device suitable for use in the combination of the present invention. The warning device of this embodiment is an air horn.

Referring now to the drawing, numeral 11 designates an air cylinder defining an inlet 12 and an outlet 13. Outlet 13 actually is a breather hole for the tail end of the piston to allow air or fluid to be exhausted from the piston cylinder as will be described. Arranged in cylinder 11 is a piston member 14 provided with annular seal-

ing members 15 to cause a seal between the piston 14 and the interior surface of cylinder 11. Piston 14 is provided with a stop 16 and a piston arm or rod 17 attached thereto. In stop 16 and protruding into chamber 11 is a longitudinal member or actuating arm 18 which also protrudes into an internal conduit or passageway 19 defined by piston arm 17. Actuating arm 18 makes a sliding fit with stop 16 which is sealed by O-ring 20. Arm 18 makes a seal with annular shoulder 21 and O-ring 22 against passage of fluid into conduit 19 through lateral passageways 23 defined by piston arm 17 communicating with the interior of cylinder 11 and thereby with inlet 12. Piston arm 17 is sealed against loss of fluid by a sealing ring or annular seal 24 abutting against a shoulder 25 of piston cylinder 11. Arranged in piston arm 17 is a siren type whistle 26 having rotating vanes 26a. Urging actuating arm 18 against the shoulder 21 is a tension means 27 illustrated by helical coil spring arranged in conduit or passageway 19. Communicating and forming a part of passageway 19 are ports 28 which allow gasiform fluid to be introduced into the warning means. The warning means 26 is provided with a hollow retaining nut 29 provided with outlets 29a to the atmosphere. Retaining nut 29 is surrounded by a connecting or knuckle joint 30 attached thereto which may be employed in attaching the piston arm to the device to be actuated thereby such as air brakes and the like.

Urging piston 14 against the end adjacent the inlet thereof is a compression means 31 illustrated by a helical coil spring. The compression means 31 is arranged in a recess 32 defined by cylinder head 33 and a corresponding recess 34 defined by piston 14.

Referring now to Fig. 2, numeral 40 designates a housing or case enclosing a siren-type air whistle which may be used in lieu of the warning means 26. The housing 40 is provided with a plurality of inlet ports 41 by way of which air or other gasiform fluid is introduced to the siren-type air whistle from the passageway 19. Arranged in the housing 40 is a rotor 42 which rotates in bearings 43 and 44. Arranged immediately below the rotor 42 is a ball bearing 45 for ease of rotation of the rotor 42. The head piece 46 provides a recessed space in which the bearing 44 and ball bearing 45 are inserted. The head piece 46 also defines outlet ports 47 for discharge of the sound from the siren-type air whistle.

In Fig. 3 is shown an illustration of an air horn 50 which may be used in lieu of the warning means 26 or the siren-type air whistle described in Fig. 2.

Referring now to Fig. 3, an air horn 50 is provided with a base member 51 in which is arranged a diaphragm 52. A passageway 53 in the base member 51 communicates with passageway 19 by a flexible conduit 19a and allows air or other gasiform fluids to be forced against the diaphragm 52. Arranged in contact with the diaphragm 52 is an adjusting means 54 surrounded by an adjusting spring 55. The adjusting means 54 and spring 55 have compression placed thereon by an adjusting screw 56 which is held in place by a lock-nut 57. Connected to the base member 51 is a throat 58 which terminates in an open end bell 59 for amplification of the sound.

The present invention may be operated as follows: Assuming that the knuckle joint 30 is connected to an air brake of the type described supra in the pending applications to Crookston, air or other gasiform fluid is introduced in the cylinder 11 by inlet 12. This air under pressure urges piston member 14 upwardly causing corresponding movement of the piston arm 17 and tightening of air brakes not shown. If the air brakes are worn or need replacing there is a tendency for the piston 14 to travel as far as the piston cylinder will allow it and, in fact, there is danger of it striking against the cylinder head 33. However, the stop member 16 is designed to prevent the piston 14 from striking piston cylinder head 33, but if the stop member struck the head 33, both the stop member and the cylinder head might be damaged. In accordance with the device of the present invention the actuating arm or longitudinal member 18 strikes against head 33 and is thereby caused to move downwardly. As the actuating arm 18 moves down the tension means 27 is compressed and the seal between the O-ring 22 and the shoulder 21 is broken allowing air from inlet 12 and cylinder 11 to travel through passageway 23 into conduit 19 and thence through warning device 26, the sounding of which indicates to the operator that the piston is overstroking. In an operating unit the total stroke of the piston is approximately 3 inches whereas the warning device begins to sound on a travel of 1⅞ inches precluding any damage to the apparatus. When the adjustment is made, the spring or tension member 27 returns the arm 18 to its inoperative position and when air is released from inlet 12 the helical spring 31 causes the piston member 14 to move down toward the inlet end. Any air which has leaked past the annular seal 15 into the chamber defined by cylinder 11 may be exhausted by breather hole 13. This outlet serves merely to prevent compression of air in the cylinder 11 and to allow ready functioning of the apparatus.

The modification of Figs. 2 and 3 operate similarly to that of Fig. 1. In Fig. 2 the air from passageway 19 is introduced through ports 41 which causes the rotor 40 to rotate radially and on passage through opening 48 causes the emission of the warning sound.

Similarly, the device of Fig. 3 is activated by air or gasiform fluid introduced through passageway 53 from passageway 19 which causes the diaphragm 52 to vibrate and generate sound waves which are discharged through throat 58 and bell 59.

It will be apparent from the foregoing description taken with the drawing that the apparatus of the present invention cannot be dismantled or inactivated without the operator dismantling the whole apparatus in view of the built-in features and in view of the warning device being made an integral part of the apparatus.

It will be understood that alterations may be made in the relative sizes, shapes and positions of the parts of the apparatus of the present invention without departing from the spirit and scope thereof.

The nature and objects of the present invention having been completely described and illustrated, what I wish to claim as new and useful and secure by Letters Patent is:

1. A device for indicating piston overstroking which comprises, in combination, a piston cylinder having an inlet at one end thereof for a gasiform fluid, a piston arranged in said cylinder ahead of said inlet provided with a stop member for preventing said piston from traveling beyond a fixed point in said cylinder, compression means in said cylinder adapted to

return said piston to the inlet end thereof, a piston arm attached to said piston provided with a longitudinal passageway extending substantially the length of said arm and a lateral passageway communicating with said inlet and said longitudinal passageway, a longitudinal member protruding through said stop member into said cylinder and extending through said piston into said longitudinal passageway, sealing means in said longitudinal passageway adapted to prevent passage of fluid from said inlet to said longitudinal passageway, tension means urging said longitudinal member against said sealing means, and a gasiform fluid operated warning means attached to said piston arm in said longitudinal passageway.

2. A device in accordance with claim 1 in which the warning device is a siren type whistle.

3. A device for indicating piston overstroking which comprises, in combination, a piston cylinder having an inlet for a gasiform fluid, a piston arranged in said cylinder, a piston arm attached to said piston provided with a conduit extending a substantial portion of the length of said arm and a lateral passageway communicating with said conduit and said cylinder, an actuating member in said conduit protruding through said piston and into said cylinder, and a warning device attached to said piston arm in said conduit in remote relationship to said actuating member and said lateral passageway and adapted to be operated by a gasiform fluid introduced through said passageway into said conduit by impingement of said actuating member against a head of said cylinder.

4. A device in accordance with claim 3 in which the piston is provided with a fixed stop member for limiting the travel thereof.

5. A device in accordance with claim 3 in which the warning device is a siren type whistle.

6. A device for indicating piston overstroking which comprises, in combination, a piston cylinder having an inlet for a gasiform fluid, a piston arranged in said cylinder, a piston arm attached to said piston provided with a conduit extending a substantial portion of the length of said arm and in fluid communication with said chamber, a warning device adapted to be operated by a gasiform fluid attached to said piston arm in said conduit, a sealing member arranged in said conduit to assume a sealing position, sealing said warning device from said chamber and movable to an open position to allow communication between said warning device and said chamber, an actuating member for said sealing member arranged in said conduit and protruding into said cylinder and adapted to be operated by impingement against the head of said cylinder to move said sealing member from its sealing position to its open position.

ROBERT R. CROOKSTON.

REFERENCES CITED

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

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