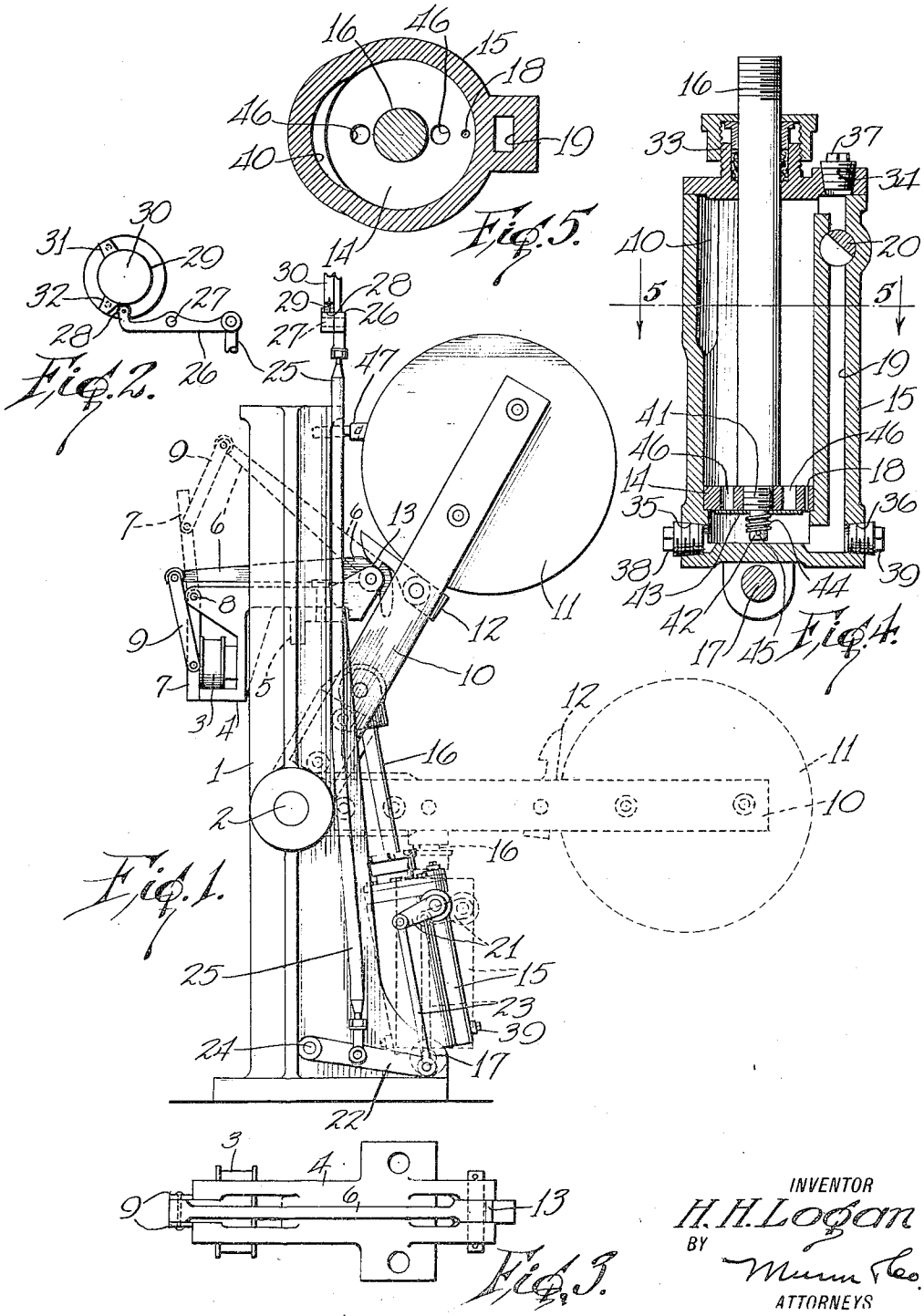
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H. H. LOGAN

SAFETY CONTROL DEVICE

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UNITED STATES PATENT OFFICE.

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SAFETY CONTROL DEVICE.

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To all whom it may concern:

Be it known that I, HENRY H. LOGAN, a subject of the King of England, who has declared his intention of becoming a citizen of the United States, and who is a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Safety Control Devices, of which the following is a full, clear, and exact description.

My invention relates to improvements in safety control devices, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a safety control device for the cable drum of a hoist, which when actuated will automatically bring the drum to an abrupt stop when the cage carried by the drum is near the upper or lower end of its movement, and which will gradually bring the drum to a stop when the cage is in the middle of its movement.

A further object of my invention is to provide a device of the type described which may be easily reset after each operation thereof.

A further object of my invention is to provide a device of the type described in which a weight is electrically controlled and which is adapted to apply the brake to the drum.

A further object of my invention is to provide a device of the type described in which only a relatively small magnet is required to hold the weight which applies the brake to the drum.

A further object of my invention is to provide a device of the type described in which the various parts are mounted on a single support.

A further object of my invention is to provide a device of the character described which consists of relatively few parts, is effective for the purpose intended, and which is not likely to easily get out of order.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which—

Figure 1 is a side elevation of the device,

Figure 2 is a side elevation of a portion of the device,

Figure 3 is a plan view of a portion of the device,

Figure 4 is a sectional view of a portion of the device, and

Figure 5 is a section along the line 5—5 of Figure 4.

In carrying out my invention, I provide a pedestal 1 in which is rotatably disposed a shaft 2. A magnet 3 is mounted on a support 4, the latter being carried by a bracket 5 of the pedestal 1. The support 4 has pivotally mounted thereon a switch arm 6 of the shape shown in Figures 1 and 3. The support 4 also has a plate 7 pivotally connected thereto at 8, the plate 7 being made of a magnetic material and adapted to be held in engagement with the magnet 3 when the latter is energized. A link 9 connects the arm 6 to the plate 7.

The shaft 2 has rigidly secured thereto an arm 10 which carries at its outer end a weight 11. The arm 10 also carries a trigger 12 which is adapted to be received in a recess 13 of the arm 6. The movement of the weight 11 from the full line position shown in Figure 1 to the dotted line position, is regulated by a piston 14 which is disposed in a cylinder 15 and which is operatively connected by means of a piston rod 16 to the arm 10. The cylinder 15 is pivotally mounted at the lower end thereof to a rod 17, the latter being carried by the pedestal 1. The cylinder 15 is filled with a fluid which is adapted to pass from beneath the piston 14 to above the piston 14 by means of a small opening 18 when the piston is moved by weight 11 which has been released in a manner hereafter described. This permits the piston 14 to move slowly from the top of the cylinder to the bottom thereof, thereby slowly rotating the shaft 2. As will be seen in Figure 4, the cylinder 15 has a by-pass 19 in the wall thereof which communicates with the bottom and with the top of the piston. This by-pass is controlled by a valve 20, the latter being actuated by an arm 21. Referring now to Figure 1, it will be seen that the arm 21 is connected to a lever 22 by means of a link 23. The lever 22 is pivotally secured to the pedestal 1 at 24 and is actuated by a rod 25. The rod 25 in turn is pivotally secured to one end of a lever 26 which is fulcrumed at 27 to a support (not

shown). The other end of the lever 26 has a roller 28 which rides on the cam surface 29 of a cam 30. The cam 30 is supported by the base 1 by means of a bracket, not shown. It will therefore be seen that when the roller 28 strikes either of the projections 31 or 32, it will rock the lever 26 so as to open the valve 20 and to permit the fluid in the bottom of the cylinder 15 to quickly pass above the cylinder by means of the by-pass 19, thus permitting the piston 14 to move rapidly downward and to quickly rotate the shaft 2. The cylinder 15 is provided with the ordinary packing gland 33 and is also provided with a fluid inlet 34 and with two fluid outlets 35 and 36. The inlet 34 and the outlets 35 and 36 have screw plugs 37, 38, and 39, respectively, disposed therein. The interior of the piston 15 has a groove 40 in the upper portion of the wall thereof which permits the fluid to quickly pass by the piston 14 when the piston first starts on its downward movement (see Figures 4 and 5). The piston rod 16 is reduced at 41 so as to receive the piston 14, and is again reduced at 42 so as to receive a disk 43. The disk 43 is slidably disposed on the portion 42 and is yieldably held against the under side of the piston 14 by means of a spring 44. The spring 44 bears against the under side of the disk 43 and against a pin 45 which is carried by the portion 42 of the piston rod 16. The piston 14 is further provided with a plurality of large openings 46 therein which are normally closed by the disk 43.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. The shaft 2 is connected by any means (not shown) to the brake mechanism of the cable drum. The cam 30 is also connected by a means (not shown) to the cable drum so that it will make a fraction less than one revolution during the entire movement of the cage which is carried by the cable drum. The magnet 3 is preferably connected in either of two ways: i. e., first in series with the oil switch (not shown), or with a circuit breaker (not shown) whereby an overload, a failure of the current, or the opening of the circuit breaker will deenergize the magnet 3; and second, in series with a switch (not shown) which is operated by the cam 30, whereby the opening of the switch will deenergize the magnet 3. The magnet 3 is also in series with a plurality of switch boxes (not shown) which are disposed along the line of travel of the cage. It will also be obvious that under some conditions one switch box may be disposed in the cage itself and be actuated by the person within the cage.

It is obvious that during the movement of the cage in the mine shaft, one of the following circumstances may arise; first, the engineer controlling the device may be careless, or he may fall asleep, faint or drop dead; second, an accident may happen to the actuating mechanism; or third, the cage may not be retarded soon enough at the end of its movement. In the event that any of the above circumstances take place, one of the switches in series with the magnet 3 will be opened, thereby deenergizing the magnet. The plate 7 will then be swung about its pivot 8 due to the weight 11 which pulls on the arm 6. As the plate 7 swings from the full line position to the dotted line position shown in Figure 1, the arm 6 will swing from the full line position to the dotted line position and will release the trigger 12 from the recess 13 in the arm. It will here be noted that the arm 6 is provided with a curved surface adjacent to the recess 13 which forces the trigger 12 out of the recess 13 when the arm 6 is swung. The weight 11 would now descend abruptly to the position shown by the dotted lines if it were not for the piston rod 16. If the magnet 3 had been deenergized when the cage was midway its movement, the valve 20 would not be opened, since neither of the projections 31 or 32 on the cam 30 would be in engagement with the roller 28. The piston 14 which is actuated by the weight 11 will rapidly move downward in the cylinder 15 during the first portion of its stroke, since the fluid beneath the piston will quickly pass above the piston by means of the groove 40. As soon as the groove 40 has been closed by the piston 14, the movement of the piston will be retarded, since the fluid will now be compelled to pass through the opening 18. As heretofore stated, the slow movement of the weight 11 from the full line position to the dotted line position will cause a slow rotation of the shaft 2 and will therefore apply the brakes on the cable drum so as to bring the cage to a slow stop.

The device can now be readily reset by merely moving the weight 11 from its dotted line position to the full line position, the trigger 12 in the meantime bearing against the arm 2 so as to swing the latter from the dotted line position to the full line position. During the movement of the arm 6, the plate 7 is returned to its full line position and the now energized magnet 3 will hold the plate 7 in this position. Due to the toggle connection between the arm 6 and the plate 7, the relatively small force exerted on the plate 7 will hold a relatively large weight, such as the weight 11.

Assume now that the magnet 3 has been deenergized when the cage is near the upper or lower end of its movement. In this event either of the projections 31 or 32 on the cam 30 will engage the roller 28. The lever 26 will swing about its pivot 27 and will, by means of the rod 25, the lever 22,

and the link 23, actuate the valve 20 so as to open the by-pass 19. The weight 11 will be permitted to fall rapidly, since the fluid beneath the piston will quickly pass to above the piston by means of the by-pass 19, thus permitting the piston 14 to move rapidly downward in the cylinder 15. The shaft 2 will therefore be quickly rotated and will in turn apply the brakes on the drum so as to bring the cage to an abrupt stop.

When resetting the device, the piston 14 can be easily moved upward in the cylinder 15, since the fluid above the piston will pass beneath the piston by means of the openings 46. The fluid in passing through the openings 46 will move the disk 43 away from the piston 14 and against the tension of the spring 44.

The weight 11 also carries one member of a switch 47 which is adapted to contact with the other member, the other member being carried by the pedestal 1. This switch is used for opening the master control circuit and will be instantly opened as soon as the weight 11 starts on its downward movement.

As heretofore stated, I have provided a device which is combined in a single unit and which can therefore be readily moved when desired. The device is relatively simple in construction and is effective for the purpose intended.

I claim:

1. A cylinder having a piston therein, said piston having a small opening therein and having a plurality of larger openings therein, a spring pressed disc disposed on the underside of said piston and being adapted to close the larger openings, said cylinder having a groove in the upper end thereof, a bore in the wall of said cylinder and communicating with the top and bottom of said cylinder, and a valve disposed in the bore.

2. In a device of the type described, a cylinder having a fluid therein, a piston mounted in said cylinder, a bore in the wall of said cylinder and communicating with the top and bottom of said cylinder, a valve disposed in the bore, a support, a lever carried by said support, a link secured to said lever and being adapted to actuate said valve, a rotatable cam, a second lever adapted to be actuated by said cam, and a rod connecting said second named lever to said first named lever.

3. A cylinder having a piston therein, said piston having a small opening therein, and a plurality of larger openings therein, and a spring pressed disc being adapted to abut the underside of said piston and to automatically close the larger openings when said piston is moving downwardly in the cylinder.

4. In a device of the type described, a cylinder, a piston mounted in said cylinder, a bore in the wall of said cylinder and communicating with the top and bottom of said cylinder, a valve disposed in the bore, a support, a lever carried by said support, a link secured to said lever and being adapted to actuate said valve, a rotatable cam, a second lever adapted to be actuated by said cam, and a rod connecting said second named lever to said first named lever, said cylinder, cam, and levers being carried by said support.

HENRY H. LOGAN.