Oct. 30, 1951 L. HOFFMAN 2,573,139

SWITCH MECHANISM

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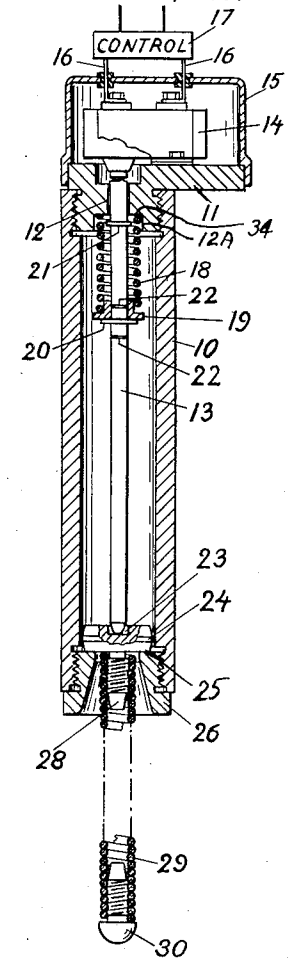


Fig. 1

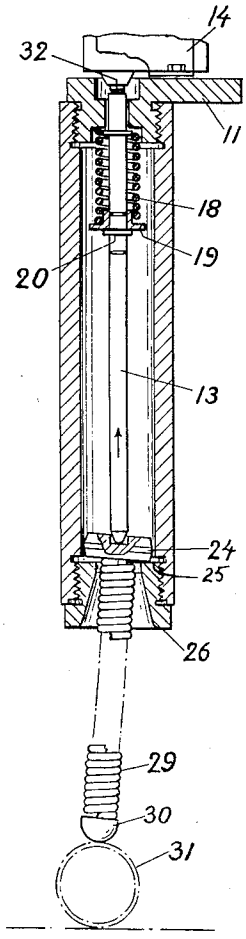


Fig. 2

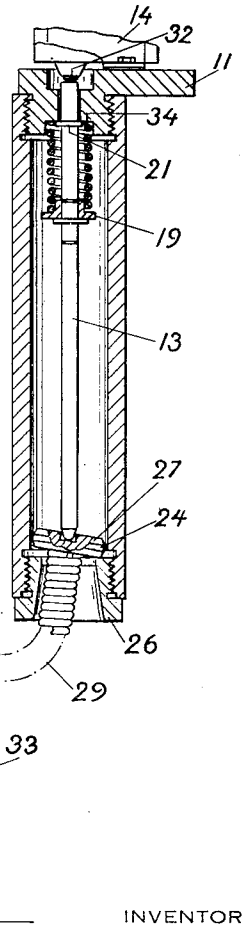


Fig. 3

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SWITCH MECHANISM

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4 Claims. (Cl. 200—153)

1

This invention relates to a flexible operator deflectable to operate a switch or the like.

Frequently, an electric control switch must be arranged with an actuator suitable for operation by various size articles, such as in a testing machine, a counter, a loading machine, etc. A fixed rigid member or lever system is not entirely satisfactory for such purposes because of differences in size of the objects encountered. This problem arises, for example, in a testing machine suitable for internal fluid pressure testing of a pipe such as described in copending application, Serial No. 139,559, filed January 20, 1950.

In a tube testing device, the pipe may roll from a loading point to loading and clamping carriages where the pipe is clamped and sealing heads advanced over the end of the pipe. Water or fluid is then fed to the interior of the pipe and pressure placed thereon so as to test the mechanical strength of the pipe and to locate leaks.

In testing machines or sorting machines, it is frequently necessary to detect the presence of articles or to start operations of the machine thereby.

One of the objects of this invention is to provide a switch or the like with a flexible deflectable actuator which will operate regardless of the size of the pipe or article within certain limits and regardless of the alignment of the pipe or article relative to the switch. Also, the flexible actuator will permit passage of the article past the actuator.

In one aspect of the invention, a switch of any suitable type can be employed and a reciprocable element associated therewith for operating the switch. The reciprocable element in turn is associated with a flexible actuator or feeler finger. When the feeler finger is contacted by an article, deflection thereof will cause reciprocation of the reciprocable element and actuation of the switch.

In a preferred embodiment, a snap acting switch is employed in conjunction with a reciprocable rod or element movable to actuate the switch. One end of the rod is in contact with a tiltable operating disc, or button member, the tiltable operating member having an associated fulcrum or abutment means about which it can rock. A flexible actuator member, preferably a spiral spring, is attached to the tiltable operating member, said flexible member being arranged so that it can be contacted by the object which is to cause actuation of the switch. Upon contact of the flexible actuator by the object, the actuator will be moved sidewise or deflected, which in turn will cause a tilting of the tiltable operating

2

member. Inasmuch as the reciprocating rod is connected with, or in contact with the tiltable operating member, reciprocation thereof will occur so as to operate the snap acting switch.

Regardless of the point or line of contact of the object with the flexible actuator, the switch will be operated by deflection of the actuator from its normal condition. As mentioned, the flexible actuator preferably is a spiral spring which is selected of the proper stiffness and characteristics to operate the tilting member and reciprocate the switch operator.

These and other objects, advantages and features of the invention will become apparent from the following description and drawing.

In the drawing:

Figure 1 is a sectional view of one form of the invention, the control box being shown diagrammatically.

Figure 2 is similar to Figure 1 with the exception that the switch is shown operated by a small object such as a small diameter pipe.

Figure 3 is similar to Figure 2 with the exception that a larger pipe is shown deflecting the spiral spring.

The invention will be described for a switch used in conjunction with a pipe testing machine but it is obvious that it can be used in many other manners. A snap acting switch of the type sold under the trade-mark "Micro-switch" is illustrated but other types of snap-acting or reciprocable operator switches can be employed.

Housing **10**, (Fig. 1) may have a switch base **11** screw threadedly engaged at one end thereof. Reciprocable operating rod or plunger **13** can be guided at its upper or one end in aperture **12** of switch base **11**, the other end of reciprocable rod **13** being located in recess **23**, of the tiltable disc, button, or operating member **24**. "Micro-switch" or other operated element **14** can be mounted on switch base **11**. Cover cap **15** can be held on base **11** in water tight relationship therewith.

Switch leads **16** from switch **14** are indicated as being connected with a suitable control relay or control box **17**. Spring **18** surrounding reciprocable rod **13** has one end in recess **12A** of switch base **11**. The other end abuts annular member or ring **19**, said ring being held in place by split retaining washer **20**. Retaining washer **20** may be of a split washer type engaged in an annular cut in the reciprocable rod **13**. Another split washer **21** is engaged in another annular cut in the reciprocating rod **13** for the purpose of limiting upward movement of the reciprocating rod **13**. A plurality of annular cuts **22** may be provided in

the reciprocating rod 13 for the purpose of alternately receiving split washer or ring 20 so that the tension of the spring can be adjusted as desired.

Tiltable operating member or disc 24 may normally rest on the face 25 of retaining plug 26, said plug being screw-threadedly engaged with the housing 10. The disc 24 normally rests on the upper flat face of plug 26. Disc 24 may have a projection 28 (Fig. 1) with threads cut therein receiving flexible spiral spring 29. A tip 30 may be screw-threadedly engaged in the outer end of spiral spring 29.

In operation, the switch is placed in such a position that articles or objects will contact the spiral spring 29. When a small article, such as pipe 31 (Fig. 2) is involved, contact will be made with spring tip 30 and cause deflection of spring 29 to the left. Movement of spring 29 to the left will in turn cause a tilting of tiltable operating member 24 about the upper face or fulcrum 25 of retaining plug 26. This will result in rod 13 being moved upwardly and thus operate button 32 of switch 14. Thus, a comparatively small movement of spring 29 from the vertical will cause an operation of the switch 14 and the pipe 31 can pass by the flexible actuator 29 after the operation without hindrance.

In the event a large diameter pipe is involved, it is desirable to arrange the device so that the switch will operate and yet permit passage of the pipe or other article past spring 29. In Figure 3, pipe 33 is seen as it passes the spring 29 tilting the tiltable operating member 24 to move reciprocable rod 13 upwardly and operate switch 14. The spring 29 will permit movement of the large diameter pipe 33 past the switch. Upward movement of the reciprocable rod 13 is limited by split ring 21 contacting face 34 of recess 12A in base 11.

Regardless of the direction of travel of the object, the switch will be operated upon a comparatively slight movement of the spring or flexible actuator 29.

It is evident that details of construction and use of the invention may be varied without departing from the spirit of the invention except as defined by the appended claims.

What is claimed is:

1. In a switch mechanism or the like, a housing having a bore with a fulcrum face located transversely of the bore axis, a tiltable operating button tiltable on said face, a reciprocable operating member connected to one side of said button and extending longitudinally into said bore, and a flexible actuator extending outwardly from the opposite side of said button, said button being tiltable by deflection of said flexible actuator to reciprocate said operator.

2. In a switch mechanism or the like, a housing having a bore with a fulcrum face located transversely of the bore axis, a tiltable operating button tiltable on said face, a reciprocable operating member connected to one side of said button and extending longitudinally into said bore, and a spiral spring extending outwardly from the opposite side of said button, said button being tiltable by deflection of said spiral spring to reciprocate said operator.

3. In a pipe testing machine or the like, having operating mechanism and feeler switch control means, the combination including a switch means connected with said mechanism for controlling operation of said machine, a housing having a fulcrum surface, a universably tiltable operating member having a fulcrum engaging surface, a reciprocable switch actuator contactable with an operating member on said switch means and with said tiltable operating member, and a flexible feeler member located in the path of the pipe, said feeler member being connected to said tiltable operating member for tilting the same and reciprocably moving the actuator and operating the switch means when the flexible member is deflected, said flexible member being deflectable by pipe of various sizes passing by the same to control said machine.

4. In a pipe testing machine or the like, having operating mechanism and feeler switch control means, the combination including a switch means connected with said mechanism for controlling operation of said machine, a housing having a bore with a fulcrum face located transverse of the bore axis, a universably tiltable operating button tiltable on said fulcrum face, a reciprocable switch actuator contactable with an operating member on said switch and with said tiltable operating member, and a flexible feeler member located in the path of the pipe, said feeler member being connected to said tiltable operating member for tilting the same and reciprocably moving the actuator and operating the switch means when the flexible member is deflected, said flexible member being deflectable by pipe of various sizes passing the same to control said machine.

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