Sept. 15, 1970 H. L. DOBRIKIN 3,529,107

DOUBLE THROW SWITCH

Filed May 9, 1968 2 Sheets-Sheet 1

Fig. 1.

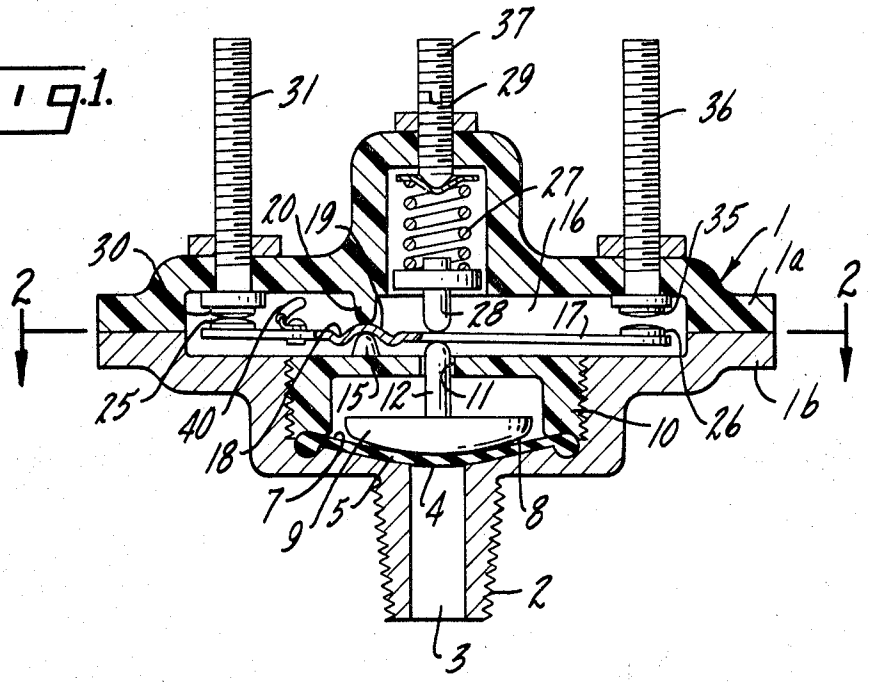
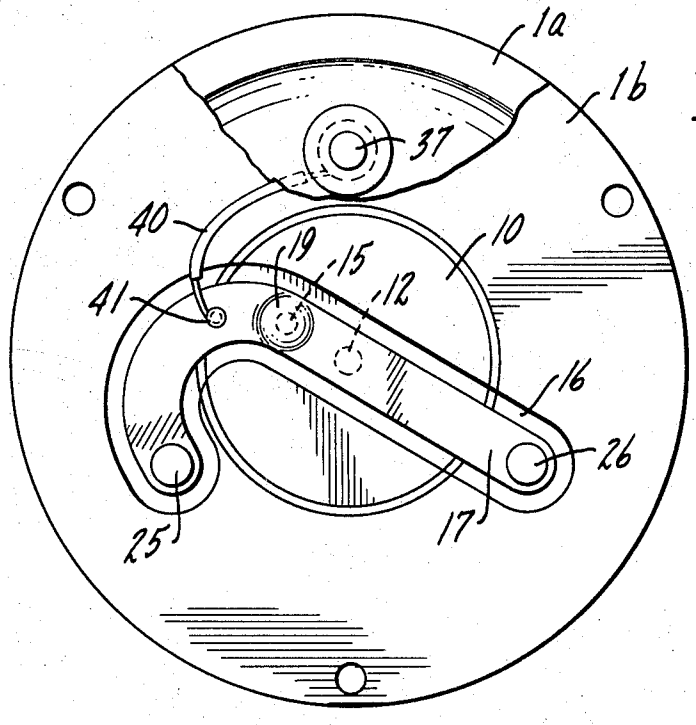



Fig. 2.




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Fig. 3.

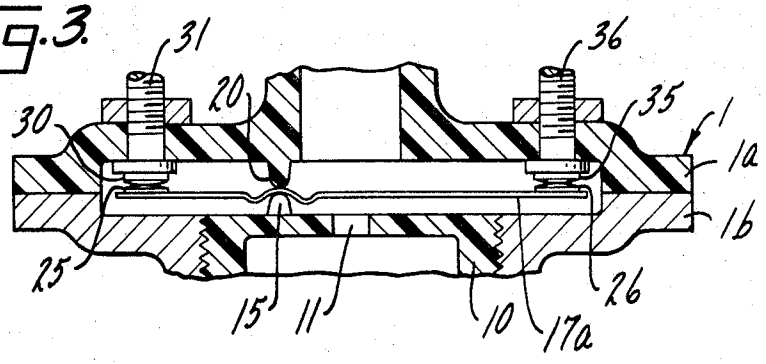



Fig. 4.

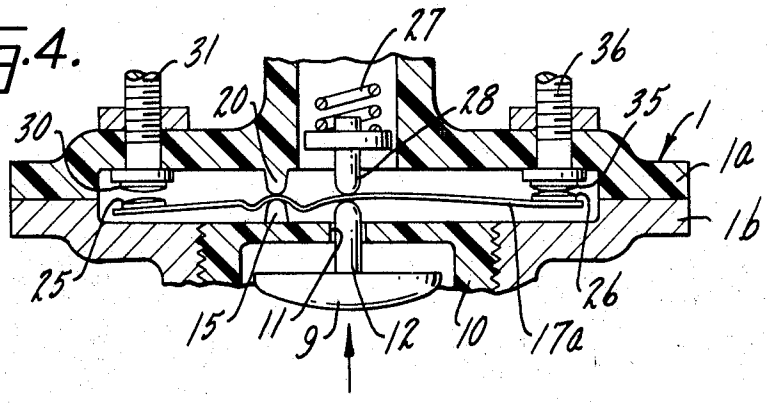
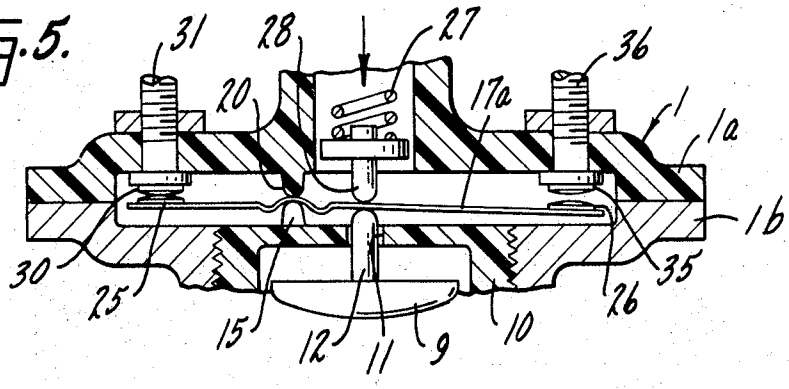



Fig. 5.




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3,529,107

# DOUBLE THROW SWITCH

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U.S. Cl. 200—83 9 Claims

## ABSTRACT OF THE DISCLOSURE

A double throw switch having a pair of spaced terminals, a flexible switch arm fulcrummed intermediate its ends and between said terminals, the switch arm carrying contact elements at its opposite ends and being urged about said fulcrum in one direction in response to fluid pressure and urged in an opposite direction by a spring.

## SUMMARY OF THE INVENTION

Within a housing, a diaphragm is responsive to fluid pressure entering the housing to move a motion-transmitting member which is in engagement with a flexible switch arm fulcrummed within the housing. The fulcrum for the switch arm is positioned between a pair of contact members within the housing, the switch arm carrying a contact element adjacent each of its ends. A yielding means engages the opposite surface of the switch arm in substantial alignment with the motion-transmitting member whereby the switch arm is moved in relation to its fulcrum in one direction in response to fluid pressure entering said housing and in the opposite direction in response to diminution of said fluid pressure and the action of said yielding means. The switch arm has a source of electrical energy connected thereto and is generally J-formed in planar configuration to provide for the desired movement of the arm portions on opposite sides of said fulcrum, while retaining the switch arm within a circular housing of minimum dimension and accommodating a 90° circumferential spacing of terminals.

This invention relates to switches, and has particular relation to switches employable in connection with fluid pressure brake systems for vehicles.

One purpose of the invention is to provide a stop light switch responsive to predetermined fluid pressure in a vehicle brake system for rapid and positive illumination of the stop light signal indicating a brakes-on condition.

Another purpose is to provide a double throw, pressure-responsive switch of maximum simplicity having a switch arm fulcrummed intermediate its ends and carrying contact elements adjacent its ends for alternate engagement with spaced contact members.

Another purpose is to provide a pressure-responsive stop light switch insuring a means for passage of electrical energy therethrough at all times.

Another purpose is to provide a double throw, fluid pressure-responsive switch of maximum simplicity and minimum cost in manufacture, while providing for an extended useful life thereof.

Other purposes may appear from time to time during the course of the specification and claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention illustrated more or less diagrammatically in the accompanying drawings wherein:

FIG. 1 is a side view with parts in cross section and moved slightly for clarity;

FIG. 2 is a top view, taken substantially on a line 2—2 of FIG. 1 and with parts broken away;

FIG. 3 is a detail view of one form of the invention;



FIG. 4 is a view similar to that of FIG. 3 with parts in another position; and

FIG. 5 is a view similar to that of FIG. 3 with parts in still another position.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the numeral **1** generally designates a housing formed of cover part **1***a* and base part **1***b*. A fitting **2** carried by housing part **1***b* defines a fluid pressure entry passage **3** positioned to deliver fluid pressure to one side **4** of a diaphragm **5**. The opposite side **7** of diaphragm **5** engages a spherical end surface **8** of a motion-transmitting member **9**. An internal housing part **10** has a generally centrally positioned aperture **11** through which an extension **12**, having a generally rounded or spherical end surface, extends. Housing part **10** carries an upstanding fulcrum portion **15** extending into a switch arm chamber **16**.

Within chamber **16** a flexible switch arm **17** of electrical energy-transmitting material extends. As may be best seen in FIG. 2, the arm **17** generally takes the form of a J in planar configuration to provide for its reception within a generally circular housing **1** of minimum diameter and to produce the action desired as described below. Intermediate its ends the switch arm **17** is downwardly offset as indicated at **18**. Within the offset area **18** the switch arm is upwardly struck or offset, as indicated at **19**. The upset portions **18** and **19** provide a seat for fulcrum **15**. A finger **20** depends from housing cover part **1***a* and contacts the upper surface, as the parts are shown, of upset **19** in alignment with fulcrum **15**.

Adjacent its opposite ends, the arm **17** carries upwardly disposed contact elements **25**, **26**. As the parts are shown, the elements **25** and **26** are carried on the upper surface of arm **17**. A yielding means, such as the spring **27**, is received within housing part **1***a* on the opposite side of chamber **16** from member **9**. Spring **27** urges a motion-transmitting member **28** having a curved or spherical end surface similar to that of extension **12**, against said upper surface of arm **17** in substantially axial alignment with extension **12**. Means **29** preferably engages housing part **1***a* for adjustment of the effect of spring **27**.

Positioned within chamber **16** and in vertical alignment, as the parts are shown, with contact element **25** is a contact member **30**. Terminal post **31** is secured to member **30** and extends upwardly out of housing **1**. Similarly, a contact member **35** is positioned in chamber **16** in substantially vertical alignment with contact element **26** and terminal post **36** is secured to contact member **35** and extends upwardly out of housing **1**. A terminal post **37** extends from a point externally of housing **1** to a position within housing **1** from whence an electrical conductor, such as the wire indicated for example at **40** in FIG. 2, extends, the wire **40** being secured to arm **17** as indicated for example **41**.

FIGS. 3, 4 and 5 illustrate the employment of an arm **17***a* of flexible material positioned, as seen in FIG. 3, so as to engage contact elements **25** and **26** with contact members **30**, **35** when arm **17***a* is in its free state. FIG. 4 illustrates the condition when fluid pressure at a predetermined safe level is delivered to diaphragm **5** through inlet **3**. FIG. 5 illustrates the condition when fluid pressure is absent from or below a safe level at inlet **3**.

Whereas there has been shown and described an operative form of the invention, it should be understood that this showing and description are to be taken in an illustrative or diagrammatic sense only. There are many modifications in and to the invention which will be apparent to those skilled in the art and which will fall within the scope and spirit of the invention.

The use and operation of the invention are as follows:

With fluid pressure in the emergency brake system of the vehicle, said fluid pressure will be present at inlet **3** and if said fluid pressure be at the safe predetermined level, the diaphragm **5** will be urged inwardly of housing **1** as will member **9** to move switch arm **17** about or on its fulcrum **15**. The movement of arm **17** on fulcrum **15** produces an upward movement of contact element **26**, as the parts are shown in FIG. 1, a corresponding downward movement of contact element **25** to provide for engagement of element **26** with contact member **35** and a separation of contact element **25** from contact member **30**. It will be understood that contact member **35** is incorporated with the normal electrical system provided for normal service brake operation and that engagement of element **26** with contact member **35** will insure delivery of electrical energy through a service system stop light switch for illumination of a stop light, for example, in response to normal brake operation through said service system.

Should, however, there occur a leak or break in the emergency air brake system, the resulting diminution of fluid pressure in said system will also occur at inlet **3** and spring **27** will move member **12**, arm **17**, member **9** and diaphragm **5** into the position shown in FIG. 1, the arm **17** being moved in the opposite direction from that occurring when fluid pressure is delivered at inlet **3** above a predetermined level. With the parts as shown in FIG. 1, contact element **26** is fully separated from contact member **35** and contact member **25** is in engagement with member **30**. Electrical energy thus delivered by terminal **37**, wire **40** and connection **41** to the arm **17** is delivered through the contact element **25** and contact member **30** to the post **31** and thus to the stop light (not shown) for illumination thereof.

With the arrangement of FIG. 1, a momentary null position is possible in which arm **17**, during its excursion from a position wherein element **26** engages member **35** and element **25** is separated from member **30** to a position in which element **26** and member **35** are separated and element **25** engages member **30**. In such position, a vehicle stop light would not be illuminated even though the operator was applying service system brakes or the automatic emergency brake application was occurring. While such position would be occupied only momentarily, it is eliminated in the arrangement of FIGS. 3–5, wherein an arm **17***a* is formed of flexible, springlike material and positioned to engage elements **25** and **26** with members **30** and **35**, respectively. Pressure delivered to diaphragm **5** deforms or flexes the portion of arm **17***a* to the right of fulcrum **15**, as the parts are shown, to maintain engagement of element **26** with member **35** and to deflect or "spring" the left-hand portion of arm **17***a* downwardly to separate element **25** from member **30**. Similarly, spring **27**, with diminished pressure at inlet **3**, bows or deflects the right-hand portion of arm **17***a* downwardly to separate element **26** from member **35**. It will be realized that the left-hand portion of arm **17***a* will snap element **25** into engagement with member **30** immediately upon downward movement of extension **12** to illuminate a stop light upon application of emergency brakes.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

**1.** A double throw switch including a housing, a culcrum in said housing, a switch arm of springlike material and having an intermediate portion seated on said fulcrum, a contact member on each side of said fulcrum, a contact element carried adjacent each of the opposite ends of said arm, a diaphragm in said housing, a fluid pressure inlet positioned in said housing for delivery of fluid pressure to one side of said diaphragm, a motion-transmitting member engaging the opposite side of said diaphragm, said motion-transmitting member having a portion engaging one surface of said arm at one side of said fulcrum, a yielding means engaging the opposite surface of said arm on said side of said fulcrum, an electrical energy conductor connected to said arm, and offset portions positiond on said arm intermediate its ends, said offset portions being and defining a fulcrum seat therewithin.

**2.** The structure of claim **1** wherein said yielding means includes a spring, a motion-transmitting member slidable in said housing and urged against said opposite surface of said arm by said spring, said first and second motion-transmitting members being in substantially axial alignment.

**3.** The structure of claim **1** characterized by and including a finger extension formed in said housing and engaging said opposite surface of said arm in substantial alignment with said fulcrum.

**4.** The structure of claim **3** wherein said fulcrum and said finger extension are formed of insulating material.

**5.** The structure of claim **1** wherein said switch arm is generally J-shaped in planar configuration, said fulcrum engages said arm adjacent the joinder of the straight and curved portions of said configuration and said motion-transmitting member engages said straight portion of said configuration adjacent the point of said fulcrum engagement.

**6.** The structure of claim **1** wherein said switch arm is formed or relatively thin springlike material and positioned to engage said contact elements with said contact members when said arm is in its free state, said arm being deformed in one direction in response to delivery of fluid pressure to said diaphragm to deflect one of said elements out of engagement with one of said members, said arm being deformed in an opposite direction in response to diminution of said fluid pressure to separate the other of said elements from the other of said members and to permit immediate re-engagement of said one element with said one member.

**7.** The structure of claim **6** wherein said arm is deformed in said one and said opposite directions on one side of said fulcrum.

**8.** The structure of claim **6** wherein said arm is J-shaped in planar configuration, said fulcrum engages said arm adjacent the joinder of the straight and curved portions of said configuration and said straight portion is deformed in said one and said opposite directions.

**9.** The structure of claim **8** wherein said one element is carried adjacent the distal end of the curved portion of said configuration.

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