Sept. 5, 1944. J. H. McCORD 2,357,675

ELECTRIC SWITCH

Filed Dec. 10, 1943 2 Sheets-Sheet 1

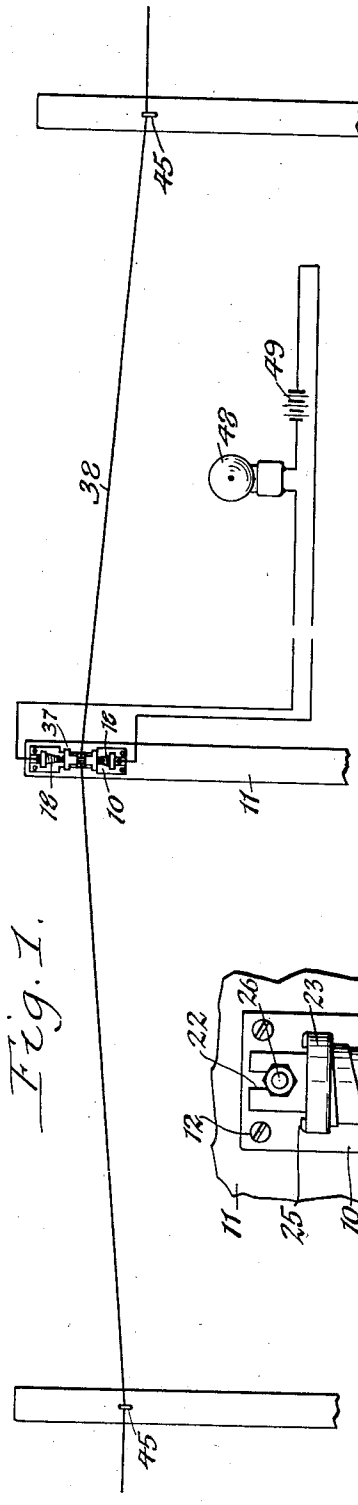


Fig. 1.

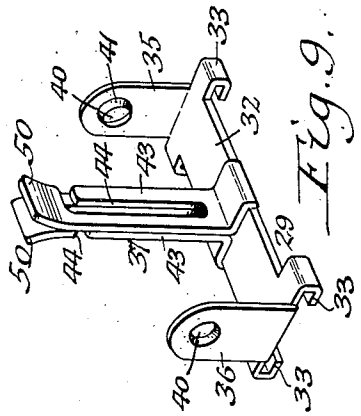


Fig. 3.

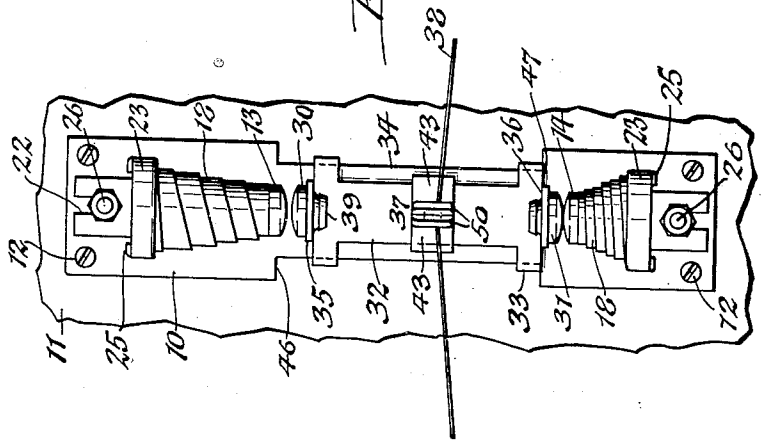


Fig. 2.

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Fig. 3.

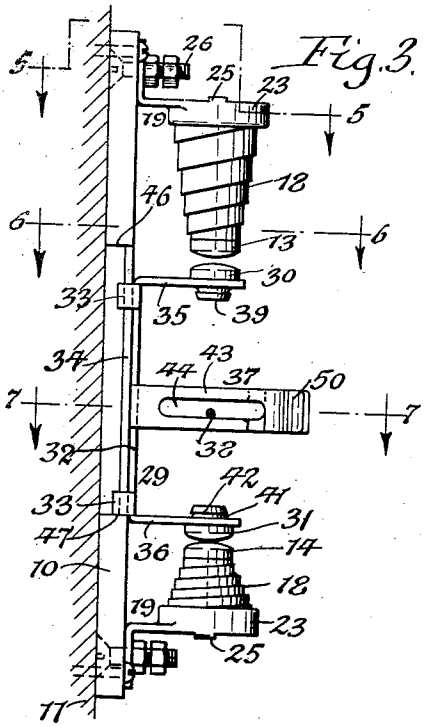


Fig. 4.

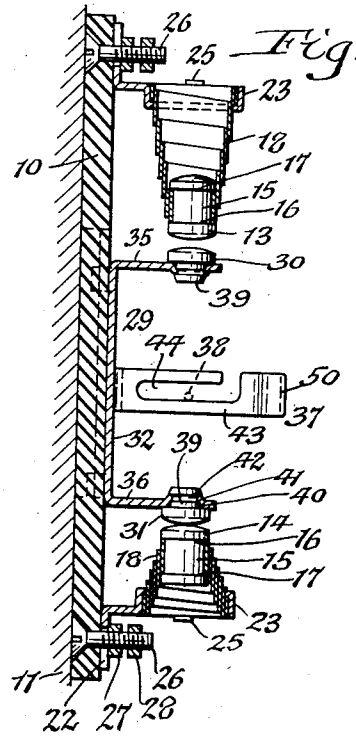


Fig. 5.

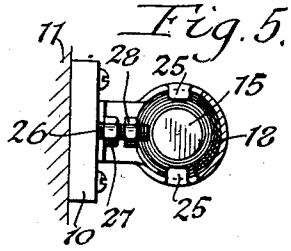


Fig. 7.

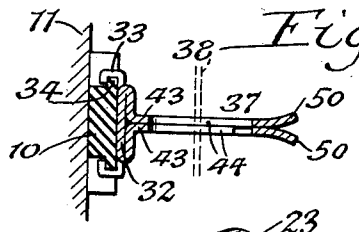


Fig. 6.

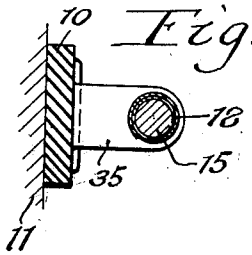
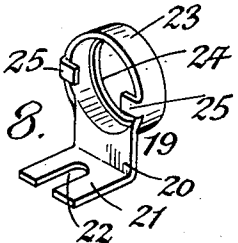


Fig. 8.



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ELECTRIC SWITCH

James H. McCord, Buffalo, N. Y.

Application December 10, 1943, Serial No. 513,669

10 Claims. (Cl. 200—52)

This invention relates to an electric switch more particularly designed for holding an electric circuit open by means of a member which is normally taut or under tension but when broken or relaxed will permit the switch to close this circuit and operate the mechanism under the control of the same.

A switch of this character can be practically employed in a loom for causing an electrically actuated clutch to stop the operation of the loom in the event that a thread intended as part of a woven fabric normally holds the switch open but when broken permits the switch to close the electric circuit of the clutch actuating mechanism and stop the boom so that the broken thread can be repaired before weaving is resumed.

This switch can also be used as part of a burglar alarm system by employing a line in the path of the possible intruder for holding this switch open but when this line is broken the switch will be released and cause an alarm by sounding a bell or horn or closing the circuit of a signal lamp.

Many other similar uses may be made of this invention but the examples mentioned above will suffice to indicate the wide range of useful installations of this invention.

The object of this invention is to provide an electric switch for this purpose which is comparatively simple and inexpensive in construction, reliable in operation and not liable to get out of order, and capable of being readily and easily installed as a complete unit.

In the accompanying drawings:

Fig. 1 is an elevation showing this invention embodied in a signal circuit containing a line which normally holds an electric circuit open but which, when broken, permits the switch to close and give audible notice of this breakage.

Fig. 2 is a front elevation, on an enlarged scale, of this switch.

Fig. 3 is a side elevation of the same.

Fig. 4 is a vertical longitudinal section thereof.

Figs. 5, 6 and 7 are horizontal sections, taken on the correspondingly numbered lines in Fig. 3.

Fig. 8 is a perspective view of one of the supporting brackets whereby the outer ends of the springs carrying the floating contacts are connected with the stationary base of the switch.

Fig. 9 is a similar view of the carriage which is slidingly mounted on the base and held by the tension line in a position in which the switch is open.

In the following description similar reference characters indicate like parts in the several figures of the drawings.

Although this switch may be mounted in any suitable manner on its support to suit the requirements of the particular installation the unit shown in the drawings has its movable parts arranged to operate in a vertical direction and in the following description the terms "upper" and "lower" are therefore merely used for convenience in one organization of this invention.

The working parts of the switch embodying this invention are mounted on a base 10 which may be made of any suitable electrical insulating material, such as Bakelite, fibre, rubber, glass or porcelain, and the same may be attached to any suitable support, such as a wooden post 11, by means of screws 12 or the like.

On the upper and lower parts of its front side are mounted two spaced floating electric contacts 13, 14 which are vertically in line and yieldably and adjustably connected with the base so as to be capable of moving vertically relative thereto. Each of these floating contacts preferably has the form of a cylindrical pin and the means for connecting the same in this manner with the base is constructed as follows:

In rear of the front end or bearing face each of the floating contacts is provided with a reduced neck 15 thereby forming on the front and rear parts of said pin a rearwardly facing front shoulder 16 and a forwardly facing rear shoulder 17, as shown in Fig. 4. The numeral 18 represents a telescopic conical spring made of resilient ribbon metal the turns or convolutions of which are wound spirally in contact with one another so that the same can expand and contract lengthwise and its convolutions maintained in axial alinement with one another. The last turn of smallest diameter at the front end of this conical spring surrounds the neck of the respective contact pin and bears against the front and rear shoulders 16, 17 thereof, thereby connecting this contact with this spring without requiring any additional fastening and still maintaining a good electrical connection between the same due to the necessity of slightly expanding the last turn at the front end of this spring when inserting the contact therein and the resilience of this spring which tends constantly to contract the same.

At its rear or large end this spring is mounted on a bracket 19 which is adjustably connected with one end of this base. This bracket is preferably constructed of sheet metal to form a horizontal transverse arm 20, a longitudinal foot 21

arranged at the inner end of the arm and having a longitudinal slot 22 and a cylindrical socket 23 arranged at the outer end of the arm and provided at its front edge with an inwardly turned annular flange 24 and at its rear edge with inwardly turned lugs 25. The last turn at the large end of the spring is inserted in the socket 23 from the rear end thereof until the front edge of this turn engages with the internal shoulder formed by the flange 24 and then the lugs 25 are bent inwardly into engagement with the rear edge of this largest turn of the spring, as shown in Figs. 4 and 5, whereby these members are connected without the use of any additional fastening means.

The bracket is connected with the base so as to be capable of vertical adjustment thereon, this being effected by the body of a clamping bolt 26 through the longitudinal slot 22 of this bracket and the base and tightening the nut 27 for securing in the leg of this bracket against the base, as shown in Figs. 2, 3, 4 and 5, which bolt has an additional screw nut 28 whereby the same may be utilized as a binding post for connecting this bracket with a wire of the electrical circuit controlled by this switch.

The numeral 29 represents a carriage guided for vertical movement on the base and carrying two bridge contacts 30, 31 which are adapted to electrically connect or disconnect the floating contacts 13 and 14 and thereby close or open the electric circuit containing these contacts. This carriage is preferably constructed of an integral sheet metal to form a central longitudinal body 32 which slides on the front side of the central part of the base, guide hooks 33 arranged on opposite vertical edges of the body at the upper and lower ends thereof and engaging with guideways 34 on the opposite edges of the central part of the base, as shown in Figs. 2, 3 and 7, supporting arms 35, 36 projecting horizontally forward from the upper and lower ends of the carriage body and connected, respectively, with the upper and lower bridge contacts 30, 31 which face outwardly away from each other, and a tension arm 37 which projects horizontally forward from the central part of the carriage and which is adapted to receive the pressure of the line 38 which holds the switch open when this line is taut or unbroken and permits the switch to close when this line is broken or slackens.

Various means may be employed for connecting the bridge contacts with the respective supporting arms of the carriage but this preferably is accomplished by the means which are shown in Figs. 2, 3 and 4 and which comprise a neck 39 arranged on the inner side of each bridge contact and projecting outwardly through an opening 40 in the respective supporting arm so that this contact engages with the inner side of the latter, and an annular burr or flange 41 formed on this arm around the outer end of the respective opening 40 and engaging an annular groove or shoulder 42 on the outer end of the neck 39 for holding this contact in its supporting arm without the aid of any further fastening.

The tension arm 37 may be variously constructed to permit of readily, easily and conveniently threading the tension line 38 thereon preparatory to controlling the apparatus with which this tension line is operatively connected. In the preferred construction this tension arm comprises two leaves or sections 43 bent horizontally forward from opposite vertical edges of the central part of the carriage so that the central parts of these sections or leaves engage each other, as shown in Figs. 2 and 7, or are arranged close to each other and each of these sections having an L-shaped slot 44 which is closed at its ends but one of which is open on the underside of the respective arm section at one point in the length of the tension arm and the other slot being open on the upper side of the respective tension arm section and at another point in the length of the tension arm so as to form a closed guide eye which receives the control line 38. The latter may be threaded endwise through the eye of the tension line if this line is broken and its end is available, but if this line is not broken the same may be threaded into the eye by first passing the same laterally between the two leaves 43 and then turn the same vertically through the open parts of the slots 44 and into the desired position within the latter. The introduction of the control line 38 into the eye of the tension arm is facilitated by diverging the front ends of the sections of the tension arm, as shown at 50 in Figs. 2, 7 and 9.

That part of the control line 38 which engages with the tension arm of the switch is deflected out of a straight line so that it exerts a constant tendency to assume a straight position, thereby causing this tension to hold the carriage at one end of its vertical movement. This tensioning effect is produced in the organization shown in Fig. 1 by passing those parts of the control line on opposite sides of the switch through fixed guide eyes or supports 45 which are arranged on opposite sides of the switch but below the level of the tension arm of the same. When the parts are assembled in this manner the control line 38 exerts a downward pull on the carriage whereby the same is lowered and the lower bridge contact 31 is held in engagement with the lower floating contact 14 and the lower spring 18 is compressed while the upper bridge contact 30 is disengaged from the upper floating contact 13 and the upper spring 18 is expanded, as shown in Figs. 1, 2, 3 and 4, thereby breaking or opening the electric circuit of which this switch forms a part. If the line 38 should be broken or become sufficiently slack to permit the line to straighten out then the previously compressed spring 18 will expand to move the carriage upwardly and engage its upper bridge contact 30 with the upper floating contact 13 whereby this switch will close the circuit of which it forms a part and cause the mechanism which responds to such closure to operate accordingly.

If desired the tension on the carriage for holding the switch in its open position while the line is intact or tight may be exerted in an upward direction in which case the lower bridge contact and floating contact would be separated for opening the circuit while the upper floating contact and bridge contact would be engaged and the corresponding spring compressed preparatory to closing the electric circuit if the line 38 breaks or becomes slack.

The extent of the vertical movement in either direction is preferably limited by engagement of either the upper end or the lower end of the carriage body with stops 46, 47 on the base adjacent to the guideways 34 of the latter.

If this electric switch is used for indicating a break in the normally traveling or running thread of a loom, the movement of covering tape or line in a wrapping machine or similar apparatus, such breaking may be utilized in connection with this switch to throw an electrically ac-

tuated clutch to stop the machine to permit of making the necessary repair in the broken line **38** before continuing the operation of the machine.

Instead, however, of actually stopping the machine a notification signal may be given to the attendant of the breakage of the control line **38** by closing the electric circuit of an electric bell **48** or a horn or the like which is energized from any suitable electric source, such as a battery **49**.

Obviously this switch can also be advantageously embodied in a burglar alarm system by fastening the line **38** on the guides **45** so that the same is deflected, as shown in Fig. 1, but normally immovable lengthwise in which case breakage of the line **38** would release the switch and cause the same to close the circuit and sound an alarm or give any other suitable warning.

I claim as my invention:

1. An electric switch comprising a base, two floating contacts yieldingly mounted in spaced relation on said base, and a carriage slidable on said base and provided with two bridge contacts adapted to assume a central position and engage both of its bridge contacts with said floating contacts, and said carriage adapted to be held by a line on one side of its central position for disengaging one of its bridge contacts from one of the floating contacts while retaining its other bridge contact in engagement with the other floating contact.

2. An electric switch comprising a base, a floating contact mounted on said base, a carriage mounted on said base and having a bridge contact adapted to engage and disengage said floating contact, and means for mounting said floating contact on said base including a spiral ribbon spring having its turns sliding telescopically lengthwise one upon another and one end of said spring being connected with said floating contact and the other end of the said spring being connected with said base.

3. An electric switch comprising a base, a floating contact mounted on said base, a carriage mounted on said base and having a bridge contact adapted to engage and disengage said floating contact, and means for mounting said floating contact on said base including a spiral ribbon spring having its turns sliding telescopically lengthwise one upon another and one end of said spring being connected with said floating contact and the other end of the said spring being connected with said base, said spring being of conical form and said floating contact being provided with a reduced neck and the last turn at the small end of the conical spring surrounding the neck of said floating contact.

4. An electric switch comprising a base, a floating contact mounted on said base, a carriage mounted on said base and having a bridge contact adapted to engage and disengage said floating contact, and means for mounting said floating contact on said base including a spiral ribbon spring having its turns sliding telescopically lengthwise one upon another and one end of said spring being connected with said floating contact and the other end of the said spring being connected with said base, said spring being of conical form and connected at its small end with said floating contact and the last turn at the large end of this spring being connected with the base by means which include a bracket secured to said base and provided with a cylindrical socket receiving said last turn and engaging the outer side thereof, a flange at one end of said socket and engaging the inner edge of said last turn and lugs arranged on the other end of said socket and bent against the outer edge of said last turn.

5. An electric switch comprising a base, a floating contact mounted on said base, a carriage mounted on said base and having a bridge contact adapted to engage and disengage said floating contact, and means for mounting said floating contact on said base including a spiral ribbon spring having its turns sliding telescopically lengthwise one upon another and one end of said spring being connected with said floating contact and the other end of the said spring being connected with said base, said spring being of conical form and connected at its small end with said floating contact and the last turn at the large end of this spring being connected with the base by means which include a bracket secured to said base and provided with a cylindrical socket receiving said last turn and engaging the outer side thereof, a flange at one end of said socket and engaging the inner edge of said last turn and lugs arranged on the other end of said socket and bent against the outer edge of said last turn and said bracket being capable of longitudinal adjustment on the base by a slot in the bracket and a bolt passing through said slot and the base.

6. An electric switch comprising a base having a contact, and a movable carriage slidable on said base and having a contact adapted to engage and disengage the contact on the base, means for guiding said carriage on the base including guideways arranged on opposite longitudinal edges of the base and guide hooks arranged on opposite edges of said carriage and engaging said guideways, and stops which are arranged on the base at the ends of said guideways and which are adapted to be engaged by the ends of the carriage for limiting the movement of the same on the base.

7. An electric switch comprising a base having a base contact, a carriage slidable on the base and having a carriage contact adapted to engage the base contact, and means for connecting the carriage and the carraige contact including an arm arranged on the carriage and provided with an opening and adapted to be engaged on its inner side by the base contact, a neck arranged on the base contact and projecting through the opening in said arm beyond the rear side of said arm and provided with an annular groove, and a flange arranged on the outer side of said arm around the opening thereof and engaging with said groove.

8. An electric switch comprising a base having a base contact, a carriage slidable on the base and having a carriage contact adapted to engage the base contact, and a tension arm which is arranged on said carriage and which is adapted to be engaged by a control line for holding said carriage in a position in which its contact is disengaged from said base contact, said tension arm including two sections which project toward each other from opposite edges of said carriage and form a guide eye between them which is adapted to receive a control line.

9. An electric switch comprising a base having a base contact, a carriage slidable on the base and having a carriage contact adapted to engage the base contact, and a tension arm which is arranged on said carriage and which is adapted to be engaged by a control line for holding said carriage in a position in which its contact is disengaged from said base contact, said tension arm includ-

ing two sections which project toward each other from opposite edges of said carriage and form a guide eye between them which is adapted to receive a control line and the front ends of said sections diverging and forming a flaring entrance for said control line between said sections.

10. An electric switch comprising a base having a base contact, a carriage slidable on the base and having a carriage contact adapted to engage the base contact, and a tension arm which is arranged on said carriage and which is adapted to be engaged by a control line for holding said carriage in a position in which its contact is disengaged from said base contact said tension arm including two arm sections which project toward each other from opposite sides of the carriage and said arm sections having L-shaped slots which together form an eye for the reception of a control line, said slots being closed at their ends and one of said slots being open on the upper side of its arm section at one point of the length of the tension arm and the slot in the other arm section being open on the underside of the respective arm section and at another point in the length of the tension arm.

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