

- [54] **PRESSURE-OPERATED TAPE SWITCH**
- [75] Inventor: **Maurice De Loisy**, Paris, France
- [73] Assignee: **Etablissements TORRIX**,
Levallois-Perret, France
- [22] Filed: **Mar. 10, 1972**
- [21] Appl. No.: **233,556**

- [30] **Foreign Application Priority Data**
July 7, 1971 France 7124778
- [52] U.S. Cl. **200/86 R**, 200/86 A
- [51] Int. Cl. **H01h 13/16**
- [58] Field of Search 200/86 R

- [56] **References Cited**
UNITED STATES PATENTS
- 3,694,600 9/1972 Koenig 200/86 R
- 2,163,960 6/1939 Paver 200/86 R
- 3,522,398 7/1970 Heiman 200/86 R

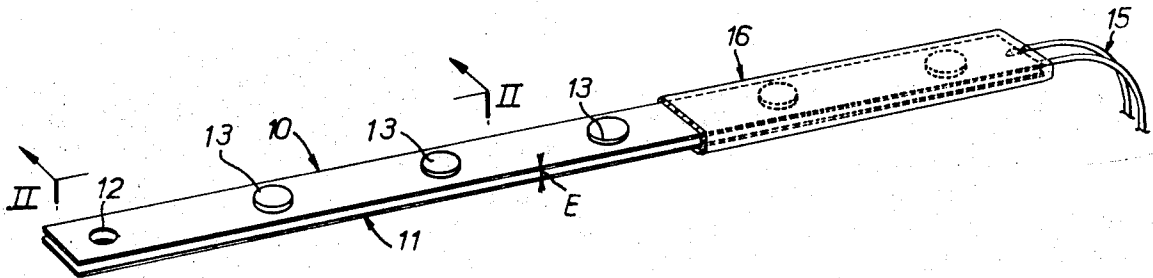
FOREIGN PATENTS OR APPLICATIONS
2,903 2/1909 Great Britain 200/86 R

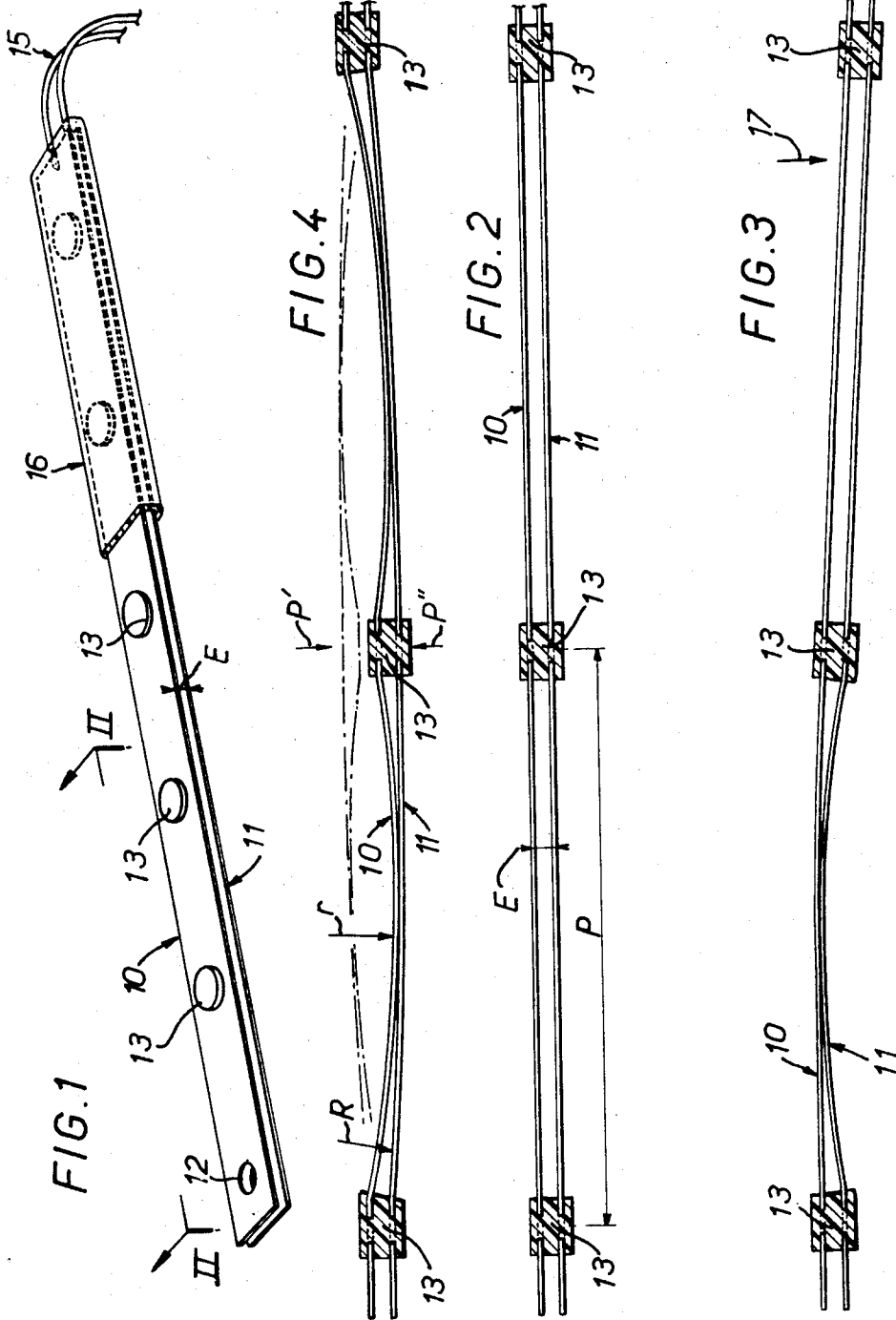
Primary Examiner—David Smith, Jr.
Attorney—Charles E. Brown et al.

[57] **ABSTRACT**

A pressure-operated tape or ribbon switch suitable for use for detecting the presence of an occupant of a seat in a motor vehicle when this switch is secured to the underside of the seat. The switch comprises a pair of elongate contact blades with pairs of spaced aligned holes at regular intervals along the longitudinal axis of the switch. Insulating studs are molded to the blades at the holes for riveting the latter together and normally maintaining the blades in spaced apart relationship. Contact is possible by direct or indirect pressure forces exerted on the switch.

6 Claims, 4 Drawing Figures





PRESSURE-OPERATED TAPE SWITCH

BACKGROUND OF THE INVENTION

The present invention relates to pressure-operated ribbon or tape switches.

Switches of this type are known which are adapted to open or close electric circuits in response to a pressure exerted thereon, the closing of the switch being adapted to control an audio or light signal, or driving means such as an electric control circuit.

Known switches of this type are generally satisfactory but are of rather complicated constructions in the positioning of insulators which causes production costs to be high.

SUMMARY OF THE INVENTION

An object of the present invention is to overcome such a disadvantage and to this end provide a pressure-operated switch of a simple and economical construction which is particularly sure in operation.

The pressure-operated tape switch according to the invention comprises a pair of conductive flexible strips or blades adapted to be connected to electric leads and insulating support means for normally maintaining the blades spaced from each and enabling the blades to be brought into engagement thereby closing the switch in response to a force exerted thereon.

Preferably, the insulating support means are formed as studs and disposed at intervals generally along the longitudinal axis of the elongate blades in openings previously formed in the blades.

Since the manufacture of the switch is very simple, the rate of production is very high, there results a substantial reduction of production costs compared to known switches.

Such a pressure-operated switch may be responsive to various different operational conditions by merely changing the thickness, the inter-blade spacing, the distance between successive insulating studs.

Various other features will be brought out in the description of an embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a pressure-operated tape switch in perspective with an outer casing partially cut away;

FIG. 2 shows an enlarged sectional view taken along the line II—II in FIG. 1; and

FIGS. 3 and 4 are views of the switch similar to FIG. 2 illustrating closed positions of the switch.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the embodiment of the invention illustrated in the figures, the pressure-operated tape switch comprises first and second elongate conductive metal strips or blades 11 and 12 having pairs of aligned holes regularly spaced along the longitudinal axis thereof.

The blades or strips 11 and 12 are assembled with a gap E therebetween effected by means of insulating studs 13 whose center-to-center distance is a function of the intended use. The insulating studs 13 are formed as integrally molded bodies of synthetic material extending through aligned pairs of holes in the respective blades and thereabout.

The blades or strips 10 and 11 are connected in a circuit 15 with a pair of leads. The assembly is enclosed in a casing 16 of insulating material.

In FIG. 2 the device is shown in its normal or rest position in which the blades or strips are out of engagement and substantially parallel to each other along the entire length of the switch.

FIG. 3 shows the tape switch in closed position wherein a force 17 is exerted on the switch as indicated 13 causing the left-hand portion of the lower blade 11 to buckle and move into contact with the undersurface of the corresponding portion of the upper contact 10. This is not only possible engagement between contacts 10 and 11 when a force is exerted on the upper of the switch. For example it may be possible that the direct force is sufficient to bring the right-hand portion and the left-hand portion of the lower contact 11 into engagement with the corresponding portions of the upper contact 10. As the contact strips 10 and 11 are effectively in electrical series any number of engagements between the contact strips is possible.

The closed position illustrated in FIG. 3 and discussed above results from an indirect force where a relatively large portion of the tape switch is bent and in which one or more of the opposed contact portions come into contact with each other; In the case that the pressure causes direct contact, substantially normal to the longitudinal axis of the switch, contact is effected in the manner illustrated in solid lines in FIG. 4.

In the closed position in solid lines in FIG. 4 the upper contacts 10 are urged into contact with associated portions of the lower contact strip 11. For example, if a force P' is exerted on an intermediate insulating stud multiple engagements of the upper contact strip with the lower contact strip 11 will result as shown in FIG. 4. It should be noted in this respect that the radii of curvature of the contact strips 10 and 11 "r" and "R" respectively are somewhat different.

If a force P'' is exerted on an insulating stud in the direction opposite to the force P', contact is as shown in phantom lines in FIG. 4. Such contact is virtually a mirror image of that shown in solid lines about the mean longitudinal plane of the switch.

Such a switch has a high degree of sensitivity in that a very slight force anywhere along the length of the switch is sufficient to bring about the closing of the switch.

In the case where the switch is secured, for example by stitching the casing 16 to the underside of a seat covering on an automobile seat, the switch will be closed even when there is no force exerted directly on the switch. For example, if the occupant of a seat which is provided with the present switch seats on one end or portion of the seat remote from the switch the deformation of the seat covering will cause the switch to close. The advantage of such a switch is obvious as its simple construction offers great sensitivity at a very low production cost.

With the present tape switch actuation is possible in any one of the following ways, in either of two directions normal to the longitudinal axis of the tape switch, along the contact blades or in line with the insulator studs, on a point remote from the switch when the latter is secured, for example, to the underside of a seat covering in an automobile.

Accordingly, such a switch has numerous possible uses but is most particularly suited for use as part of a

warning system when connected with "idiot" lights mounted on the dashboard of a vehicle to indicate that the occupant is present and the vehicle can not be started until the corresponding seat belt is fastened. In such a case once the seat belts are fastened the "idiot" light is turned off and the starting circuit is operative.

The present switch is not limited to the particular configuration shown in the present drawings and described hereinabove. Further, the switch blades may be curved relative to each other and the cut-outs may be of any desired shape such as polygons.

What I claim is:

1. A tape switch operable in response to both a direct force applied thereto and overall bending of said tape switch, said tape switch comprising a pair of elongated contact blades having free side edges and being connected together in spaced parallel relation by separately formed studs in insulated relationship, each blade having at each stud an opening therethrough; and each stud having an inner portion of a cross section greater than said openings maintaining adjacent portions of said blades in said spaced relation, and outer portions of a cross section greater than said openings clamping said blades against said central portion, said studs rigidifying those portions of said blades at and adjacent said studs and preventing relative movement therebetween to provide means whereby said tape strip is bent at least one blade section disposed between a pair of adjacent studs will be stressed and will move to an overcenter position contacting the other blade.

2. The tape switch of claim 1 together with means for

preventing separation of said blades intermediate said studs.

3. The tape switch of claim 1 together with a flexible insulating casing receiving said blades and forming means for preventing a stressed blade portion from assuming an over center position spaced from the other blade.

4. A tape switch operable in response to both a direct force applied thereto and overall bending of said tape switch, said tape switch comprising a pair of elongated contact blades having free side edges and being connected together in spaced parallel relation by separately formed studs in insulated relationship, each blade having at each stud an opening therethrough; and each stud having an inner portion of a cross section greater than said openings maintaining adjacent portions of said blades in spaced relation, and outer portions of a cross section greater than said openings clamping said blades against said central portion, and a flexible insulating casing telescoped over said blades, said blades being free to both move as a unit under a bending pressure and to individually deflect under a direct pressure into contacting relation.

5. The tape switch of claim 4 wherein said blades, even when encased within said casing, are free to bend as a unit in response to application of forces other than a force effecting a direct bending of one blade into contact with the other blade.

6. The tape switch of claim 4 wherein said casing is free to move relative to said studs.

* * * * *

35

40

45

50

55

60

65