3,272,929
CARD READER SWITCH WITH ISOLATED CYLINDRICAL SMALLER PORTION AND SMALLER CONCENTRIC CYLINDRICAL CONTACT PORTION


3 Claims. (Cl. 200—3)

This invention relates to improvements in devices for sensing mechanical pressure or its absence, or for sensing the presence or absence of solid media in selected regions probed by the device. More particularly, this invention concerns a punch card readout device having selected switches and means for preventing contamination of the electrical contact surface of the selected switches so that good electrical contact is established when appropriate. The invention is herein described by reference to the presently preferred embodiment hereof; however, it will be recognized that certain modifications and changes with respect to details may be made without departing from the essential features involved.

The teachings of this invention involve subject matter related to a pending application, Serial No. 174,882, filed February 21, 1962, and entitled, "Punch Card Readout Device." In particular, a novel multiswitch device for registering or functionally responding to the coded information borne by an IBM punch card or the like is described in the above-mentioned co-pending application. However, the teachings of the instant invention refer particularly to the problem of contact surface contamination of the selected switches caused when sliding contacts carry particles of insulating material onto an adjoining conducting surface material of the switches. In the use of various prior art punch card readout devices, over any period of time, insulating particles will contaminate and preclude efficient electrical response from a conducting surface.

Various switching pins have been devised heretofore to prevent switch or reader pin insulating material transfer onto and between electrical contacts. An example of such prior art would be: electrical contacts of unequal lengths which ride solely on the metal conducting surface of the readout pin and provide an open circuit when the longer contacting member rides off the contacting surface.

An object of the present invention is to achieve greater reliability and functional accuracy in a device of this nature particularly by overcoming the problem of contamination of the switching element contact surface.

Another object of this invention is to provide positive and reliable means in a readout device which will give continuous service with no contamination of contacting surfaces. A related object is to achieve this result without increasing expense or complication of the overall readout device.

A further object is to achieve the result of good electrical contact during appropriate times in a readout pin without surface contamination over prolonged periods of use in a simple, conveniently organized, compact, and inexpensive way.

Briefly, the invention comprises electrical switching means used in a readout device having a set of electrical contact means disposed to cooperate with a reciprocating contact means whereby in a closed circuit condition a first portion of said set of contact means engages the surface of electrical conductivity of said reciprocating contact means and whereby in an open circuit condition a second and different portion of said set of contact means engages with an insulating surface of said reciprocating contact means.

Features and other objects and advantages of the invention will become more fully evident from the following description based on the accompanying drawings in which:

FIGURE 1 is an elevation view of the illustrative embodiment, showing the invention from left to right as shown in an open circuit and closed circuit condition, respectively.

FIGURE 2 is an isometric view of the illustrative embodiment, showing one possible configuration of the insulating portion of the readout pin.

FIGURE 3 is a diagrammatic detail of the embodiment of FIGURE 1.

FIGURE 3A is a section view of FIGURE 3 representing the invention in an open circuit condition;

FIGURE 3B is a section view of FIGURE 3 representing the invention in a closed circuit condition.

As illustrated in FIGURE 1, two switches 10 as shown from left to right are reciprocating in an open circuit and closed circuit position. Frame means 20 rigidly holds longitudinal member 13 and the contact leads 9 of the set of electrical contact means 12 in a stationary position. Reciprocating member 11, disposed to bias against spring 15 and to reciprocate over member 13, comprises: (a) head portion 18 disposed to sense mechanical pressure or its absence as a readout device when a punch card is inserted in the over-all mechanism as disclosed in the above-mentioned copending application; (b) cylindrical electrical conducting surface 16; and, (c) cylindrical longitudinally fluted electrical insulating portion 14. It is to be understood that the teachings of this invention are not restricted to any particular part of reciprocating member 11 but are shown here as illustrative of one possible configuration. As seen in FIGURE 1, the reciprocating member 11 is disposed to slide over the rigidly fixed member 13. In its open position, the set of contacts 12 engage the insulating member 14. In the closed position, member 11 is biased to its lower most position due to the presence of a mechanical pressure exerted on head 18. In this position the set of contacts 12 have come into tangential relationship with electrical conducting surface 16 to the member 11. As will be pointed out herein, a different portion of contacts 12 maintains sliding contact with member 14 than with member 16.

In FIGURE 2, the reciprocating member 11 is shown to have an insulating portion 14 of a particular structure, viz., longitudinally fluted with raised and depressed surfaces. It is this particular structure that provides the non-contamination feature of this invention as considered in FIGURE 3; again, it is to be understood that the particular structure herein is for illustrative purposes only and is not restricted to the structure shown.

In FIGURE 3, the set of contact members 12 comprising, for example, ordinary leaf springs of resilient electrical conducting material, is shown in contact, through a first part of members 12, i.e., the more laterally disposed portions 12a of members 12 as shown in FIGURE 3A, with insulating portion 14 of member 11, and by dotted reference in contact through a second part of members 12, i.e., the medial portion 12b of members 12 as shown in FIGURE 3B, with contacting surface 16. By reference to FIGURE 3A, the first part 12a of set of contact members 12 is seen in contact with the insulating portion 14 of member 11. Portion 14 is shown in FIGURE 3A having upraised and depressed surfaces which extend longitudinally along the cylindrical member 11. Because the diameter of the cylindrical electrical conducting surface 16 is smaller than the diameter of insulating portion 14, it is seen that when member 11 moves in circuit position, as seen in FIGURE 3B, the contacts 12 engage electrical conducting surface 16 by means of a
second part 12b of contacts 12, different always from said first part 12a of contacts 12 which slide on insulating portion 14. Since the contact shown in FIGURE 3B (closed circuit) involves the second part 12b of members 12, and the contact shown in FIGURE 3A (open circuit) involves the first part 12a of members 12, it is evident that no transfer of contamination particles will occur from insulating portion 14 to electrical conducting surface 16, thereby insuring good electrical contact at appropriate times.

Since numerous changes may be made in the above apparatus and different embodiments may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Sensing apparatus having yieldably biased switching means, said means comprising in combination:

(a) reciprocating contact means including:

(1) a cylindrical longitudinally fluted electrical insulating portion in combination with

(2) a smaller diameter cylindrical electrical conducting portion, said cylinder portions sharing a common longitudinal axis; and

(b) a set of electrical contact means disposed to slide along the surface of said reciprocating contact means,

said set of electrical contact means comprising at least two members of such configuration that under open circuit conditions only a first portion of said at least two members makes contact with said cylindrical longitudinally fluted electrical insulating portion of said reciprocating contact means and under closed circuit conditions only a second portion of said at least two members makes contact with said smaller diameter cylindrical electrical conducting portion of said reciprocating contact means.

2. The combination in claim 1 wherein said set of electrical contact means comprises rigidly fixed leaf springs of resilient electrical conducting material.

3. The combination in claim 1 wherein said cylindrical longitudinally fluted electrically insulating portion comprises a shank having alternating longitudinally extending upraised and depressed surfaces.

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ROBERT K. SCHAEFER, Primary Examiner.
J. R. SCOTT, Assistant Examiner.