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(54) Contact-type keyboard for typewriters.

(57) The contact-type keyboard (11) comprises a plurality of keys (12), each having an actuator (13) which is movable axially for co-operating with an elastic element (14) formed by a rubber dome portion in the form of an inverted cup. Fixed inside each dome portion (14) is a conducting pellet 21 for short-circuiting two corresponding elements (22) of a printed circuit (23). A stop element (27) which is housed within each dome portion (14) is in the form of a circular ring and is coaxial and concentric with the conducting pellet (21) and is capable of being stopped by the stop surface (28) on which the element (22) of the printed circuit (23) is fixed. The stop element (27) also projects within the dome portion (14), is opposite to a circular external ring (26) capable of co-operating with the respective actuator (13), and is disposed between a peripheral diaphragm (17) and a radially internal diaphragm (18) which are of limited and uniform thickness and which are adjacent to the stop element (27).

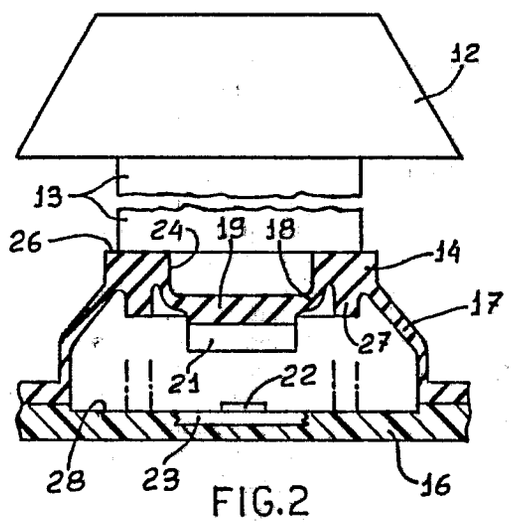

FIG.2

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Description

CONTACT-TYPE KEYBOARD FOR TYPEWRITERS

The present invention relates to a contact-type keyboard for typewriters of the type set forth in the introductory part of claim 1. The dome portions are usually integrally formed in a rubber mat.

A keyboard of the above kind is known, in which each movable actuator comprises a shoulder co-operating with a stop portion of the mat to define the travel movement of the actuator, each stop portion being disposed adjacent to the respective dome portion. While this keyboard is functional, it does suffer from the disadvantage of being rather bulky precisely due to the fact that the actuator has its shoulder projecting laterally and the mat has the stop portion projecting from the surface, outside the respective dome portion, so that it is also rather expensive.

A keyboard is also known in which the dome portion is of a rather complicated shape, having an external diaphragm of variable thickness and internal diaphragm having a shoulder capable of cooperating with the base of the movable actuator. In addition the movable actuator comprises an external ring which, when the associated key is depressed, is capable of co-operating with the part of the external diaphragm at which the thickness thereof is at its smallest. That keyboard suffers from the disadvantage that the dome portion and the actuator are complicated in design and are thus very expensive, while in addition there is substantial wear of the external diaphragm due to the fact that, when it is deformed by virtue of the associated key being depressed, the portion of minimum thickness is continuously engaged by the respective external ring, and the internal diaphragm which is deformed by the base of the movable actuator.

The object of the present invention is therefore to provide a contact-type keyboard which is of reduced dimensions, simple, reliable and which at the same time is very easy to use, practical and inexpensive.

To this end the contact-type keyboard according to the invention is characterised as set forth in claim 1.

A preferred embodiment of the present invention is set forth in the following description which is given by way of non-limiting example with reference to the accompanying drawing in which:

Figure 1 is a side view of part of the keyboard,

Figure 2 is a view in partial section of some details from Figure 1 on an enlarged scale, and

Figure 3 is a partial plan view of some details from Figure 1 on a different scale.

Referring to Figure 1, the contact-type keyboard according to the model is generally identified by reference numeral 11 and comprises a series of keys 12, each of which is mounted on an actuator 13 which is displaceable axially in known manner per se. The keys 12 and the actuators 13 are shown diagrammatically and are substantially similar to those described in our published European patent application EP 0 091 284.

Each actuator 13 with the lower part thereof is capable of co-operating with an elastic element 14 formed by a dome portion of silicone rubber, of inverted cup shape.

The elements or dome portions 14 may be produced individually or they may be provided in one or more rubber mats 16, by means of technologies known in themselves.

Each dome portion 14 (see Figure 2) comprises a suitably shaped peripheral diaphragm 17 of limited and uniform thickness, an internal diaphragm 18 of limited and uniform thickness and a central part 19 to which a cylindrical conducting pellet or insert 21 is fixed. The central part 19 is of substantially the same size as the conducting pellet 21 which is capable of short-circuiting an element 22 of a printed ciruit 23 when the respective key 12 is depressed, thereby to generate a corresponding electrical signal in known manner per se.

The internal diaphragm 18 defines an upper space 24 which in turn can define a circular external ring 26 against which the repective actuator 13 normally bears. A stop element 27 projects in the interior of the dome portion 14, is opposite to the circular external ring 26 and is coaxial and concentric with the central part 19 and the conducting pellet 21, being in the form of a circular ring. The internal diaphragm 18 is connected by one end to the central part 19 and by the other end to the opposite part of the circular external ring 26. The peripheral diaphragm 17 is connected by one end to the opposite part of the circular external ring 26 and by the other end to the mat 16. With the stop element 27 being disposed between the peripheral diaphragm 17 and the internal diaphragm 18 and therefore with the two diaphragms 17 and 18 being connected at the ends to the opposite part of the circular external ring 26, they are in the same horizontal plane adjacent to the stop element 27.

The stop element 27 is capable of co-operating with the surface 28 on which the element 22 of the printed circuit 23 is normally disposed, as indicated in dash-dotted lines in Figure 2. When the stop element 27 bears against the surface 28, it defines the travel movement of the respective actuator 13. In fact, by depressing a key 12, the operator causes axial displacement of the respective actuator 13 which, always being in contact with the circular external ring 26, causes it to be depressed, deforming the external and internal diaphragms 17 and 18 and the conducting pellet 21 comes into engagement with the element 22, thereby to generate a corresponding electrical signal. The stop element 27 engages against the surface 28 whereby the travel movement of the actuator 13 is stopped. Since the stop element 27 is in the form of a circular ring, the arrangement always provides for a secure and stable condition of engagement and abutment as between the element 27 and the surface 28. In that way, even if the operator continues to apply a pressure to the depressed key 12, the travel movement of the actuator 13 is reliably stopped by

the stop element 27 bearing against the surface 28. That therefore ensures that both the conducting pellet 21 and the element 22 of the printed circuit 23 do not suffer from rupture, damage or other drawbacks.

It will be apparent therefore that the peripheral diaphragm 17 and the internal diaphragm 18 are adjacent to the stop element 27 and, being of limited and uniform thickness, permit deformation of both thereof with a minimum amount of pressure when the respective key 12 is actuated, immediately returning to their initial position as soon as the pressure ceases to be applied without the smallest amount of wear among the various parts which make up the keyboard 11. The stop element 27 in the form of a circular ring disposed in the interior of each elastic element or dome portion 14 substantially reduces the overall external size, also simplifies the form of the actuator 13, and ensures a secure and stable stop action, thus avoiding wear as between the conducting pellet 21 and the element 22 of the printed circuit 23. In addition, with the stop element 27 being opposite to the circular external ring 26, the pressure of the actuator 13 goes from the circular external ring 26 directly and only to the stop element 27 whereby the peripheral and internal diaphragms 17 and 18 are always only subjected to simple bending stress, thus avoiding composite pressures, forces and stresses which would prejudice the function and integrity thereof.

Claims

1. A contact-type keyboard for typewriters comprising a plurality of keys (12) each having an axially movable actuator (13) capable of co-operating with an elastic element (14) formed by a rubber dome portion in the form of an inverted cup and a stop element (27) capable of stopping the travel movement of the respective actuator against a stop surface (28) a conducting pellet (21) for short-circuiting a corresponding element (22) of a printed circuit (23), and in which each dome portion comprises a peripheral diaphragm (17) of limited thickness and a circular external ring (26) capable of co-operating with the respective actuator, characterised in that each dome portion comprises a central internal part (19) of transverse dimensions which are substantially equal to those of the conducting pellet (21), and a radially internal diaphragm (18) of limited and uniform thickness which connects the central part to the circular external ring (26) and in that the stop element (27) projects in the interior of dome portion (14), is opposite to the circular external ring (26) and is disposed between the internal and peripheral diaphragms (18 and 17) of the dome portion.

2. A contact-type keyboard according to claim 1, characterised in that the stop element (27) comprises a circular internal ring disposed between the peripheral diaphragm (17) and the internal diaphragm (18).

3. A contact-type keyboard according to claim 2, characterised in that the peripheral diaphragm (17) and the internal diaphragm (18) are both capable of undergoing deformation under the pressure of the actuator (13), permitting engagement of the circular internal ring (27) against the stop surface (28), immediately resuming their initial position as soon as the pressure ceases, and in that the two circular rings (26, 27) are substantially aligned.

4. A contact-type keyboard according to any of the preceding claims, characterised in that the stop element (27) is opposite to the circular external ring (26) and aligned with this ring to transfer the pressure of the actuator (13) from the circular external ring (26) directly and only to the stop element (27) and to cause the two diaphragms (17, 18) to be subjected only to flexural stress.

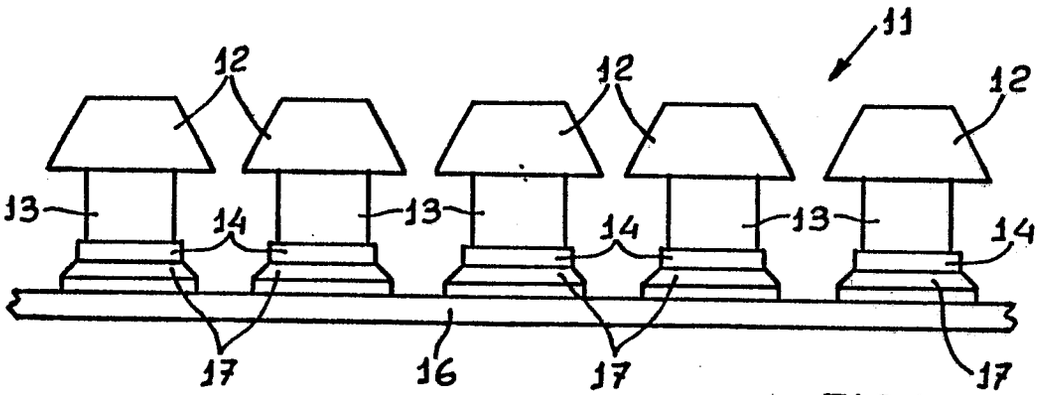

FIG.1

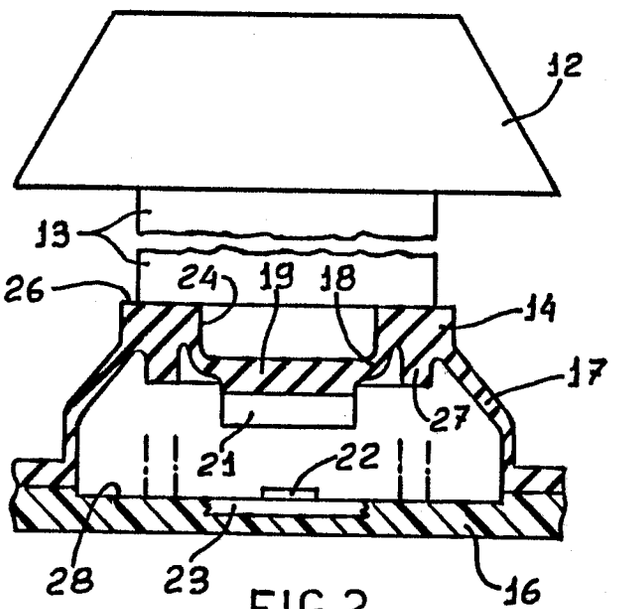

FIG.2

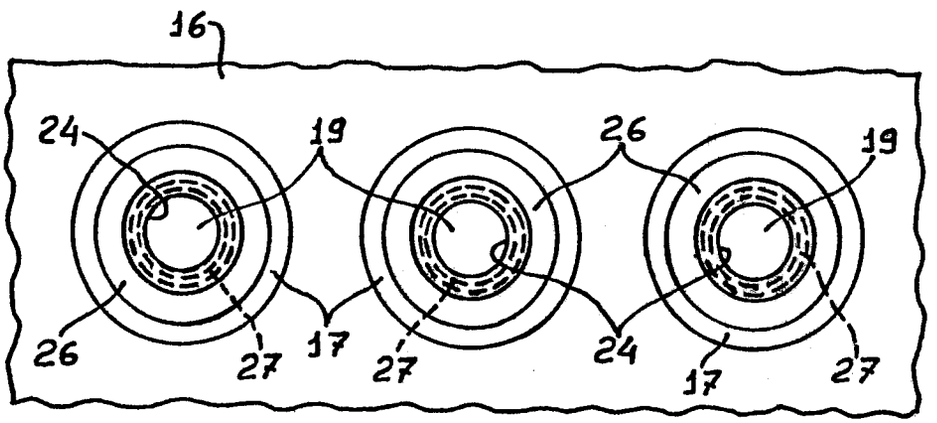

FIG.3