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3,284,595

AIR-OPERATED ELECTRICAL SWITCHES

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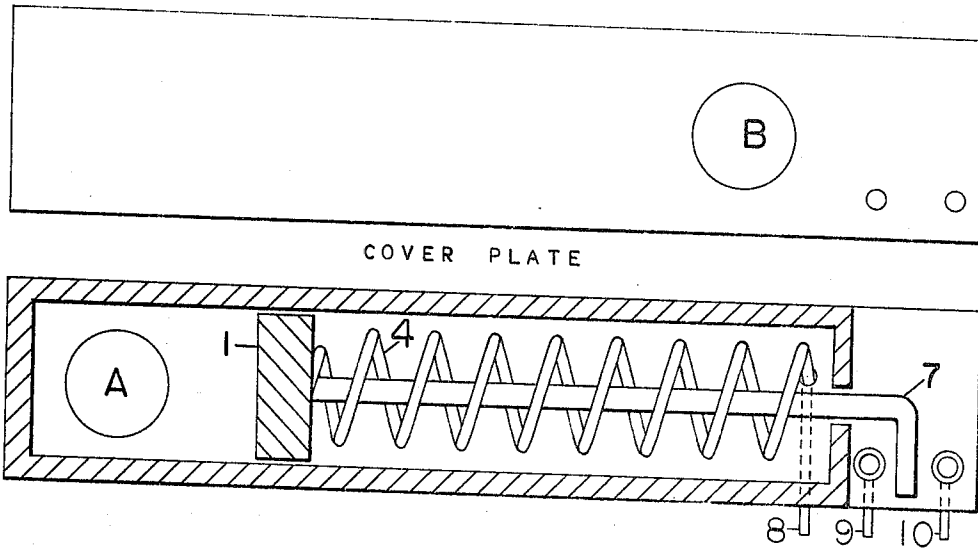


FIG. 1

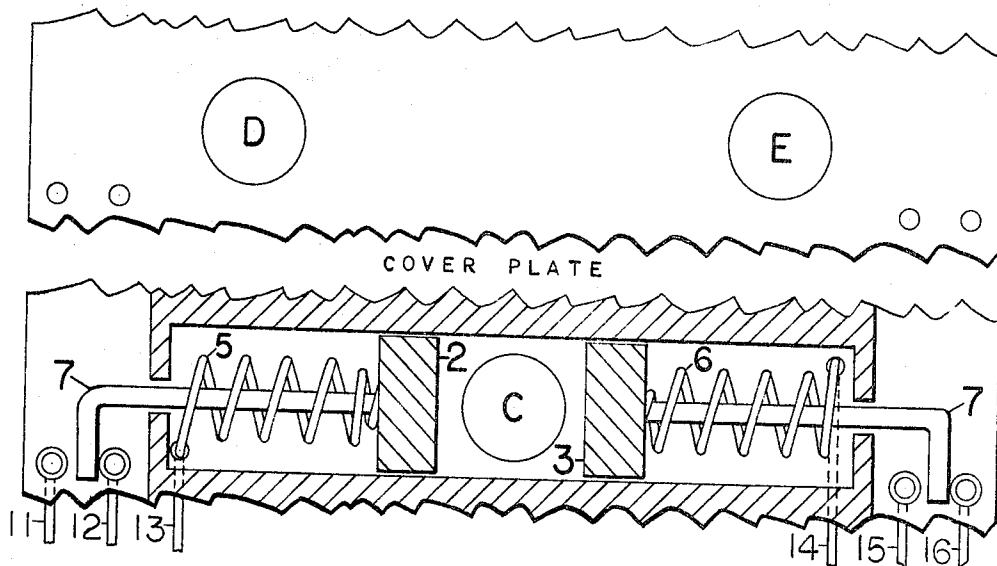


FIG. 2

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AIR-OPERATED ELECTRICAL SWITCHES

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My invention relates to an air-operated electrical switch, sensitive enough to be controlled by the breath. A primary object of this invention is to afford controls for an electric harmonica.

A further object is to present a versatile, simple, and sensitive electrical switch to convert from air mechanics to electrical circuitry for the control of any suitable apparatus.

Other objects will appear in the course of the following description.

In the drawings:

FIGURE 1 is an open-faced view of a simple air-operated switch.

FIGURE 2 is an open-faced view of one of a bank of compound air-operated electrical switches.

A and C are designated as input air holes; B, D and E are designated as air exhaust holes. Nevertheless, it must be understood that the air flow may be in either direction. Parts 1, 2 and 3 are restrictive bodies in the form of pistons, which may be either round or rectangular in cross section; as practical needs dictate. Parts 4, 5 and 6 are coil springs, rigidly affixed to the piston heads at one end, and passing out a "back" hole to become the input electrical leads. Part 7 is a rigid conducting bar or wire, the length of which is adjusted by bending to place the desired tension on the coil spring. In FIGURE 1, there is no spring tension at rest position.

In order to function properly, with due attention to ease of manufacture and ruggedness of construction, this air-electric switch comprises a minimum number of parts with a minimum requirement for precision in manufacture. Compactness and in-line construction, permitting the banking of switches, is embodied in the design. Other general design specifications may be stated as follows:

(1) To make and break electrical circuits by an air driven electrical contact, activated by moderate air pressure, and sensitive to sudden pulses or changes in direction of air flow.

(2) To permit a small air flow about the piston for the accommodation of the operator, rather than to operate on a pressure principal embodied in the usual vacuum switch.

(3) The conversion of mechanical power to electrical power by means of a switching arrangement subject to control by the breath.

With the above specifications and objects in view, this invention consists in a moveable piston placed within a cylinder or hollow enclosure at the terminal of an air line; with the piston held in place loosely by the cylinder walls, a coiled spring and a rigidly attached bar or wire.

The input electrical signal follows the spring and then traverses the bar, permitting concise electrical wiring of a back panel, and eliminating the usual flexible electrical lead which would tend to suffer metal fatigue, and which might tend to interfere with the operation of the mechanism.

The switch may consist of a single unit, permitting contact with either of two output contacts in turn; or it may consist of a compound unit, comprising two pistons, each having one input and two output contacts.

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The most obvious use for the single switch shown in FIGURE 1 is the activation of some form of electrical apparatus under conditions wherein bar 7 rests between the two contacts 9 and 10. Electrical input is at 8, with the signal being fed up the coiled spring and back down the bar. With air being injected at A, contact is made between 8 and 10, or with air being ejected at A, contact is made between 8 and 9.

The most obvious application for the compound switch shown in FIGURE 2 is the control of electrical signals which must be kept grounded between applications. Suppose 12 and 16 to be grounded. For no input air signal, spring tension holds the conducting bars against 12 and 16, grounding out the input signals coming in at 13 and 14. However, upon the injection of air through C, piston 3 is held more firmly in place, but piston 2 is free to move to the left, removing the ground at 12 and closing contact 11. Conversely, with air ejected through hole C, piston 2 is locked more firmly in place, but piston 3 is free to move to the left, removing ground 16 and closing contact 15.

Having thus described my invention, what I claim is:

1. An electrical switch comprising at least a moveable restrictive body positioned between vents within an enclosure open to air admission, said restrictive body being responsive to air flow and being loosely fitted in said enclosure to permit interstitial air flow; a spring having one end attached to said restrictive body and the opposite end fixed relative to stationary enclosure elements; electrical contacts, and means for connecting said contacts to selected circuitry; and contact activating means affixed to said restrictive body whereby electrical switching is accomplished by movement of said restrictive body in response to air movement.

2. A switch as defined in claim 1 wherein said spring is a coil spring; and said activating means is a rigid member passing through the coils of said spring.

3. A switch as defined in claim 2 wherein said rigid member is a contact-carrying conductor attached to an input electrical lead, bent right-angularly, with selective positioning of the bent end section relative to said electrical contacts.

4. A switch as in claim 1 wherein said spring is electrically conductive and serves as an input electrical lead.

5. An electrical switch comprising at least two moveable restrictive bodies positioned on opposite sides of an input vent and inwardly from two output vents within an enclosure open to air admission; two springs having one end of each connected individually to each of said restrictive bodies and the opposite end fixed relative to stationary enclosure elements; electrical contacts, and means for connecting said contacts to selected circuitry; each of said restrictive bodies being oppositely responsive to unidirectional air movement by said springs biasing said restrictive bodies relative to said contacts; and contact activating means affixed to each of said restrictive bodies whereby electrical switching is accomplished by movement of said restrictive bodies in response to air movement.

6. A switch as in claim 5 wherein said springs are coil springs; and said activating means are rigid members passing through the coils of said springs.

7. A switch as in claim 6 wherein said rigid members are formed with contact-carrying conductors attached to input electrical leads and bent right-angularly, with selective positioning of the bent end sections relative to said electrical contacts.

8. A switch as defined in claim 5 wherein said springs are electrically conductive and serve as input electrical leads.

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