Sept. 30, 1952 A. ALLEN 2,612,185

PNEUMATIC SWITCH

Filed March 14, 1951 2 SHEETS—SHEET 1

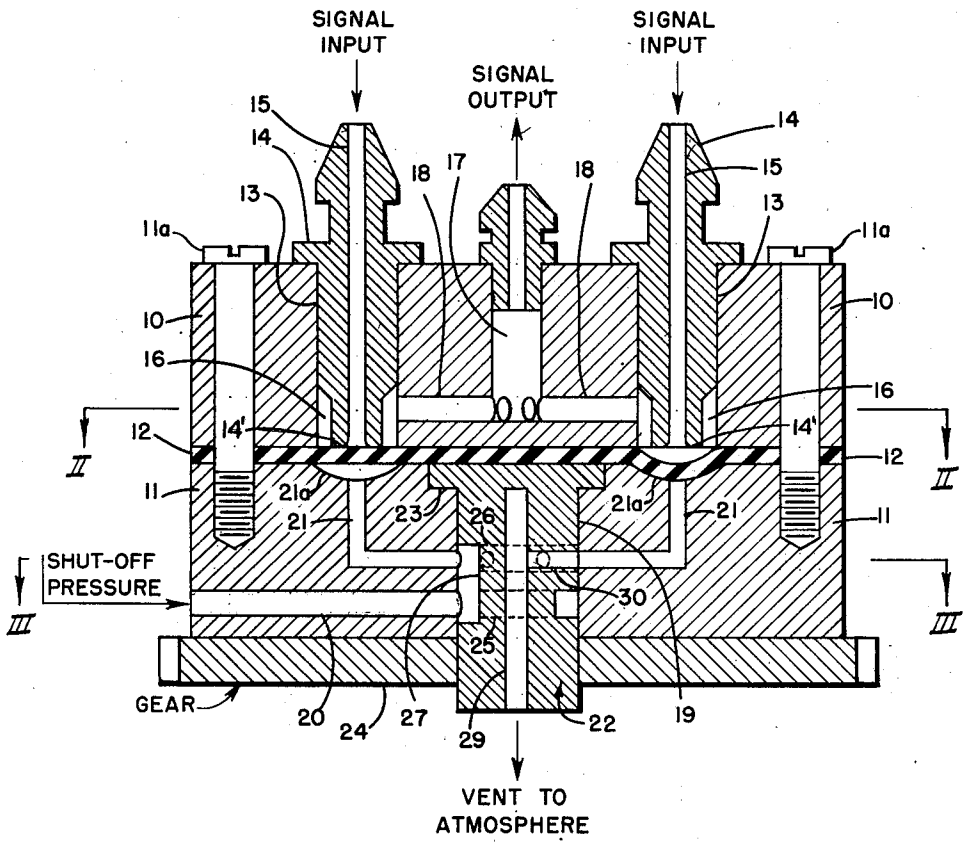


FIG. I

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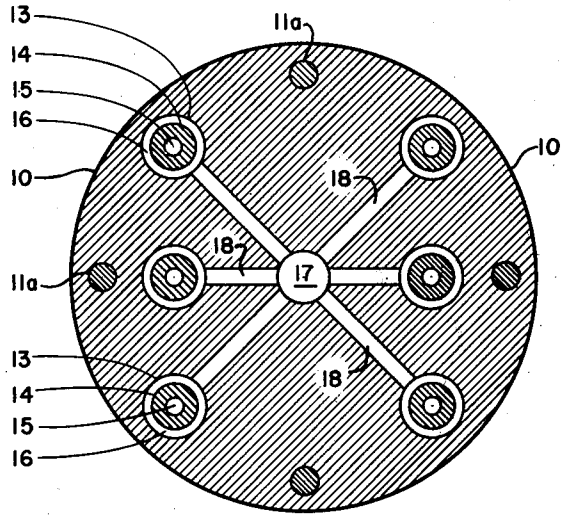


FIG. II

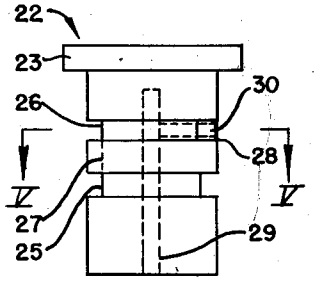


FIG. IV

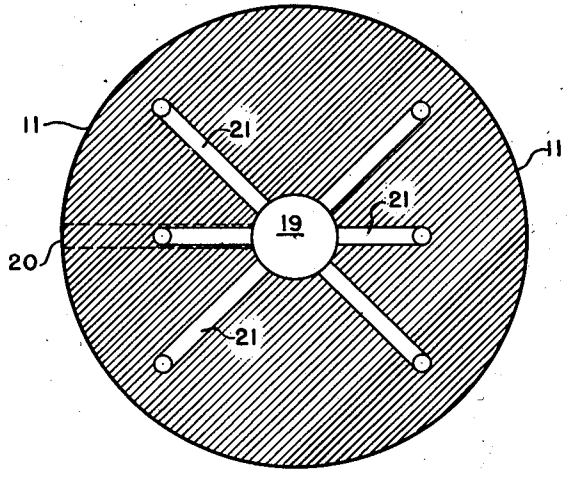


FIG. III

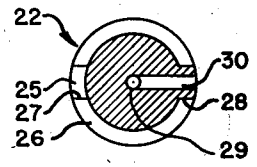


FIG. V

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UNITED STATES PATENT OFFICE

2,612,185

PNEUMATIC SWITCH

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Application March 14, 1951, Serial No. 215,612

1 Claim. (Cl. 137—635)

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This invention relates to instruments used for indicating, recording, or controlling with respect to variable conditions, and has particular reference to pneumatic systems in such instruments.

The particular problem involved concerns the use of a plurality of condition sensing elements and pneumatic signals therefrom and the selection of the particular signal or signals desired to be used at particular times.

An example of such an arrangement is a multirecord recorder for temperatures, flows, pressures, etc., and this invention may be used as a pneumatic switching device for accomplishing the signal selection in such a multirecord recorder.

A multirecord recorder is disclosed in the pending U. S. patent application Serial No. 83,272, by H. L. Bowditch et al., filed March 12, 1949, for an Industrial Recording Mechanism. This pending application discloses a pneumatic switching device, comparable in general purpose with the device of this invention.

It is an object of this invention to provide a new and improved pneumatic switch.

Referring to the drawings, in which an illustrative embodiment of this invention is shown:

Figure I is a showing, in vertical central section, of a pneumatic switch;

Figure II is a horizontal section through the whole upper body of the device showing the upper body only taken on a line as indicated by II—II in Figure I;

Figure III is a horizontal section through the whole lower body of the device, showing the lower body only, taken on a line as indicated by III—III in Figure I;

Figure IV is an elevation of a rotatable selector shaft which is shown in vertical central section in Figure I; and

Figure V is a horizontal section through the selector shaft, taken as on line V—V in Figure IV.

Referring to Figure I, the pneumatic switch comprises, mainly a signal input body 10, a selector body 11 secured thereto by bolts 11*a*, and between these bodies, a diaphragm 12.

With reference to Figures I and II, in the signal input body 10 there are a number of passages 13 through each of which the pneumatic input signals from a different condition sensing element are conducted. In each passage 13 there is an adaptor 14 with a central signal passage 15 therethrough. The outer end of the adaptor 14 is formed to receive and secure a pipe or tube (not shown) from the related condition sensing element (not shown).

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The inner end of the adaptor is flush with the inner face of the input body 10 to form a valve seat 14' and may be contacted by the diaphragm 12. It will be seen that such contact, under proper shut-off pressure, would close off the signal passage 15, shutting off the pneumatic signal therein.

With further reference to the adaptor 14, the inner end thereof is reduced in outer diameter, thus providing an annular opening 16 about the adaptor. It follows that without the interference of the diaphragm 12, the inner end of the signal passage 15 would not be blocked and the input signal would be transmitted out of the inner end of the signal passage 15, over the inner end of the adaptor 14, and back into the annular opening 16.

The signal input body 10 is further provided with a single, central, pneumatic output signal passage 17, common to all of the input signals. The common character of this output passage is accomplished by connecting passages 18 between each of the input signal annular openings 16 and the output passage 17.

Whereas six input passages 15 are shown, any desired number may be used. The single diaphragm 12 overlies the inner ends of all the passages 15, and portions of the diaphragm, as will be shown, may separately and individually shut off the signal in such of the passages 15 as are selected for shut-off, while permitting a signal to pass from one of the passages 15, through a connecting passage 18 to the common output passage 17.

In other words, the diaphragm 12 is not operated as a whole under a single pressure, but the several portions of the diaphragm adjacent the inner ends of the input passages 15, may be operated singly or in concert to shut off certain of the passages 15, as desired. This is accomplished, as will be shown, through the passages and arrangements of the selector body 11. The usual practice is to choose one of several input signals as the one desired in the output passage 17. The other signals are then shut off by the application of shut-off pressure to the associated portions of the diaphragm while the shut-off pressure is not applied to that portion of the diaphragm which is associated with the signal selected for the output signal at that particular time.

With reference to Figures I and III, the selector body 11 is provided with a central opening 19, and a shut-off pressure inlet passage 20 leading to said opening. Shut-off pressure passages 21 lead

from the central opening 19 to the inner surface of the body 11, each having an opening to that surface in alignment with and adjacent to the inner end of one of the inlet passages 15 of the body 10, although separated therefrom by the diaphragm 12. The inner surface of the body 11 is formed with cuplike depressions 21a about each of the shut-off pressure passages 21. These depressions receive the adjacent portion of the diaphragm 12 when the shut-off pressure is not applied thereto. At this time the selected input signal pressure is being transmitted through its input passage 15, around the inner end of its adaptor 14, to the associated annular opening 16, and thence to the common output passage 17 through the related connecting passage 18.

Referring to Figures I, IV, and V, in the central opening 19 of the selector body 11, a rotatable selector shaft 22 is mounted, with its inner end adjacent the diaphragm 12, and headed as at 23 to provide a bearing for the rotation of the shaft 22. The outer end of the shaft 22 is provided with a gear 24, through which any desired selector impulse may be transmitted to the shaft 22 so as to rotate it to such a position as will arrange for the application of shut-off pressure to all shut-off portions of the diaphragm 12 except that one which is related to the signal desired for the output.

This selection is made possible by the particular configuration of the selector shaft 22. This shaft, in its normal outside diameter, completely fills the central opening 19 except for such clearance as is needed for the rotation of the shaft. However, there is an annular cutaway portion 25, some portion of which is always open to the shut-off pressure inlet passage 20. A second annular cutaway 26 and a vertical slot 27 connecting the two annular cutaways, are provided so the cutaway 25 is also open, at any one setting, to all but one of the shut-off passages 21. This one selected passage is blocked from the shut-off pressure by the normal outer diameter of the selector shaft 22 in its close fitting association with the central opening 19, and because the annular cutaway 26 does not completely encircle the shaft, as indicated by the portion 28, Figure IV.

Moreover, the selector shaft 22 is provided with

an axial passage 29 as a vent to atmosphere, with a single radial venting passage 30 leading to the passage 29 through the portion 28. With this arrangement the passage 21 which is selected for venting, is connected to atmosphere through the passages 30 and 29.

To select a particular input signal, in body 10, as the one desired in the output 17, the selector shaft 22 is rotated until the radial venting passage 30 is aligned with the related shut-off pressure passage 21. The pressure therein is thus vented, and the related diaphragm portion is pushed into the related recess 21a in body 11 by the related input signal pressure, and a passage is provided to the outlet passages 18 and 17 for this one, selected pneumatic signal. The other signals, as explained above, are all shut off by the application of shut-off pressure to the related portions of the diaphragm, forcing those portions over the inner ends of the signal openings 15.

I claim:

A pneumatic switching device comprising a pair of bodies and a diaphragm separating said bodies, one of said bodies containing a plurality of pneumatic signal input passages extending to said diaphragm and closable thereby, and a common output passage connected to each of said input passages when not shut off by said diaphragm, and the other of said bodies containing shut-off pressure passages to said diaphragm adjacent each of said inlet passages, and a rotatable selector shaft having a vent to atmosphere and a passage positioned by the rotation of said selector shaft to connect said vent passage with one of said shut-off passages, said one of said shut-off passages being thus selected not to receive said shut-off pressure.

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The following references are of record in the file of this patent:

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