Oct. 31, 1939. A. SCHWEIZER 2,177,674

ATMOSPHERIC PRESSURE RESPONSIVE DEVICE

Filed March 3, 1938

Fig. 1

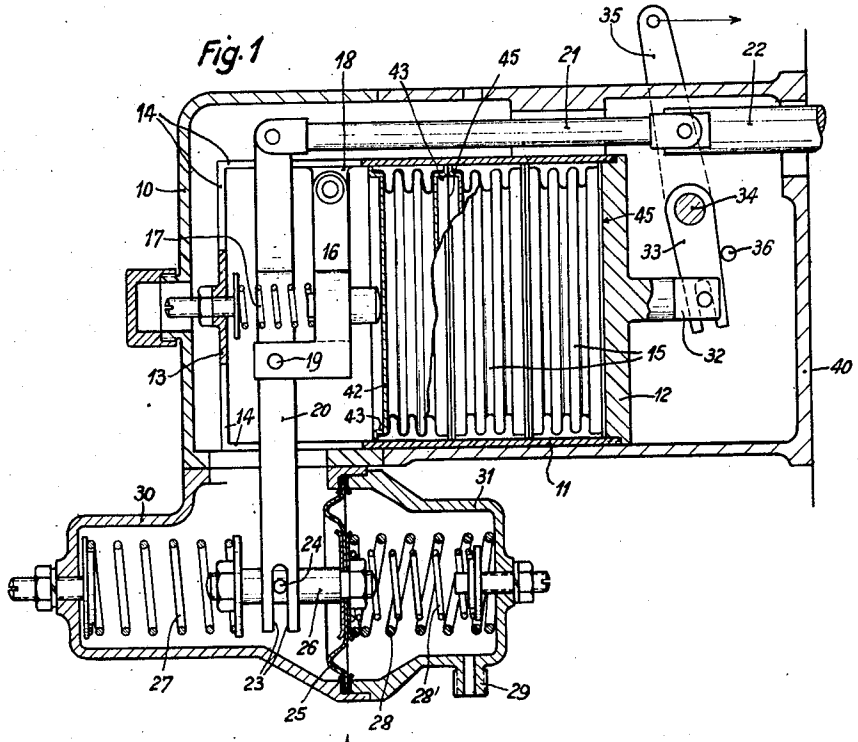
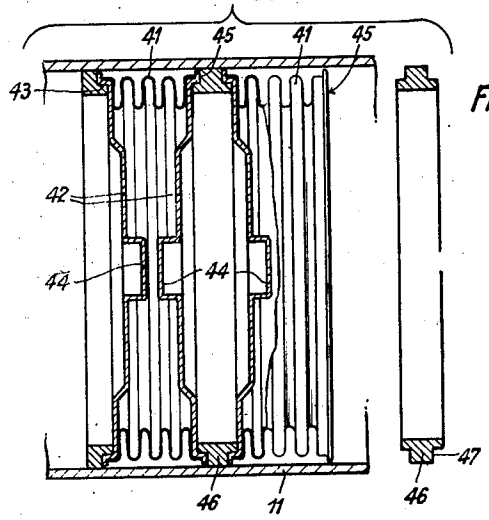


Fig. 2



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ATMOSPHERIC PRESSURE RESPONSIVE DEVICE

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6 Claims. (Cl. 137—156.5)

This invention relates to improvements in or modifications of the mixture control for internal combustion engines operating at varying altitudes and provided with a number of diaphragm capsules each individually axially displaceable within a common guide element.

By the present invention the diaphragm capsules forming a part of the atmospheric pressure responsive device embodying this invention are formed from sections of elastic tubes, i. e. Sylphon bellows closed by end plates which are provided with rims serving to transmit the force and which are axially displaceable in the guiding element. The rims of the end plates preferably engage in guide rings.

By this means the construction shown in the prior application of Heinrich and Schweizer, Serial No. 147,330 filed June 9, 1937, can be considerably improved in its operation. In said construction a turning couple might occur due to the adjustment force operating at the centre of each diaphragm capsule, and due to the frictional resistance at individual points on, and particularly at the lower parts of the guide member, by reason of which turning couple the capsules or the guide members thereof might turn at an angle to the guide path and jam.

In the construction of this invention this occurrence is avoided in that the adjustment force is transferred to the rims of the diaphragm bellows, by which the bellows are guided so that these can no longer jam. Further by this new arrangement the frictional resistance to free movement of the control arrangement is considerably reduced.

The invention is more particularly described with reference to the accompanying drawing, in which:

Figure 1 is a sectional elevation of a mixture control.

Figure 2 shows a modified form of diaphragm bellows provided with guide rings.

A cylindrical sleeve 11 having end walls 12 and 13 is disposed in a casing 10, in which sleeve three diaphragm bellows 15 are mounted to be axially displaceable therein. The diaphragm bellows are abutted against one another and against the wall 12 by means of a spring 17 and interposed lever 16.

The lever 16 is pivotally supported on two lugs 18 carried by the sleeve 11, and carries on its lower bent and forked end the pivotal pin 19 of a two armed lever 20 which is guided by a pair of slits 14 in the sleeve 11. This lever has a recess to receive the spring and is coupled in known manner at its upper end with the control element 22 of an injection pump by means of a freely pivoted connecting rod 21.

The opposite forked end of the lever 20 is provided with a guide slot 23 and engages a pin 24 carried on a spindle 26 mounted on a membrane 25. The membrane 25 and the spindle 26 are disposed together with a spring 27 serving to guide the spindle 26 in a casing part 30 secured by flanges to an open side of the casing 10, which casing part 30 is provided with a cover 31.

Two return springs 28 and 28' are disposed within the hollow space of this cover 31. A pressure conveying pipe leading to the air inlet pipe of the internal combustion engine is attachable to a perforated lug 29. The sleeve 11 surrounding the diaphragm bellows is displaceably mounted in the casing 10 in order to be able to adjust the regulating rod 22 as desired, independently of the operation of the diaphragm 15 and 25. For this purpose a lever 33 having a slotted guide is provided, which has an adjusting lever 35 provided with a shaft 34, and which engages with a spindle 32 provided on the wall 12 of the sleeve 11, the movement of which is limited by the stop-pin 36. The casing 10 is provided with a machine surface 40 in order that it may be mounted on the injection pump in known manner, the regulating rod controlling the quantity of fuel injection being indicated by reference 22. Instead of the cylindrical sleeve a guide formed by individual guide rods may be used.

The diaphragm bellows 15 consist of sections of tube 41, and of pairs of end plates 42 on which the edges 43 of the tube sections may be concentrically hermetically welded. The two end discs are, in the form of construction shown in Figure 2, dished inwardly at their centres to provide two sockets or internal projections 44, which, even with the highest air pressure occurring around them, do not come into contact when the bellows are filled in normal manner. Immediately however, the gas filling of these escapes due to leakage from the bellows, these two projections will come into contact and will transfer forces acting on one end plate to the other end plate. By this means the advantage is obtained that the arrangement still remains operative, even when one diaphragm bellows is leaky, and no serious interference in the operation of the internal combustion engine can occur. The rims 43 are provided with contacting faces 45, the edges of which, as shown in the construction of Figure 1 are directly guided in the sleeve 11 between each two oppositely disposed end plates, as

shown in Figure 2. Guide rings 46 may further be disposed, which latter are provided with annular flanges 47 over which the edges 43 of the end plates 42 can be pushed. In both forms of construction the hollow spaces bounded by two adjacent end plates belonging to different diaphragm bellows are not hermetically closed. The operative bellows surface therefore, in the construction of Figure 1, is equivalent to the sum of the surfaces of the three end plates.

I declare that what I claim is:

1. In apparatus of the character described, a hollow guide, and a plurality of diaphragm bellows movably mounted in said guide, said bellows each camprising an expansible tube, and end plates closing the ends of said tube to provide end faces having projections adjacents their peripheries whereby contact of adjacent bellows is at their edges only.

2. An atmospheric pressure responsive device comprising a guide casing and a plurality of diaphragm bellows sections movably mounted in said casing, each bellows section comprising a corrugated tube section and end plates closing the ends thereof and provided with longitudinally extending peripheral flanges by which the expansion and contraction movements of the bellows sections are transmitted from one section to the other.

3. A device as set out in claim 2 in which the edges of the flanged end plates are guided at their edges for movement in said guide casing.

4. A device as set out in claim 2 including a guide ring arranged between each two adjacent bellows sections and slidably mounted in said guide casing, the flanges of adjacent end plates engaging and being guided by said guide ring.

5. A device as set out in claim 2 including a guide ring arranged between each two adjacent bellows sections and slidably mounted in said guide casing, said ring having annular laterally extending centering flanges, the flanges of adjacent end plates engaging said flanges.

6. A device as set out in claim 2 in which the end plates of each bellows section are provided with internal projections adapted to contact with each other after the bellows section has contracted a predetermined amount to prevent further contraction thereof.

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