

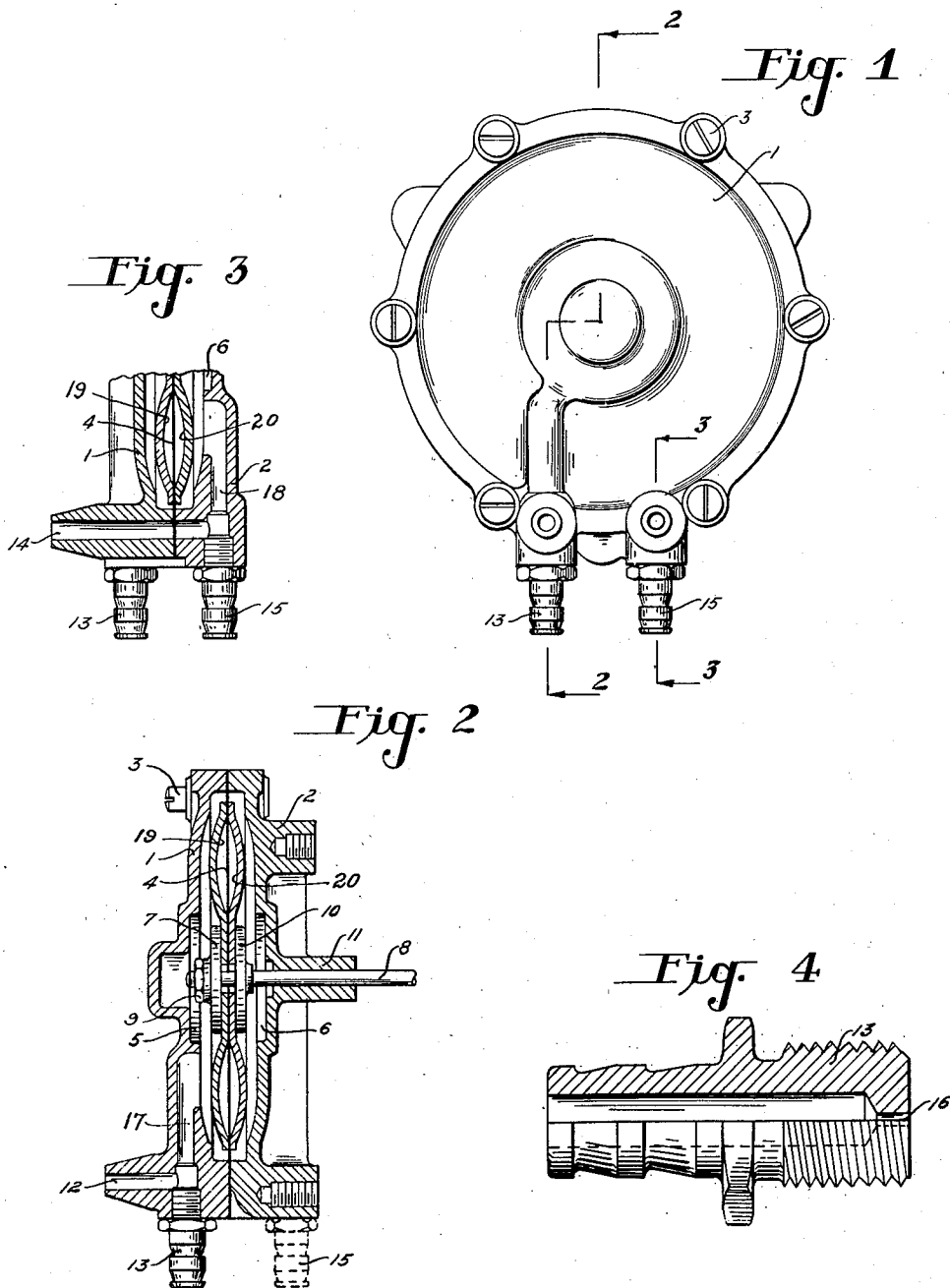
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AIR RELAY ASSEMBLY FOR AUTOMATIC PILOTS

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AIR RELAY ASSEMBLY FOR AUTOMATIC PILOTS

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1 Claim. (Cl. 137—157)

This invention relates to air relays for automatic pilots and has for its primary object to provide an improved housing that will be leakproof in operation and simple in construction and which may be formed in one simple die casting operation of each of its two complementary parts and still provide for the necessary inlet and outlet ports in the two chambers in the housing that are separated by the conventional two-way pressure responsive flexible diaphragm.

With the foregoing and other objects in view, the invention resides in the combination of parts and in the details of construction hereinafter set forth in the following specification and appended claim, certain embodiments thereof being illustrated in the accompanying drawing, in which:

Figure 1 is an end view of the housing for the air relay;

Figure 2 is a view in section taken through air relay assembly along line 2—2 of Figure 1;

Figure 3 is a view in section through one of the air outlet passages and nozzles taken along line 3—3 of Figure 1; and

Figure 4 is an enlarged detail view in section taken through one of the outlet nozzles.

Referring more particularly to the drawing the air relay assembly includes a housing made up of two single separate castings 1 and 2 releasably joined together by a series of screws 3 near their outer edges passing therethrough and also through a two-way pressure responsive flexible diaphragm 4 held by two stiffening plates 19 and 20 and two retaining members 7 and 10. The plates 19 and 20 are of lesser diameter than the diaphragm to stiffen the latter against sagging but permit sufficient flexing of the diaphragm for operating purposes. The diaphragm divides the space between the inner concave faces of the two complementary castings into two separate air chambers 5 and 6. The diaphragm is not actuated in either direction by any springs, or the like, and is strictly a two-way pressure responsive diaphragm that is operated in one direction or the other away from central neutral position by a differential of pressure in air chambers 5 and 6 as the differential is created by a conventional normally equalized pressure differential creating means. The diaphragm is apertured to receive a reciprocatory shaft 8 which is a shaft for operating the conventional balanced oil valve of the conventional automatic pilot. The shaft 8 is connected to the diaphragm by means of nuts 9. Shaft 8 is slidable in a bearing support 11 to accomplish such work for which it is intended, namely to hold such balanced oil valve balanced when the diaphragm is in central neutral position and to move shaft 8 to unbalance the oil valve in accordance with movements of the diaphragm to either side of neutral position.

Casting 1 is die cast to include an air outlet passage 12 and a passage screw-threaded to receive a removable inlet nozzle 13 with a restricted bore 16. Both inlet nozzle 13 and outlet 12 are in communication with a channel 17 in the side wall of casting 1 leading to air chamber 5 on the left side of the diaphragm. Casting 2 is die cast to include an air outlet 14 and a passage screw-threaded to receive a removable inlet nozzle 15, provided with a restricted bore, such as shown at 16. Both inlet and outlet are in communication with a channel 18 in the side wall of the casting 2 leading to air chamber 6.

Under the control of the conventional gyro air pick-off and suction pump, not shown, when the air in chamber 6 alone is exhausted under the control of restricted inlet nozzle 15 and through passage 14 the diaphragm is drawn to the right so as to force shaft 8 to the right which, in the usual manner, operates the balanced oil valve, not shown, to the right. Likewise, when air chamber 5 alone is exhausted under the control of restricted inlet nozzle 13 and through passage 12 the diaphragm is drawn to the left so as to force shaft 8 to the left which operates the oil valve accordingly.

It will readily be seen from the foregoing that there has been provided an automatic pilot air relay that in addition to the diaphragm and shaft, includes only two simple complementary removable and replaceable castings which provide the necessary air passages and which inlet passages are adapted to removably receive air intake nozzles.

I claim:

In combination in an air pressure actuated relay, a housing comprising two separate flanged complementary single die castings with opposed concave inner surfaces, a two-way pressure responsive flexible diaphragm mounted between and suspended and supported solely by said castings to form two separate air chambers normally of equal size but variable in size by the movements of said diaphragm in either direction away from neutral central position caused solely in response to the differences in pressure acting on the opposite sides of said diaphragm, each of said castings having cast integrally within the side wall thereof a single air channel communicating with its separate air chamber and an air inlet and an air outlet in each of said castings communicating with its separate air channel each of said channels constituting the sole means for admission of air to and the exhaust of air from its associated chamber, and a shaft connected to and movable by said diaphragm.

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