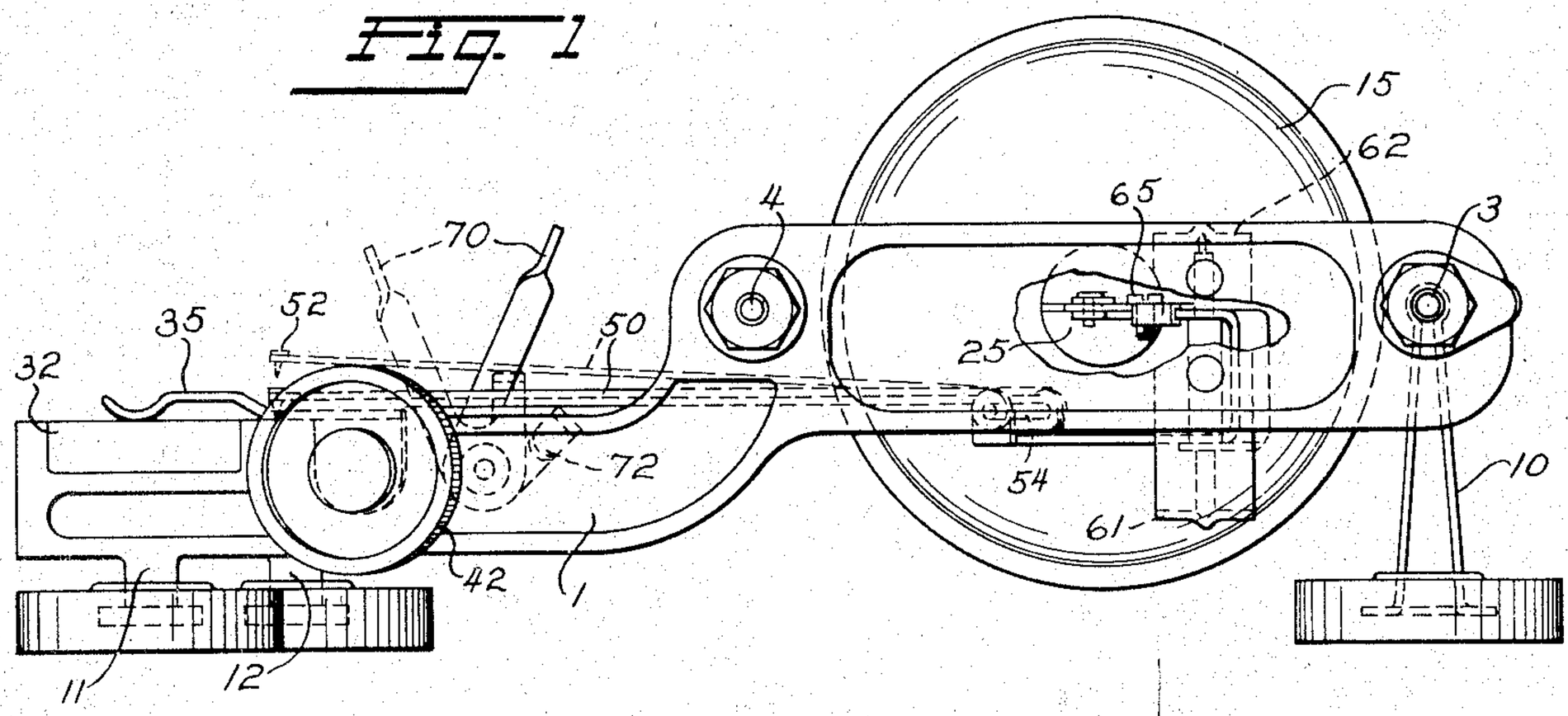
March 30, 1943. B. R. SHAW 2,315,137

RADIOSONDE PRESSURE ELEMENT

Filed July 18, 1941

Fig. 1



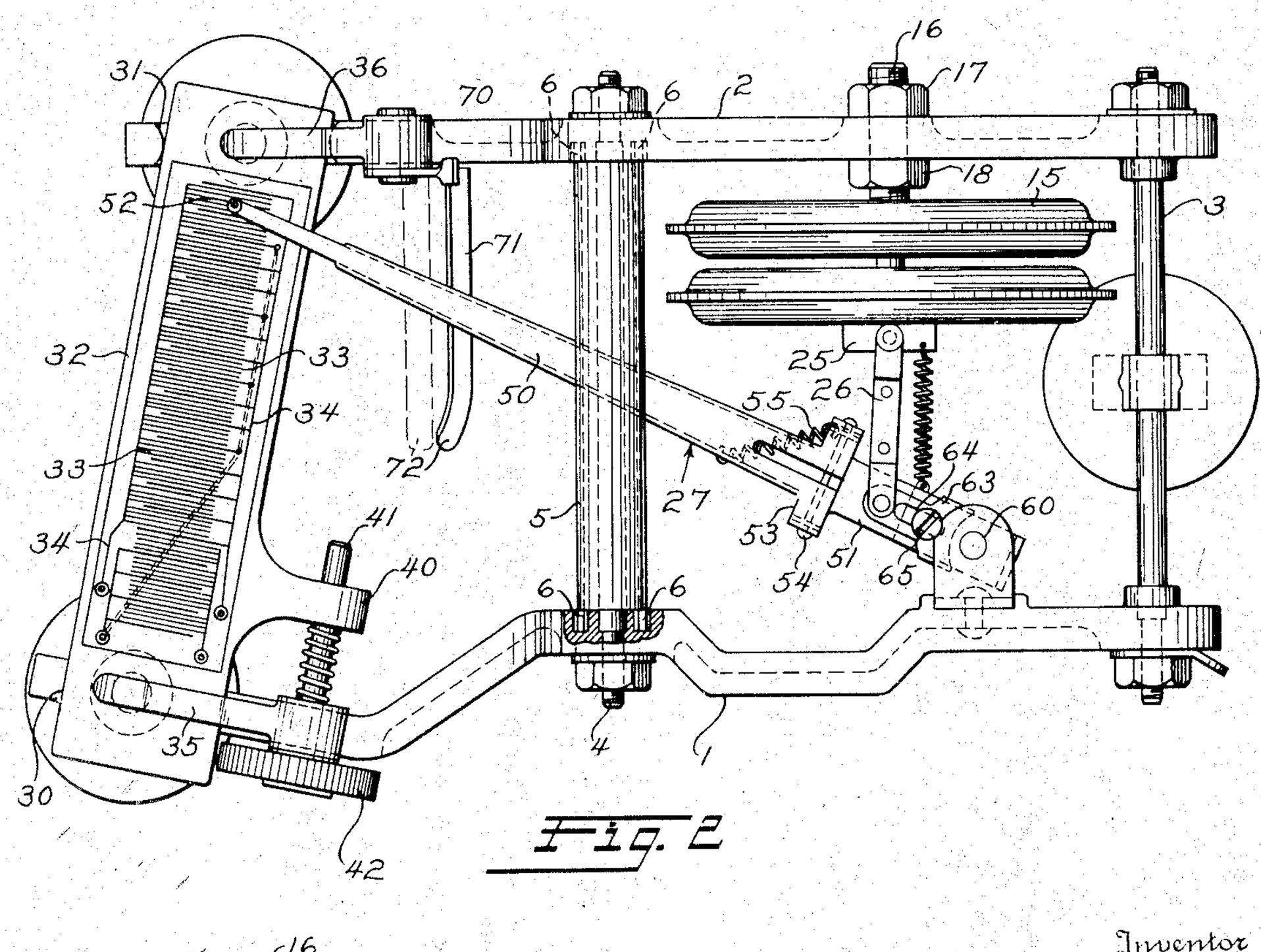




Fig. 2

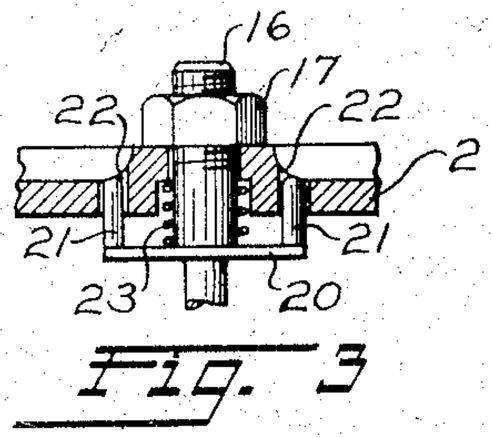



Fig. 3

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## RADIOSONDE PRESSURE ELEMENT

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10 Claims. (Cl. 200—83)

This invention relates, broadly, to devices or systems for operating means, such as a device for switching from one electrical circuit to another, in accordance with a variable factor and, more particularly, relates to the pressure-responsive system of a radiometeorograph, by which changes in air pressure are caused to vary an electric current, thereby permitting an indication of changes in atmospheric pressure to be secured.

It is the principal object of this invention to provide a new and improved structure and arrangement of parts of an apparatus of the type referred to above, whereby new and improved operation of such a device will be secured and many of the structural and operation defects and disadvantages of known devices will be done away with.

Other objects and features of novelty of the invention will be made apparent by the following description and the annexed drawing, it being understood, however, that such description and drawing are merely illustrative of the invention, which is not limited thereby or otherwise than by the appended claims.

Referring to the drawing, in which like reference numerals refer to like parts,

Fig. 1 is a side elevational view, with parts broken away, showing the invention;

Fig. 2 is a plan view of the device disclosed in Fig. 1, and

Fig. 3 shows a modified form of means for attaching the bellows assembly to the side frame member.

It is usual to provide in radiometeorograph apparatus a system or device, one of the physical characteristics of which is varied by changes in the pressure of the surrounding air which, by reason of such physical change, causes an electric current to be varied in accordance with such changes in atmospheric pressure. The new and improved device according to this invention is operable to produce these results and functions in a new and improved manner and by reason of improved structural and operational features.

This device, as disclosed in the drawing forming part of this application, comprises a frame including the two longitudinal side members 1, 2 which are connected and spaced at their one ends by a bolt 3 and, intermediate their ends, by a second bolt 4. A tube 5 surrounds the bolt 4 and is provided at its opposite ends with lugs 6 which extend into slots in the inner faces of the side members 1, 2, whereby the tube not only spaces the side members apart but also prevents any twisting thereof. If desired, the tube 5 may surround the bolt 3 instead of bolt 4. As stated, the bolt 4 connects the side members at points intermediate their ends and the frame is therefore divided into approximately two equal parts, one of which lies between the bolts 3 and 4 and the other of which lies between the free ends of the side members and the bolt 4. As shown in Fig. 1, the side frame members are so formed that the portion of the frame between the bolts 3, 4 is vertically above the part between the bolt 4 and the free ends of the side members, for a purpose which will appear hereinafter. Supports for the frame member are provided by a depending foot member 10 which is connected to the bolt 3 and by two depending foot members 11, 12 which are connected to the lower parts of the side members 1, 2, respectively, adjacent the free ends thereof, the lower faces of the three feet members being in the same plane as shown in Fig. 1.

Between the bolts 3, 4 the side member 2 supports a pressure-responsive device comprising the evacuated bellows 15 which are connected in tandem as shown in Fig. 2. One side of the bellows assembly is held in fixed position by means of a screw-threaded bolt 16 which extends loosely through the side 2 and is provided with nuts 17, 18 which are on the outside and inside of the side frame member, respectively, and by means of which the bolt and bellows assembly may be fastened to the side members and may be adjusted with respect thereto. In the modification shown in Fig. 3 the screw-threaded bolt 16 extends through an opening in side member 2, receiving nut 17 on its outer end. A wing member 20 is attached to the bolt 16 and is disposed between one of the bellows and the side member 2 and is provided with at least two lugs 21 which extend into apertures 22 in the side member. A spring 23, which surrounds the bolt 16 is disposed between the side wall and the wing member 20 and constantly urges these parts away from each other. This spring is sufficiently strong to resist the expansion of the bellows and co-operates with the exterior nut 17 to permit adjustment of the position of the bellows with respect to the side member. The lugs 21 co-operate with the apertures 22 in the side member to prevent any turning of the bolt or bellows. At the free end of the bellows assembly which end alone is moved by changes in atmospheric pressure, there is provided on the outer face of the outermost bellows a member 25 to which is connected one end of a link 26, the other end of which is connected

to a contact arm 27, the structure and purpose of which will be described hereinafter.

Adjacent the free ends of the side frame members, which are the ends opposite to that at which the bolt 3 is located, the upper surfaces of the two side frame members are provided with aligned recesses 30, 31 within which are received the ends of a block 32, on the upper surface of which are a plurality of wires, contacts or markings forming a commutator 33 included in electrical circuits 34. The recesses 30, 31 are so proportioned as to just receive and firmly hold the ends of the block 32, the upper surface of which is preferably flush with the upper surfaces of the side frame members when the block is positioned in the recesses. Mounted on the upper surfaces of the two side frame members, 1, 2 are spring fingers 35, 36, respectively, the free ends of which overlie the recesses 30, 31 and engage the upper surface of the block 32 when the same is positioned in the recesses to thereby firmly hold it therein. At one side thereof the block 32 is provided with a part 40 extending outwardly therefrom and having a screw threaded hole therethrough which receives the end of an adjusting screw 41 having the head 42 disposed outwardly of the side frame members. It will be seen that after the block 32 is positioned within the recesses 30, 31 and after the shank of the adjusting screw has been threaded through the opening in the part 40 the block 32 may be moved longitudinally of itself and laterally of the frame by means of the adjusting screw.

Means are provided by the invention for causing movement of the bellows due to changes in atmospheric pressure to be translated into variations of the circuits 34 in a novel and improved manner, such means comprising the contact arm 27. This arm comprises two hinged parts 50 and 51. The part 50 is provided at its free end with a contact point 52 which normally engages the upper surface of the commutator 33 and at its other end is provided with laterally extending wings 53 having lugs at the ends thereof which lie in face to face abutment with similar lugs formed on the ends of wings carried by the end of the part 51 of the contact arm. A pin 54 forms the hinge connection between the parts 50, 51. A spring 55, having one end attached to one of the lugs formed on the end of the wing carried by part 51 and the other end attached to part 50, is provided to urge the contact point 52 on part 50 into constant engagement with the upper surface of the commutator 33.

The part 51 of the contact arm is generally U-shaped, the side members of the U being mounted on a pivot member 60, the ends of which are rotatably supported by the two side arms 61, 62 of a U-shaped bracket which is mounted on the inner face of side frame member 1. The lower leg of the U-shaped part 51 is provided at its outer end with the wings with which the wings 53 of the contact part 50 of the arm are hingedly connected. The upper leg of the part 51 is shorter than the lower leg and has adjustably connected to it member 63 which is provided with an elongated slot 64 through which extends a tightening nut 65 which is carried by the upper leg of the member 51. By reason of this screw and lost motion slot connection the member 63 may be moved longitudinally of the upper leg of the part 51 in order to increase the effective length thereof. At its outer end the member 63 is connected to the bellows assembly 15 by means of the link 26 which has been heretofore described.

Means are provided by the invention for holding the contact part 50 of the arm 27 away from the commutator 33 and against any undesired motion. It will be noted that the part 50 of the contact arm extends beneath the torque tube 5. Pivotally mounted on the frame 2 is a lever having an operating arm 70 and a second arm 71 which extends at right angles to the side frame member 2 in the direction of the side frame member 1 and the free end of which is turned downwardly as shown at 72. The arm 70 of the lever may be operated to cause the arm 71 to move from a lowered position in which it is completely out of contact with the arm 50 to a raised position in which it engages the lower surface of the arm 50 and raises the arm about its hinged connection 54, 54 to a position in which the upper surface of the arm 50 engages lightly the lower surface of the torque tube 5 thereby effectively holding the arm 50 between the lever arm 71 and the torque tube.

It is believed that the operation of the described apparatus will be apparent from the description thereof and that the function of the various parts will also be apparent, and no further description of the operation is believed to be necessary.

It will be seen that I have provided a new and improved apparatus for causing variations in atmospheric pressure to be translated into variation of a resistance. While I have described and illustrated but one modification of the invention it will be apparent that further modifications and embodiments may be made and practiced without departing in any way from the spirit or scope of the invention, for the limits of which reference must be had to the appended claims.

What is claimed is:

1. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members, means connecting said side members at one end and intermediate their ends to form a rigid frame, means for preventing twisting of the frame and for spacing the side members thereof, aligned recesses in the upper surfaces of the side members adjacent the ends thereof removed from the connected ends and within which a removable block carrying electrical contacts is adapted to be positioned, and spring fingers on the upper surfaces of the side members adjacent said recesses and having free ends overlying the recesses and adapted to bear on the block when in the recesses and to hold it therein.

2. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members connected at their one ends and intermediate their ends and having parallel, unconnected portions extending from the parts so connected and being displaced vertically therefrom by an offset in the side members, the side members between the two connections therebetween being constructed and arranged to support and position pressure-responsive devices, and aligned recesses formed in the free ends of the side members within which a block carrying electrical contacts is adapted to be received.

3. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members connected at their one ends and intermediate their ends and having parallel, unconnected portions extending from the parts so connected and being displaced vertically therefrom by an offset in the side mem-

bers, the side members between the two connections therebetween being constructed and arranged to support and position pressure-responsive devices and a pivoted arm, and aligned recesses formed in the free ends of the side members within which a block carrying electrical contacts is adapted to be received.

4. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members connected at their one ends and intermediate their ends and having parallel, unconnected portions extending from the parts so connected and being displaced vertically therefrom by an offset in the side members, the side members between the two connections therebetween being constructed and arranged to support and position pressure-responsive devices, aligned recesses formed in the free ends of the side members within which a block carrying electrical contacts is adapted to be received, a supporting member mounted on the end connection between the side members, and additional supporting members mounted respectively on the lower face of each of the side members adjacent the free end thereof, the lower faces of all of such supporting members being in the same plane.

5. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members, means connecting said side members at one end and intermediate their ends to form a rigid frame, means for preventing twisting of the frame and for spacing the side members thereof, aligned recesses in the upper surfaces of the side members adjacent the ends thereof removed from the connected ends and within which a removable block carrying electrical contacts is adapted to be positioned, and spring fingers on the upper surfaces of the side members adjacent said recesses and having free ends overlying the recesses and adapted to bear on the block when in the recesses and to hold it therein, and means mounted on one of the side members and cooperating with a block positioned in said recesses for adjusting the block transversely of the frame.

6. In an apparatus for operating means in accordance with changes in air pressure, a supporting frame comprising side members connected at their one ends and intermediate their ends and having unconnected end portions extending from the parts so connected and being displaced vertically therefrom by an offset in the side members, the side members between the two connections therebetween being constructed and arranged to support and position pressure-responsive devices, aligned recesses formed in the free ends of the side members within which a block carrying electrical contacts is adapted to be received, a lever pivoted to one of the side members adjacent said recesses and having an operating arm and a second arm which extends at right angles to the side member to which it is connected and toward the other side member, the second arm being adapted and constructed to normally lie in a position below and not in engagement with the pivoted arm and to be movable to a position in which it engages the arm and moves it upwardly with respect to the side members.

7. An apparatus for operating means in accordance with changes in atmospheric pressure, comprising side members connected at their one ends and intermediate their ends, a pressure-responsive device mounted on one of the side members between said connections, an electrical contact device supported between the two side members adjacent the unconnected ends thereof, an arm pivoted to one of the side members opposite the pressure-responsive device the free end of which is in sliding engagement with the electrical contacts, and a link connecting the pressure-responsive device to the arm intermediate the ends thereof.

8. An apparatus according to claim 7, in which the arm is formed of two hinged parts whereby one part may be moved out of engagement with the contacts.

9. An apparatus according to claim 7, in which the arm is formed of two hinged parts, one of which is pivotally connected to the side members and is U-shaped, one of the legs thereof being connected to the pressure-responsive device and the other being hinged to the part of the arm which engages the contacts.

10. An apparatus according to claim 1, in which a bolt connects the side members intermediate their ends and the means for preventing twisting of the frame and spacing the side members thereof comprises a tube surrounding the bolt and having its ends bearing on the inner walls of the side members and attached to the side members.

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