

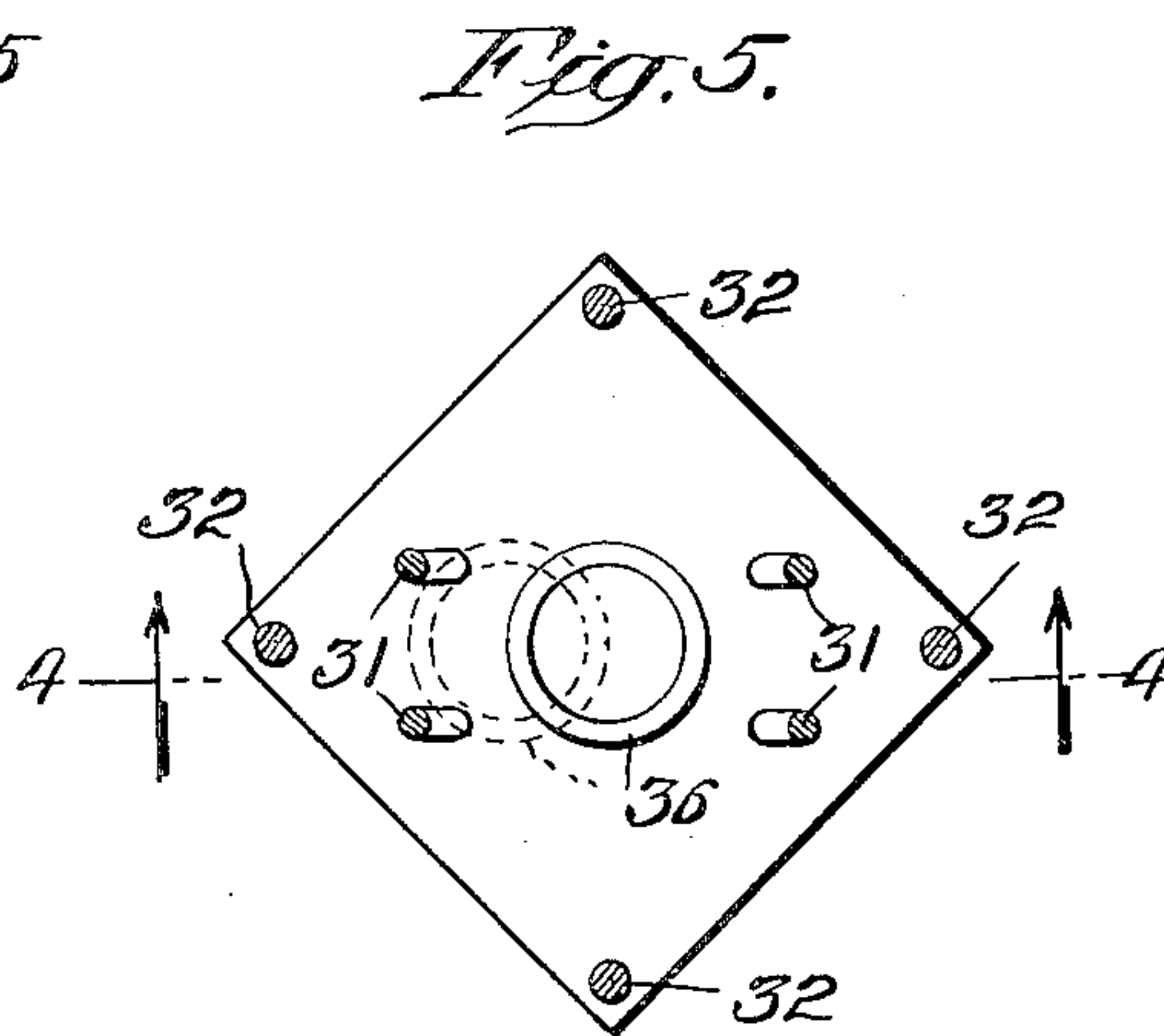
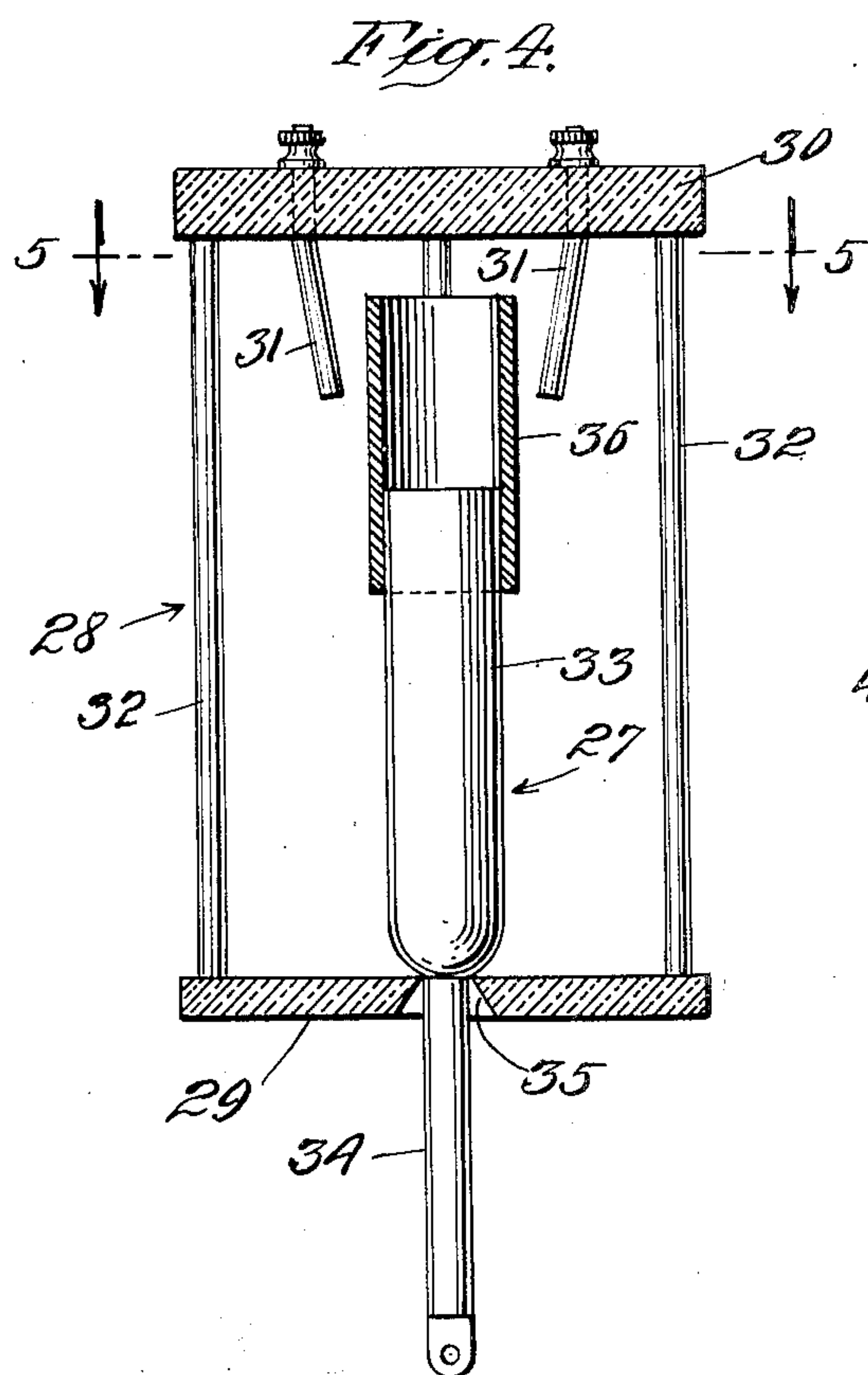
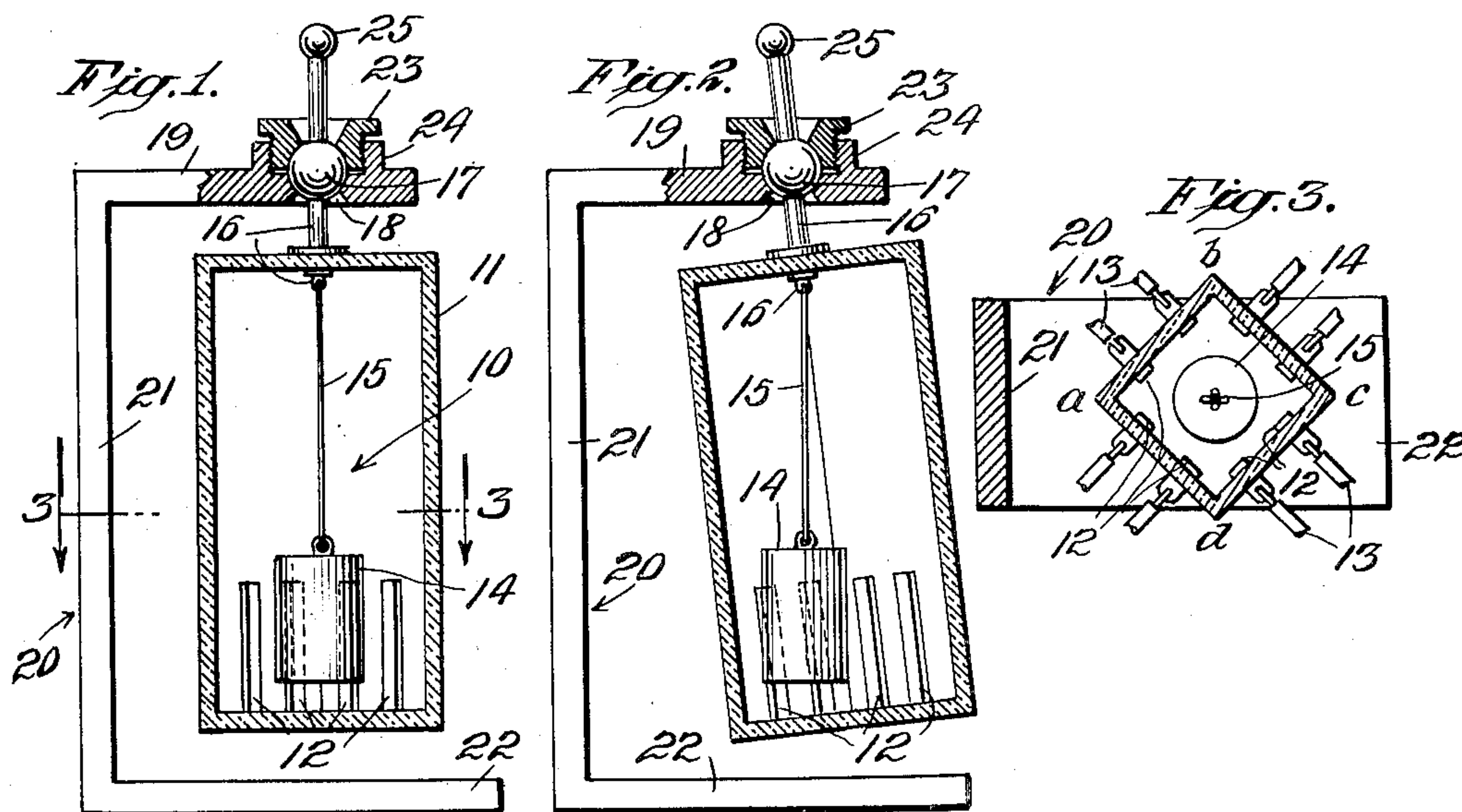
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H. G. LAPSLEY

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ELECTRIC SWITCH

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INVENTOR
HOWARD G. LAPSLEY
BY *Archibald Coy*
ATTORNEY

UNITED STATES PATENT OFFICE

HOWARD G. LAPSLEY, OF PLAINFIELD, NEW JERSEY

ELECTRIC SWITCH

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This invention relates to an improvement in electric switches.

The main object of the invention is to provide an improved switch which is adapted for great flexibility of use. Another object is to provide a switch of this character adapted for quick and simple make and break action. Other objects of the invention are to provide an improved switch having the above characteristics and also the capacity to carry currents of considerable magnitude, a switch which is substantially fireproof, and a switch which can easily be constructed to meet the requirements within a wide range of capacity.

The mercury switch has the general characteristics of flexibility, adaptability, and capability of being substantially fireproof. The mercury switch is, however, limited substantially to currents of 25 amperes and 250 volts, whereas the switch of the present invention can be made to carry from two to four times the maximum limit of the mercury switch and still retain its characteristics of flexibility. The switch of the present invention is substantially fireproof as in the case of the mercury switch, and the contact pressure of the electrodes may be regulated, as by the design of the switch, to meet requirements far in excess of those which can be met by the mercury switch. Also, mercury has inherent limitations as a conductor, while a conducting material, such as copper, when given sufficient contact area and pressure, is practically without limit. In view of the foregoing, it may be said that the switch of the present invention embodies substantially all the merits of the mercury and in addition, due to its much greater capacity, has a larger field of application. Other features of the invention relate to the construction and arrangement of parts whereby the invention may be carried out in the general manner specified.

In the accompanying drawing illustrating preferred forms of the invention, Fig. 1 is a fragmentary elevation of one embodiment of the invention, partly broken away to show details of structure; Fig. 2 is a

view similar to Fig. 1 but with the parts in different positions; Fig. 3 is a section taken along the line 3—3 of Fig. 1; Fig. 4 is a section taken along the line 4—4 of Fig. 5 and illustrating another embodiment of the invention; and Fig. 5 is a section taken along the line 5—5 of Fig. 4.

According to the preferred embodiments of the invention, provision is made of a frame carrying several groups of contacts, and of a circuit closing member supported in said frame, the relation between the circuit closing member, the frame and the supporting means for the circuit closing member being such that normally the circuit closing member will be out of engagement with the groups of contacts but upon relative tilting therebetween the circuit closing member may be brought into engagement with the contacts of one of said groups to effect a corresponding circuit closing action.

Referring to Figs. 1, 2 and 3, a pendulum 10 is suspended in a frame or casing 11 containing groups of contacts 12 connected with insulated wires 13 extending outwardly from the casing or frame 11. As here shown, the pendulum includes a weight or bob 14 and a suspension member 15, such as a cord, attached at one end to the bob 14 and at the other end to a fastening device 16 projecting from the lower surface of the top of the casing, and the casing, which is preferably of insulating and fireproof material such as glass, hard rubber, porcelain and bakelite, is of square cross section with the contacts or contact strips 12 arranged in pairs at the angles so that the bob 14 may wedge between the contacts of any pair and complete the corresponding circuit. In this illustrative form of the invention the casing is closed at the top and bottom as well as at the sides and may easily be made watertight. Where it is desirable to inspect the operation of the switch or to inspect the contacts, the casing material would be clear or transparent and where a fire-proof and flash-proof switch is needed, as in photographic or motion picture film rooms, the

material of the envelope or casing would be opaque.

Closing of the gap between the contacts 12 at any one of the corners *a*, *b*, *c* or *d* 5 (Fig. 3) may be accomplished by relative movement between the bob and the casing. This relative movement may be effected by means of a member or rod 16 attached at its lower end to the top of the casing 11. In- 10 termediate the ends of the member or rod 16, it is provided with a ball 17 seated in a correspondingly shaped seat or socket at the upper end of an opening 18 through an overhanging arm 19 of a frame 20 includ- 15 ing an upright 21 and a base 22. The ball 17 may be held in position in said socket by a member 23 corresponding to a packing gland and having an external screw thread cooperating with a screw thread at the in- 20 ner side of an annular flange 24 projecting upwardly from the upper surface of the arm 19. The rod 16 extends upwardly through the holding member 23 and preferably is provided at its upper end with a 25 head in the form of a ball 25 which is adapted for use as a finger piece. It will be seen that the opening through the holding member 23 and the opening through the overhanging arm 19 are so shaped that the 30 connection is substantially universal and the rod 16 may be swung to a considerable extent in any direction about the center of the ball 17.

By pressing the finger piece or ball 25 35 to the left (Fig. 1) the casing 11 is tilted (Fig. 2) so that the bob 14 is engaged by and wedged between the contacts at the corner *a*, and obviously by pressing the ball 25 in other and suitable directions the bob 40 14 may be caused to bridge the pair of contacts at any one of the other corners *b*, *c* or *d*. Thus this form of switch is of a multiple throw type. The capacity of the switch may be increased by varying the proportions 45 so that the casing will have to be tilted to a greater extent to bring a pair of contacts into engagement with the bob, and also by increasing the weight of the bob.

In the second illustrative embodiment of 50 the invention, a circuit closing member 27 is mounted in a frame or cage 28 including a base or plate 29 which supports the member 27, a top or plate 30 which supports a plurality of groups of contacts 31, and mem- 55 bers or rods 32 connecting said plates 29 and 30, which preferably are of insulating material such as glass or porcelain or micarta. Two pairs of contacts 31 are shown and they are in the form of rods or springs pass- 60 ing through the upper plate 30, the upper ends of these contacts being provided with binding posts and the lower ends being positioned for engagement by the upper end of the circuit closing member 27. The cir- 65 cuit closing member 27 has a body portion

33 above the base 29 and a downwardly ex- extending portion 34 in the form of a rod passing through a hole 35 in the base, the hole being just large enough at its upper 70 end to accommodate the rod and flaring out beneath said upper end to permit the rod to be swung in different directions as de- sired. The body portion 33 is provided at its lower end around the upper end of the 75 rod 34 with a spherical surface which rests on the top of the base 29 and facilitates the free rocking movement of the circuit closing member. At the upper end of the body portion 33 is a tubular contact portion 36 by 80 which the actual circuit closing is effected. It will be evident that by making the contact portion 36 tubular, the contact portion or member can be made of considerable size without raising the center of gravity to an 85 undue extent. In this embodiment of the invention, the circuit closing member may be balanced in its central and vertical position (Fig. 4) or it may be tilted to the left, as indicated in Fig. 4, to connect one pair 90 of contacts 31 or to the right to connect the other pair of contacts. In this form of the invention, the circuit closing member may either be on easy balance for quick and re- sponsive control or may be operated from 95 the lower end of the rod 34 by any suitable means acting thereon. It should be noted that with the terminals projecting downwardly from the top cap they are practical- ly free from exposure to the weather, ice, 100 sleet, dirt, etc.

Both of the illustrative embodiments of the invention have the same advantages of balance, which inherently provides for ease of operation in establishing or interrupt- 105 ing flow of current; and also the advantage of affording a choice of several circuits in small space and with limited movement. Obviously both forms have a wide range of useful application.

It should be understood that various 110 changes may be made in the construction and arrangement of parts and that certain parts may be used without others without departing from the true scope and spirit of the invention. 115

I claim:—

1. In a switch, the combination of a frame having a top, a plurality of groups of spaced contacts arranged around said frame, a con- 120 tact member suspended from said top for freely swinging in any direction from the vertical to engage the contacts of any of said groups, and means for supporting said frame for tilting in any direction from the 125 vertical to effect engagement of said contact member with the contacts of any selected group.

2. In a switch, the combination of a closed casing, a plurality of groups of spaced con- 130 tacts arranged around the interior of said

- casing, a contact member in said casing and suspended for freely swinging in any direction from the vertical under gravitational force to engage the contacts of any of said groups, and means for suspending the casing from above for swinging movement in any direction from the vertical to effect engagement or disengagement of the contact member and the contacts of any of said groups.
3. In a switch, the combination of a closed casing, a plurality of groups of spaced contacts arranged around the interior of said casing, a contact member mounted in said casing for movement from a central position into engagement with the contacts of any of said groups and back again in accordance with tilting movements of said casing, a rod projecting upwardly from the top of said casing and provided at an intermediate point with a ball, and a fixed socket cooperating with said ball to support the casing while permitting tilting of the casing by manipulation of the portion of the rod above said ball.
4. The combination with a support, of a ball and socket joint carried by the upper part of the support, a frame suspended from said support for free swinging movement in all directions, a pendulum supported from the top of the frame for free swinging movement in all directions relative thereto and having a bob of conductive material, said pendulum being located wholly within the frame, and pairs of contacts carried by the frame and adapted to be bridged by the bob upon relative swinging movements of the bob and frame.
5. The combination with a support, of a ball and socket joint carried by the upper part of the support and including a ball having a rigid rod projecting downwardly therefrom, a frame having its upper end rigidly mounted on said rod, a pendulum attached to the lower end of the rod and having a conductive bob, said pendulum being wholly within the frame, the pendulum and frame having unrestrained and independent swinging movements in all directions, and pairs of contacts carried by the frame in the path of said pendulum.

HOWARD G. LAPSLEY.