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(54) **Driving gear commutator switch.**

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DE-U- 7 201 452
FR-A- 1 340 217
FR-A- 2 105 130

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Description

OBJECT OF THE INVENTION

The present invention relates to the field of switch and/or commutator contacts used in driving gears, mainly in household appliances.

The commutator-switch is particular in its construction in that by merely inverting the assembly position of some of the parts, a common terminal can be turned into an outlet terminal and vice versa, in the understanding that a common terminal is one through which the current goes into each commutator-switch.

BACKGROUND OF THE INVENTION

The upsurge of household appliances for many years is leading to a growing tendency to use multiple blocks or strips to connect electric circuit wires to the corresponding components, instead of the conventional wire-to-wire connections. Such use of multiple strips attempts at rationalizing the manufacture and assembly of one of the most difficult parts to automate, namely the appliance's wiring.

Nevertheless, one of the main problems posed using multiple connectors, both when used with the assistance of a printed circuit, and, in particular, when directly connected to component terminals, lies in the arrangement of such terminals in order to try to exploit the possibilities of both the components and the connectors and the means to manufacture the bundles of wires as far as possible.

Driving gears are known which are provided for such purposes, said gears having several (commutator and/or switch) contacts, which are characterized in that each commutator or switch common or current input terminal can be located at two of the three positions usually existing therefor.

This type of commutator-switch unfortunately affords a different internal layout, depending on the terminal arrangement used, and the number of versions of most of the parts comprising the commutator-switch are even doubled, those numbers of the terminals among them again being doubled over the previous situation taking into consideration of the fact that it is almost inevitable to provide the connection with the assistance of a printed circuit applied on suitable versions thereof.

In any case, the basic commutator and/or switch contact structure used in the said devices comprises a swivel-mounted stiff conductor strap, provided with two or three contact heads, one resting permanently upon the respective common or input terminal contact head, such strap swinging on such head, whereas the other head or heads will contact the respective output terminal or terminals head or heads.

This structure is moreover complemented with a rotating lever that drives the aforesaid conductor strap, in turn controlling the latter's movement.

As regards the locking force of the contact heads with respect to each other, and the necessary strength for displacement of the conductor strap and driving lever towards their idle position, this is provided by an helically wound spring.

The disadvantages and problems posed by this type of switches and/or commutators are as set forth hereinbefore.

The preamble of claim 1 is based on FR-A-1 340 217 which describes a commutator in which the position of the common terminal is changed in order to construct the other kind of commutator, in addition to changing the bracing of the mobile conductor strap and the position of the drive cam, this double bracing whithin the commutator housing requires additional internal space and hence a greater commutator size.

The basic structure of the said commutator switch, as the structure described in Patent FR-A-2 105 130, is defined by a swivel-mounted stiff conductor strap, provided with three contact heads, one of which rests permanently on the common or input terminal contact head, such strap swinging on said head, whereas the remaining head or heads will contact an output terminal head, the means piloting the strap comprising three ridges provided in the commutator housing. This commutator structure is complemented with a similarly swivel-mounted drive lever fitted at its end with a projecting feeler that which cooperates with a rotating cam profile to drive the conductor strap through a subsidiary lever or sheet, in turn controlling its movement by means of at least a spring which ensures that the contacts are tight by exerting its pressure upon the conductor strap.

In the commutator of DE-U-72 01 452 different housings are used for the right common terminal and the left common terminal commutator conformations, since the terminals are arranged crosswise in the housing, the terminals of adjacent housings cannot lie facing one another due to the electric requirement of distance between terminals.

DESCRIPTION OF THE INVENTION

It is the object of the invention to provide a new conception of a commutator or switch for the above mentioned purposes, but with the possibility of the common or input terminal being located at two of the three positions provided in the contact-carrier element or box for such terminals, with the peculiarity that regardless of the arrangement chosen, the same parts will always be used, the only changes being some of their positions, this being an advantage with regard to the manufacturing of the parts and their assembly.

Another essential feature of the commutator-switch is that no different driving levers are required, given that the operating conditions (forces and driving

lever and conductor strap stroke) barely change with the layout change.

More specifically, the commutator is structurally based on three terminals, one being an input or common terminal and the other two being output terminals, each having its own respective head. These three contact heads of the respective terminals are faced by the swivel-mounted conductor strap which is logically provided with the three contact heads facing the former.

One such conductor strap contact head permanently rests on the respective common terminal contact head, and this is due to the strength exerted thereupon by an open helical spring, with the added peculiarity that this spring urges such conductor strap towards a stable position where a second contact head contacts one of the output terminals.

The assembly comprises a driving lever, driven either by means of a rotating cam, capable of moving the conductor strap so that, overcoming the open spring strength, it is able to disengage the strap and output terminal contact heads, opening the respective circuit and, if so provided, continuing to move the same to close the respective circuit at the second output terminal.

The assembly further comprises an auxiliary lever attached to the actual conductor strap, through which the helically wound spring strength is transmitted to both said conductor strap and said driving lever, and thus the lever stroke is transmitted to the strap itself.

According to this new commutator conception it suffices to arrange the opposite orientation of the assembly formed by the conductor strap, the auxiliary lever and the helically wound spring in the support element to successfully alter a common terminal to an output terminal or to turn an output terminal into a common terminal.

In the case of switches, the only difference is, compared with commutators, that such switches will not be provided with one of the two output terminals.

DESCRIPTION OF THE DRAWINGS

In order to provide a full description and contribute to the complete understanding of the characteristics of this invention, a set of drawings is attached to the specification which, while purely illustrative and not fully comprehensive, shows the following:

Figure 1.- Is a cross-section of a commutator made according to the invention, at rest and with the common terminal on the left-hand side.

Figure 2.- Is the same view as the previous figure, but with the commutator in an intermediate working where only one of the strap conductor heads contacts the position corresponding common or input terminal conductor head.

Figure 3.- Is the same view as the previous two figures, in a final working position where two of the strap heads contact the common input terminal and one of the output terminals.

Figure 4.- Is different view of the commutator with the common terminal on the right-hand side and in an intermediate working position, or in other words, opposed to that of figure 2.

Figure 5.- Is a detail of a profile section of the conductor strap to which the relevant auxiliary lever is attached.

Figure 6.- Is a detail of the practical coupling between the conductor strap and the driving lever, as well as the respective open helically wound spring. The enlarged detail shown in circle "A" has been taken from this figure.

Figure 7.- Finally shows several modules placed on top of each other including the conductor strap guided and positioned within each of them.

PREFERRED EMBODIMENT OF THE INVENTION

In the light of these figures, and particularly of figures 1 to 4, the commutator comprises an insulating housing body (1) provided with three terminals (2-2′-2″) fitted with the respective contact heads (3-3′-3″), facing the same number of conductor strap (5) contact heads (4-4′-4″), on which rests an auxiliary lever (6) defining an upper arm (7) and a lower arm (8), such upper arm (7) backed and superimposed to the actual conductor strap (5) whereas the lower arm is arranged parallel with respect to conductor strap (5), though distanced from the same, with the peculiarity that said two arms (7) and (8) are stiffly locked to each other by means of a reinforcement element (9).

The commutator assembly is comprises a driving lever (10), push-button or any other like element, from which projects a feeler (11) which rests on the stepped surfaces (12-12′-12″) of a cam (13) rotating in the direction of the rrow referenced as (14) in figure 1. In other words, whenever the cam (13) rotates, the feeler (11) can rest upon the surface of smaller diameter (12), average diameter (12′) or larger diameter (12″), so that in any one of these positions the driving lever (10) will swing to a greater or lesser extent to act on the conductor strap (5) through the auxiliary lever.

Figure 1 shows how the conductor heads (3) and (3″) of the terminals (2) and (2″) are in contact with contact heads (4) and (4″) of conductor strap (5), the device being at rest, this being so because an helically wound spring (15) provided between the body (1) and the conductor strap (5), resting on the upper surface of arm (7) of the auxiliary lever (6), holds such strap (5) in the position, as shown in such figure 1.

This figure 1 also shows that said spring (15) is placed on the commutator's left-hand side or area, ensuring that terminal (2), which is also located on that left-hand side, is in turn the common or current input terminal.

From this position, when the driving lever (10) feeler (11) moves on to the cam (13) intermediate or upper stepped surfaces (12′) and (12″), the rib (16) on the actual driving lever (10) will urge the auxiliary lever (6), moving the same against the strength exerted by the helically wound spring (15) on the same, whereupon the conductor strap (5) itself moves to lead said parts to the positions shown in figures 2 and 3, in which positions the feeler (11) is on the cam (13) intermediate (12′) and high (12″) stepped surfaces, respectively.

The auxiliary lever (6) and the conductor strap (5) are functionally coupled to each other so that both the spring (15) strength and the rib (16) movement are transmitted to the strap through said lever (6), this being achieved because said lever (6) has the aforesaid two arms (7) and (8). It can be seen that the upper arm (7) rests on the conductor strap (5), because of the spring (15) strength.

The free end (17) of the upper arm (7) extends beyond the contact head (4), the distance of extension corresponding to the stretch comprised between the two arrows marked as (18), while the lower arm (8) is spaced away from the conductor strap (5) and arranged parallel to the same.

When the commutator is in the positions shown in figures 2 and 3, the auxiliary lever (6) tends to swing at an angle with regard to the conductor strap (5), resting on the upper arm's (7) free end (17) and tending to take up the position shown in figure 6.

Such circumstance leads to the appearance of a resultant force applied to the free end (17), which in figure 6 is marked R, and the magnitude of which is calculated by :

$$R = \frac{F \cdot d}{D}$$

where F is the compression force exerted by the spring (15) "D" and "d" being the respective distances between the points where R and F are applied and the support point (16) of the driving lever (10). The resultant force R in turn leads to the appearance of a turning moment marked M in this figure 6, the magnitude of which being determined by :

$$M = R \times L$$

where L is the distance between the free end (17) and the swing axis of the strap (5) which is the contact point (3,4), which moment acts on the actual strap (5), causing the same to swing on its support and specifically on its conductor head (3), following the auxiliary lever's (6) angle displacement, and hence remaining joined to the latter's upper arm (7).

Figure 3 shows a positioning of the commutator-switch where the rib (16) of the driving lever (10) pushes the conductor strap (5) by means of the auxiliary lever (6) which is joined to the conductors (3′) of the fixed terminal and the contact head (4′) of the conductor strap (5) between them. While the central contact heads (3′) and (4′) are not engaged, as shown in fig. 2, the auxiliary lever (6) does not disengage the strap (5), but when they are, disengaged it will swing with respect to the strap (5) thereby providing the suffered strain between the auxiliary lever (6) and the conductor strap (5) and the strength between the contact heads (3′) and (4′) which will allow the absorption of the dimensional variations and wears in the switch assembly.

Figure 4 shows how the conductor strap (5) and auxiliary lever (6) parts and the spring (15) that used to be on the left-hand side have now been disposed on the right-hand side or area of the housing (1). In that case the terminal (2″) now becomes the input or common terminal and terminals (2) and (2′) become the output terminals, the other elements remaining where they were. It means that the only thing that changes is the conductor strap, auxiliary lever and spring assembly positioning so that in the new commutator layout and operation, the input and output terminal can be interchanged depending of the user's wishes.

Transformation of said commutator into a switch will take place by leaving out one of the output terminals, locating the common terminal on the right or left-hand side.

Figure 7 shows how the conductor strap (5) is held in the correct longitudinal position by its wider end part (19) held between the insulating box (22) walls (20) and (21) and is transversely guided by the partition walls (21). The auxiliary lever (6), and particulary branch (7), is provided with a rim (23), see figure 5, which penetrates a slot (24) in the conductor strap (5), which is moreover provided with a recess (25) through which the lever (6) central reinforcement (9) passes.

It finally remains to be said that the structure described or driving device it constitutes, can have a modular configuration, so that-whenever several units are required for a given use whatever number of modules are deemed appropriate, are piled on top of each other, as clearly shown in figure 7, each module comprising a box (22) made of insulating material (preferably molded plastics), where all those parts the commutator or switch consists of, are mounted. Obviously, the commutator module stack comprises the corresponding guiding and attachment means.

Claims

1. Driving gear commutator switch comprising an insulating housing (1) incorporating three terminals (2,2′,2″) and a driving lever (10) riding on a rotating cam (13), said housing being provided with guide partition walls (20,21,22);
   a swivel-mounted conductor strap (5) which is selectively actuated by said driving lever (10), said strap (5) carrying three contact heads (4,4′,4″),

said contact heads facing respective contact heads (3,3′,3″) provided on three terminals (2,2′,2″), one of said contact heads (4,4′,4″) resting permanently on a current input terminal (2,2″), each of the other of said contact heads (4,4′,4″) being selectively engagable with a respective output terminal contact head;
an auxiliary lever (6) backed to the conductor strap (5) so that the thrust of said driving lever (13) is achieved by said auxiliary lever enabling the swivelling action of the strap;
a helicoidal spring (15) provided between said housing and said auxiliary lever (6);
characterised in that the auxiliary lever (6) is provided with two arms (7,8) joined to each other by a central reinforcement element (9) which passes trough a lateral recess (25) of the conductor strap (5), the upper arm (7) of which being disposed with its flat surface resting superimposed on the conductor strap (5) and the lower arm (8) beneath the latter while being distanced therefrom and running parallel thereto, the free end (17) of the upper arm extending beyond the corresponding strap end contact head (4), so that in the rest and in the intermediate active commutator switch positions, the upper arm (7) completely rests on the conductor strap due to said spring (15) action, whereas in the final active position of the commutator switch, the resultant force (R) of the spring acts on said free end (17) causing rotation of the auxiliary lever around this end.

2. Driving gear commutator switch according to claim 1 characterised in that to afford two ways of assembling the conductor strap (5) into the same housing (1) incorporating the driving lever (10) and the terminals (2, 2′,2″) in the same position without turning the housing with respect to the commutator stack, the helicoidal spring (15) is guided within a rib (16) provided in the upper arm (7) of the auxiliary lever (6) near the central reinforcement element (9), so that the central axis of the spring, the force (F), and the central element (9) are located between the permanently engaged contact head (4) and the central contact head (4′) of the conductor strap.

Patentansprüche

1. Antriebsgetriebe-Umschalter mit einer Isolieraufnahme (1), welche drei Anschlussklemmen (2, 2′, 2″), einen auf einem Drehnocken (13) gleitenden Betätigungshebel (10) und Führungswände (20, 21, 22) aufweist; einem drehbar angebrachten Leitriemen (5), der wahlweise vom genannten Antriebshebel (10) betätigt wird, wobei der Riemen (5) mit drei Kontaktköpfen (4, 4′, 4″) ausgestattet ist, die zu anderen Kontaktköpfen (3, 3′, 3″) hin ausgerichtet sind, welche an drei Anschlussklemmen (2, 2′, 2″) angeordnet werden, während sich einer der Kontaktköpfe (4, 4′, 4″) ständig an der Stromeingangsklemme (2, 2″) abstützt undd jeder weitere Kontaktkopf (4,4′, 4″) wahlweise mit dem Kontaktkopf der jeweiligen Ausgangsklemme verbunden werden kann; einem Hilfshebel (6), der so am Leitriemen (5) angebracht wird, dass der Schub des Antriebshebels (13) dadurch erreicht wird, dass der genannte Hilfshebel das Drehen des Riemens zulässt, und einer zwischen der Aufnahme und dem Hilfshebel (6) vorgesehenenn Schraubenfeder (15), dadurch gekennzeichnet, dass der Hilfshebel (6) zwei Arme (7, 8) aufweist, die über ein mittleres und durch die seitliche Ausnehmung (25) des Leitriemens führendes Verstärkunsgteil (9) miteinander verbunden werden, wobei der obere Arm (7) mit der flachen Oberfläche auf dem Leitriemen (5) und der untere Arm (8) unter dem Riemen liegt und gleichzeitig von demselben entfernt ist und parallel dazu bewegt wird, und das freie Ende (17) des oberen Armes über den entsprechenden Kontaktkopf (4) des Riemenendes in der Weise hinausragt, dass der obere Arm (7) in Ruhestellung und in den aktiven Zwischenstellungen des Umschalters, dank der Wirkung der erwähnten Feder (15), voll auf dem Leitriemen aufliegt, während die sich ergebende Federkraft (R) in der aktiven Stellung des Umschalters auf das freie Ende (17) wirkt und zur Drehung des Hilfshebels um dieses Ende führt.

2. Antriebsgetriebe-Umschalter, gemäss Anspruch 1 dadurch gekennzeichnet, dass der Leitriemen (5) in zwei verschiedenen Weisen in derselben Aufnahme (1), welche den Betätigungshebel (10) und die Anschlussklemmen (2, 2′, 2″) enthält, montiert werden kann, ohne die Aufnahme den Umschaltelementen gegenüber drehen zu müssen; die Schraubenfeder (15) wird dabei in einer Wulst (16) am oberen Arm (7) des Hilfshebels (6), neben dem mittleren Verstärkungsteil (9), so geführt, dass sich die mittlere Achse der Feder, die Kraft (F) und das mittlere Teil (9) zwischen dem ständig verbundenen Kontaktkopf (4) und dem mittleren Kontaktkopf (4′) des Leitriemens befinden.

Revendications

1. Interrupteur commutateur d'engrenage d'actionnement, qui comprend un logement isolant (1), qui incopore trois terminaux (2, 2′ et 2″) et un levier d'actionnement (10) qui se déplace sur une came tournante (13), ce logement étant pourvu

de cloisons de guidage (20, 21 et 22); une courroie conductrice (5), montée de façon giratoire, actionnée de manière sélective par le levier d'actionnement cité (10), cette courroie (5) étant dotée de trois têtes de contact (4, 4′ et 4″), qui sont orientées vers d'autres têtes de contacts respectives (3, 3′ et 3″), disposées sur trois terminaux (2, 2′ et 2″), une de ces têtes de contact (4, 4′ et 4″) s'appuyant en permanence sur un terminal d'entrée de courant (2 et 2″), chacune des autres têtes de contact (4, 4′ et 4″) pouvant s'unir de façon sélective à la tête de contact d'un terminal de sortie respectif; un levier auxiliaire (6), accouplé à la courroie conductrice (5), de manière que l'on obtienne la poussée du levier d'actionnement (13) par le fait que que le levier auxiliaire cité plus haut permet l'action giratoire de la courroie; un ressort hélicoïdal (15), disposé entre le logement et le levier auxiliaire (6); qui est caractérisé par le fait que le levier auxiliaire (6) est pourvu de deux bras (7 et 8), unis entre eux par un élément central de renforcement (9) qui passe au travers d'un rabaissement latéral (25) de la courroie conductrice (5), le bras supérieur (7) se trouvant appuyé avec sa surface plate sur la courroie conductrice (5) et le bras inférieur (8) se trouvant placé au-dessous de cette courroie, tout en en étant séparé et se mouvant parallèlement à celle-ci, l'extrémité libre (17) du bras supérieur s'étendant au-delà de la tête de contact correspondante (4) de l'extrémité de la courroie, de telle manière qu'au repos et dans les positions intermédiaires actives de l'interrupteur commutateur, le bras supérieur (7) s'appuie complètement sur la courroie conductrice, grâce à l'action du ressort (15) cité plus haut, tandis que dans la position active de l'interrupteur commutateur, la force résultante (R) du ressort agit sur l'extrémité libre (17), provoquant la rotation du levier auxiliaire autour de cette extrémité.

2. Interrupteur commutateur d'engrenage d'actionnement, conforme à la revendication 1, qui est caractérisé par le fait qu'il permet deux manières de monter la courroie conductrice (5) dans le même logement (1) qui incorpore le levier d'actionnement (10) et les terminaux (2, 2′ et 2″) dans la même position, sans qu'il faille faire tourner le logement par rapport à la pile des commutateurs; le ressort hélicoïdal (15) étant guidé dans un rebord (16), placé sur le bras supérieur (7) du levier auxiliaire (6), près de l'élément central de renforcement (9), de manière que l'axe central du ressort, la force (F) et l'élément central (9) se trouvent situés entre la tête de contact unie en permanence (4) et la tête de contact centrale (4′) de la courroie conductrice.

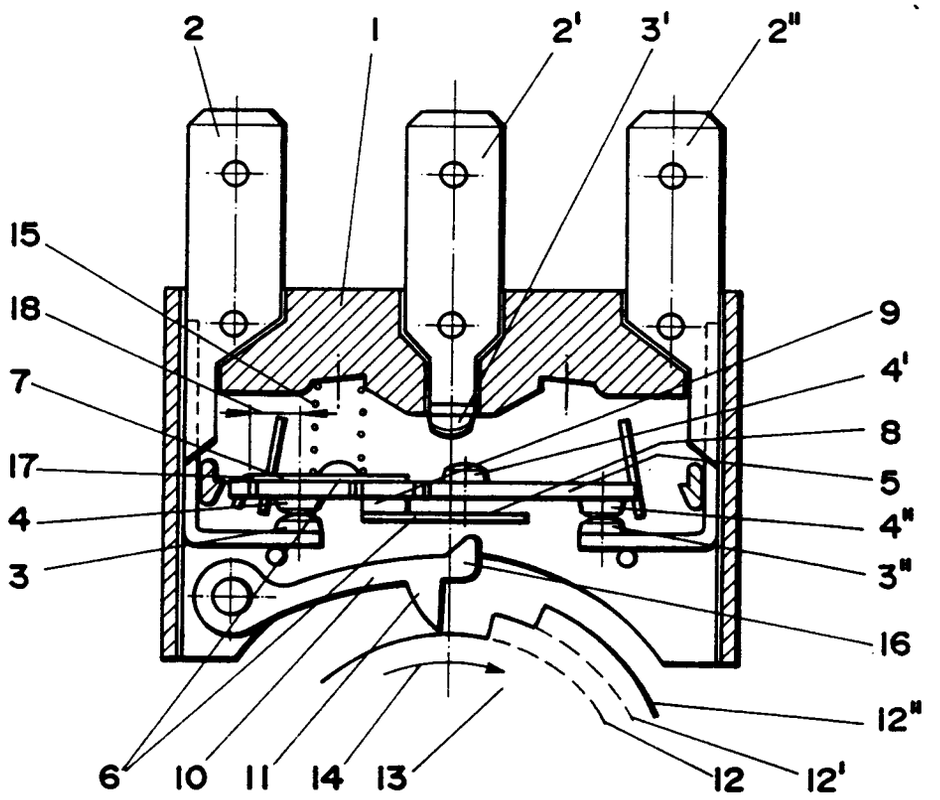

2
1
2'
3'
2"
15
18
7
17
4
3
9
4'
8
5
4"
3"
16
12"
12'
12
6
10
11
14
13

FIG.-1

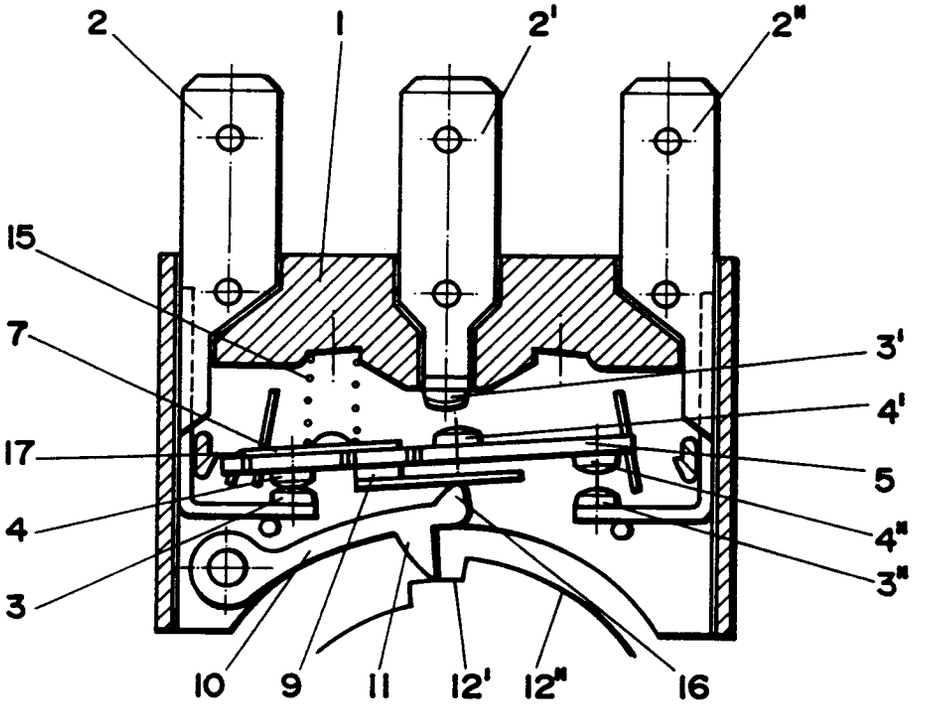

2
1
2'
2"
15
7
17
4
3
3'
4'
5
4"
3"
10
9
11
12'
12"
16

FIG.-2

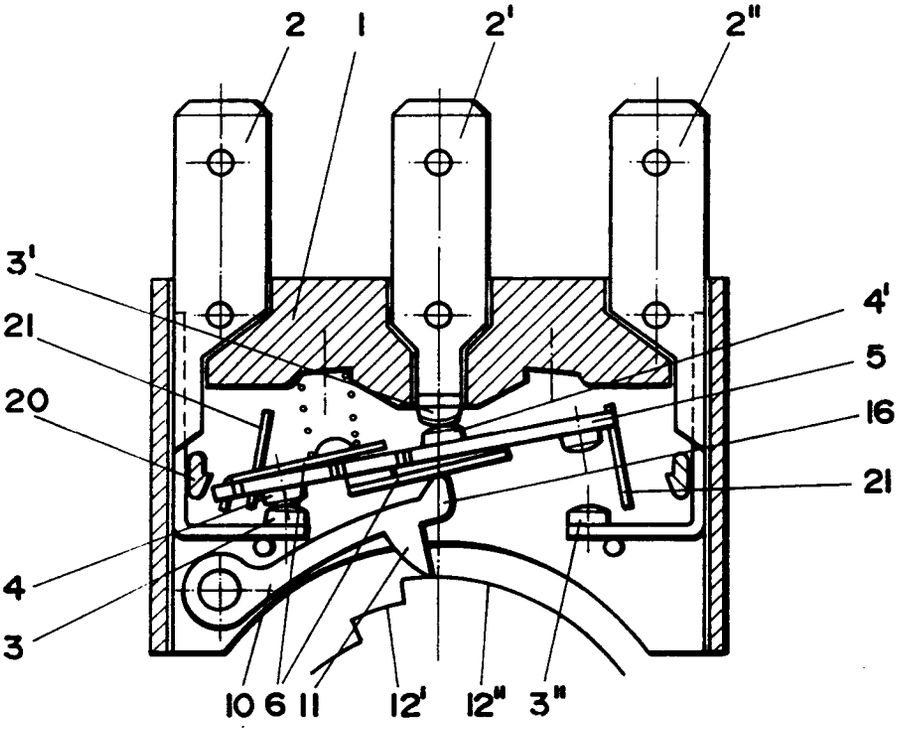

2
1
2'
2"
3'
21
20
4'
5
16
21
4
3
10 6 11
12'
12"
3"

FIG.-3

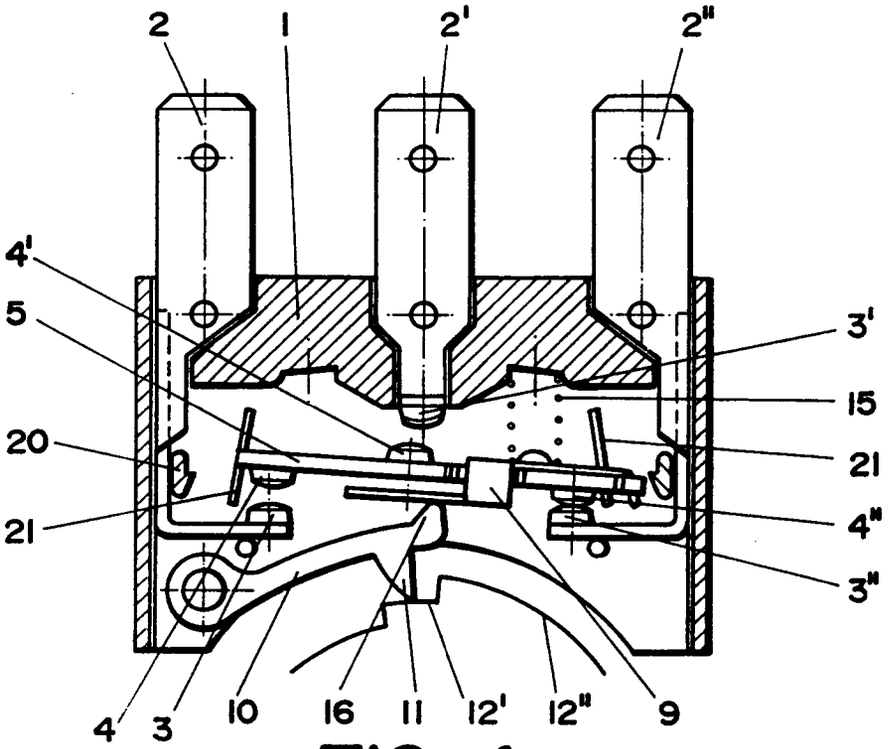

2
1
2'
2"
4'
5
3'
15
20
21
21
4"
3"
4
3
10
16
11
12'
12"
9

FIG.-4

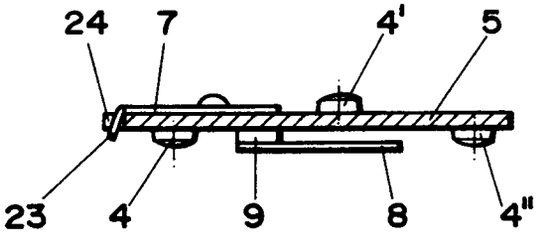


FIG.-5

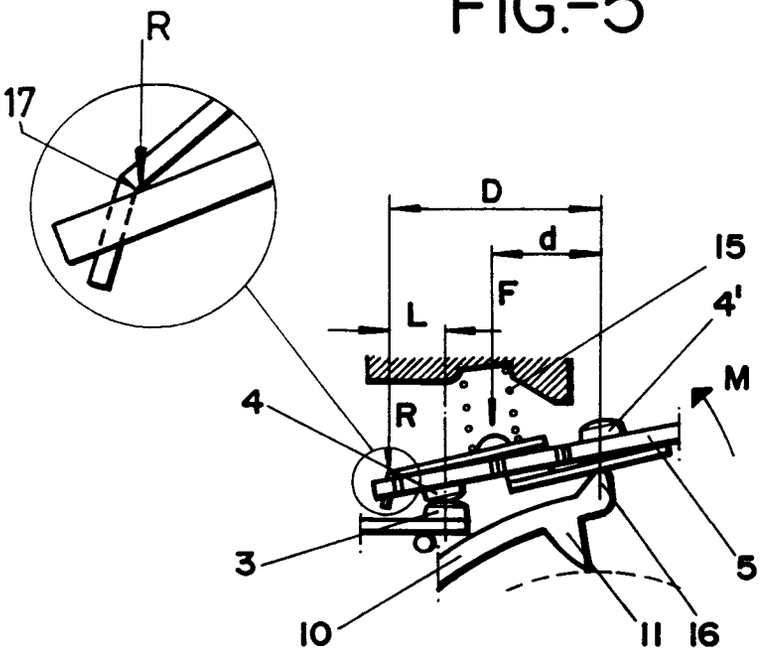


FIG.-6

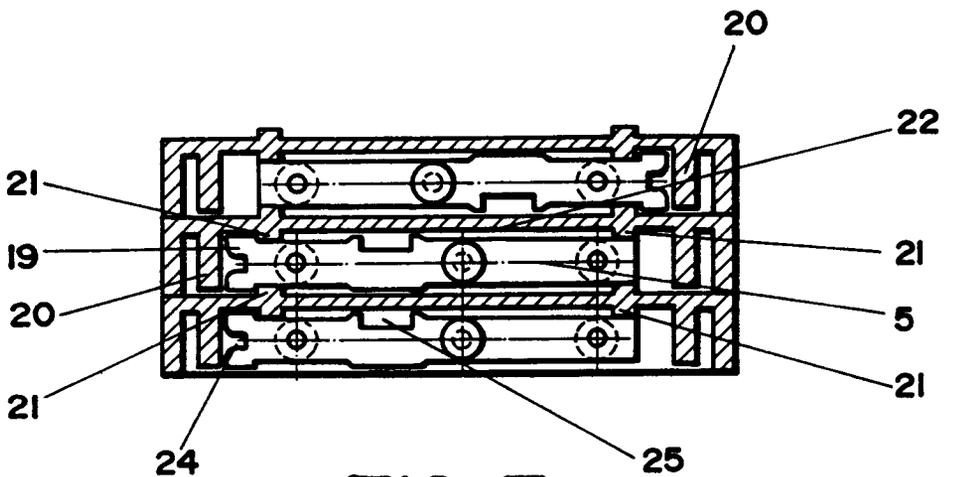


FIG.-7