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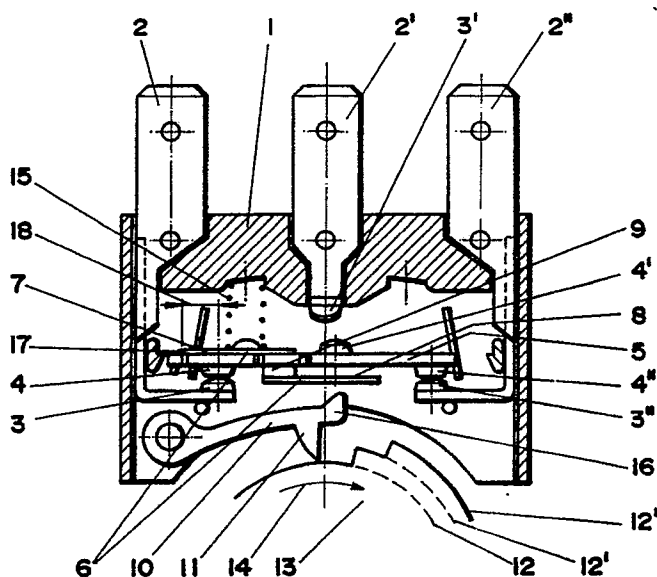
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DE FR GB IT Bulletin 00/1(71) Applicant: **FAGOR. S.COOP. LTDA.**
B. San Andrés, s/n
E-20500 Mondragon (Guipuzcoa)(ES)(72) Inventor: **Chauvigne, Michel**
6, Rue du Pont
Cluses (Hte-Savoie)(FR)
Inventor: **Uroz Belaunzarán, Juan Carlos**
Avda. Alava, 8 - 3 Izda
Mondragon(Guipuzcoa)(ES)(74) Representative: **Carpintero Lopez, Francisco**
HERRERO & ASOCIADOS, S.L. Alcalá, 21
E-28014 Madrid(ES)(54) **Driving gear commutator switch.**

(57) The commutator-switch comprises a stiff conductor strap (5) having two or three contacts (4-4'-4'') that face the same number of contacts (3-3'-3'') provided in respective terminals (2-2'-2'') with the peculiarity that the said swivel-mounted conductor strap (5) is driven with the assistance of an auxiliary lever (6) backed to the same and an open spiral spring (15) resting upon a support box (1) at one of

its ends and on the auxiliary lever (6) upper branch (7) at the other end.

The configuration of the different elements permit that both the conductor strap and the auxiliary lever, and the spring, be mounted in the support-box in two different positions, merely depending on the position of the common terminal in the box.

**FIG.-1****EP 0 430 845 A1**

DRIVING GEAR COMMUTATOR-SWITCH

PURPOSE 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 that by merely inverting the assembly position of some of the parts making the same up, 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 relevant components, instead of the conventional wire-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 relevant appliance's wiring.

Nevertheless, one of the main problems posed by connection, using multiple connectors, both when used with the assistance of a printed circuit, but above all 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 gear are known provided for such purpose with several (commutator and/or switch) contacts, which in order to foster organisation of the connection points are particular in that each commutator or switch common or current inlet terminal can be located at two of the three positions usually existing therefor.

This type of appliance unfortunately affords a different internal layout, depending on the terminal arrangement used, and the versions of most of the parts comprising the commutator-switch are even doubled, those of the terminals among them, these latter being again doubled over the previous situation if it is borne in mind that it is almost inevitable to provide the connection with assistance in the form of a printed circuit applied on suitable versions thereof.

At all events, 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 inlet terminal contact head, such strap swinging on such head, whereas the other head or heads will contact the respective outlet 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 to the locking force of the contact heads 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 open spiral spring.

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

DESCRIPTION OF THE INVENTION

The subject of the invention is a new conception of a commutator or switch provided for the aforesaid purposes, but with the possibility of the common or inlet terminal being located at two of the three places 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 obvious advantage as to hardware, in both the manufacturing of parts and assembly handling thereof.

Another essential feature of the commutator-switch subject hereof 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 subject hereof is structurally based upon three terminals, one being an inlet or common terminal and the other two being outlet terminals, each having its own respective head. These three contact heads of the respective terminals are faced by the swivel-mounted conductor strap that is logically provided with the three contact heads facing the former.

One such conductor strap contact head permanently rests upon the respective common terminal contact head, and this is due to the strength exerted thereupon by an open spiral 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 outlet terminals.

The assembly is complemented with a driving lever or like element, driven either by means of a rotating cam or by any other like means, capable of moving the conductor strap so that, overcoming

the open spring strength, it is able to separate the strap and outlet terminal contact heads, opening the respective circuit and, if so provided, continuing to move the same to close the respective circuit at the second outlet terminal.

The assembly is further complemented with an auxiliary lever, attached to the actual conductor strap, through which the open spiral spring strength is transmitted, to both the said conductor strap and the driving lever and in short the latter's movement to the actual strap.

According to this new commutator conception it suffices to invert the mounting position of the assembly formed by the conductor strap, the auxiliary lever and the open spiral spring in the support element to successfully turn a common terminal into an outlet terminal and vice versa.

In the case of switches, the only difference there is as compared with commutators, according to the description provided hereinbefore, is that such switches will not be provided with one of the two outlet terminals so that depending on which of the two terminals is missing, the common terminal will change its position changing places with the outlet terminal or otherwise.

DESCRIPTION OF THE DRAWINGS

In order to provide a fuller 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 working, where only one of the strap conductor heads contacts with the relevant common or inlet terminal conductor head.
- Figure 3.- Is the same view as the previous two figures, in a different working position and where two of the strap heads contact the common inlet terminal and one of the outlet terminals.
- Figure 4.- Is another 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 spiral 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 specifically figures 1, 2, 3 and 4, the commutator subject hereof comprises a housing or box (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''), upon which strap rests an auxiliary lever (6) defining an upper branch (7) and a lower branch (8), such upper branch (7) backed and superimposed to the actual strap (5) whereas the lower branch is arranged appreciably parallel to such conductor strap (5), though away from the same, with the peculiarity that such two branches (7) and (8) are stiffly locked to each other by means of a reinforcement element (9).

The commutator assembly is complemented with a driving lever (10), push-button or any other like element, from which projects a feeler (11) that can rest upon the stepped surfaces (12-12'-12'') of a cam (13) rotating in the direction of the arrow 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 lever (10) will swing to a greater or lesser extent to act upon the conductor strap (5) through the auxiliary lever.

Figure 1 shows how the terminals (2) and (2'') conductor heads (3) and (3'') are in contact with conductor strap (5) conductor heads (4) and (4''), the device being at rest, this being so because an open spiral spring (15) provided between the box or housing (1) and the actual strap (5), specifically resting upon the auxiliary lever (6) upper branch (7) surface holds such strap (5) in the said position, as shown in such figure 1.

It should also be observed in this figure that the said spring (15) is placed on the commutator's left-hand side or area, ensuring that terminal (2), that is also located on that left-hand side, is in turn the common or current inlet terminal.

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

For its part, 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 conveyed to the strap through the said lever (6), this being achieved because such lever (6) has the aforesaid two arms or branches (7) and (8), and it can be seen that the upper branch (7) rests, when idle, upon the actual conductor strap (5), because of the spring (15) strength.

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

When the commutator is in the positions shown in figures 2 and 3, the auxiliary lever (6) tends to rotate at an angle with regard to the conductor strap (5), resting upon the upper branch (7) edge (17) and tending to take up the position shown in figure 6.

Such circumstance leads to the appearance of a resultant force that in such figure 6 is marked R, and whose magnitude is:

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

where F is the compression force exerted by the spring (15). The resultant R in turn leads to the appearance of a turning moment marked M in this figure 6 and whose magnitude is:

$$M = R \times L$$

which moment acts upon the actual strap (5), causing the same to swing on its support and specifically on its conductor head (3), following the auxiliary lever's angle displacement (6) and hence remaining joined to the latter's upper branch (7).

Only when the strap (5) contact head (4') meets the high terminal (2') contact head (3'), as shown in figure 3, will the auxiliary lever (6) move away angularly from the conductor strap (5), there-

by allowing the actual lever (10) rib (16) to move further in order to provide the necessary strength for the two contact heads (3') and (4') to join each other, besides offsetting dimensional variations and wear during operation.

The foregoing is applicable for figures 1, 2 and 3.

Turning to figure 4, the same 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 support box (1), in which case the terminal (2'') now becomes the inlet or common terminal and terminals (2) and (2') become the outlet terminals, the other elements remaining where they were, i.e., the only thing that changes is the conductor strap, auxiliary lever and spring assembly position so that in the new commutator layout and operation, the terminal that used to be the inlet is now the outlet terminal and vice versa.

Transformation of the said commutator into a switch will take place by leaving out one of the outlet terminals, locating the common terminal on the right or left-hand side, as shall be most appropriate for the relevant use.

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). For its part, the auxiliary lever (6) and specifically branch (7) is provided with a rim (23), see figure 5, that penetrates a slot (24) in the conductor strap (5), which latter 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, usual in this sort of appliances and therefore known, 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, that shows that each module comprises a box (22) made of insulating material and preferably molded plastic, where the parts making up the commutator or switch described are mounted. Obviously, and as is also usually the case, in this figure 7 the modules will have the relevant guiding and attachment means to each other.

We feel that the device has now been sufficiently described for any expert in the art to have grasped the full scope of the invention and the advantages it offers.

The materials, shape, size and layout of the elements may be altered provided that this entails no modification of the essential features of the invention.

The terms used to describe the invention herein should be taken to have a broad rather than a restrictive meaning.

Claims

1. Driving gear commutator-switch, of the type comprising a conductor and swivel-mounted strap (5) provided with two or three contact heads (4-4'-4'') one of which rests permanently upon the common current inlet terminal (2) or (2'') contact head (3) or (3''), the other heads of the said strap (5) also being able to contact with the respective outlet terminal heads, essentially characterised in that backed to the said conductor strap (5) is an auxiliary lever (6) provided with two arms or branches (7) and (8), the first of which is disposed with its upper area resting upon the actual conductor strap (5) and the second one under the latter and largely parallel thereto, both of which auxiliary lever (6) arms (7) and (8) are stiffly joined to each other by means of a reinforcement (9), with the peculiarity that in the rest and intermediate device positions, the said upper branch (7) wholly rests upon the conductor strap (5), by action of an open spiral spring (15) provided between the device housing (1) body and the actual auxiliary lever (6), and also with the lower branch (8) of such lever (6) facing a projection or rib (16) provided in a swivel-mounted driving lever (10) or push-button fitted with a feeler (11) sliding upon the stepped surface of a cam (13) so that depending on such feeler (11) position, at one of the said cam sectors (12-12'-12'') the auxiliary lever (6) will be successfully urged for the conductor strap (5) to swing and hence the said strap (5) head will contact with the respective commutator terminal head, it moreover having been foreseen that the auxiliary lever (6) upper branch (7) extend into an end projection (17) that goes beyond the relevant contact head (4).
2. Driving gear commutator-switch, according to claim 1, characterised in that the high outlet terminal (2') contact head (3') is symmetrically positioned with regard to heads (3) and (3'') of the other two terminals (2) and (2'').
3. Driving gear commutator-switch, according to foregoing claims, characterised in that the conductor strap (5) is positioned in a housing or box (22) provided with the relevant guide means, formed by ribs and/or partition walls (20) and (21), whereas the open spiral spring

(15) is positioned at one of its ends in a recess provided to such end in the box (1) or general device body and at the other end it is guided in a rib provided to such end in auxiliary lever (6) branch (7), it having been foreseen that the ribs and/or partition walls are symmetrically provided and the body (1) recess for the spring to rest upon is located at either side of the line of symmetry thereof, to afford two ways of assembling the conductor strap (5), auxiliary lever (6) and open spiral spring (15).

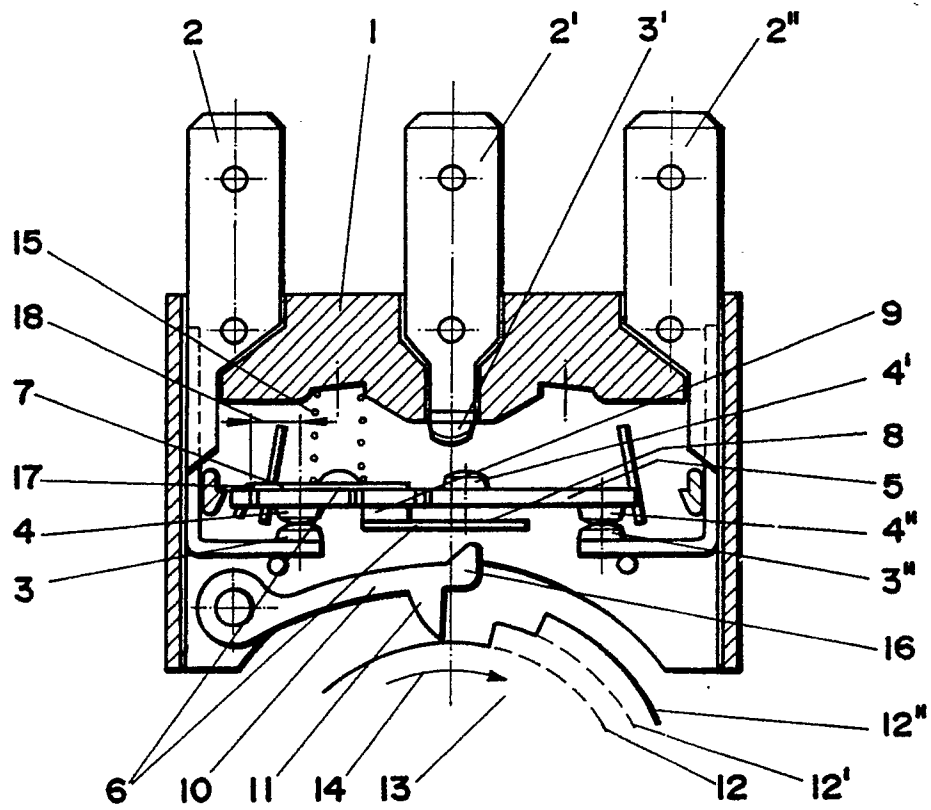


FIG.-1

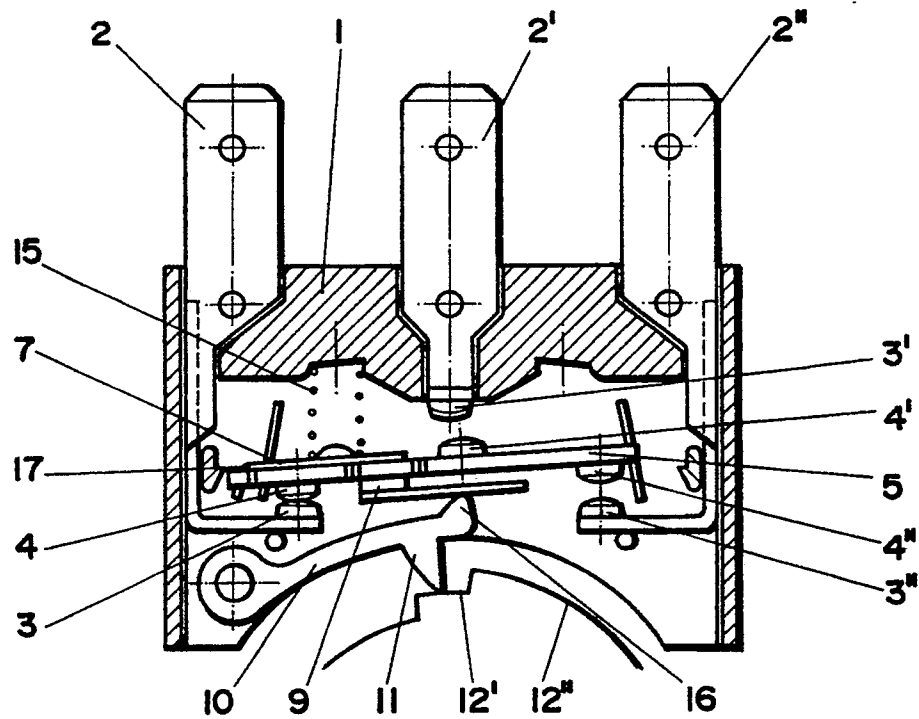


FIG.-2

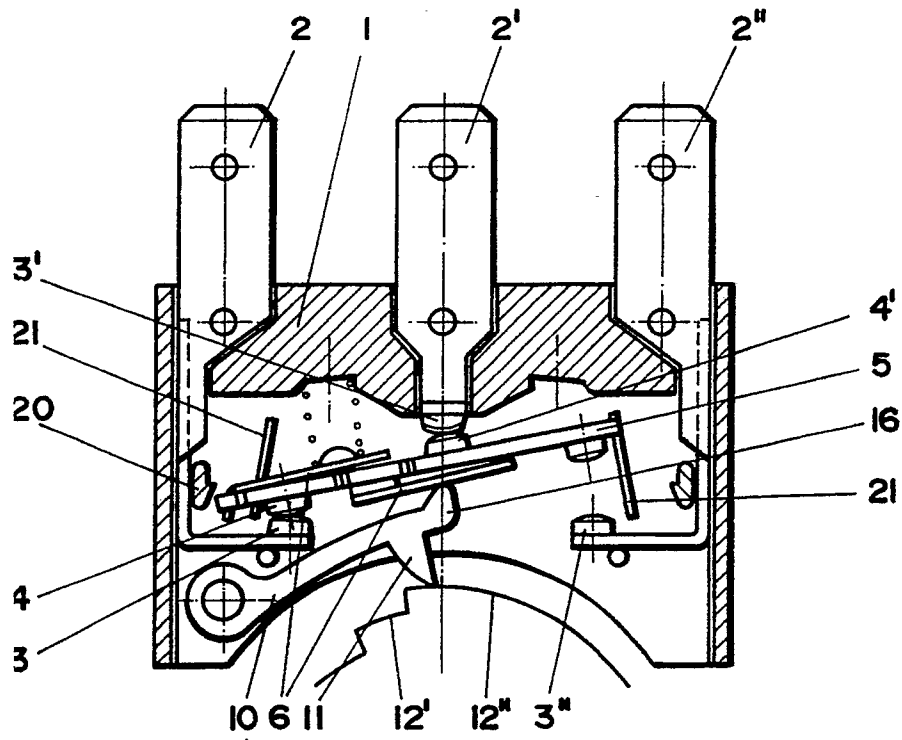


FIG-3

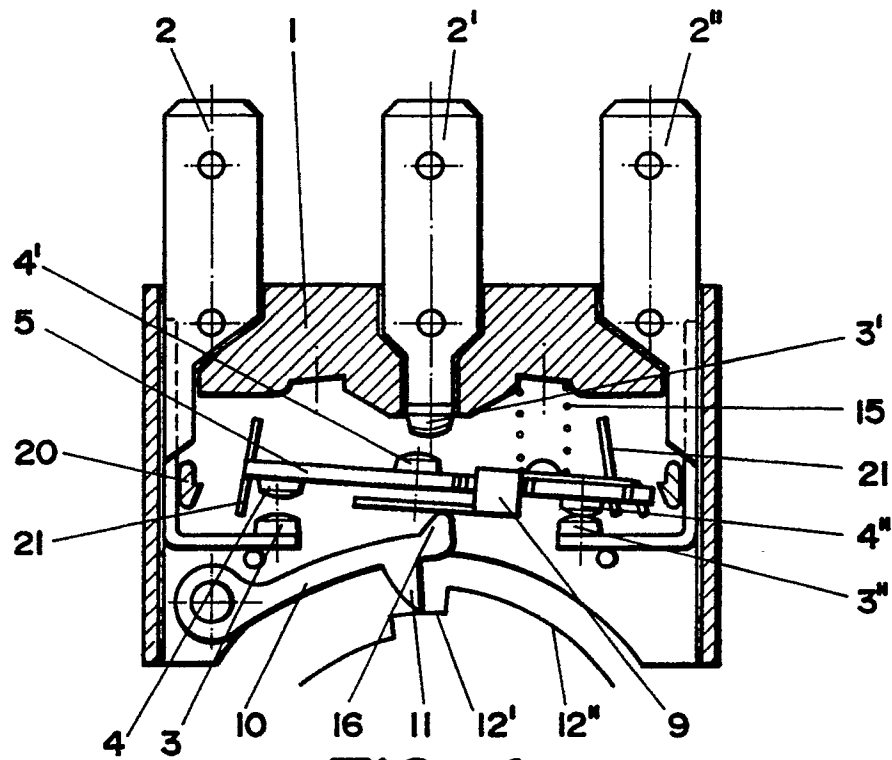


FIG-4

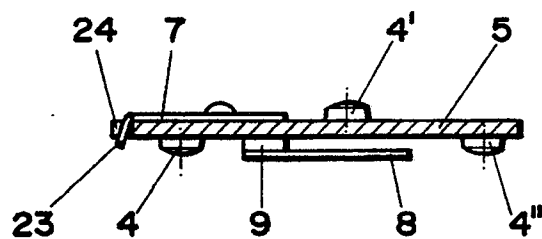


FIG.-5

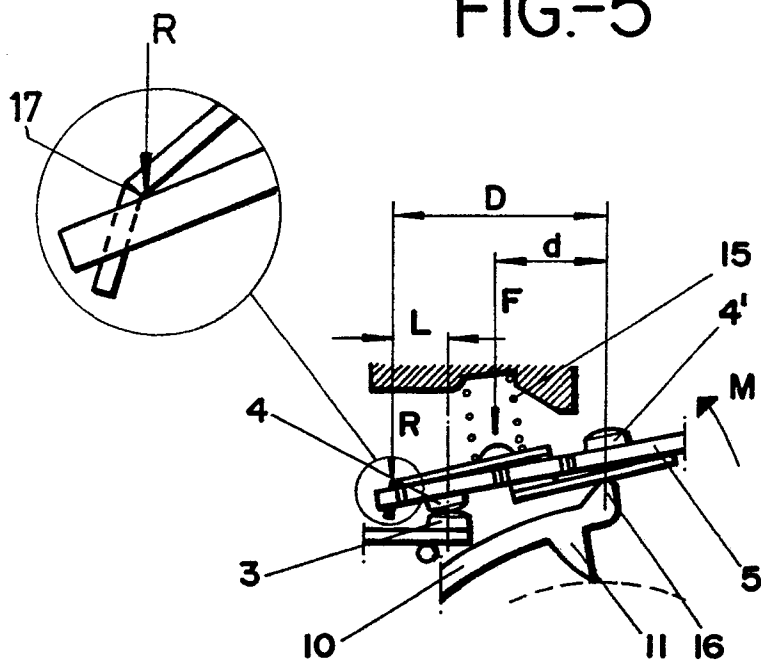


FIG.-6

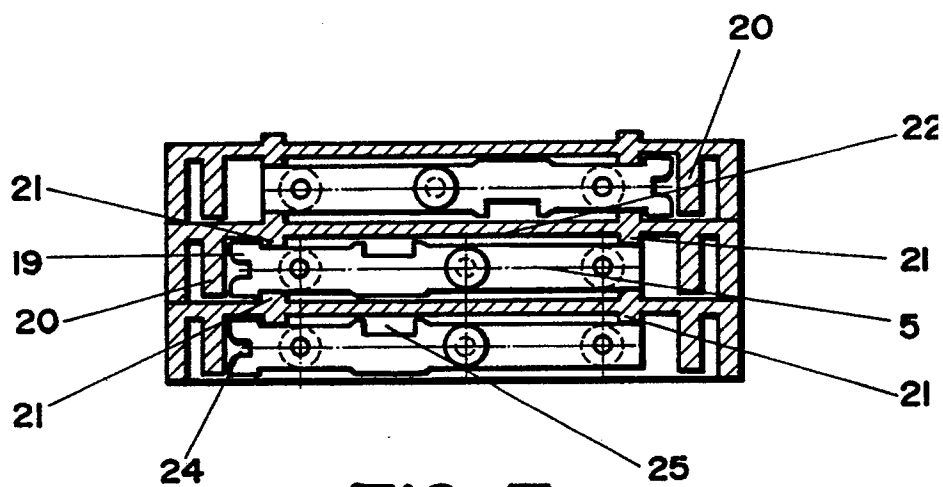


FIG.-7



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EUROPEAN SEARCH REPORT

Application Number

EP 90 50 0081

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)		
A	FR-A-1 340 217 (ETABLISSEMENTS MERLIN & GERIN) * page 1, right-hand column - page 2, left-hand column; figures 1, 2 * - - -	1	H 01 H 43/02 H 01 H 11/00		
A	FR-A-2 105 130 (SOCIETE ANONYME CROUZET) * page 2, lines 3 - 10; figures 1, 2 * - - -	1,3			
A	DE-U-7 201 452 (SIEMENS AG) * page 4, paragraph 3 - page 5, paragraph 1; figures 3, 4 * - - - - -	1			
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)		
			H 01 H		
The present search report has been drawn up for all claims					
Place of search Berlin		Date of completion of search 08 March 91	Examiner RUPPERT W		
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention</td><td>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention	E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document
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