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54 **A tap/switch combination for civil range electrical appliances.**

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Description

This invention relates to a tap/switch combination for civil range electrical appliances, comprising an electric current tap provided with receptacles for an electric consumer plug, and an electric switch provided with mechanical linkages for applying or cutting off a power supply to said tap, the operation of said mechanical cut-off linkages being controlled by the insertion and withdrawal movements of the plug into/out of said tap and being brought about through an interlock mechanism extending between the tap receptacles and the mechanical cut-off linkages.

Known are, in the branch of electric taps for industrial plugs, mechanical interlock or other devices which are controlled by a safety switch, whereby the plug can be neither pulled out nor pushed in unless the switch is in its open or break condition.

Such interlock devices are enforced by regulatory bodies to protect persons and properties in such particular environments as indoor spaces where a potential fire or explosion danger exists, construction sites, and damp or wet places.

In the field of electric plugs for domestic and the like uses, regulations on work accident prevention, as provided by D.P.R. 547 of April 27, 1955, No. 311, and regulations on proper workmanship (e.g. as set forth by COMITATO ELETTRONICO ITALIANO C.E.I.) provide for electric plug take-offs, designed to power consumers rating higher than 1,000 W, to be protected at an upstream location by either a fused or magnetothermal switch, to only enable plugging in and out in an open circuit condition, i.e. in a dead receptacle condition.

Manipulating an electric plug under a load may, in fact, constitute a hazard for the user, whether by arcing, or flashing and deterioration of the tap inlet holes, or wear and cratering of the pins, or damaging the delicate receptacle protecting arrangement in the instance of taps equipped with shutters.

From CH-A-389713 there is known a tap/switch combination including an electric current tap with receptacles for an electric consumer plug and an electric switch with mechanical linkages for applying or cutting off the power supply to said tap, wherein the operation of said mechanical cut-off linkages is controlled by the insertion and withdrawal movements of the plug into/out of said tap. With this known tap/switch combination, the insertion of the plug always involves a closure of the switch and the switch cannot be opened when the plug is inserted into the tap.

From DE-U-1903068 there is known a tap/switch combination including an electric current

tap with receptacles for an electric consumer plug, an electric switch with mechanical linkages for applying or cutting off a power supply to said tap and an interlock mechanism for acting on said mechanical linkages in the off-position of the switch when the plug is not inserted into said tap.

The technical problem underlying this invention is that of providing a tap/switch combination for civil range electrical appliances which has such constructional and operational characteristics as to obviate the drawbacks of the cited prior art.

To solve the aforesaid problem, this invention provides a tap/switch combination as indicated, wherein said interlock mechanism comprises a lever journaled on the interior of said tap and being displaceable angularly from an operating position, where a first arm of the lever lies close to and transversely of at least one of said receptacles and a second arm of the lever is coupled to said cut-off linkages, to an inoperative position where said second arm is uncoupled from said cut-off linkages, and a spring-loaded means effective to hold the lever in the operating position thereof, said lever being displaceable angularly on the plug being inserted into said tap.

Further features and the advantages of this invention will become apparent from the following detailed description of a preferred embodiment thereof, given here by way of illustration and not of limitation with reference to the accompanying drawing figures.

In the drawings:

Figure 1 is a perspective view showing diagrammatically a current tap/switch combination according to this invention;

Figure 2 is an enlarged scale, perspective detail view of the combination shown in Figure 1;

Figure 3 is a plan and sectional view showing diagrammatically the tap/switch combination of Figure 1;

Figures 4 and 6 are diagrammatic views, in elevation and in section, of the tap/switch combination of Figure 1, in two different operating conditions thereof;

Figure 5 is a diagrammatic view of the inventive combination, taken along the section line V-V in Figure 4;

Figure 7 is a diagrammatic view of the inventive combination, taken along the section line VII-VII in Figure 6;

Figure 8 is a perspective view showing diagrammatically a second embodiment of the tap/switch combination according to this invention; and

Figure 9 is an enlarged scale, perspective detail view of the combination shown in Figure 1.

With reference to the drawing figures, comprehensively designated 1 is a tap/switch combina-

tion according to the invention and comprising a current tap 2 and a switch 3, specifically intended for mounting within a frame, omitted from the drawings, for a flush-mounted or enclosed box civil range electrical appliances.

The combination 1 has a substantially parallelepipedal outward shape, and a tap body 4 and switch body 5 defined therein which are both box-shaped and laid close against each other along two corresponding walls thereof; for convenience of illustration, these two side-by-side walls will be regarded as a single wall designated by the reference numeral 6.

Placed within the body 5 of the switch 3 are a pair of poles, not shown, one of which is located close against the wall 6, and the other at an opposed wall 5a; provided along both poles are a respective fixed contact 7 carried on the body 5 and a respective moving contact 8, mounted on a moving contact holder assembly 9 to be explained hereinafter.

The switch 3 also includes mechanical cut-off linkages, generally designated 10, which are supported on the body 5; the cut-off linkages 10 include a tumbler key 11 associated with the moving contact holder assembly 9.

The moving contact holder assembly 9 comprises a moving contact holder body 12 which includes electric paths and non-conductive portions and has, mounted on one end thereof, the moving contacts 8, which are thus held in mutually parallel and spaced-apart relationship. Between the key 11 and the moving contact holder assembly 9, there is provided a spring-biased toggle mechanism 13, known per se.

The mechanical cut-off linkages 10 further comprise a spring-loaded rest lever 14 which is journaled in the body 5 and displaceable angularly from a first position to a second position, as made clear hereinafter. Said rest lever 14 includes, in turn, two arms 14a, 14b lying substantially at right angles to each other. The larger arm, 14a, has a pair of lugs 15 and 16 facing the wall 6 and opposed wall 5a, respectively; moreover, the arm 14a is formed with a slit 17.

With the rest lever 14 in its first position, or position of consent to contact making, the smaller arm, 14b, is adapted to provide a bearing point for the moving contact holder body 12, purposely formed with a rest dog 12a, and therefore to enable the switch 3 to make.

By contrast, with the rest lever 14 in its second position, or contact break position, the second arm 14b would be pivoted away from the moving contact holder body 12, thereby affording no bearing point for the dog 12a and causing the switch 3 to break.

The rest lever 14 is constantly biased toward said position of consent to contact making by a spring, not shown.

Indicated at 18 is an ammeter coil supported on the switch body 5 at the wall 5a; the ammeter coil 18 has a set number of turns of a large cross-sectional area wire lead and is provided with a cylindrical pusher 19 operative to engage with the lug 16 on the occurrence of shorting currents and to move the rest lever 14 accordingly to its contact break position, thus releasing the contact holder assembly 9 and causing the switch 3 to break.

The switch 3 also includes an additional arm 20, formed integrally with the rest lever 14 and extending parallel to the second arm 14b. The additional arm 20 is provided with an adjustable contact tip 20a and adapted for engagement by a bimetallic strip thermal relay, not shown, to move the rest lever 14 into its contact breaking position.

The current tap 2 has three receptacles 21,22,23 formed of corresponding bushings 24,25,26 which are supported on the tap body 4 in mutually spaced-apart relationship. The middle receptacle 22 is, in particular, intended for grounding the current tap 2.

Said receptacles, 21,22 and 23, are adapted to receive respective prongs 27,28 and 29 of an electric plug 30, known per se.

In accordance with this invention, the tap/switch combination 1 includes an interlock mechanism 31,32 extending between the receptacles 21,22,23 of the tap 2 and the cut-off linkages 10 of the switch 3.

According to the invention, the above-mentioned interlock mechanism comprises a substantially crank-like lever 31 journaled on the interior of the body 4 of the current tap 2 and being displaceable angularly from an operating position to an inoperative position, as explained more clearly hereinafter.

The interlock mechanism further comprises a spring-loaded means 32 arranged to act on the lever 31 for holding it in its operating position.

The lever 31 includes a lever body 33 of C-like configuration which is provided with a pair of pins, both indicated at 34, facing each other in aligned relationship.

The pins 34 fit into respective seats 35 formed in the tap body 4 close to the wall 6.

The lever 31 also has a first arm 36 and second arm 37 extending substantially at right angles to each other and being secured to the lever body 33; more specifically, the first arm 36 consists of a lug extending perpendicularly to the lever body 33 in the proximity of the intermediate receptacle 22 to the receptacles 21 and 23, whilst the second arm 37 extends aligned to one of the sides of said C-shaped body 33.

It should be noted that, according to this invention, the second arm 37 extends through an aperture 38 formed in the wall 6, and that with the lever 31 in its operating position, the first arm 36 extends transversely of the receptacle 22 and the second arm 37 is active on said cut-off linkages 10.

In particular, with the lever 31 in its operating position, the second arm 37 will be active on the first arm 14a of the rest lever 14, thus moving it angularly into the aforesaid contact breaking position.

With the lever 31 in said inoperative position, the first arm 36 will be positioned outside the receptacle 22 to enable introduction of the plug 30, and the second arm 37 will be uncoupled from the cut-off linkages.

In the exemplary embodiment discussed, the spring-biased means 32, operative to constantly bias the lever 31 toward its operating position, is preferably composed of a pair of parallel lugs 39 formed from an elastically deformable material and being supported at one end by the lever body 33 and having the other, free end in pushing contact with the wall 6.

Advantageously, the lever body 33, first arm 36, second arm 37, and aforesaid lugs 39 are a one piece construction, being preferably molded as such from a synthetic plastic material.

The tap/switch combination 1 according to this invention operates as set forth herein below.

With the plug 30 removed from the current tap 2 of the tap/switch combination 1, i.e. with the prongs 27,28,29 out of the receptacles 21,22,23, the lever 31 will be held in its operating position by the spring-loaded means 32, with its first arm 36 set to interfere with the receptacle 22 and its second arm 37 to act on the cut-off linkages 10 (re. Figures 4 and 5).

The rest lever 14 will be held, therefore, in its contact breaking position, and the moving contacts 8 at a set distance away from their corresponding fixed contacts 7.

It is important to observe that with the combination 1 in the above-outlined condition, whereby the plug 30 is separated from the current tap 2, if the key 11 of the switch 3 is depressed toward a contact making position, the key 11 will tend to return at once to its contact breaking position. In fact, with the rest lever 14 in the contact breaking position, the rest dog 12a of the moving contact holder body 12, being shifted by the key 11 via the spring-loaded toggle mechanism 13, will no longer be contacting the rest lever 14. Thus, locking of the aforesaid moving contact holder body 12 and spring-loaded toggle mechanism 13 in a contact making position is effectively prevented, and the key 11 can move back to its contact breaking position by the action of the spring-loaded toggle

mechanism 13.

On introducing the prongs 27,28,29 of the plug 30 into the receptacles 21,22,23 of the tap 2, the prong 28, which corresponds with the receptacle 22, will contact the first arm 36 of the lever 31 (re. Figures 6 and 7) and cause the lever 31 to be displaced angularly from its operating position to its inoperative position where the second arm 37 is uncoupled from the rest lever 14 of the cut-off linkages 10. Thus, by operating the key 11, the switch 3 can be brought to a contact making condition.

Finally, on pulling the plug 30 out of the current tap 2, the spring-loaded means 32, i.e. the elastic lugs 39, will bring the lever 31 back into its operating position, thus driving the cut-off linkages 10 to open the contacts.

It should be noted that, consistently with the considerations made in the foregoing, in the tap/switch combination of this invention operation of the cut-off linkages 10 is controlled by the insertion and withdrawal of the plug 30 into/out of the current tap 2, such operation being enacted with the intermediary of the interlock mechanism comprising the lever 31 and spring-loaded means 32.

Advantageously in those cases where the current tap 2 includes no middle ground receptacle 22, and consequently, the plug 30 has no corresponding middle prong 28, the first arm 36 of the lever 31 would consist (re. Figures 8 and 9) of three lugs 36a,36b,36c set parallel at a mutual distance apart, of which the extreme lugs 36a and 36c lie at the receptacles 21 and 23.

In this second embodiment of the tap/switch combination according to the invention, the angular movement of the lever 31 by operation of the cut-off linkages 10 would be brought about, therefore, by insertion and withdrawal of the prongs 27 and 29 into/from the receptacles 21 and 23 of the tap 2.

The current tap/switch combination of this invention affords the primary advantage that a plug can be pushed into and pulled out of a current tap always in an open circuit condition, regardless of the switch setting. Thus, the risk of arcing and flashing is avoided which, as is known, would result in both the tap receptacles and prongs of the consumer plug becoming deteriorated.

Consequently, the tap/switch combination according to the invention can be considerably more reliable than conventional switch taps for civil electric appliances, it affording complete and automatic safety especially for the incompetent user, in full conformity with the lawful provisions mentioned in the preamble.

The tap/switch combination disclosed hereinabove is obviously susceptible to changes and modifications within the protection scope of the instant invention as set forth in the appended

claims.

Claims

1. A tap/switch combination for civil range electrical appliances, comprising an electric current tap (2) with receptacles (21, 22, 23) for an electric consumer plug (30) and an electric switch (3) with mechanical linkages (10) for applying or cutting off a power supply to said tap (2), the operation of said mechanical cut-off linkages (10) being controlled by the insertion and withdrawal movements of the plug (30) into/out of said tap (2),
 said operation being brought about through an interlock mechanism (31,32) extending between the tap receptacles (21, 22, 23) and the mechanical cut-off linkages (10),
 wherein said interlock mechanism comprises a lever (31) journalled on the interior of said tap (2) and being displaceable angularly from an operating position where a first arm (36) of the lever (31) extends in the proximity and transversely of at least one of said tap receptacles (21, 22, 23) and a second arm (37) of the lever (31) is coupled to said mechanical cut-off linkages (10), to an inoperative position where said second arm (37) is uncoupled from said mechanical cut-off linkages (10), and a spring-loaded means (32) effective to hold the lever (31) in the operating position thereof, said lever (31) being displaceable angularly to permit insertion of the plug (20) into said tap (2).
2. A tap/switch combination according to Claim 1, characterized in that said spring-loaded means (32) comprises a pair of elastic lugs (39) supported on said lever (31).
3. A tap/switch combination according to Claim 2, characterized in that said elastic lugs (39) and said lever (31) are a one-piece construction.
4. A tap/switch combination according to Claim 3, characterized in that the first (36) and second (37) arms of said lever (31) extend substantially at right angles to each other.
5. A tap/switch combination according to Claim 4, characterized in that said first arm (36) comprises a lug lying at a ground-connection middle receptacle (22) of the current tap (2).
6. A tap/switch combination according to Claim 4, characterized in that said first arm (36) comprises at least two lugs (36a, 36b,36c) set parallel at a mutual distance apart.

Patentansprüche

1. Eine Steck/Schalt-Kombination für elektrische Anwendungen im Zivilbereich, die folgende Elemente aufweist: eine elektrische Strom-Steckdoseneinrichtung (2) mit Aufnahmevorrichtungen (21, 22, 23) für einen elektrischen Verbraucherstecker (30) und einen elektrischen Schalter (3) mit mechanischen Verbindungsmechanismen (10) zum Anlegen oder Abschalten einer Strom- bzw. Spannungsversorgung an die Steckdoseneinrichtung (2), wobei die Wirkung der mechanischen Abschalt-Verbindungsmechanismen (10) durch die Einfüge- und Ausziehbewegungen des Steckers (30) in die Steckdoseneinrichtung (2) hinein bzw. aus ihr heraus kontrolliert bzw. gesichert wird,
 wobei diese Wirkung durch einen Verriegelungsmechanismus (31, 32) erreicht wird, der sich zwischen den Aufnahmevorrichtungen (21, 22, 23) der Steckdoseneinrichtung und den mechanischen Abschaltverbindungsmechanismen (10) erstreckt,
 wobei der Verriegelungsmechanismus einen Hebel (31) aufweist, der in dem Inneren der Steckdoseneinrichtung (2) angebracht ist und winkelförmig von einer Betriebsposition, bei der ein erster Arm (36) des Hebels (31) sich in die Nähe und quer zu wenigstens einer der Steckdosen-Aufnahmevorrichtungen (21, 22, 23) erstreckt und ein zweiter Arm (37) des Hebels (31) in Verbindung steht mit den mechanischen Abschaltverbindungsmechanismen (10), in eine Nichtbetriebsposition versetzbar ist, bei der der zweite Arm (37) nicht in Verbindung mit den mechanischen Abschaltverbindungsmechanismen (10) steht, und eine federgespannte Einrichtung (32) in der Lage ist, den Hebel (31) in der Betriebsposition zu halten, wobei der Hebel (31) winkelförmig verstellbar ist, um das Einfügen des Steckers (20) in die Steckdoseneinrichtung (2) zu erlauben.
2. Eine Steck/Schalt-Kombination nach Anspruch 1, dadurch gekennzeichnet, daß die federgespannte Einrichtung (32) ein Paar elastische Vorsprünge bzw. Ansätze (39) aufweist, die auf dem Hebel (31) angebracht sind.
3. Eine Steck/Schalt-Kombination nach Anspruch 2, dadurch gekennzeichnet, daß die elastischen Ansätze (39) und der Hebel (31) einteilig ausgebildet sind.
4. Eine Steck/Schalt-Kombination nach Anspruch 3, dadurch gekennzeichnet, daß der erste (36) und zweite (37) Arm des Hebels (33) im wesentlichen einen rechten Winkel miteinander

aufweisen.

5. Eine Steck/Schalt-Kombination nach Anspruch 4, dadurch gekennzeichnet, daß der erste Arm (36) einen Ansatz aufweist, der bei einer mittleren Masseverbindungs-Aufnahmevorrichtung (22) der Strom-Steckdoseneinrichtung (2) liegt.

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6. Eine Steck/Schalt-Kombination nach Anspruch 4, dadurch gekennzeichnet, daß der erste Arm (36) wenigstens zwei Vorsprünge bzw. Ansätze (36a, 36b, 36c) aufweist, die parallel und mit einem gegenseitigen Abstand zueinander angeordnet sind.

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Revendications

1. Ensemble à prise/interrupteur pour des appareils électriques ménagers domestiques, comportant une prise (2) de courant électrique ayant des douilles (21, 22, 23) pour une fiche électrique (30) de consommateur et un interrupteur électrique (3) avec des éléments mécaniques (10) de liaison pour appliquer une alimentation en énergie à ladite prise (2) ou couper cette alimentation en énergie de ladite prise (2), la manoeuvre desdits éléments mécaniques de liaison (10) de coupure étant commandée par les mouvements d'insertion de la fiche (30) dans ladite prise (2) et de retrait de la fiche 30 de la prise (2),

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ladite manoeuvre étant réalisée au moyen d'un mécanisme (31, 32) d'enclenchement s'étendant entre les douilles (21, 22, 23) de la prise et les éléments mécaniques de liaison (10) de coupure,

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dans lequel ledit mécanisme d'enclenchement comporte un levier (31) qui tourillonne sur l'intérieur de ladite prise (2) et qui peut être déplacé angulairement d'une position de travail dans laquelle un premier bras (36) du levier (31) s'étend à proximité de et transversalement à au moins l'une desdites douilles (21, 22, 23) de la prise et un second bras (37) du levier (31) est accouplé auxdits éléments mécaniques de liaison (10) de coupure, jusqu'à une position de repos dans laquelle ledit second bras (37) est désaccouplé desdits éléments mécaniques (10) de liaison de coupure, et un moyen (32) chargé par ressort ayant pour effet de maintenir le levier (31) dans sa position de travail, ledit levier (31) pouvant être déplacé angulairement pour permettre une insertion de la fiche (30) dans ladite prise (2).

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2. Ensemble à prise/interrupteur selon la revendication 1, caractérisé en ce que ledit moyen (32) chargé par ressort comporte une paire de

branches élastiques (39) supportées sur ledit levier (31).

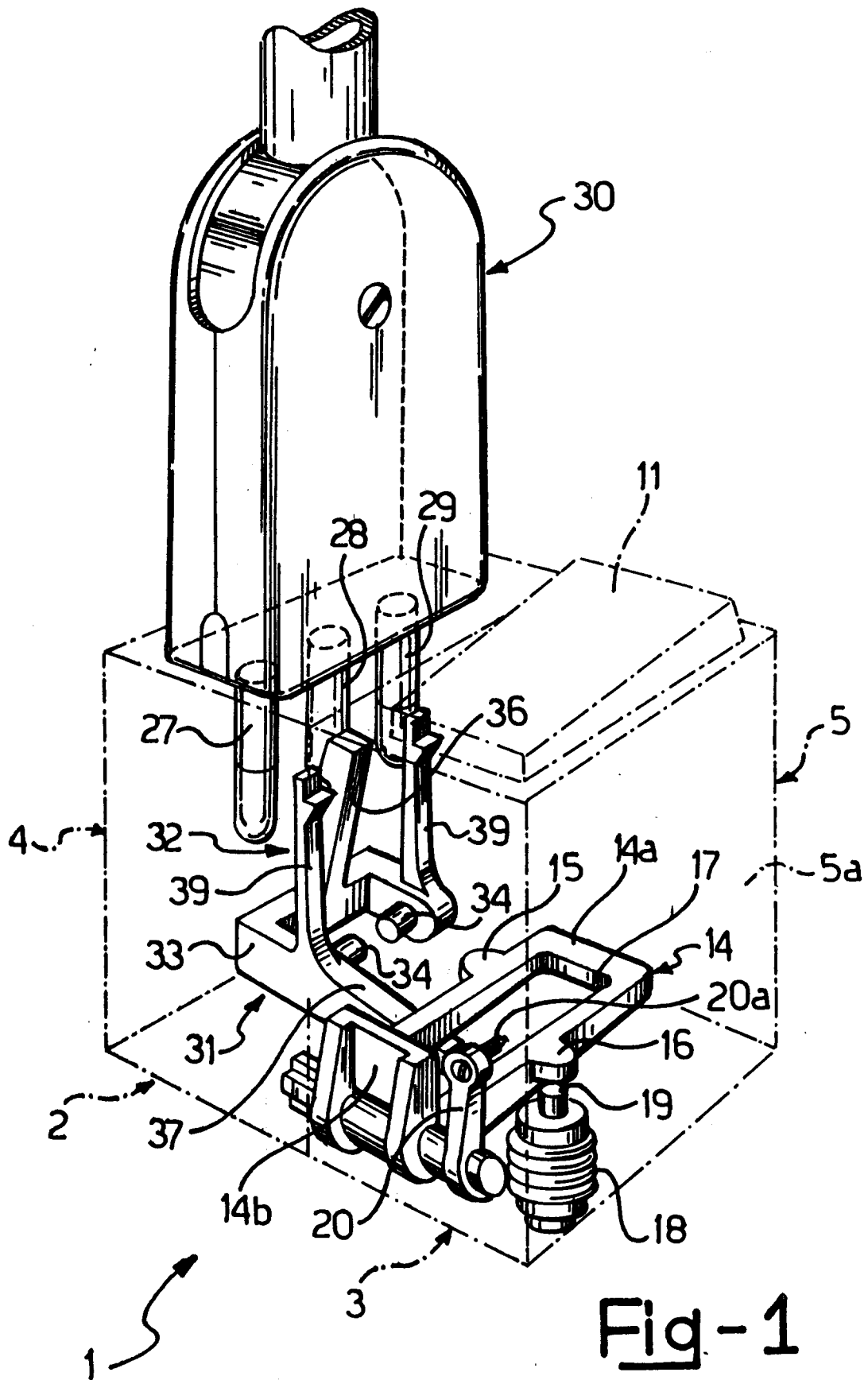
3. Ensemble à prise/interrupteur selon la revendication 2, caractérisé en ce que lesdites branches élastiques (39) et ledit levier (31) sont réalisés d'une seule pièce.

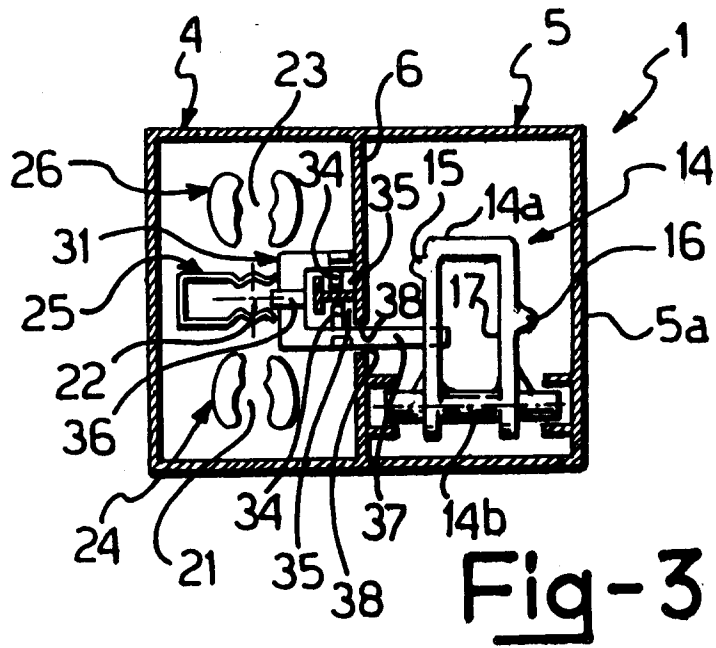
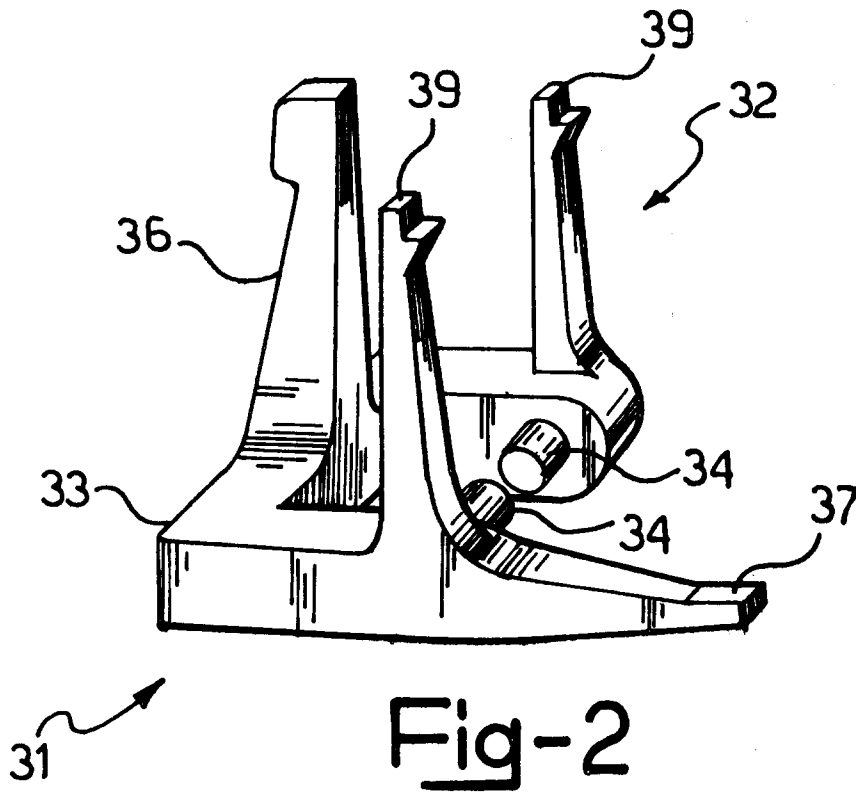
4. Ensemble à prise/interrupteur selon la revendication 3, caractérisé en ce que les premier (36) et second (37) bras dudit levier (31) s'étendent sensiblement à angle droit l'un par rapport à l'autre.

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5. Ensemble à prise/interrupteur selon la revendication 4, caractérisé en ce que ledit premier bras (36) comporte une branche s'étendant à une douille médiane (22) de connexion à la masse de la prise (2) de courant.

6. Ensemble à prise/interrupteur selon la revendication 4, caractérisé en ce que ledit premier bras (36) comporte au moins deux branches (36a, 36b et 36c) disposées parallèlement à une certaine distance les unes des autres.





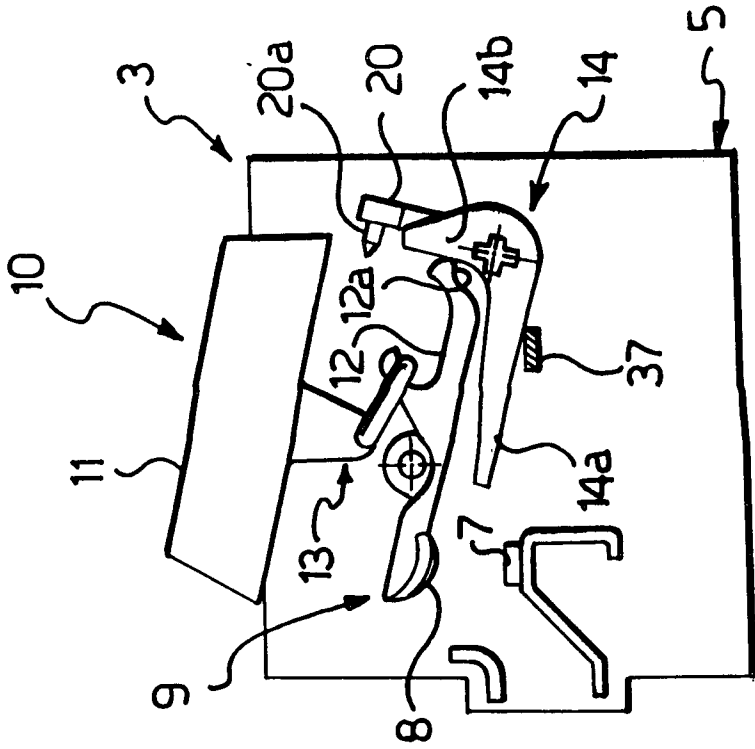


Fig-5

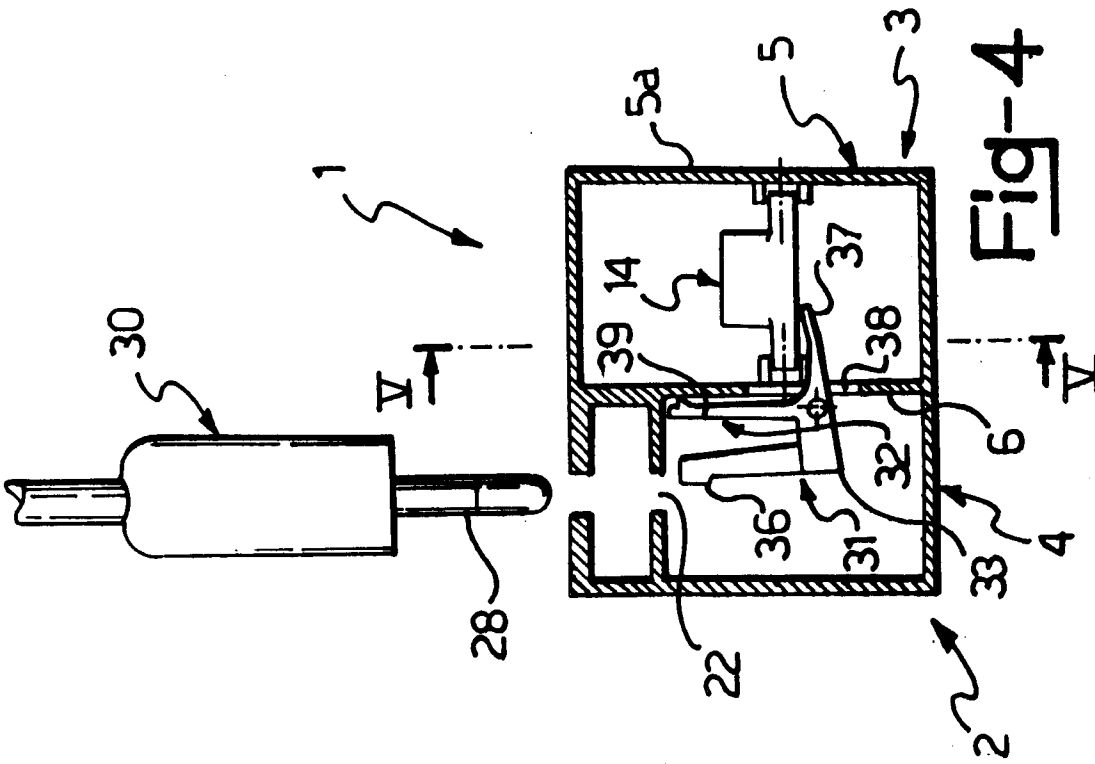


Fig-4

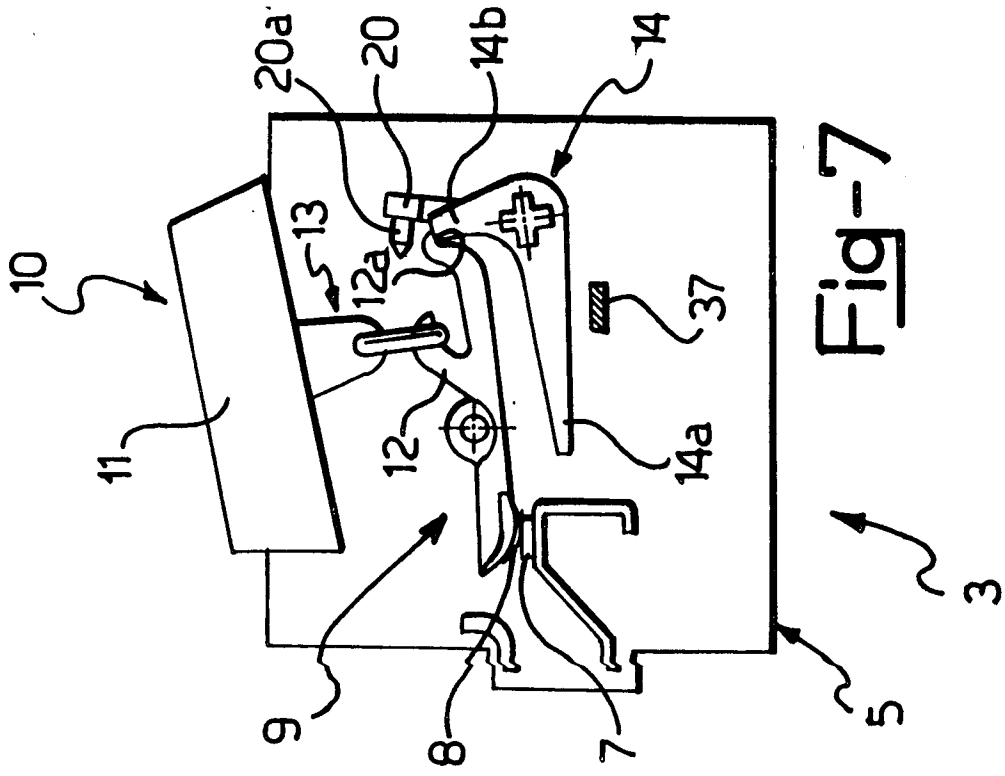


Fig-7

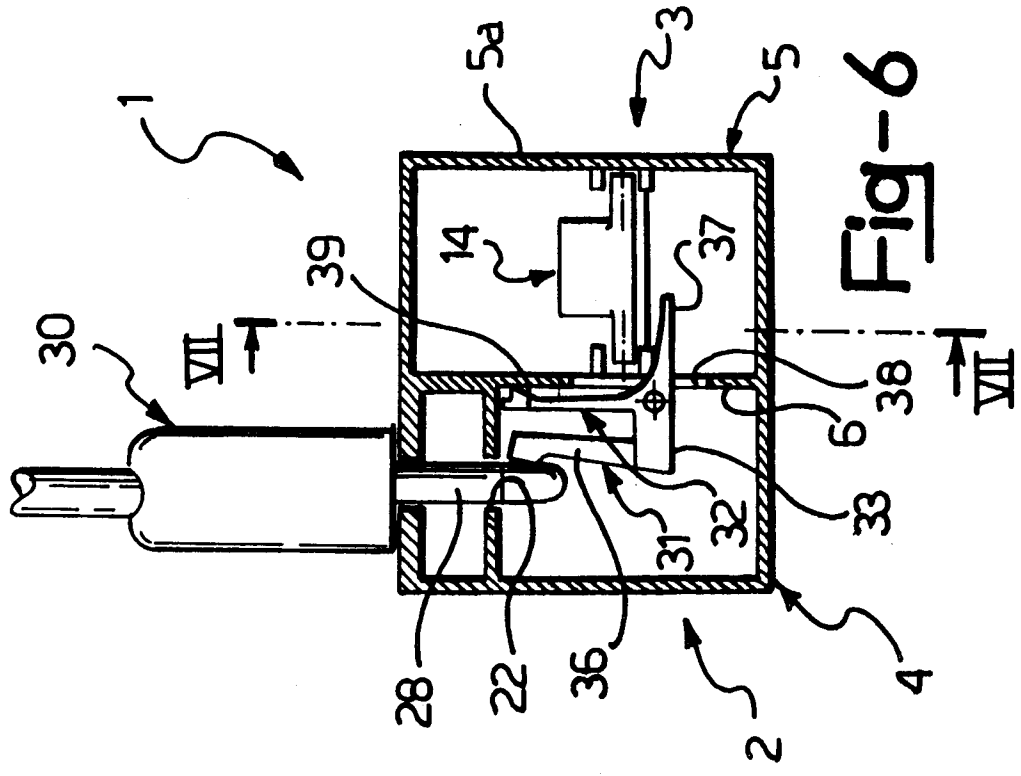


Fig-6

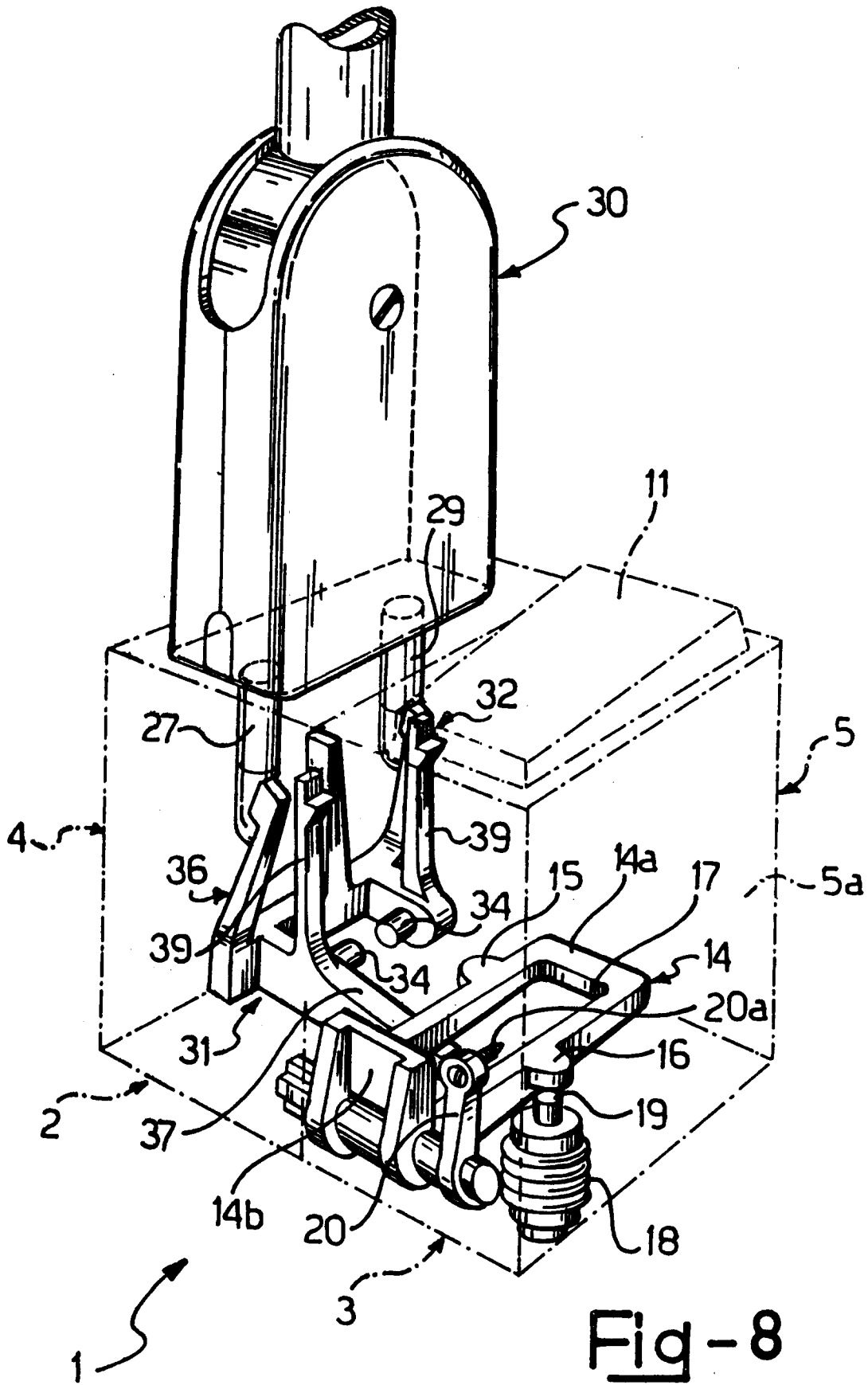


Fig-8

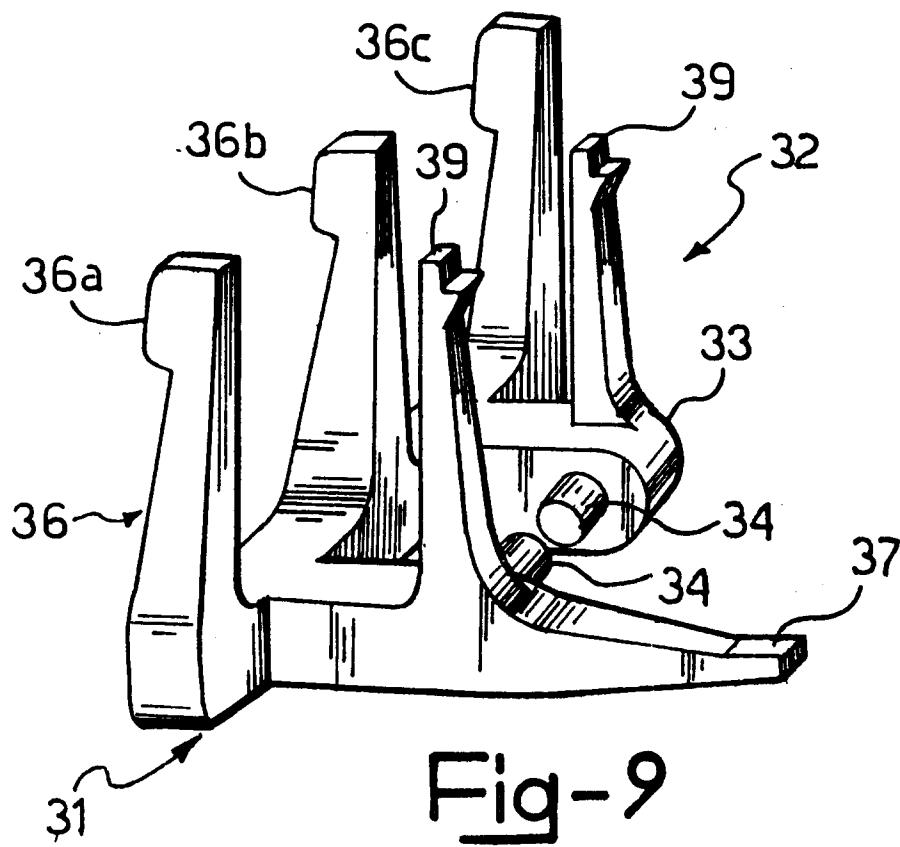


Fig-9