

May 20, 1958

A. BAGNAGATTI

2,835,756

SWITCH MECHANISM

Filed May 11, 1955

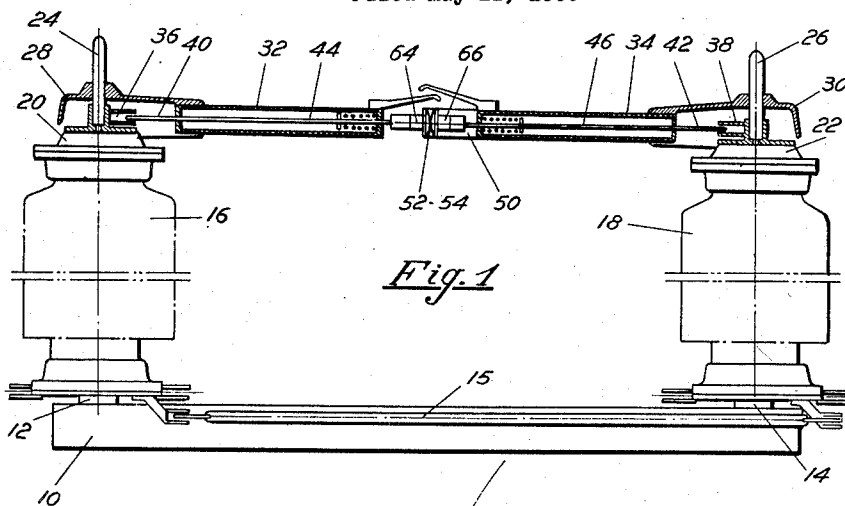


Fig. 1

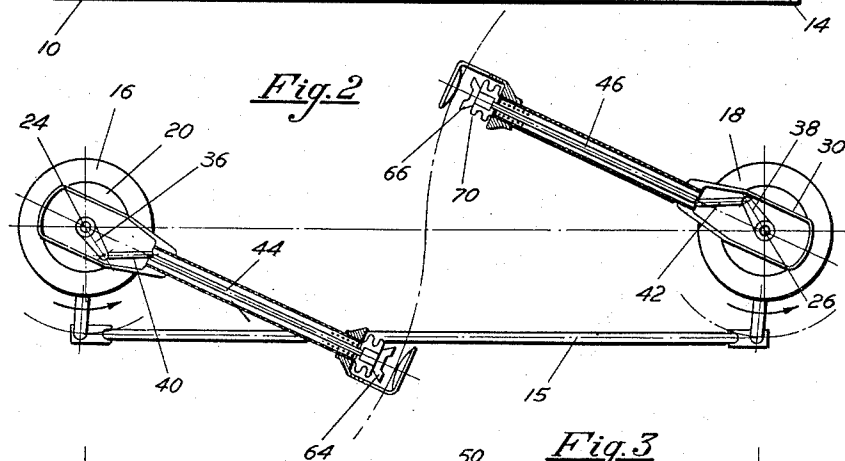


Fig. 2

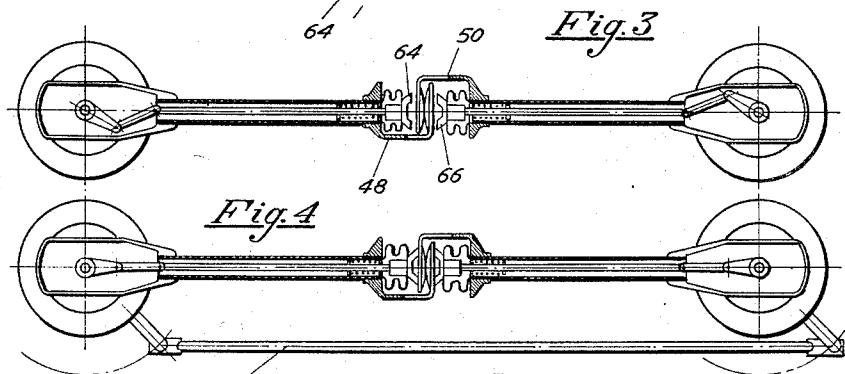


Fig. 3

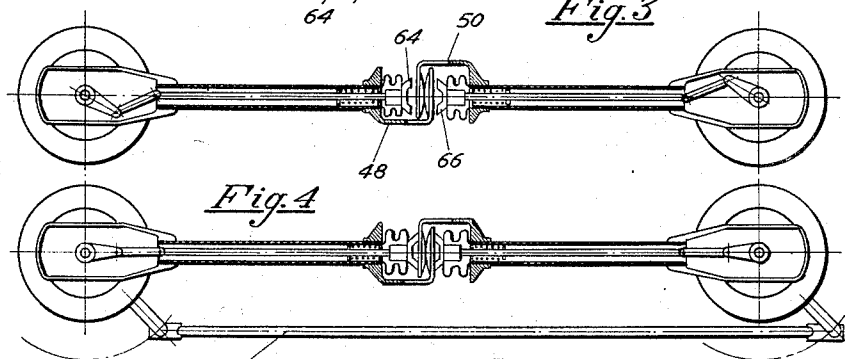


Fig. 4

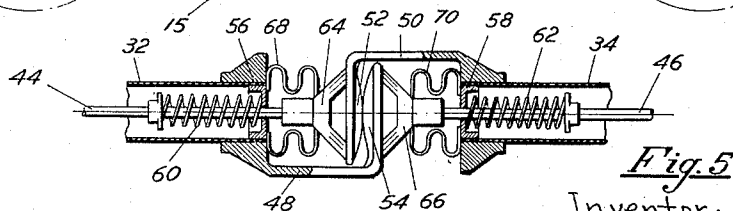


Fig. 5

Inventor:
Achille Bagnagatti
By: Michael S. Straker agt.

1

2,835,756

SWITCH MECHANISM

Achille Bagnagatti, Milan, Italy

Application May 11, 1955, Serial No. 507,707

6 Claims. (Cl. 200-48)

This invention relates to a device for cut-off or knife switches in general, provided with a double expansion electric contact actuated by opposed pressures carried out by a lever-rod, or lever-connecting-rod and rod operative chain, and fitted on insulating posts, particularly suitable to embody cut-off switches of the two insulating post type, with contacts revolving in opposed directions, and with controlled drive and shock damping.

A contact device for knife or cut-off switches and the like is described in the German Patent 531,339. In said device, a movable cross-arm is provided at both ends with axially fitted contacts movable in opposed directions thereon and suitable to be brought into engagement with their mating contacts by means of toggle connecting-rod systems, which drive is derived from the means by which said cross-arm is swung from one to the other of its rest positions.

This invention relates to an improvement of the above-said, already known contact device.

The device according to the invention, of the type comprising two movable contacts which can be resiliently engaged with their mating contacts by means of a toggle connecting-rod system, is characterized in that both the contact and its mating contact are provided with opposed stirrup-shaped members, which free ends can be engaged one another, thereby establishing an operating connection, while the movable contacts are provided with two spring brushes, controlled by the toggle connecting-rod system to resiliently engage themselves with the free ends of stirrup member with which the mating contact is provided.

It is to be understood that the device according to this invention could be provided with a double contact, by having any of stirrup members associated with a related spring contact brush, in such a manner that the clamping action of same brushes be mutually offset, while a double expansion contact is obtained.

The invention will be hereinafter disclosed in the following description, taken with reference to the accompanying drawing, wherein a device according to the invention, as fitted to a two-arm cut-off switch is shown, being both description and drawing given only as a not restrictive example.

In same drawing:

Fig. 1 is a partly sectional elevation of a cut-off switch in its closed position.

Figs. 2, 3 and 4, 5 are plan views, also partly in section of same cut-off switch in its different positions, and more precisely in the open position (see Fig. 2); while the movable contacts are being engaged and the thrust of brushes is offset (see Fig. 3), and in the final step, while the brushes are being expanded in order to close the contacts (see Fig. 4).

Referring now to said figures, the cut-off switch as shown consists of a base 10, whereon the two rotary supports 12-14 are fitted, being same supports connected one another by means of the die-rod 15.

The column insulators 16-18, as fitted on the afore-stated supports 12-14, are provided with heads 20-22, whereon the pins 24-26 are mounted.

Said pins co-operate with boxes 28-30, whereon the tubular arms 32-34 are firmly secured.

The toggles 36-38, keyed to above pins, are articulated by means of the connecting rods 40-42, with the rods 44-46, which are slidingly fitted within said tubular arms 32-34.

2

The stirrups 48-50 are fastened in opposed positions onto the free ends of said tubular arms, thereby forming gutter-shaped contacts, which engage one another by means of conical projections 52-54, as formed on the inside, mutually engaging surfaces of said stirrups.

The opposed ends of rods 44-46 are guided by the brushes 56-58, secured to the ends of arms 32-34. The springs 60-62, threaded on latter rods, are also held within same brushes and push axially said rods in opposed directions.

The resilient brushes 64-66, as fitted on the ends of rods 44-46, which project out of the legs of stirrups 48-50, are electrically connected to their arms 32-34 through flexible leads 68-70.

The closing of cut-off switch contacts is obtained by having the column insulators 16-18 swung around their supports 12-14.

The arms 32-34 are swung the one against the other, until a mutual engagement of shaped projections 52-54 on the stirrups 48-50 takes place, thereby stopping said arms. At the end of such a motion, both arms 32-34 are aligned on their longitudinal axes, as shown in Fig. 3. The further rotation of column insulators 16-18 is not more transmitted to the arms 32-34, owing to mutual engagement of the ends of rods 48-50.

However, a further rotation of connecting rod systems 36-40 and 38-42 occurs, under the action of the columns 16-18, whereby the rods 44-46 are caused to slide axially the one against the other.

Thus, the brushes 64-66 are engaged and elastically pressed respectively against the outside faces of square ends of the stirrups 48 and 50. Said stirrups 48-50 are operatively connected to one another while performing latter motion, whereby a given stiffness is obtained.

As a result of the aforescribed operations, the electrical contacts are closed, thereby setting up a double path for the current, which allows a remarkable decrease of the masses as fitted on the ends of knife supporting arms, above all in the case of high amperage cut-off switches.

More precisely, in addition to mutual engagement of stirrups through the projections 52-54, two parallel-connected circuits 48-66-50-64 are established.

Moreover, an operative connection, practically free from any stress (above all in respect of column insulators 16-18) between the arms 44-46 can be obtained while the cut-off switch is closed, owing particularly to the provision of stirrups 48-50, whereby the insulators are relieved from the stresses as caused by the expansion of contact brushes 64-66, which resilient action is braked and offset.

The stability of contacts in their closed positions is obtained by bringing any of the connecting rod systems 36-40-38-42 in a position slightly beyond (i. e. by a few degrees) their dead centres.

The cut-off switch can be opened by performing the aforescribed operations in a reversed sequence.

As it is to be understood, further applications of the afore disclosed and illustrated device could be readily found out, by making suitable changes thereto.

Thus, f. i., in place of two arms 44-46 showing like length, two arms of different length, anywhere directed, would be fitted on the device.

The advantages which can be obtained by the device according to this invention are as follows:

(a) A mutual and contemporaneously acting pressure of the expansion, a two contact system is obtained, thus setting up a double path for the current, which results in a substantial decrease of the masses as fitted on the end of knife supporting arms, particularly in the case of high amperage cut-off switches.

(b) The thrust of brushes is applied against the back

of contact heads, which engage each other owing to the particular shape of their heads by showing in front their electrical contact faces.

(c) The column insulators are subjected only to negligible contact stresses while, due to the double expansion operative system, any abrupt shock between the contacts can be positively prevented.

(d) Electrical continuity between the two heads while the cut-off switch is closed, due to the fact that both expansion operative systems are brought slightly beyond their dead centres.

(e) No burning of main contacts due to arcing can occur while throwing the switch closed or open, since the initial contact is never set up thereon.

(f) Manufacture of cut-off switches provided with two column insulators only, by saving one column insulator in respect of three insulator types, with open cut-off switch, a greater spark gap between the opposed contacts being obtained, since there is not any intermediate column insulator.

What I claim is:

1. A switch mechanism comprising, in combination, a base member; a pair of spaced insulating mountings rotatably mounted on said base member and having free end portions; a first toggle arm fixedly mounted at one of the ends thereof on said free end portion of one of said insulating mountings and being rotatable therewith between a circuit opening position and a circuit closing position; a second toggle arm fixedly mounted at one of the ends thereof on said free end portion of said other insulating mounting and being rotatable therewith between a circuit opening and a circuit closing position; at least one contact mounted on the other end of said first toggle arm; at least a second contact mounted on the other end of said second toggle arm, said contacts engaging one another when said first and second toggle arms are in their circuit closing positions; first switch holding means mounted at said other end of said first toggle member and adapted to be moved into engagement with said other end of said second toggle arm when said arms are in their respective circuit closing positions; first resilient means for resiliently urging said first switch holding means out of engagement with said other end of said second toggle arm; a second switching holding means mounted at said other end of said second toggle arm and adapted to move into engagement with said other end of said first toggle arm when said arms are in their respective circuit closing positions; and means for moving said first and second switch holding means into engagement with their respective ends of said toggle arms against the action of said resilient means, whenever desired.

2. A switch mechanism comprising, in combination, a base member; a pair of spaced insulating mountings rotatably mounted on said base member; a pair of switch arms, each of said switch arms being fixedly mounted on one of said insulating mountings respectively and being rotatable therewith between circuit opening and circuit closing positions, each of said switch arms having a free end portion, a contact mounted on said free end portion and adapted to engage the contact of said other switch arm when said switch arms are in circuit closing position, a switch holding member mounted adjacent said free end portion and being movable into a switch holding position wherein said switch holding member engages said other switch arm, and resilient means for normally urging said switch holding member out of its switch holding position; and means for moving said switch arms into circuit closing position wherein said contacts make electrical contact with one another and said switch holding members are moved into switch holding position against the action of said resilient means.

3. A switch mechanism comprising, in combination, a base member; a pair of parallel spaced insulating mountings rotatably mounted on said base member and extending in a direction substantially transverse to said base

member; a pair of switch arms, each of said switch arms being fixedly mounted on one of said insulating mountings respectively and being rotatable therewith between circuit opening and circuit closing positions, said switch arms extending substantially transversely to said insulating mountings, each of said switch arms having a free end portion, a contact mounted on said free end portion and adapted to engage the contact of said other switch arm when said switch arms are in circuit closing position, a switch holding member mounted adjacent said free end portion and being movable into a switch holding position wherein said switch holding member engages said other switch arm, and resilient means for normally urging said switch holding member out of its switch holding position; and means for moving said switch arms into circuit closing position wherein said contacts make electrical contact with one another and said switch holding members are moved into switch holding position against the action of said resilient means.

4. A switch mechanism comprising, in combination, a base member; a pair of spaced insulating mountings rotatably mounted on said base member; a pair of switch arms, each of said switch arms being fixedly mounted on one of said insulating mountings respectively and being rotatable therewith between circuit opening and circuit closing positions, each of said switch arms having a free end portion, a U-shaped member mounted on said free end portion, a contact mounted on said U-shaped member and adapted to engage the contact of said other switch arm when said switch arms are in circuit closing position, a switch holding member mounted adjacent said free end portion and being movable into a switch holding position wherein said switch holding member engages said other switch arm, and resilient means for normally urging said switch holding member out of its switch holding position; and means for moving said switch arms into circuit closing position wherein said contacts make electrical contact with one another and said switch holding members are moved into switch holding position against the action of said resilient means.

5. A switch mechanism comprising, in combination, a base member; a pair of spaced insulating mountings rotatably mounted on said base member; a pair of switch arms, each of said switch arms being fixedly mounted on one of said insulating mountings respectively and being rotatable therewith between circuit opening and circuit closing positions, each of said switch arms having a free end portion, a U-shaped member mounted on said free end portion, a contact mounted on an inner face of said U-shaped member and adjacent the open end of said U-shaped member, said contact being adapted to engage the contact of said other switch arm when said switch arms are in circuit closing position, a switch holding member mounted adjacent said free end portion and being movable into a switch holding position wherein said switch holding member engages an outer face of said U-shaped member on said other switch arm, and resilient means for normally urging said switch holding member out of its switch holding position; and means for moving said switch arms into circuit closing position wherein said contacts make electrical contact with one another and said switch holding members are moved into switch holding position against the action of said resilient means.

6. Apparatus as claimed in claim 2 wherein said switch holding members are electrically conductive and form a parallel path for electric current flowing through said contacts in said circuit closing position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,094,087	Wilkins	Sept. 28, 1937
2,605,370	Leopold	July 29, 1952