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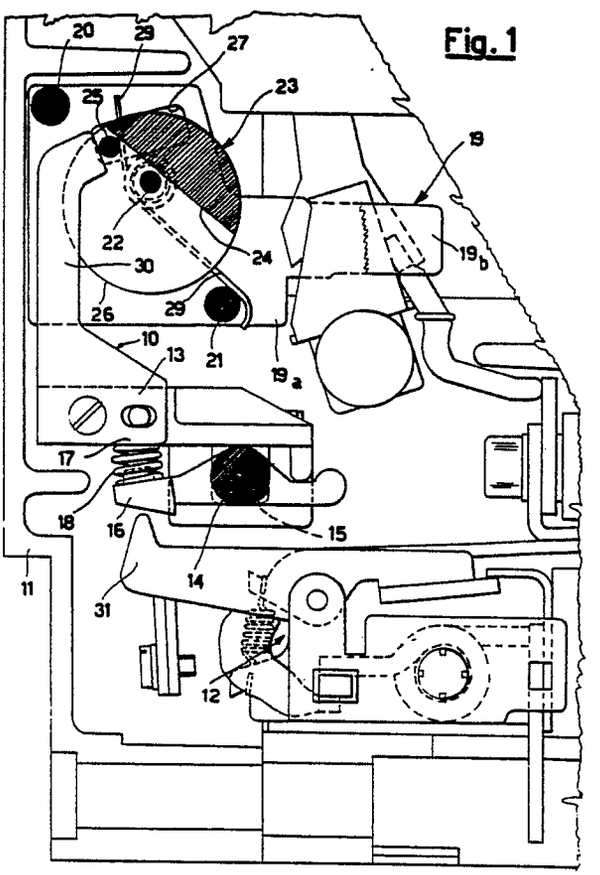
(54) Delaying device for release elements of electrical ciruits breakers.

(57) The invention provides a delaying device for release elements of electrical circuit breakers, which is essentially constituted, in a circuit breaker structure, by at least a coil connected in series to a main circuit of a circuit breaker, said at least one coil actuating, when electrical power is supplied to it, at least an elastically-swinging lever capable of rotating a release shaft causing the tripping of said circuit breaker, said shaft being provided with at least one tongue suitable to engage said at least one lever, characterized in that said delaying device is constituted by first delaying lever means elastically mounted on said release shaft, and acting on second delaying means of the delaying-mass type, fastened onto said circuit breaker structure in correspondence of said first delaying lever means.

Fig. 1



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"DELAYING DEVICE FOR RELEASE ELEMENTS OF ELECTRICAL CIRCUIT BREAKERS"

The object of the present invention is a delaying device for release elements of electrical circuits.

Some types of circuit breakers are provided with release elements which, in case of anomalous conditions of power supply, perform their tripping action, generally for protecting the circuits downstream them (both whether such circuits are true circuits, or loads).

The release elements, which are mechanically linked to the retainer elements of the circuit breaker, cause the switching off of this latter.

By taking now into consideration the switching-off time, two types of release elements can be distinguished, viz., the instantaneous release elements, and the release elements with a fixed delay time (these latter perform their tripping function with a preset fixed delay time).

The delay in the tripping action is generally determined by wheelworks or by bimetallic elements, which determine extremely variable release times, sometimes not justified from the view point of an efficacious and rational protection of the circuits.

Furthermore, most release elements known from the prior art derive from more complex devices, which are not specifically designed for the tripping function as described above. This fact involves, besides a considerable structural complexity, also very high production costs.

A not least disadvantage is the non-reliability and the non-repeatitivity of the switching actions, in as much as, the higher and the more complex the moving masses, the greater the maintainance and breakage problems, and the shorter the operating life of said devices.

The purpose of the present invention is obviating the disadvantages due to the above cited devices known from the prior art, by providing a release device which is very simple from the structural viewpoint, and can be produced hence at low costs, and is endowed with high reliability characteristics.

In view of such a purpose, according to the present invention a delaying device has been provided for release elements of electrical circuit breakers, which is essentially constituted, in a circuit breaker structure, by at least a coil connected in series to a main circuit of a circuit breaker, said at least one coil actuating, when electrical power is supplied to it, at least an elastically-swinging lever capable of rotating a release shaft causing the tripping of said circuit breaker, said shaft being provided with at least one tongue suitable to engage said at least one lever, characterized in that said delaying device is constituted by first delaying lever means elastically mounted on said release shaft, and acting on second delaying means of the delaying mass type, fastened onto said circuit breaker structure in correspondence of said first delaying lever means.

For the purpose of better understanding the characteristics, as well as further advantages thereof, the present invention is now disclosed with reference to the hereto attached drawing tables, wherein:

Figure 1 shows a schematic view of a release agent according to the invention, and

Figure 2 shows a view of a detail of a leaf spring inserted inside a release device of the type as disclosed in Figure 1.

Referring to the figures, with 10 a delaying device according to the invention is generally indicated, which is inserted inside a circuit breaker structure 11, of which only one release element, generally indicated in 12, is visible.

The delaying device 10 is basically formed by two parts: a first part, constituted by a lever 13, having a substantially "L"-shape, mounted on the release shaft 14 of the circuit breaker 11 by means of a slot 15.

The shaft 14 is equipped with a tongue 16 having a substantially trapezoidal section.

Between the tongue 16 and a lower portion 17 of lever 13, a helical spring 18 is provided, which, together with the slot 15, allows an elastical backlash between the shaft 14 and the tongue 13.

The second part of device 10, which constitutes the delaying mass, consists of a support 19 fastened onto the structure 11 in an upper position relatively to shaft 14, and constituted by two laminar elements 19a and 19b (NOTE: of element 19b, only an end, on-sight, portion is shown, whilst element 19a is totally visible), constrained by means of connecting pins 20 and 21. Between the elements of said support 19, a drum 23 is eccentrically hinged in 22. The drum 23 is provided with a groove 24 inside which a pin 25, protruding from the base surfaces 26 of drum 23 is transversely housed.

The pin 25 limits the rotation of the drum, by being in engagement with sliding seats 27 provided on each one of the elements of support 19.

Furthermore. between the protruding pin 25 and the connecting pin 21 a torsion spring 29 is provided.

An upper portion 30 of lever 13 is in engagement with pin 25, so that, when the release element 12 acts on tongue 16, by means of a toothed lever 31 thereof, the release shaft 14 cannot cause

the opening of the circuit breaker until the lever 13 has not won the elastic force of the spring 18, and of the delaying mass constituted by the drum 23 eccentrically movable on the support 19.

Still according to the invention, it is clear how the spring 18 can be replaced by any other elastic means, such as, e.g., a leaf spring 50 having a suitable stiffness, directly inserted in the structure of lever 13 (Figure 2).

By suitably calibrating the mass of drum 23 and the elastic constants of the springs relatively to the currents involved, the desired delay times in circuit breaker switching off can be obtained.

The present invention has been disclosed for purely illustrative and non limitative purposes, but it must be understood that modifications and changes can be supplied by those skilled in the art, without going out of the protection scope of the present patent application.

Claims

1. Delaying device for release elements of electrical circuit breakers, which is essentially constituted, in a circuit breaker structure, by at least a coil connected in series to a main circuit of a circuit breaker, said at least one coil actuating, when electrical power is supplied to it, at least an elastically-swinging lever capable of rotating a release shaft causing the tripping of said circuit breaker, said shaft being provided with at least one tongue suitable to engage said at least one lever, characterized in that said delaying device is constituted by first delaying lever means elastically mounted on said release shaft, and acting on second delaying means of the delaying-mass type, fastened onto said circuit breaker structure in correspondence of said first delaying lever means.

2. Delaying device according to claim 1, characterized in that said first delaying lever means are constituted by a substantially "L"-shaped lever mounted on said release shaft by means of a slot, with between said lever and a tongue protruding from said release shaft, a helical spring being interposed.

3. Delaying device according to claim 1, characterized in that said second delaying means of delaying-mass type are constituted by a drum eccentrically hinged on support means provided in an upper position relatively to said shaft, said drum being engageable with said "L"-shaped lever.

4. Delaying device according to claims 1 and 3, characterized in that said drum is engageable with said lever by means of a groove provided on its side surface, inside which a pin protruding from the base surfaces of said drum is transversely housed, said lever being in mutual engagement with said pin for the purpose of shifting said drum under predetermined conditions.

5. Delaying device according to claims 1 and 3, characterized in that said support means for said drum are constituted by two laminar elements constrained by means of two connection pins.

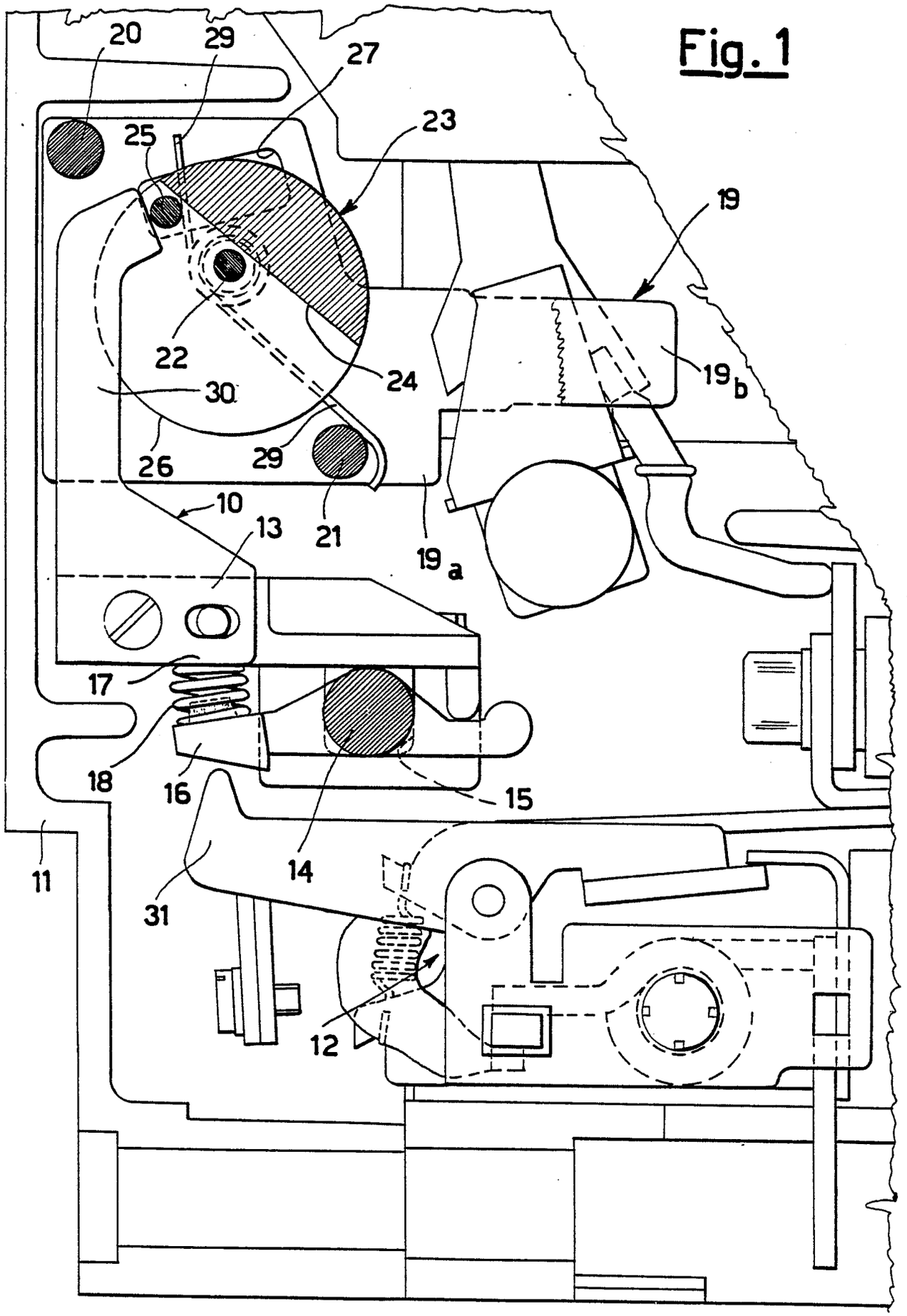
6. Delaying device according to claims 1 and 3, characterized in that on said eccentrically-hinged drum a torsion spring acts.

7. Delaying device according to claims 1 and 5, characterized in that each one of said two laminar elements is provided with a sliding seat in engagement relationship with the ends of said pin protruding from said base surfaces of said drum.

8. Delaying device according to claim 1, characterized in that said first lever means elastically mounted on said release shaft are constituted by an essentially "L"-shaped lever comprising a leaf spring.

9. Delaying device according to any of the preceding claims, substantially as herein disclosed and illustrated.

Fig. 1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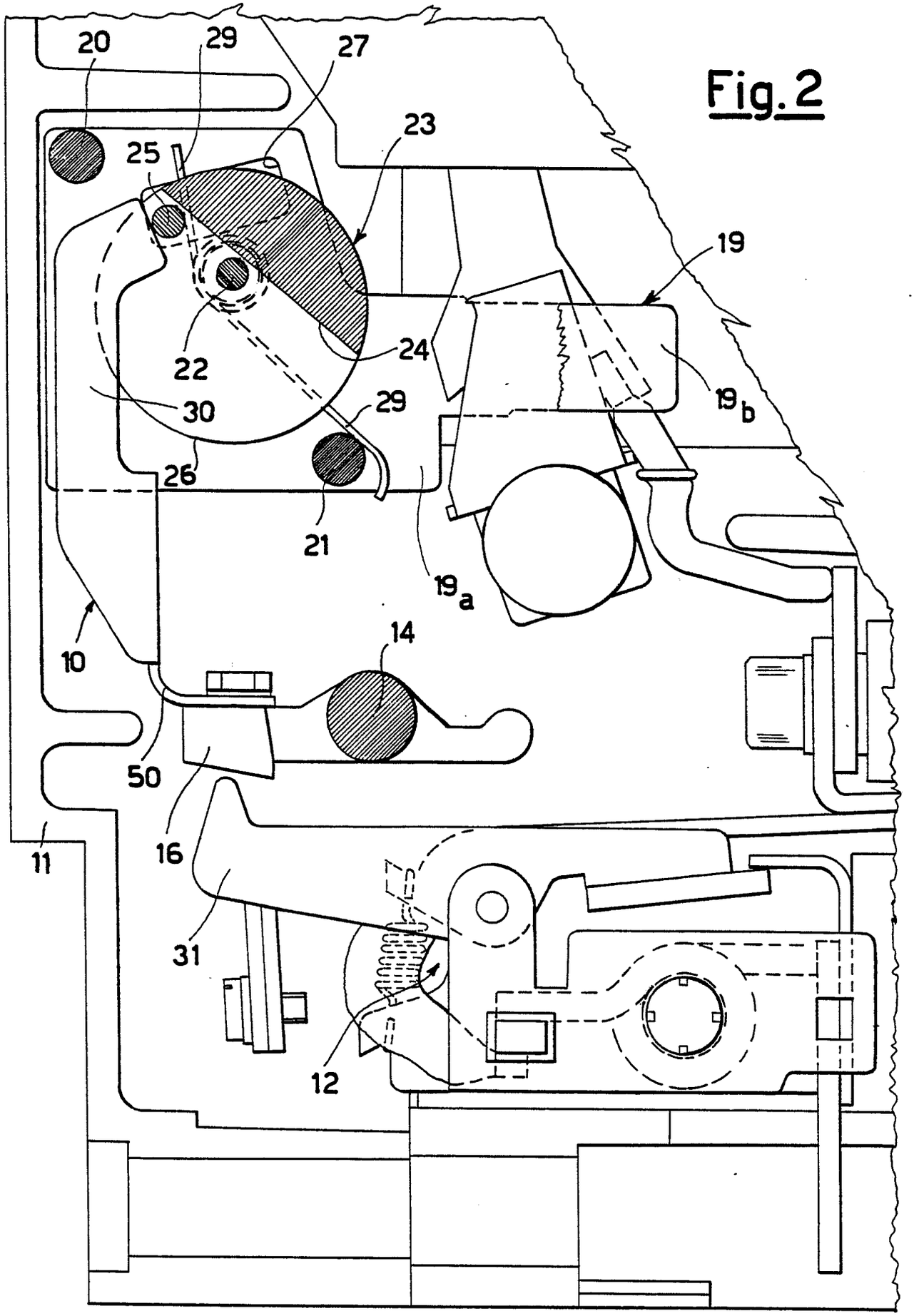

Fig.2