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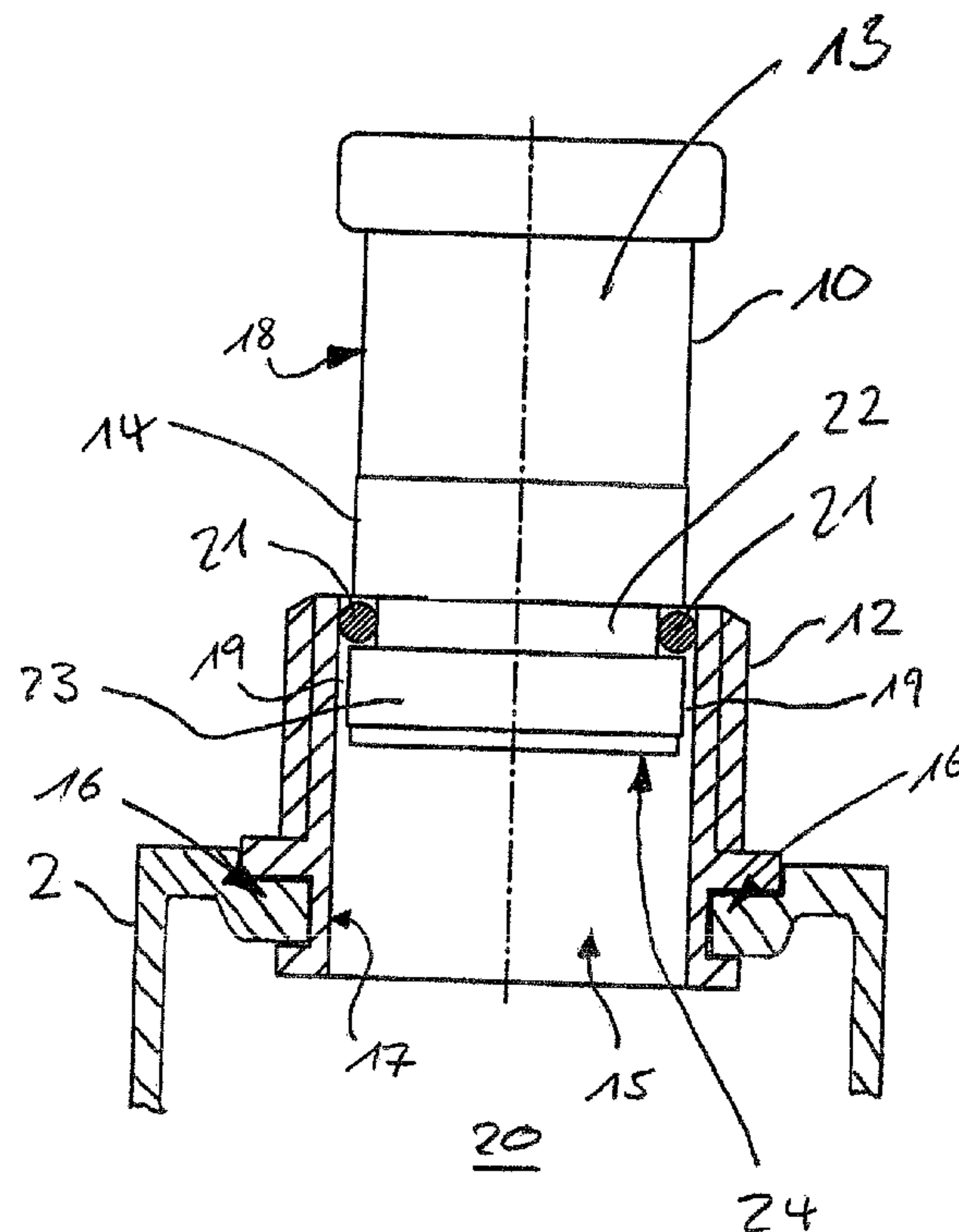
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(54) Titre : DISJONCTEUR SCELLE A COMMANDE A DOUBLE EFFET

(54) Title: SEALED CIRCUIT BREAKER WITH PUSH-PULL ACTUATION



(57) Abrégé/Abstract:

In order to seal a circuit breaker (1) with a threaded collar (12) fixed on the breaker housing (2) and an approximately cylindrical actuating element (10) displaceably guided in a bore (15) of the threaded collar (12) and partially protruding from the breaker housing (2) for manual push-pull actuation in an advantageous way on the actuating side, a sealing ring (21) which seals the annular gap (19) formed between the wall (17) of the bore (15) and the circumference (18) of the actuating element (10) is provided.

Abstract

In order to seal a circuit breaker (1) with a threaded collar (12) fixed on the breaker housing (2) and an approximately cylindrical actuating element (10) displaceably guided in a bore (15) of the threaded collar (12) and partially protruding from the breaker housing (2) for manual push-pull actuation in an advantageous way on the actuating side, a sealing ring (21) which seals the annular gap (19) formed between the wall (17) of the bore (15) and the circumference (18) of the actuating element (10) is provided.

Figure 3

TER-02673

Description

Sealed circuit breaker with push-pull actuation

The invention relates to a circuit breaker, in particular for use in aircraft or spacecraft equipment, with a threaded collar fixed on the breaker housing and an approximately cylindrical actuating element displaceably guided in a bore of the threaded collar and partially protruding from the breaker housing, the actuating element being mechanically connected to a switching mechanism in such a way that the switching mechanism is adjustable between a closed position and an open position by manual pushing or pulling of the actuating element.

Such circuit breakers are commonly used in particular in aviation and aerospace technology and have to conform to national and international standards. Known to exist are single-pole designs, which are described for example in DIN EN 2495, MS 3320 (US) and VG 95345-6, and multi-pole designs for the simultaneous switching of multi-conductor networks, which are described for example in VG 95356-11 and AS 14154 (US). Circuit breakers of this type are fitted in aircraft and in the cockpit area as well as outside the pressure cabin, for example in the landing gear. The circuit breakers used here must always remain operational even under adverse environmental conditions, such as changing atmospheric pressure and changing temperatures, in particular low temperatures. In this respect, it must be ensured in particular that any ingress of condensate and solid particles, such as for example dust or soot, into the breaker housing is prevented.

It is known from the standard VG 95345-23 to use an additional protective cap for sealing a circuit breaker in the area of its actuating element. The protective cap is in this case screwed onto the threaded collar of the circuit breaker in place of a customary fastening nut and comprises a flexible sealing element which either completely encloses the part of the actuating element protruding from the breaker housing or fits snugly around the circumference of the actuating element in the manner of an annular lamella. In a disadvantageous way, the sealing element of the known protective caps is itself arranged in a permanently unprotected way on the surface of the circuit breaker that is visible and can be touched. The sealing element is consequently exposed not only to adverse environmental influences but also possibly to mechanical loading, for example by an installation tool, so that mechanical damage to the sealing element is not ruled out. In addition, the circuit breaker is only ever sealed as long as the protective cap is firmly screwed on it. In particular, proper functioning of the circuit breaker is only ensured if the mounting of the protective cap is properly performed.

The invention is based on the object of providing a circuit breaker with which the stated disadvantages are avoided.

This object is achieved according to the invention by the features of claim 1. Accordingly, in the case of a circuit breaker of the generic type, a sealing ring that is arranged between the wall of the bore provided in the threaded collar of the circuit breaker and the circumference of the actuating element is provided and seals the annular gap formed there.

The sealing ring has the effect of protecting the circuit breaker in a simple way on the actuating side from splash water and condensate and also from penetrating contamination. The sealing ring is advantageously fitted already during the production of the circuit breaker. The circuit breaker is consequently already sealed in itself before installation, for example in an aircraft, thereby avoiding possible sources of error due to incorrect mounting or installation errors. Furthermore, the sealing ring is concealed in the threaded collar of the circuit breaker and consequently protected from damaging external access.

In a preferred configuration of the circuit breaker, the sealing ring lies in an annular groove of the actuating element and is consequently held in a non-slip manner on the circumference of the actuating element. This makes particularly simple production of the circuit breaker possible. In an equivalent way, however, the sealing ring may also lie in a groove alternatively provided in the threaded collar, and consequently be held on the threaded collar. The actuating element expediently comprises a basic body, onto the circumference of which a marking ring and an end ring, arranged toward the inside of the housing from the latter, are pushed. The marking ring, which is made to be of a different color than the basic body, in particular white, is in this case only ever visible from the outside if the actuating element and the switching mechanism connected to it are in the open position. Such a switching position indication has already been described in the aforementioned standards. The marking ring and the end ring are in this case advantageously used for forming the annular groove, in that they are pushed onto the basic body with a spacing and receive the sealing ring between them.

Exemplary embodiments of the invention are explained in more detail below on the basis of a drawing, in which:

figure 1 shows in a schematic representation a circuit breaker with an actuating element for manual push-pull actuation in the open position,

figure 2 shows in a representation according to figure 1 the circuit breaker in the closed position,

figure 3 shows in a schematic cross section through the breaker housing of the circuit breaker according to figure 1 the actuating element in the open position, and

figure 4 shows in a representation according to figure 3 the actuating element in the closed position.

Corresponding parts are designated by the same reference numerals in the figures.

Figures 1 and 2 show a circuit breaker 1, which is intended for use in aircraft or spacecraft equipment. Reference is expressly made to the disclosure of the standards relevant to such a circuit breaker 1, DIN EN 2495, VG 95345-6, VG 95345-11, MS 3320 and AS 14154.

The circuit breaker 1 comprises a breaker housing 2 of insulating material, from which at least one pair of terminal contacts 3 and 4 protrude. By electrical contacting of the terminal contacts 3 and 4 with the conductors (not represented any more specifically) of a circuit to be protected, the circuit breaker 1 is connected in the way intended into the circuit to be protected.

The circuitry of the circuit breaker 1 is schematically represented in figures 1 and 2. The terminal contacts 3 and 4 are connected in the interior of the breaker housing 2 via a current path 5, in which a trip 6 and a switching contact 7 are incorporated.

In normal operation of the circuit breaker 1, the switching contact 7 is closed, so that a current flow between the terminal contacts 3 and 4 is made possible. If there is an electrical overload in the current path 5, the trip 6 actuates a switching mechanism 8, which is only indicated. The switching mechanism 8 comprises a latching mechanism 9, which opens the switching contact 7. The circuit breaker 1 thereby switches from the closed position, represented in figure 2, into the open position, represented in figure 1, in which the conducting connection between the terminal contacts 3 and 4 is interrupted.

For the manual actuation of the circuit breaker 1, it has an approximately cylindrical actuating element 10, which partially protrudes from the breaker housing 2 on an upper side 11 of the housing opposite from the terminal contacts 3 and 4. The actuating element 10 is in this case displaceably guided in an approximately hollow-cylindrical threaded collar 12, which bears an external thread (not represented any more specifically) and, as described in more detail in the aforementioned standards, is provided together with a fastening nut (not represented) for screwing the circuit breaker on an installation plate (not represented). The actuating element 10 is mechanically connected captively to the switching mechanism 8, in particular riveted, and protrudes further from the breaker housing 2 in the open position represented in figure 1 than in the closed position represented in figure 2. To identify the switching position

of the circuit breaker 1, the actuating element 10 is provided with a marking ring 14, which has been pushed onto the circumference of a basic body 13 and is arranged with respect to the basic body 13 in such a way that it is visible from the outside only in the open position of the circuit breaker 1, while it is covered over by the threaded collar 12 in the closed position. The marking ring 14 is made to be of a different color than the basic body 13, in particular white, and consequently serves for the conspicuous identification of the switching position of the circuit breaker 1. By manually exerting pressure on the actuating element 10, the latter can be made to move from the open position into the closed position, the switching contact 7 being closed by the actuating element 10 interacting with the switching mechanism 8. Similarly, the actuating element 10 can be re-set from the closed position into the open position by manual pulling, the switching contact 7 in turn being opened by way of the switching mechanism 8.

In figures 3 and 4, the actuating element 10 is respectively represented in the open position and in the closed position, in a section through the housing. It is particularly evident from this that the actuating element 10 lies in a bore 15 of the threaded collar 12 fixed with a form fit on the breaker housing 2 by means of a tongue-and-groove construction 16. Because of the play required to allow the actuating element 10 to move with respect to the threaded collar 12, an annular gap 19 is formed between the wall 17 of the bore 15 and the circumference 18 of the actuating element 10. In order to prevent any ingress of water or contaminating particles through the annular gap 19 into the interior space 20 of the breaker housing 2, a sealing ring 21 is provided, arranged between the wall 17 and the circumference 18 and consequently closing the annular gap 19 in a sealing manner. The sealing

ring 21 in this case lies in an annular groove 22 formed into the circumference 18 and is consequently held such that it is fixed in its position with respect to the actuating element 10. In other words, when there is a movement of the actuating element 10 with respect to the threaded collar 12, the sealing ring 21 is moved along with it. For forming the annular groove 22, in addition to the marking ring 14, an end ring 23 is pressed onto the basic body 13 from the inner side 24 of the actuating element 10 in such a way that between the marking ring 14 and the end ring 23 there is a spacing, in which the sealing ring 21 lies.

Claims

1. A circuit breaker (1) with a threaded collar (12) fixed on the breaker housing (2) and an approximately cylindrical actuating element (10) displaceably guided in a bore (15) of the threaded collar (12) and partially protruding from the breaker housing (2), the actuating element (10) being mechanically connected to a switching mechanism (8) in such a way that the switching mechanism (8) is adjustable between a closed position and an open position by manual pushing or pulling of the actuating element (10), characterized by a sealing ring (21) sealing the annular gap (19) formed between the wall (17) of the bore (15) and the circumference (18) of the actuating element (10).

2. The circuit breaker (1) as claimed in claim 1, characterized in that the sealing ring (21) lies in an annular groove (22) of the actuating element (10).

3. The circuit breaker (1) as claimed in either of claims 1 and 2, characterized in that the actuating element (10) comprises a basic body (13), a marking ring (14), pushed onto the circumference of the basic body (13), and an end ring, pushed onto the circumference of the basic body (13) and arranged toward the inside of the housing with respect to the marking ring (14), the marking ring (14) and the end ring (23) being arranged in relation to each other with a spacing, and the sealing ring (21) lying between the marking ring (14) and the end ring (23).

List of designations

- 1 circuit breaker
- 2 breaker housing
- 3,4 terminal contact
- 5 current path
- 6 trip
- 7 switching contact
- 8 switching mechanism
- 9 latching mechanism
- 10 actuating element
- 11 upper side of housing
- 12 threaded collar
- 13 basic body
- 14 marking ring
- 15 bore
- 16 tongue-and-groove construction
- 17 wall
- 18 circumference
- 19 annular gap
- 20 interior space
- 21 sealing ring
- 22 annular groove
- 23 end ring
- 24 inner side

1/2

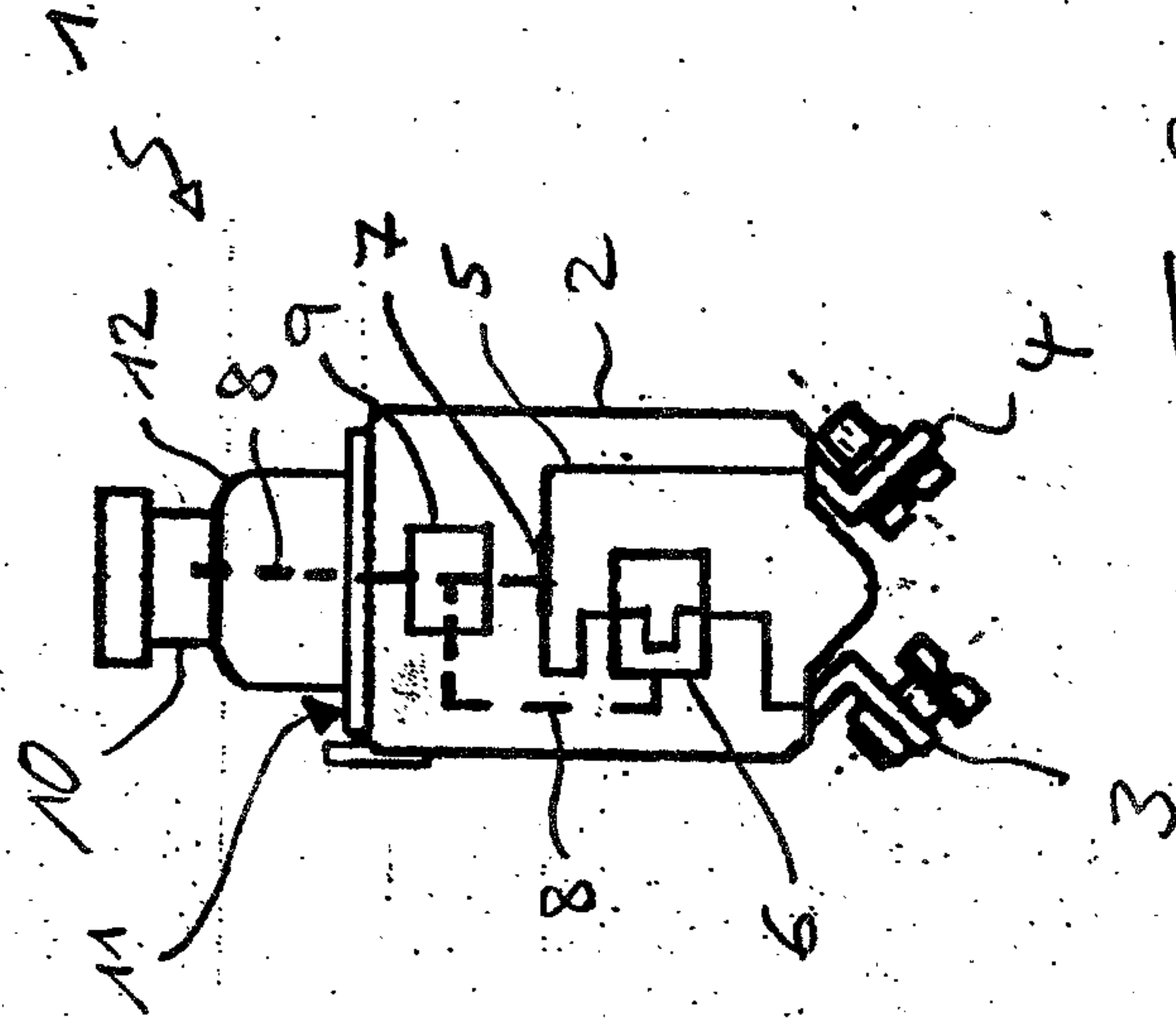


Fig. 2

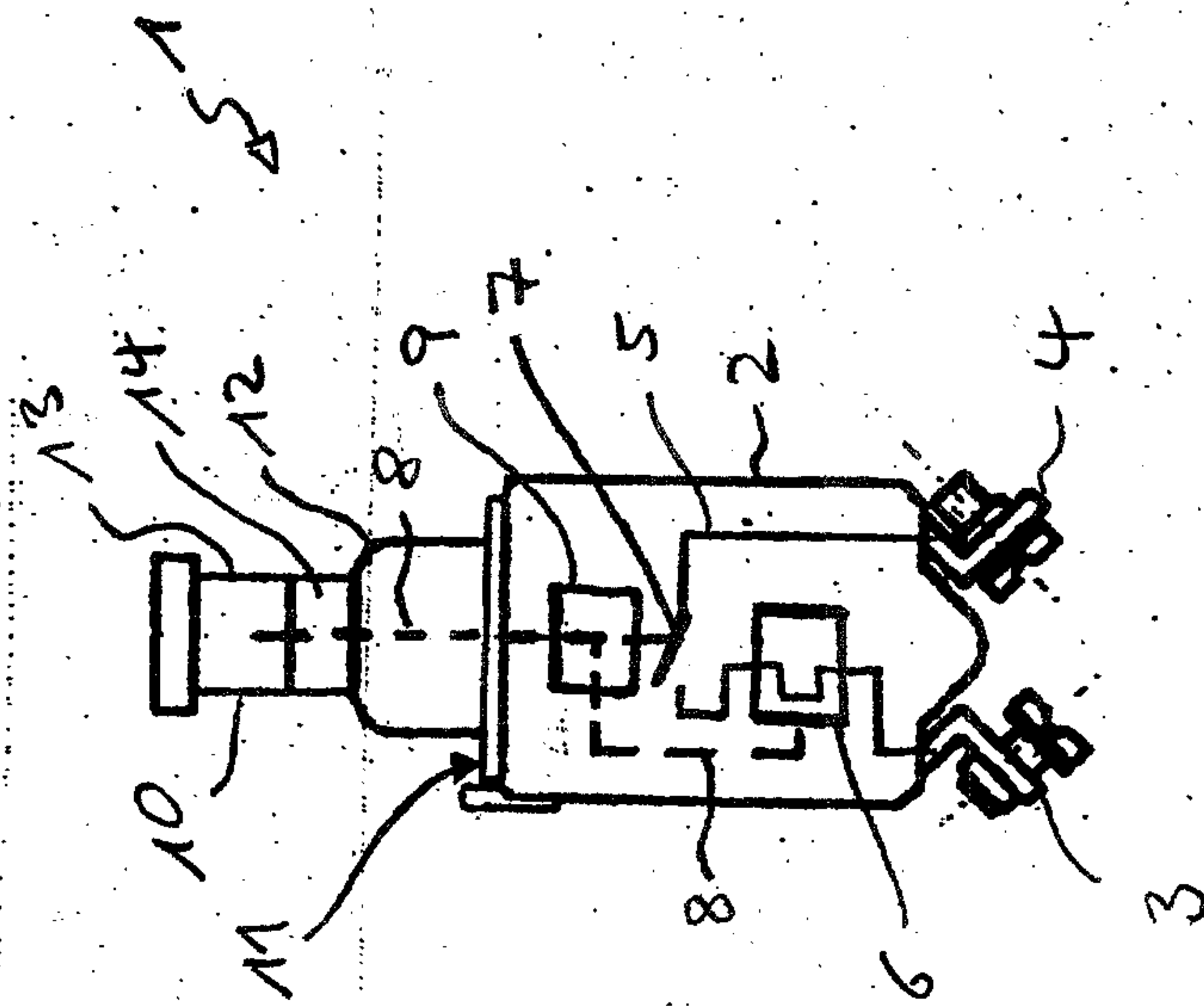


Fig. 1

Marks & Clerk

