

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 200074077 B2
(10) Patent No. 763159

(54) Title
Multipolar circuit-protection assembly for a collector rail system

(51)⁷ International Patent Classification(s)
H01H 009/10 H01H 021/84

(21) Application No: **200074077**

(22) Application Date: **2000.08.02**

(87) WIPO No: **WO01/11642**

(30) Priority Data

(31) Number	(32) Date	(33) Country
19937017	1999.08.05	DE
29913698	1999.08.05	DE

(43) Publication Date : **2001.03.05**

(43) Publication Journal Date : **2001.05.10**

(44) Accepted Journal Date : **2003.07.17**

(71) Applicant(s)
Klaus Bruchmann

(72) Inventor(s)
Klaus Bruchmann

(74) Agent/Attorney
**WATERMARK PATENT and TRADEMARK ATTORNEYS, Locked Bag 5, HAWTHORN
VIC 3122**

(56) Related Art
DE 8802457
EP 0418206

(19) Weltorganisation für geistiges Eigentum
Internationales Büro



(43) Internationales Veröffentlichungsdatum
15. Februar 2001 (15.02.2001)

PCT

(10) Internationale Veröffentlichungsnummer
WO 01/11642 A1

(51) Internationale Patentklassifikation⁷: H01H 9/10, 21/84

(71) Anmelder und
(72) Erfinder: BRUCHMANN, Klaus [DE/DE]: Am Ölberg
7a, 96450 Coburg (DE).

(21) Internationales Aktenzeichen: PCT/EP00/07484

(22) Internationales Anmeldedatum:
2. August 2000 (02.08.2000)

(74) Anwalt: GROENING, Hans, W.; Boehmert & Boehmert,
Franz-Joseph-Strasse 38, 80801 München (DE).

(25) Einreichungssprache: Deutsch

(81) Bestimmungsstaaten (national): AE, AG, AL, AM, AT,
AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU,
CZ, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

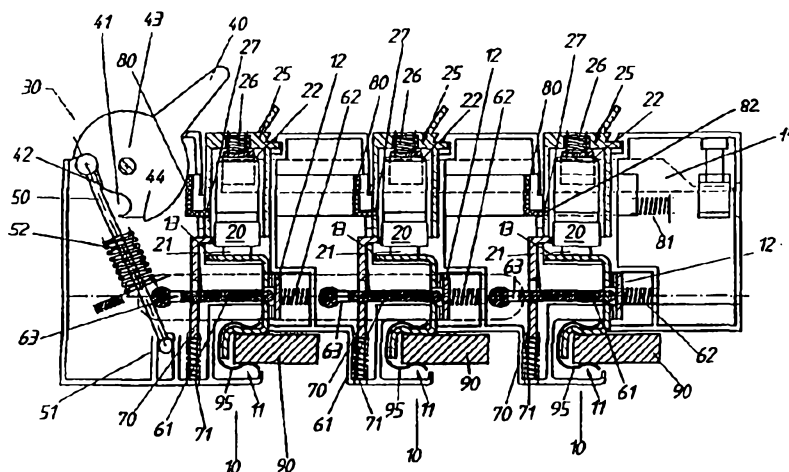
(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
199 37 017.6 5. August 1999 (05.08.1999) DE
299 13 698.1 5. August 1999 (05.08.1999) DE

[Fortsetzung auf der nächsten Seite]

(54) Title: MULTIPOLAR CIRCUIT-PROTECTION ASSEMBLY FOR A COLLECTOR RAIL SYSTEM

(54) Bezeichnung: MEHRPOLIGE SCHALTERSICHERUNGSANORDNUNG FÜR SAMMELSCHIENENSYSTEME



(57) Abstract: The invention relates to a multipolar circuit-protection assembly for a collector rail system, comprising at least two circuit-protection units (10) for receiving a respective fuse (20). Said circuit-protection units (10) comprise a fastening- and contact device (11) for a collector rail. The inventive multipolar circuit-protection assembly comprises a switching device for closing and interrupting the electrical circuit of all the circuit-protection units. Said multipolar circuit-protection assembly also comprises a combined switching and blocking device (30) composed of a switching lever (40), an actuating device (60), a blocking device (70) for each circuit-protection unit (10) and a stopping device (80).

(57) Zusammenfassung: Die Erfindung betrifft eine mehrpolige Schaltersicherungsanordnung für Sammelschienensysteme mit mindestens zwei Schaltersicherungseinheiten (10) zur Aufnahme je eines Sicherungseinsatzes (20), wobei die Schaltersicherungseinheiten (10) eine Befestigungs- und Kontaktvorrichtung (11) für eine Sammelschiene umfassen,

[Fortsetzung auf der nächsten Seite]



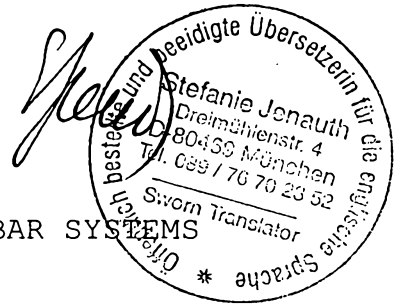
(84) Bestimmungsstaaten (*regional*): ARIPO-Patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI-Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Veröffentlicht:

— Mit internationalem Recherchenbericht.

Zur Erklärung der Zweibuchstaben-Codes, und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

und mit einer Schaltvorrichtung zum Schließen und Unterbrechen des Stromkreises aller Schaltersicherungseinheiten, wobei die Schaltersicherungsanordnung eine kombinierte Schalt- und Blockiervorrichtung (30) umfaßt, mit einem Schalthebel (40), einer Betätigungsanordnung (60), einer Blockiervorrichtung (70) für jede Schaltersicherungseinheit (10) und einer Arretiervorrichtung (80).



MULTIPOLE FUSED SWITCH ARRANGEMENT FOR BUSBAR SYSTEMS

Abstract

5 The invention relates to a multipole fused switch arrangement for busbar systems having at least two fused switch units (10) which each holds a fuse link (20), with the fused switch units (10) having a
10 mounting and contact apparatus (11) for a busbar, and having a switching apparatus for closing and interrupting the circuit of all the switched fuse units, with the fused switch arrangement comprising a combined switching and blocking apparatus (30), having
15 a switching lever (40), an operating arrangement (60), a blocking apparatus (70) for each fused switch unit (10), and a locking apparatus (80).

(Fig. 1)

MULTIPLE FUSED SWITCH ARRANGEMENT FOR BUSBAR SYSTEMS

DESCRIPTION

The invention relates to a multipole fused switch arrangement for busbar systems having at least two fused switch units which each holds a fuse link, with
 5 the fused switch units having a mounting and contact apparatus for a busbar, and having a switching apparatus for closing and interrupting the circuit of all the switched fuse units.

Such fused switch arrangements are used in particular for protecting three-phase circuits, in which case three-pole fused switch arrangements are
 10 required.

Since such fused switch arrangements are also operated by those not skilled in the art, it has frequently been found to be a problem that incorrect operations even on the fused switch arrangement have led to damage to the appliances.

15 A fused switch arrangement as claimed in the preamble of claim 1 is known from DE 42 07 156 C2.

A design for an electrical switch and a fuse holder in which a fuse link can be inserted is known from DE 42 07 156 C2. The contacts of the fuse link are connected to and disconnected from a fixed mating contact via moving contacts,
 20 via two switching strips whose relative position with respect to one another can be adjusted via a switching lever. Covering apparatus for a housing for an electrical switch is likewise disclosed in DE 42 07 156 C2, which covering apparatus is locked to the housing when the switching strips are in the switched-on position, so that the housing cannot be opened in this switched-on position.

25 Furthermore, a fused switch unit is known from DE 88 02 457.1 U1, which comprises a manually operable load-break switch and a low-voltage (inaudible) capacity fuse-disconnector in a common insulating housing. Although this document discloses a fused switch unit which is comparable to a fused switch unit for a multiple fused switch arrangement as claimed in the preamble of claim
 30 1, that is to say it discloses a similar element part, there is no information whatsoever, however, relating to a multiple fused switch arrangement per se, or to the technical problems associated with such a fused switch arrangement.

Furthermore, a fused switch unit is known from DE 197 34 235 A1, which discloses an interlocking slide with an interlocking web for interlocking a fuse holder in an associated chute.

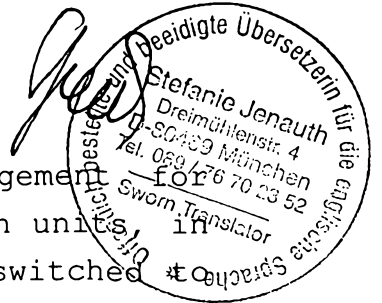
WO 86/06221 discloses a safety apparatus for switches, which are
5 interlocking pins which are moved into an interlocking position by means of an operating button in the case of the on-switch of the apparatus irrespective of whether fuse links are or are not inserted in the apparatus.

Although a number of the documents known from the prior art already have elements which promote safety, and which are intended to prevent incorrect
10 operation, the potential for incorrect operations by untrained personnel is still relatively high.

Accordingly, one object of the invention is to provide a multipole fused switch arrangement as claimed in the preamble of claim 1, which is easy to operate minimizes the risk of incorrect operations by untrained personnel, in
15 particular preventing the fused switch arrangement from being switched on when the fused switch units do not all have a fuse link inserted in them.

The object is achieved by a multipole fused switch arrangement as claimed in claim 1, while claims 2 to 14 relate to particularly preferred embodiments of the fused switch arrangement according to the invention.

20 According to the invention, the fused switch arrangement comprises a combined switching and blocking apparatus. The combined switching and blocking apparatus has a switching lever, which can be switched to and from between a switched-on position and a



switched-off position, an operating arrangement
switching switching links of the fused switch units in
which case the operating apparatus can be switched to
and fro between a contact position and an interrupted
5 position, a blocking apparatus for each fused switch
unit for blocking the operating arrangement in the
interrupted position, and a locking apparatus for
locking the fuse link in an operating position, in
which case the locking apparatus can be switched to and
10 fro between a locked position and an isolating
position.

The locking apparatus is coupled to the switching lever
such that it is always in the locked position when the
15 switching lever is in the switched-on position, and
which, conversely, is in the isolating position when
the switching lever is in the switched-off position.
The operating arrangement is furthermore coupled to the
switching lever such that it is always in the
20 interrupted position when the switching lever is in its
switched-off position. Further coupling between the
operating arrangement and switching lever is possible,
but not necessary.

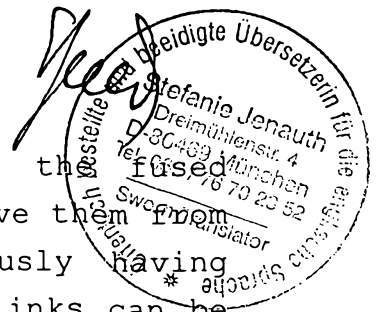
25 The blocking apparatus blocks the operating arrangement
in the interrupted position when one of the fuse links
from the fused switch arrangement is not in its
operating position, that is to say it has been
completely removed from the fused switch arrangement,
30 or has been at least partially withdrawn from its
operating position.

The multipole fused switch arrangement according to the
invention carries out two major protection functions.
35 Firstly, it prevents the circuit of the fused switch
arrangement from being closed via the switching links
when the fuse links are not all in their operating
position, and the fused switch arrangement is thus no
longer in a ready to operate state. Secondly, it makes

it impossible to remove fuse links when the switch arrangement is switched on, or to move them from their operating position, without previously having interrupted the circuit, so that the fuse links can be replaced only when no current is flowing and no voltage is applied. This double protection function reliably precludes incorrect operations and prevents damage to the elements of the fused switch arrangement, in particular of the contacts, for example as a result of switching arcs and spark flashovers.

In one preferred embodiment, the operating arrangement has a pushrod for each fused switch unit, with the pushrods being rigidly connected to one another and each pushrod resting on spring-loaded switching links via which the circuit of the fused switch unit is closed and interrupted. This ensures that all the circuits in all the fused switch units are interrupted even if only one of the pushrods is blocked in its interrupted position, since the associated fuse link is not in its operating position.

The operating arrangement can be coupled directly or indirectly to the switching lever in various ways. The coupling is preferably provided via a switching rod which is guided in a recess in the switching lever. The operating arrangement and the switching lever are coupled on only one side, that is to say only switching of the switching lever from the switched-on position to the switched-off position results in force being exerted on the operating arrangement via the switching rod, while there is no direct coupling between the switching rod and the operating arrangement when the switching lever is switched from the switched-off position to the switched-on position. Thus, although the switching lever can also be moved to the switched-on position when the operating arrangement is blocked in its interrupted position, no force is exerted, however, by the switching rod or the switching

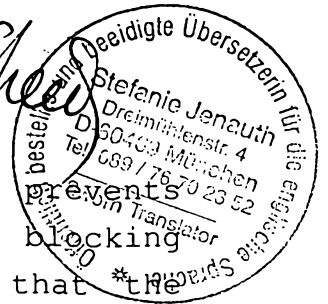


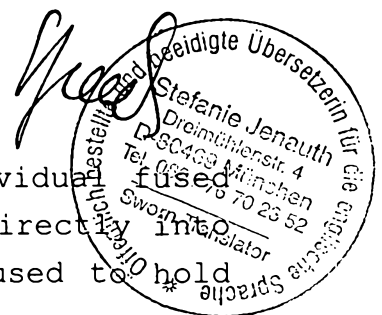
lever on the operating arrangement. This loading or damage, in particular to the apparatus. At the same time, this ensures that circuit cannot be closed inadvertently by forceful operation of the switching lever while at the same time destroying the blocking apparatus.

The operating arrangement is preferably prestressed in its contact position by at least one spring apparatus, so that the operating arrangements are automatically located in their contact position when, firstly, all the fuse links are in their operating position and the blocking apparatus is in consequence not acting on the operating arrangement, and when the operating lever is in its switched-on position.

Each blocking apparatus is advantageously prestressed by a spring apparatus in a position which blocks the operating arrangement in its interrupted position, so that the operating arrangement is released only when one fuse link is in its operating position, as a result of which the blocking apparatus is moved against the force of the spring effect to a position in which the blocking apparatus and the operating arrangement do not influence one another. The blocking apparatus is automatically moved by the spring apparatus to its blocking position as soon as one fuse link is removed from its operating position, although, owing to the locking apparatus, this can occur only if the switching lever is in its switched-off position, and the operating arrangement is thus in its interrupted position.

When it is in its blocking position, the blocking apparatus advantageously engages in an opening in the operating arrangement, so that the blocking apparatus prevents any movement of the operating arrangement.





Depending on the configuration of the individual switch units, the fuse links are inserted directly into the fused switch unit, or fuse plugs are used to hold the fuse links in the fused switch units.

5

Accordingly, a locking apparatus can be provided which acts directly on the fuse link, but locking apparatuses are preferably provided which do not act directly on the fuse link, but which engage with a latching element on a fuse plug when in their locked position.

10

The features and advantages of the invention will become particularly clear from the attached schematic drawings, in which:

15

Figure 1 shows a cross-sectional view of one embodiment of a three-pole fused switch arrangement, with the switching lever being in a switched-on position and the fused switch arrangement being ready to operate;

20

Figure 2 shows a detail of the fused switch arrangement shown in Figure 1, with the switching lever being in a switched-off position;

25

Figure 3 shows the detail shown in Figure 2, but with the fuse link having been removed; and

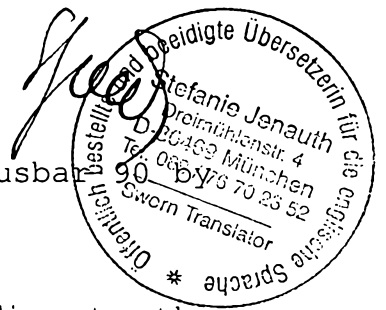
Figure 4 shows the details shown in Figures 2 and 3, but with the switching lever having been removed to the switched-on position after removal of the fuse link.

30

Figure 1 shows a fused switch arrangement having three fused switch units 10, into each of which a fuse plug 25 with a fuse link 20 is inserted.

35

Each fused switch unit 10 is mounted on a busbar 90 means of a surrounding spring 95.

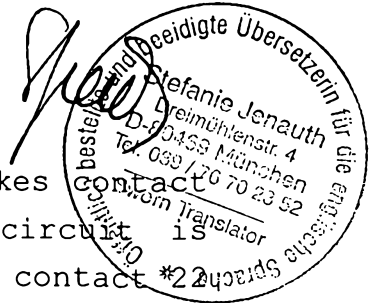


The switching and blocking apparatus according to the invention comprises, in the embodiment shown in Figure 1, a switching lever 40, a spring-loaded switching rod 50, an operating apparatus 60 which in each case comprises one pushrod 61 per fused switch unit 10, a spring-loaded blocking apparatus 70, and a likewise spring-loaded locking apparatus 80. The spring 52 of the switching rod 50 has a considerably greater spring constant than the springs 62 in the operating apparatus and the springs 81 in the locking apparatus, which have approximately the same spring constants. The springs 71 in the blocking apparatus 70 have the lowest spring constant in the switching and blocking apparatus.

When the fused switch arrangement is in the working position shown in Figure 1, the switching lever 40 is in the switched-on position. The switching lever 40 has a recess 41, in which one end of the switching rod 50 is guided. The other end of the switching rod 50 is seated in a bearing 51 in the fused switch arrangement.

The operating arrangement 60 is prestressed in its contact position indirectly via three springs 62, which are positioned between the housing of the fused switch arrangement and switching links 12. The switching links 12 thus bridge an interruption in a bottom contact 30, which makes contact with a lower contact 21 of the fuse link 20, so that the contact is produced between the fuse link 20 and the busbar 90.

The operating arrangement 60 is in this case deflected so far in the direction of the switching rod 50 that the pushrod 61 on the left in the drawing rests on the switching rod 50.



Each upper contact 22 of the fuse link 20 makes contact with a tapping contact 14, so that the circuit is closed via the tapping contact 14, the upper contact and the lower contact 21 of the fuse link 20, the bottom contact 13, the switching link 12, the extension of the interrupted bottom contact 13 and the busbar 19.

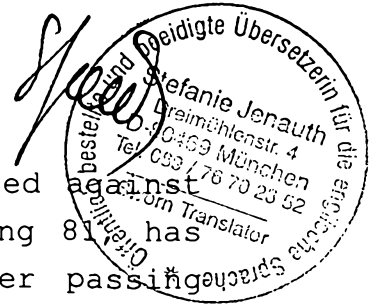
The fuse link 20 is always pressed by force from a spring 26 in the fuse plug 25 against the bottom contact 13, thus ensuring a reliable contact.

The locking apparatus is pressed by the formed-out region 43 of the switching lever 40 into an opening (which is used as a latching element 27) in the fuse plug 25, so that the fuse plug 25 is fixed, together with the fuse link 20, in its operating position. The locking apparatus 80 is formed as one part for all the fused switch units and is prestressed by means of a spring apparatus 81 against the formed-out region 43 of the switching lever 40.

Individual fused switch units and their assemblies are identical, and it should once again be mentioned that both the locking apparatus 80 and the operating arrangement 60 are formed as one part for all the fused switch units, so that the individual elements can thus move only together, and no relative movement is possible, for example between the pushrods 61. In contrast, the blocking apparatuses 70 are autonomous assemblies, which are separate from one another, in each fused switch unit 10.

The method of operation of the switching and blocking apparatus 30 according to the invention is clear from the further figures 2 to 4, which, for simplicity, show only a detail of the embodiments.

In Figure 2, the switching lever 40 has been moved from its switched-on position to its switched-off position.



The locking apparatus 80, which is prestressed against the switching lever 40 by means of the spring 81, has been moved to the left in the figure, after passing over a step 44 (which is introduced in the switching lever 40) in the switching lever 40, so that the interlocking element 82 no longer engages with the opening 27 in the fuse plug 25. The fuse plug 25, together with the fuse link 20, is thus no longer locked in its operating position.

10

The switching of the switching lever 40 to its switched-off position results in the switching rod 50 pivoting to the right in its bearing 51 and in the recess 42, as a result of which the operating arrangement 60 is forced via the pushrod 61 to its interrupted position, in which the switching link 12 is lifted off the bottom contact 13. The circuit is thus interrupted at the bottom contact 13.

15

20 Since the fuse plug 25 is still in its operating position and presses against a protrusion on the blocking apparatus, the blocking apparatus 70 is still held in a non-blocking position against the influence of its spring apparatus 71.

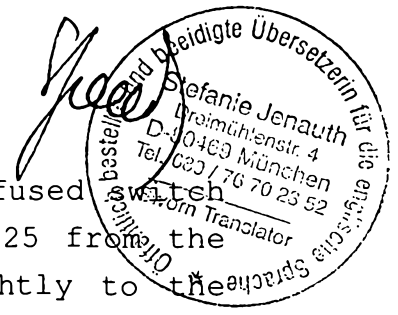
25

Subject to the precondition that all the other fused switch units (which are not shown in Figure 2), are in analogous positions, the switching lever 40 can be moved back to its switched-on position, as a result of which the fuse plugs 25 are automatically locked by the locking apparatus 80. Since the operating arrangement 60 is not blocked, it is pushed to the left in the drawing together with the switching link 12 by means of the spring apparatus 62, as a result of which the switching link 12 makes contact with the interrupted bottom contact 13, and closes the circuit.

30

35

Figure 3 shows the fused switch arrangement shown in Figure 2, but with the fuse plug 25 together with the

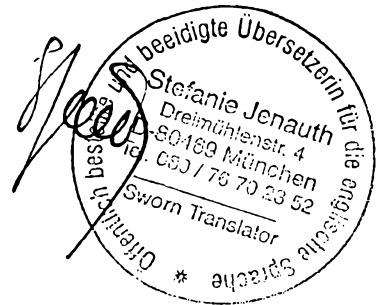


5 fuse link 20 having been removed from the fused switch
unit 10. In order to remove the fuse plug 25 from the
fused switch unit, it must be pushed slightly to the
left in the figure, in order that the latching
element 16 of the fuse plug 25 can be moved over the
projection 15 of the housing of the fused switch
arrangement.

10 The locking apparatus 80 is, as already explained in
conjunction with Figure 2, no longer engaged with the
fuse plug 25, so that the locking apparatus 80 does not
prevent removal of the fuse plug 25 and of the fuse
link 20.

15 Once the fuse plug 25 is no longer pressing downwards
onto the protrusion on the blocking element 70, the
blocking apparatus 70 is moved upwards in the drawing
by means of its spring 71, so that parts of the
blocking apparatus 70 extend into an opening 63 in the
20 pushrod 61 of the operating arrangement 60, blocking
it.

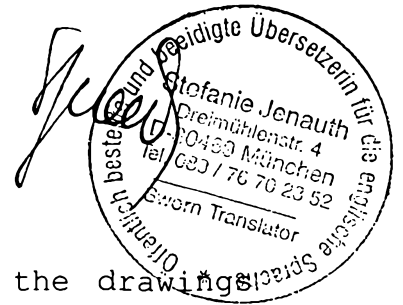
As is shown in Figure 4, although the switching lever
40 can be moved to its switched-on position, this
25 results, however, in the switching rod 50 also being
pivoted to the switched-on position. The pushrod 61 and
the mounting arrangement 60 do not follow the movement
of the switching rod 50 since the blocking apparatus 70
is engaged in the opening 63 in the pushrod 61. Since
30 the switching rod 50 and the pushrod 61 are not firmly
connected to one another, movement of the switching
lever does not exert any force on the pushrod 61 or on
the blocking apparatus 70, either. The pushrod 61 and
the blocking apparatus 60 are still blocked, so that
35 the switching link 12 is also held at a distance from
the bottom contact 13, against the spring force of the
spring 62, by the pushrod 61. Thus, as designed, the
circuit is still interrupted, as before.



Merely for the sake of completeness, it should be noted
5 that the integral, rigid operating arrangement 60 means
that the switching links 12 of the other fused switch
units 10 are also held by the corresponding pushrods 61
at a distance from the associated bottom contact 13,
even if the fuse plug 25 has not been removed from
10 these fused switch units 10 and the corresponding
pushrod 61 is in consequence not autonomously blocked
by the separate blocking apparatus 70.

Since the switching rod 50 and the pushrod 61 are not
15 firmly connected to one another this prevents careless
operating personnel from being able to cause damage to
the fused switch arrangement when the operating
arrangement 60 is blocked by one of the blocking
apparatuses 70.

20 Finally, it should be mentioned that, of course,
modifications can be carried out to the specific
refinements of this embodiment without departing from
the subject matter of the invention. In particular,
25 fuse links without fuse plugs can be inserted directly
into the fused switch units, and different types of
fuse, for example screw-in fuses, may be used instead
of plug-in fuses, or a different refinement of the
switching lever or of the recess with the dead point
30 may be chosen for switching which is essentially
independent of manual switching.



Furthermore, it should be mentioned that the drawings
are only schematic and, in particular, no restrictions
5 with regard to dimensions and sizes can be derived from
the drawings.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A multipole fused switch arrangement for busbar systems having at least two fused switch units which each holds a fuse link, with the fused switch units having a mounting and contact apparatus for a busbar, and having a switching apparatus for closing and interrupting the circuit of all the switched fuse units, having a switching lever which can be switched to and fro between a switched-on position and a switched-off position and having an operating arrangement for switching switching links of the fused switch unit, in which case the operating arrangement can be switched to and fro between a contact position and an interrupted position, and in which case the operating arrangement is coupled to the switching lever such that it is in the interrupted position when the switching level is in the switched-off position

wherein

the fused switch arrangement includes a combined switching and blocking apparatus, having

- the switching lever,
- an operating arrangement,

- in each case one blocking apparatus for each fused switch unit for blocking the operating arrangement in the interrupted position, with the blocking apparatus blocking the operating arrangement in the interrupted position when one of the fuse links of the associated fused switch arrangement is not in its operating position, and

- a locking apparatus for locking the fuse links in an operating position, in which case the locking apparatus can be switched to and fro between a locked position and an isolating position, with the locking apparatus being coupled to the switching lever such that it is in the locked position when the switching lever is in the switched-on position, and is in the isolating position when the switching lever is in the switched-off position,

2. The fused switch arrangement as claimed in claim 1, wherein the operating arrangement has a pushrod for each fused switch unit, with the pushrods being rigidly connected to one another.

3. The fused switch arrangement as claimed in claim 2, wherein each pushrod rests on the spring-loaded switching links.

4. The fused switch arrangement as claimed in any one of the preceding claims, wherein the operating arrangement is coupled to the switching lever via a switching rod.

5. The fused switch arrangement as claimed in any one of the preceding claims, wherein the coupling between the operating arrangement and the switching lever is on one side, and only switching of the switching lever from the switched-on position to the switched-off position results in force being exerted on the operating arrangement in the direction of the interrupted position.

6. The fused switch arrangement as claimed in claim 4 or 5, wherein the switching rod is guided in a recess in the switching lever.

7. The fused switch arrangement as claimed in claim 6, wherein the recess has a dead point for switching which is essentially independent of manual switching.

8. The fused switch arrangement as claimed in any one of the preceding claims, wherein the operating arrangement is prestressed by at least one spring apparatus in its contact position.

9. The fused switch arrangement as claimed in any one of the preceding claims, wherein each blocking apparatus is prestressed by a spring apparatus in a position which blocks the operating arrangement in its interrupted position.

10. The fused switch arrangement as claimed in claim 9, wherein each blocking apparatus is arranged such that the movement of the associated fuse link to its operating position forces said blocking apparatus against the spring force of the spring apparatus to a position which releases the operating apparatus.

11. The fused switched arrangement as claimed in one of the preceding claims, wherein, in its blocking position, the blocking apparatus engages in an opening in the operating arrangement.

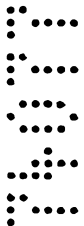
12. The fused switch arrangement as claimed in any one of the preceding claims, wherein the locking apparatus locks the fuse link directly.

13. The fused switch arrangement as claimed in any one of claims 1 to 11, wherein the locking apparatus locks the fuse link indirectly via a fuse plug, in which the fuse link is inserted.

14. The fused switch arrangement as claimed in claim 13, wherein the locking apparatus has an interlocking element which, in the interlocked position, engages in an interlocking manner in a latching element on the fuse plug.

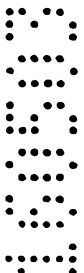
DATED this 9th day of May 2003

KLAUS BRUCHMAN



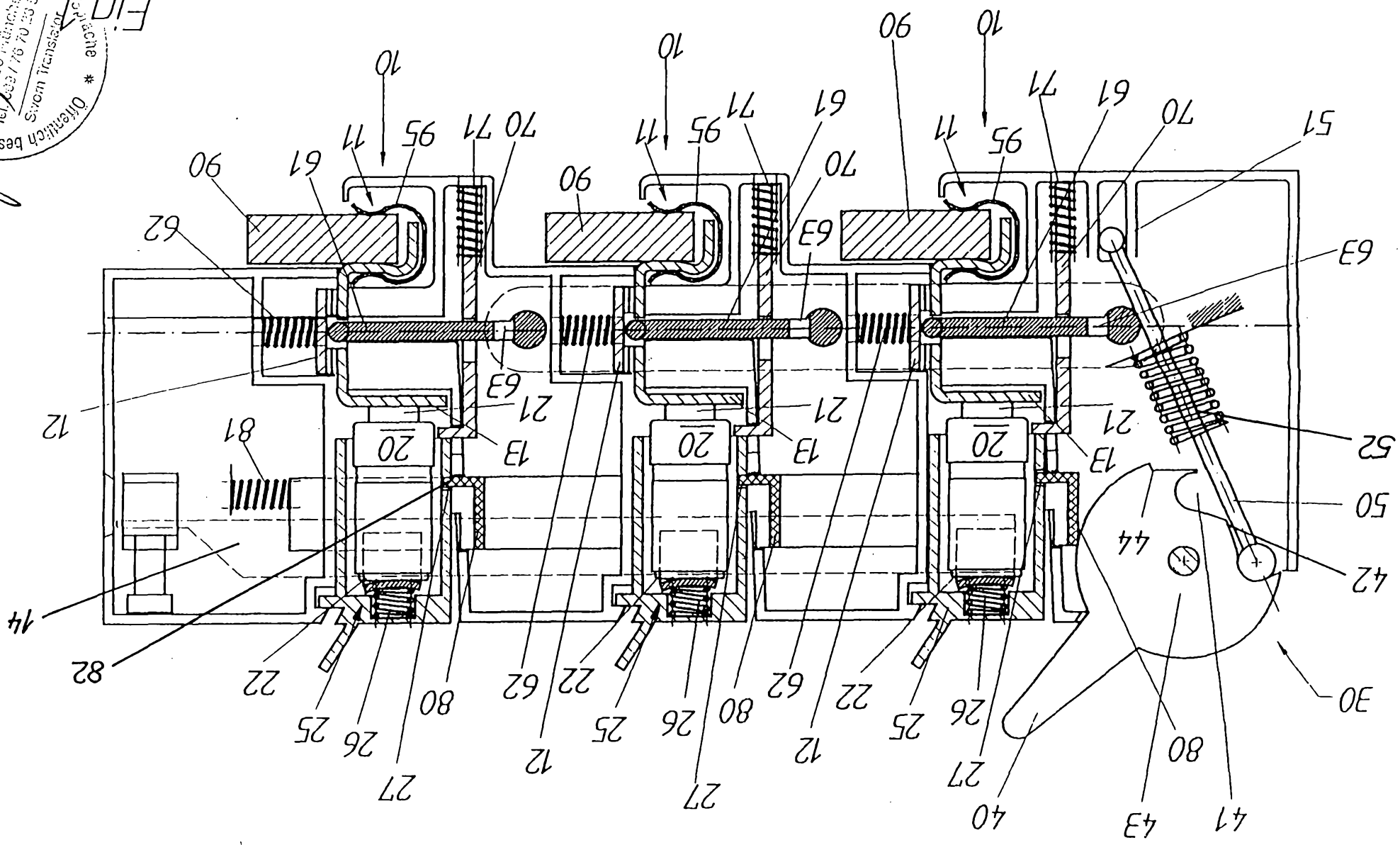
WATERMARK PATENT & TRADE MARK ATTORNEYS
290 BURWOOD ROAD
HAWTHORN VICTORIA 3122
AUSTRALIA

CJS/LPS/CMM



Offentlich bestellte und
 beidigte Übersetzerin für
 Stefania Janauth
 Reimthstr. 4
 8005 München
 Tel. 089 / 76 70 23 52
 Swom Translator

Fig. 1



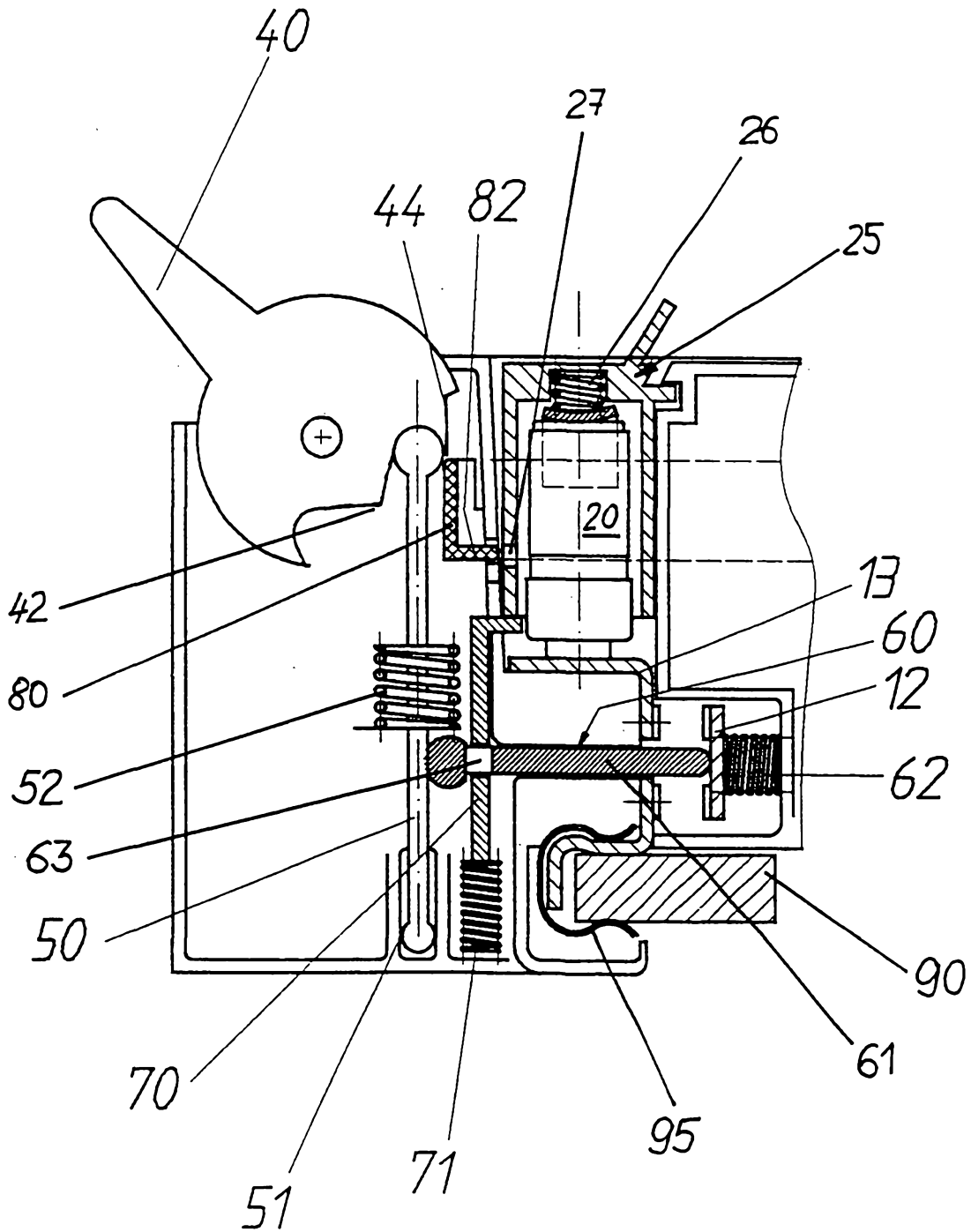


Fig.2

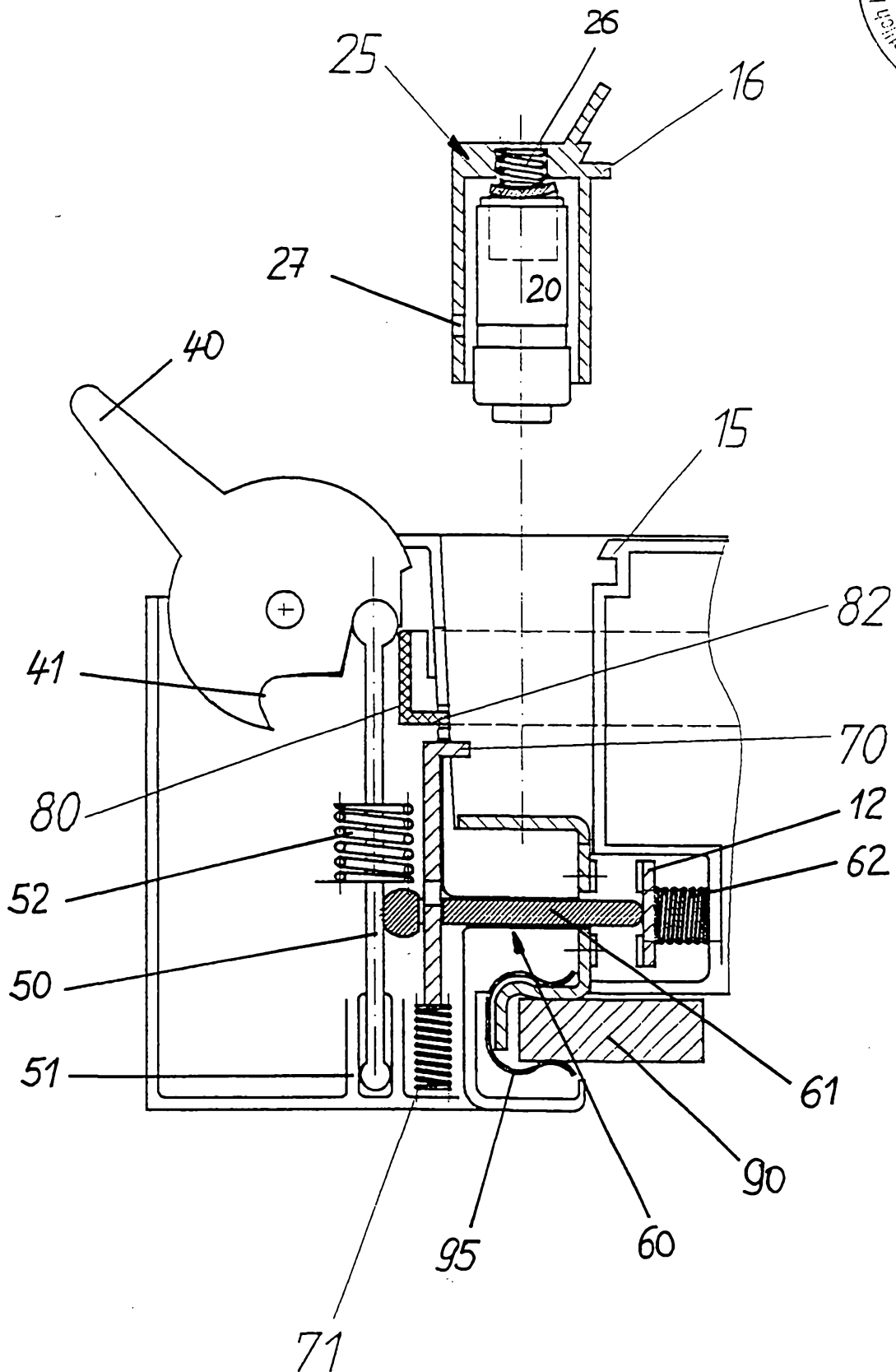


Fig. 3

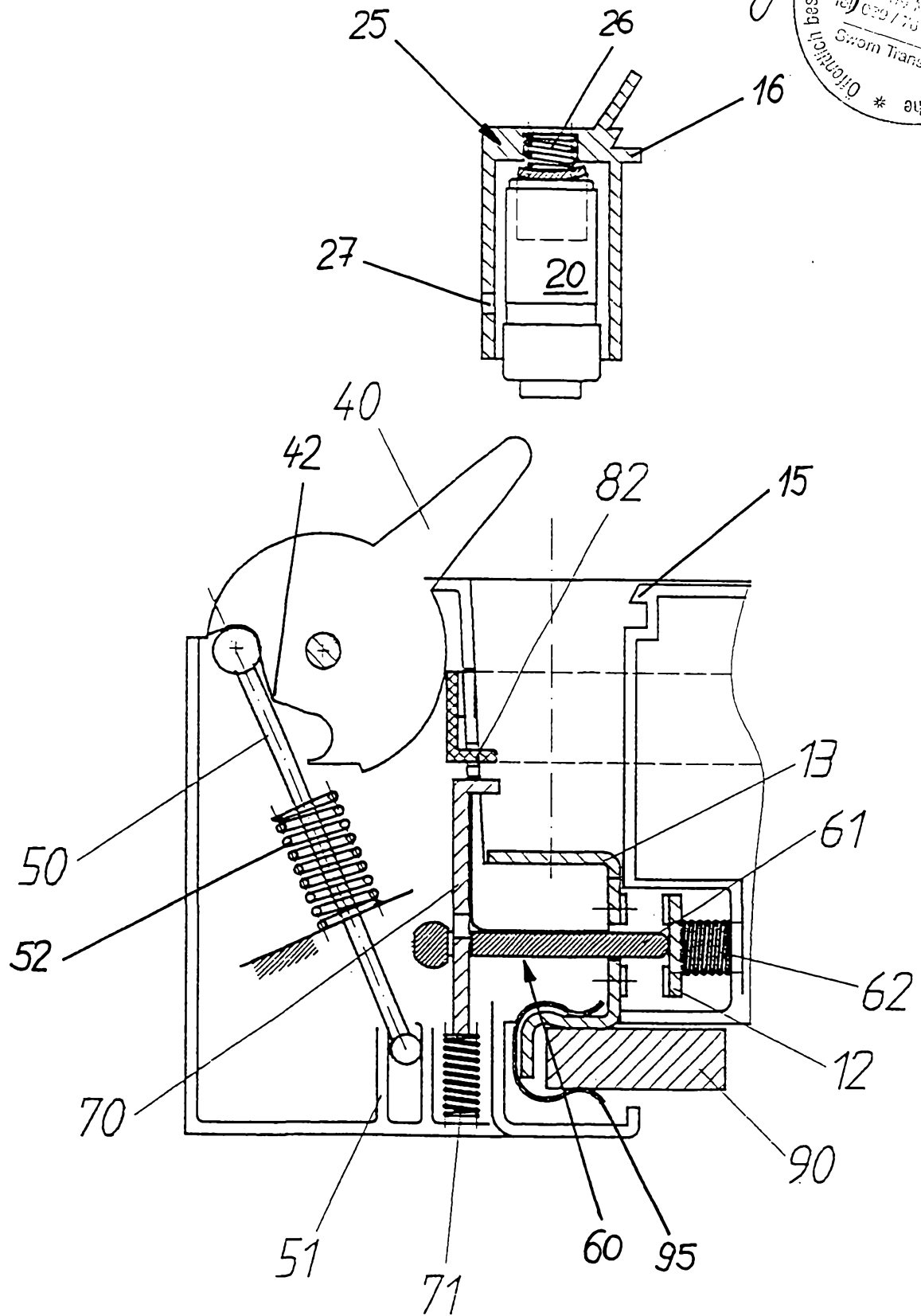
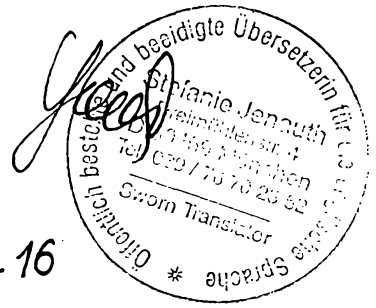


Fig.4