

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

604928

APPLICATION FOR A STANDARD PATENT

I\We,

LA TELEMECANIQUE ELECTRIQUE

of

33 BIS, AVE DU MARECHAL JOFFRE
92000 NANTERRE
FRANCE

hereby apply for the grant of a standard patent for an
invention entitled:

A DEVICE FOR RENDERING CONTACTORS ELECTRICALLY
AND MECHANICALLY INOPERATIVE

which is described in the accompanying complete specification

Details of basic application(s):

Number of basic application	Name of Convention country in which basic application was filed	Date of basic application
--------------------------------	---	------------------------------

87 09341

FR

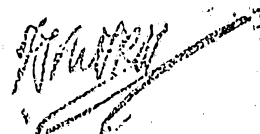
26 JUN 87

My/our address for service is care of CLEMENT HACK & CO., Patent
Attorneys, 601 St. Kilda Road, Melbourne 3004, Victoria,
Australia.

DATED this 24th day of June 1988

LA TELEMECANIQUE ELECTRIQUE

CLEMENT HACK & CO.



TO: The Commissioner of Patents.

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 3-10-90

Forms 7 and 8

AUSTRALIAPatents Act 1952DECLARATION IN SUPPORT OF A CONVENTION OR NON-CONVENTION
APPLICATION FOR A PATENT OR PATENT OF ADDITIONName(s) of
Applicant(s)In support of the application made by LA TELEMECANIQUE
ELECTRIQUE

Title

for a patent for an invention entitled A DEVICE FOR
RENDERING CONTACTORS ELECTRICALLY AND
MECHANICALLY INOPERATIVEName(s) and
address(es)
of person(s)
making
declarationI/We, Alain CARIAS C/- LA TELEMECANIQUE ELECTRIQUE
of 33 EIS, Ave Du Marechal Joffre
92000 NANTERRE, FRANCE

do solemnly and sincerely declare as follows:-

1. I am/we are the applicant(s) for the patent, or am/are authorised by the abovementioned applicant to make this declaration on its behalf.
2. The basic application(s) as defined by Section 141 of the Act was/were made in the following country or countries on the following date(s) by the following applicant(s) namely:-

Country, filing
date and name
of Applicant(s)
for the or
each basic
application

in FRANCE on 26 JUNE 1987
by LA TELEMECANIQUE ELECTRIQUE
in _____ on _____ 19____
by _____

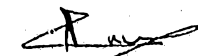
3. The said basic application(s) was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Name(s) and
address(es)
of the or
each actual
inventor

4. The actual inventor(s) of the said invention is/are Bernard FOURNIER of 22, rue Sarah
Bernhardt, 95130 LE PLESSIS BOUCHARD, FRANCE

See reverse
side of this
form for
guidance in
completing
this part

5. The facts upon which the applicant(s) is/are entitled to make this application are as follows:-
The applicant would be entitled to have
assigned to it a patent granted to the actual
inventor in respect of the said invention

DECLARED at Nanterre this 20th day of June 1988Chef du Service de la
Propriété Industrielle

Alain CARIAS

This form may be completed and filed after the filing of a patent application but the form must not be signed until after it has been completely filled in as indicated by the marginal notes. The place and date of signing must be filled in. Company stamps or seals should not be used.

No legalisation is necessary

(12) PATENT ABRIDGMENT (11) Document No. AU-B-18371/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 604928

(54) Title
A DEVICE FOR RENDERING CONTACTORS ELECTRICALLY AND MECHANICALLY
INOPERATIVE

International Patent Classification(s)
(51)⁴ H01H 009/26

(21) Application No. : 18371/88 (22) Application Date : 24.06.88

(30) Priority Data

(31) Number (32) Date (33) Country
87 09341 26.06.87 FR FRANCE

(43) Publication Date : 05.01.89

(44) Publication Date of Accepted Application : 03.01.91

(71) Applicant(s)
LA TELEMECANIQUE ELECTRIQUE

(72) Inventor(s)
BERNARD FOURNIER

(74) Attorney or Agent
GRIFFITH HACK & CO, GPO Box 1285K, MELBOURNE VIC 3001

(56) Prior Art Documents
US 4513181
AU 564544 25707/84 H01H 9/26

(57) Claim

8. An interlocking device for rendering electrically and mechanically inoperative one or the other of two contactors each having an actuating member, said device of the type comprising:

i- a flat case with first and second opposite parallel side walls, spaced a small distance apart and each having a central region and, top and bottom walls which extend in planes substantially perpendicular to the first and second side walls, said case having a fixed pin and being adapted for being mounted between the two contactors disposed side by side;

ii- first and second movement take-offs adapted for respectively coupling with the actuating member of the respective contactors through substantially coaxial apertures provided in the central regions of the first and second side walls respectively, each of said first and second movement take-offs being movable between first and second positions corresponding respectively to the work position and the rest

(11) AU-B-18371/88
(10) 604928

-2-

position of the contactor with which it is associated;

iii- first and second mobile elements providing reciprocal inoperativeness, driven respectively by said first and second movement take-offs, said mobile elements having a travel distance such that when the first movement take-off is in its first position, the first mobile element prevents movement of the second movement take-off to its first position and conversely,

iv- first and second switch devices respectively comprising first and second pairs of fixed contacts, connected respectively by first and second conductor means to first and second input connection elements and to first and second output connection elements, and first and second mobile contact elements respectively actuated by said second and first mobile elements,

said first and second input connection elements being mounted on one of said top wall or bottom wall of the case whereas said first and second output connection elements are mounted on the other of said top wall or bottom wall, and said first and second switch devices form with the input and output connection elements which are associated therewith as well as with the corresponding conductor means, first and second through current lines, which do not cross inside the case and are directed transversely with respect to said top and bottom walls.

AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

604928

Form 10

Short Title:

Int. Cl:

Application Number:
Lodged:

Complete Specification-Lodged:
Accepted:
Lapsed:
Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant:

LA TELEMECANIQUE ELECTRIQUE

Address of Applicant: 33 BIS, AVE DU MARECHAL JOFFRE
92000 NANTERRE
FRANCE

Actual Inventor:

Address for Service: CLEMENT HACK & CO.,
601 St. Kilda Road,
Melbourne, Victoria 3004,
Australia.

This document contains the
amendments made under
Section 49 and is correct for
printing

Complete Specification for the invention entitled:
A DEVICE FOR RENDERING CONTACTORS ELECTRICALLY
AND MECHANICALLY INOPERATIVE

The following statement is a full description of this invention
including the best method of performing it known to me:-

TITLE OF THE INVENTION

A device for rendering contactors electrically and mechanically inoperative.

BACKGROUND OF THE INVENTION

5 The present invention relates to a device for rendering contactors mechanically and electrically inoperative in which the original design of the mobile elements makes it possible to obtain an arrangement of the output terminals which facilitates wiring and interchangeability with existing systems providing mechanical inoperativeness.

10 The term "rest position" in relation to a contactor or switch when used in this specification, denotes the de-energized state thereof. For a make-contact, this is equivalent to the open state, but for a break-contact, it is equivalent to the closed state. Similarly the term "work position" denotes the energised state of a contactor or switch, corresponding to the closed state of a make-contact, and the open state of a break-contact.

15 1. Field of the Invention

20 It is generally known that devices of this kind providing such inoperativeness are usually associated with contactors for controlling electric motors so as to prevent simultaneous switching on and so short-circuiting particularly when these contactors provide reversal of operation and star-triangle starting.

25 Such inoperativeness may be electric alone, however, in order to prevent operating errors, it is preferable for it to be both electric and mechanical.

30 The provision of electric inoperativeness between two contactors consists in actuating, in the first third of the travel of the closing contactor, but preferably as early as possible, a contact which opens the circuit of the coil of the other contactor and vice-versa.

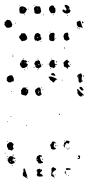
 Mechanical inoperativeness uses a system of levers which are interlocked so that when one contactor has begun to close,



1B

it is impossible to close the other.

In automatic operation, electric inoperativeness alone would be sufficient. However, in the case of the simultaneous energization of two contactor coils, or in _____



the case of a shock causing the movement of their mobile assemblies, or else in the case of wrong actuation of these contactors, there is a risk of short-circuiting by the simultaneous closure of the power poles of both 5 contactors. This is why mechanical inoperativeness is generally associated with electric inoperativeness.

2. Description of the Prior Art

To provide such mechanical inoperativeness, even in 10 the case of contactors mounted side by side, a locking mechanism is generally used incorporated in a case from which project movement take-off fingers. This case is then placed between two contactors so that the movement take-off fingers are coupled respectively with actuation 15 members provided in said contactors.

The electric inoperativeness is generally provided by using one of the break contacts (or NC as they are generally called) usually provided on each of the 20 contactors, it being understood that this solution has the drawback of reducing the number of contacts available on each contactor.

To overcome this drawback, a device has been proposed in the form of a module adapted for fitting between the two contactors to be locked and comprising 25 both levers providing mechanical inoperativeness and contacts providing electric inoperativeness. A device of this kind which provides simultaneously mechanical and electric inoperativeness is described in the French patent issued to the firm UNELEC, n° 2 045 090 on 30 May, 1969.

30 Another more recent and more compact device which can be used between two contactors is described in the PCT patent to ALLEN BRADLEY COMPANY (USA) n° 85 03382 dated 23 January 1984.

It can however be observed that the embodiments 35 proposed in this patent have the drawback that the input and output terminals assigned to one of the contacts are

placed on the same side of the case of the device whereas the input and output terminals of the other contact are placed on the other side of this case. This feature, which results from the general design of the device, is particularly troublesome, not only in so far as safety and the simplicity of providing interconnecting wiring are concerned, but also the risks of error which this arrangement may give rise to.

The purpose of the invention is particularly to overcome these drawbacks.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided an interlocking device for rendering electrically and mechanically inoperative one or the other of two contactors, said device comprising:

- a flat case with two opposite parallel side walls, spaced a small distance apart and, at least a top wall and a bottom wall which extend in planes substantially perpendicular to said side walls, this case being formed so as to be able to be mounted between two contactors disposed side by side;

- first and second movement take-offs adapted for respectively coupling with the mobile assemblies of the two contactors through substantially coaxial apertures provided in the central regions of the two side walls, each of these two movement take-offs being movable between two positions corresponding respectively to the work position and the rest position of the contactor with which it is associated;

- mobile elements providing reciprocal inoperativeness, driven respectively by said movement take-offs, these mobile elements having a travel distance such that the passage of one of the movement take-offs to the work position brings the element which corresponds with it to a position preventing the passage of the other movement take-off to the work position; and,

- two switching devices corresponding respectively to said two contactors, each of said switching devices comprising at least one pair of fixed contacts connected respectively by



connecting conductors to an input connection element and to an output connection element, the fixed contacts corresponding to one switch bridged by a mobile contact element corresponding to a mobile element which is actuated by a movement take-off associated with the other contactor, such that when the movement take-off of one contactor moves to close the corresponding contactor contacts, the associated mobile contact element moves away from its fixed contacts thereby opening a current path,

said input connection elements are mounted on one of said top or bottom walls of the case whereas said output connection elements are mounted on the other of said top or bottom walls, and said switch devices form with the input and output connection elements which are associated therewith as well as with the corresponding connection conductors, first and a second through current lines, without crossing inside the case and directed transversely with respect to said top and bottom walls of the case.

According to another aspect of the invention there is provided an interlocking device for rendering electrically and mechanically inoperative one or the other of two contactors each having an actuating member, said device of the type comprising:

i- a flat case with first and second opposite parallel side walls, spaced a small distance apart and each having a central region and, top and bottom walls which extend in planes substantially perpendicular to the first and second side walls, said case having a fixed pin and being adapted for being mounted between the two contactors disposed side by side;

ii- first and second movement take-offs adapted for respectively coupling with the actuating member of the respective contactors through substantially coaxial apertures provided in the central regions of the first and second side walls respectively, each of said first and second movement take-offs being movable between first and second positions corresponding respectively to the work position and the rest position of the contactor with which it is associated;

iii- first and second mobile elements providing reciprocal



inoperativeness, driven respectively by said first and second movement take-offs, said mobile elements having a travel distance such that when the first movement take-off is in its first position, the first mobile element prevents movement of the second movement take-off to its first position and conversely,

iv- first and second switch devices respectively comprising first and second pairs of fixed contacts, connected respectively by first and second conductor means to first and second input connection elements and to first and second output connection elements, and first and second mobile contact elements respectively actuated by said second and first mobile elements,

said first and second input connection elements being mounted on one of said top wall or bottom wall of the case whereas said first and second output connection elements are mounted on the other of said top wall or bottom wall, and said first and second switch devices form with the input and output connection elements which are associated therewith as well as with the corresponding conductor means, first and second through current lines, which do not cross inside the case and are directed transversely with respect to said top and bottom walls.



According to the invention, in this device providing inoperativeness said input connection elements are mounted
 10 on one of said sidewalls of the case whereas said output connection elements are mounted on the other sidewall, and said switch devices form with the input and output devices which are associated therewith as well as with the corresponding connection conductors, two through current
 15 lines, without crossing inside the case and directed transversely with respect to said sidewalls of the case.

BRIEF DESCRIPTION OF THE DRAWINGS

20 Some embodiments of the invention will be described hereafter, by way of non limitative examples, with reference to the accompanying drawings in which :

Figure 1 shows in a front view one embodiment of a device of the invention associated with two contactors in
 25 the rest position;

Figure 2 is a view similar to that of figure 1 but in which the first contactor is in the work position and the other is in the rest position;

Figure 3 shows the same device with the first
 30 contactor in the rest position and the other in the work position;

Figure 4 shows in a front view another embodiment of the device of the invention; and

Figure 5 is a diagrammatical representation of
 35 another variant of the device of the invention. _____



DESCRIPTION OF THE PREFERRED EMBODIMENTS

Such as shown in figures 1 to 4, the device 5 providing mechanical and electric inoperativeness comprises :

- a support case 1,
- a lever 2 mounted for rotation about a fixed pin 4 fixed to case 1, this lever 2 being rotated by a first pin 6 adapted for coupling with the mobile assembly of a first contactor,
- a pusher 3 mounted for sliding inside case 1 along a linear path, by means of slides 5, 5', this pusher 3 being driven by a second pin 7 adapted for coupling to the 15 mobile assembly of a second contactor,
- two switch devices I_1 , I_2 of the double break contact type whose mobile parts 12, 13 are respectively carried by the pusher 3 and lever 2, preferably via a resilient crushing system, and whose fixed parts each 20 comprise a pair of fixed contact elements 15, 16-17, 18 respectively connected to the input and output terminals 19, 21-20, 22.

The input terminals 19, 21 are situated on one side 40 of the case (preferably at the level of one of its 25 lateral edges) whereas the output terminals 20, 22 are situated on the other side 39 of the case (preferably at the level of the lateral edge of the case opposite the preceding one), so that when the switch devices I_1 , I_2 are closed, the current lines pass through the case in a 30 direction substantially perpendicular to that of sides 39, 40.

As mentioned above, lever 2 and pusher 3 are interlocked respectively with the movements of the mobile assemblies of the contactors by means of pins 6 and 7 ; 35 for this, these pins project on each side of case 1 through openings 14, 14a formed in its two opposite front

walls, so as to be able to engage in housings provided in the mobile assemblies of the contactors.

The edges of the openings 14, 14a are oriented in a direction which corresponds to the direction of movement of the mobile assembly of the contactors.

More precisely, lever 2 comprises three arms B_1 to B_3 joined together by two portions bent substantially at right angles C_1 , C_2 in the following arrangements :

- the first arm B_1 is adapted so as to occupy a position such as that shown in figure 1 in which it extends substantially parallel to the axis of movement of pusher 3 at a given distance therefrom,

- the second arm B_2 is connected to the first arm B_1 by the bent portion C_1 through which pin 4 passes, and extends in the direction of the axis of movement of pusher 3, the end of this arm situated opposite the bent portion C_1 carrying pin 6,

- the third arm B_3 is connected to said end of arm B_2 by the bent portion C_2 so as to extend, in the position shown in figure 1, parallel to and in line with pusher 3, this third arm B_3 having at its end the mobile part 13 of the switch device I_1 .

20 Pusher 3 comprises a lateral protuberance P oriented towards arm B_1 of lever 2 and has at its end opposite the end of arm B_3 the mobile part 12 of a switch device I_2 .

This protuberance P is more particularly adapted so that its area of movement overlaps that of lever 2 and so
25 that conversely, the area of movement of the lever overlaps that of said protuberance P, so as to be able to obtain the following operation.

When the contactor which drives pusher 3 is closed, as shown in figure 2, the switch device I_2 which is
30 generally placed in series with the coil of the other contactor is open.

If, however, in this position an attempt to close the other contactor is made, tending to move lever 2, the surface 10 of said lever 2 will abut against the surface
35 11 of protuberance P of said pusher, thus preventing said closure.

Similarly and, in accordance with figure 3, when the contactor secured to lever 2 is closed, the switch device I_1 generally placed in series with the coil of the first contactor is open. If, in this position, an attempt to close said first contactor is made, the surface 8 of protuberance P of pusher 3 will abut against surface 9 of lever 2 and will prevent said closure.

The mechanical inoperativeness thus achieved, through the combination of the translational/rotational movements of pusher 3 and lever 2, proves very efficient for the movements of surfaces 8 to 11 which block each other are practically perpendicular.

With the above described arrangement and because there is no crossing of electric connections inside case 1, it becomes possible to use a case of small thickness which may readily replace existing cases providing mechanical inoperativeness. Furthermore, the rectilinear or substantially rectilinear movement of the movement take-off parts simplifies adaptation to the mobile assemblies of the contactors.

Figure 4 shows another embodiment of the invention which uses more conventional interlocking levers 23 and 24.

One of levers 23 is modified and comprises an additional arm 38 on which at least one mobile contact 25 is placed which closes the fixed contacts 26 and 27 connected to terminals 28 and 29.

The other lever 24 also has, on a portion close to its locking surfaces, at least one mobile contact 30 which closes the fixed contacts 31 and 32 connected to terminals 33 and 34.

The movement take-offs are conventionally formed by pins 35 and 35a passing through the openings 36 and 36a in case 37.

The arrangement of the contacts, such as described, also makes it possible to have current paths, passing

through the case, substantially perpendicular to the direction of movement of the mobile assemblies of the contactors to be made inoperative, which is materialized by the direction of the openings 36 and 36a.

5 This arrangement and the absence of connection crossings inside the case makes possible as reduced a thickness as possible.

It should be noted that, in this solution, levers 23 and 24 may be made in the same mold, the additional arm 10 38, required on lever 23, being removed from lever 24 after molding thereof.

It should also be noted that, in the two embodiments, the term input or output for the connection terminals is only given for the sake of clarity of the 15 explanation and in no wise prejudices the actual subsequent assignment of said terminals.

The device shown in figure 5 is based on a principle similar to that of the above described example.

However, in this case, the two levers 50, 51 are 20 formed of molded parts of identical shape each having two impressions 52, 53-54, 55 each adapted to receive a mobile contact bridge. These two levers 50, 51 are mounted for rotation about two respective pins 56, 57 disposed symmetrically with respect to the median plane of symmetry 25 P, P' of case 58.

Each of these levers 50, 51 has three arms 60, 61, 62-63, 64, 65 disposed in the form of a fork which are connected, by one of their ends to a common region 66, 67 through which one of said pins 56, 57 passes.

30 Actuation of one of the two levers 50, 51, from a corresponding contactor, is provided by means of a pin 68, 69 mounted on the free end of its central arm 61, 64 and which passes through an oblong aperture 70 centered on the plane of symmetry P, P'.

35 The other two arms 60, 62 - 63, 65 of this lever 50, 51 are equipped with reception means (impressions 52 to

55) adapted each for receiving a mobile contact bridge.

As in the above described example, this device comprises two through current lines, namely an upper line 71 and a lower line 72, each of these lines comprising a switch device including two fixed contact elements and a mobile contact bridge carried by a corresponding lever.

The upper through line 71 is formed so as to define in case 58 a free space of substantially trapezoidal shape inside which arms 60, 63 of levers 50, 51, which provide the locking function, may move. The lever arms which carry the mobile contact elements which cooperate with fixed contacts on the second through current line do not participate in providing inoperativeness of the device.

The fixed contact elements 73, 74 of the upper current line 71 are then disposed at the level of one of the oblique sides of said free space and cooperate with a mobile contact bridge 75 carried by the arm of the lever 63.

The lower through line 72 extends in a plane offset with respect to the mean plane in which levers 50, 51 move, so as to facilitate the passage of one 76 of the two conductors 76, 77 of this line.

This through line 72 comprises, opposite the oblique side of the upper line including the fixed contact elements 73, 74 an oblique part 78 including two fixed contact elements 79, 80 which cooperate with a mobile contact bridge 81 carried by the arm of lever 62.

It should be noted that in this case the reception means 52, 54 provided on arms 60, 65 are not used.

The advantages of the above described solution are its simplicity and the fact that, since it only uses a single type of lever, it lends itself better to mass production and is of a lower cost price.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An interlocking device for rendering electrically and mechanically inoperative one or the other of two contactors, said device comprising:

5 - a flat case with two opposite parallel side walls, spaced a small distance apart and, at least a top wall and a bottom wall which extend in planes substantially perpendicular to said side walls, this case being formed so as to be able to be mounted between two contactors disposed side by side;

10 - first and second movement take-offs adapted for respectively coupling with the mobile assemblies of the two contactors through substantially coaxial apertures provided in the central regions of the two side walls, each of these two movement take-offs being movable between two positions
15 corresponding respectively to the work position and the rest position of the contactor with which it is associated;

 - mobile elements providing reciprocal inoperativeness, driven respectively by said movement take-offs, these mobile
20 elements having a travel distance such that the passage of one of the movement take-offs to the work position brings the element which corresponds with it to a position preventing the passage of the other movement take-off to the work position;
and,

25 - two switching devices corresponding respectively to said two contactors, each of said switching devices comprising at least one pair of fixed contacts connected respectively by connecting conductors to an input connection element and to an output connection element, the fixed contacts corresponding to one switch bridged by a mobile contact element corresponding
30 to a mobile element which is actuated by a movement take-off associated with the other contactor, such that when the movement take-off of one contactor moves to close the corresponding contactor contacts, the associated mobile contact element moves away from its fixed contacts thereby opening a
35 current path,

 said input connection elements are mounted on one of said top or bottom walls of the case whereas said output



connection elements are mounted on the other of said top or bottom walls, and said switch devices form with the input and output connection elements which are associated therewith as well as with the corresponding connection conductors, first and
 5 ~~a~~ second through current lines, without crossing inside the case and directed transversely with respect to said top and bottom walls of the case.

2. The device as claimed in claim 1, wherein one of said elements providing reciprocal inoperativeness comprises a lever
 10 mounted for rotation about a fixed pin on the case, this lever carrying the mobile contact element of one of two said switch devices and being driven by one of said movement take-offs and the other mobile element providing inoperativeness comprises a pusher mounted for sliding in the case so as to move in
 15 translation under the action of the other movement take-off, this pusher carrying the mobile contact element of the other switch device.

3. The device as claimed in claim 2, wherein said pusher has a protuberance whose area of movement overlaps that of said
 20 lever so as to provide said inoperativeness.

4. The device as claimed in claim 1, wherein said mobile elements providing inoperativeness comprises two rotary levers driven by pins, one of these levers comprising an additional
 25 arm on which is placed the mobile contact element of one of the switch devices, the other lever having, in the vicinity of its locking surfaces, the mobile contact ^{element} ~~bridge~~ of the other switch device.

5. The device as claimed in claim 1, wherein said mobile
 30 ^{elements} ~~means~~ providing inoperativeness comprises two rotary levers of identical shape each having two impressions adapted each for receiving a mobile contact bridge, these levers each having three arms disposed in the form of a fork, which are connected, by one of their ends, to a common region through which a pivot pin passes, the actuation of each of these levers, from a



corresponding contactor, taking place by means of a pin mounted on the free end of its central arm and the other two arms of each of these levers each comprise one of said impressions.

5 6. The device as claimed in claim 5, wherein the said first through line is formed so as to define inside the case a free space of trapezoidal shape inside which the arms of said levers which provide the locking function may move and the fixed contact elements of this current line are disposed at the level of one of the oblique sides of said free space and cooperate with a mobile contact bridge carried by one of said arms.

10 7. The device as claimed in claim 5, wherein the said second through line extends in a plane offset with respect to the mean plane in which said levers move, this through line including an oblique part having two fixed contact elements of the second switch device which cooperate with a mobile contact bridge carried by a lever arm which does not participate in providing mechanical inoperativeness of the device.

20 8. An interlocking device for rendering electrically and mechanically inoperative one or the other of two contactors each having an actuating member, said device of the type comprising:

25 i- a flat case with first and second opposite parallel side walls, spaced a small distance apart and each having a central region and, top and bottom walls which extend in planes substantially perpendicular to the first and second side walls, said case having a fixed pin and being adapted for being mounted between the two contactors disposed side by side;

30 ii- first and second movement take-offs adapted for respectively coupling with the actuating member of the respective contactors through substantially coaxial apertures provided in the central regions of the first and second side walls respectively, each of said first and second movement take-offs being movable between first and second positions corresponding respectively to the work position and the rest



position of the contactor with which it is associated;

iii- first and second mobile elements providing reciprocal inoperativeness, driven respectively by said first and second movement take-offs, said mobile elements having a travel distance such that when the first movement take-off is in its first position, the first mobile element prevents movement of the second movement take-off to its first position and conversely,

iv- first and second switch devices respectively comprising first and second pairs of fixed contacts, connected respectively by first and second conductor means to first and second input connection elements and to first and second output connection elements, and first and second mobile contact elements respectively actuated by said second and first mobile elements,

said first and second input connection elements being mounted on one of said top wall or bottom wall of the case whereas said first and second output connection elements are mounted on the other of said top wall or bottom wall, and said first and second switch devices form with the input and output connection elements which are associated therewith as well as with the corresponding conductor means, first and second through current lines, which do not cross inside the case and are directed transversely with respect to said top and bottom walls.

9. The device as claimed in claim 8, wherein one of said first and second mobile elements comprises a lever mounted for rotation about said fixed pin, said lever carrying the mobile contact element of one of said first and second switch devices and being driven by one of said first and second movement take-offs and the other of said first and second mobile elements comprises a pusher mounted for sliding in the case so as to move in translation under the action of the other movement take-off, this pusher carrying the mobile contact element of the other switch device.

10. The device as claimed in claim 9, wherein said pusher



has a protuberance whose area of movement overlaps that of said lever so as to provide said inoperativeness.

5 11. The device as claimed in claim 8, wherein said first and second mobile elements comprise two rotary levers driven by pins, one of these levers comprising an additional arm on which is placed the mobile contact element of one of the switch devices, the other lever having a locking surface and, located in the vicinity of said locking surface, the mobile contact element of the other switch device.

10 12. The device as claimed in claim 8, wherein said mobile elements comprise two rotary levers of identical shape each having first and second impressions adapted each for receiving one of said mobile contact elements, these levers each having first, second and third arms disposed in the form of a fork, 15 which are connected, by one of their ends, to a common region through which a pivot pin passes, the actuation of each of these levers, from a corresponding one of said two contactors, taking place by means of a pin mounted on the free end of its second arm and the first and third arms of each of these levers respectively comprise said first and second impressions.

20 13. The device as claimed in claim 12, wherein said first through current line is formed so as to define inside the case a free space shaped as a trapezium having two oblique sides inside which the arms of said levers move and the fixed contacts which define said first through current line are 25 disposed at the level of one of said oblique sides and cooperate with a mobile contact element carried by one of said arms.

30 14. The device as claimed in claim 12, wherein said second through current line extends in a plane offset with respect to the mean plane in which said levers move, said second through current line including an oblique portion including the two fixed contacts of the second switch device



which cooperate with a mobile contact element carried by a lever arm which does not participate in providing mechanical inoperativeness of the device.

5 15. An interlocking device substantially as herein described with reference to and as illustrated in any one or more of the accompanying drawings.

Dated this 12th day of June, 1990.

LA TELEMECANIQUE ELECTRIQUE
By Its Patent Attorneys:

GRIFFITH HACK & CO.
Fellows Institute of Patent
Attorneys of Australia.

10

11

12

13



24.

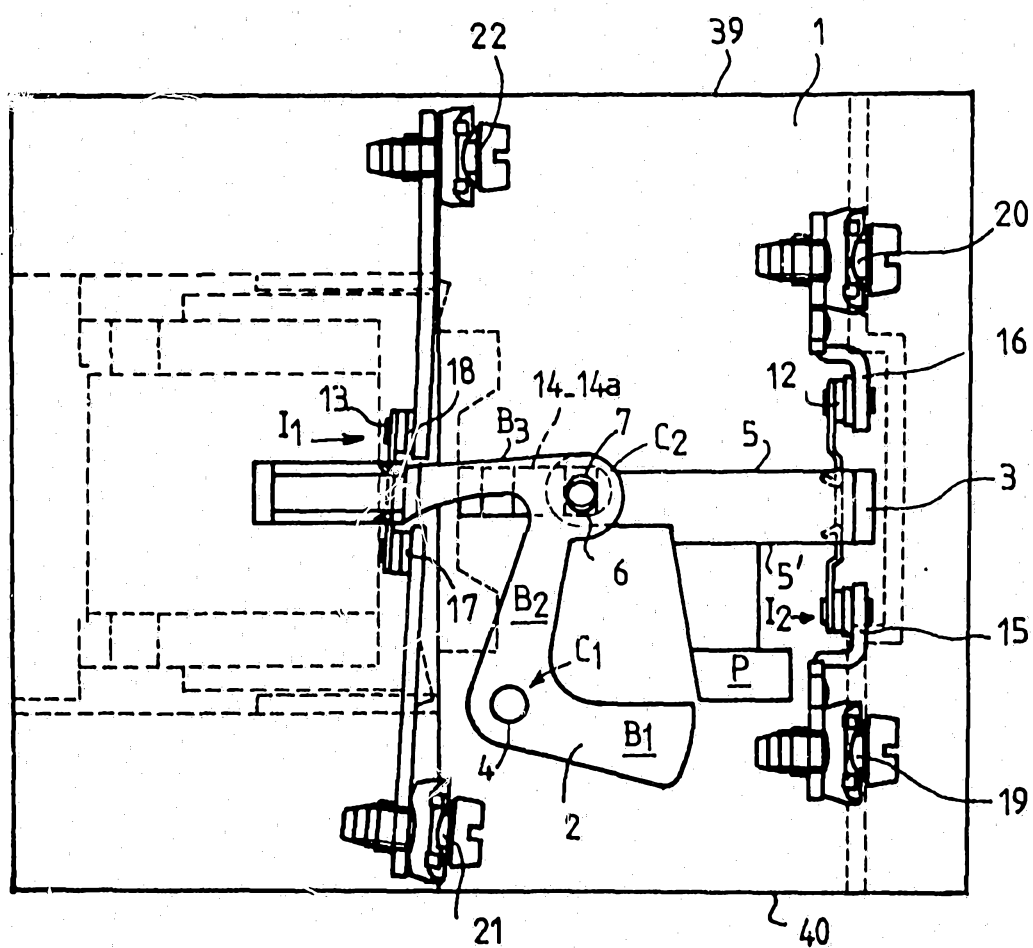


FIG. 2

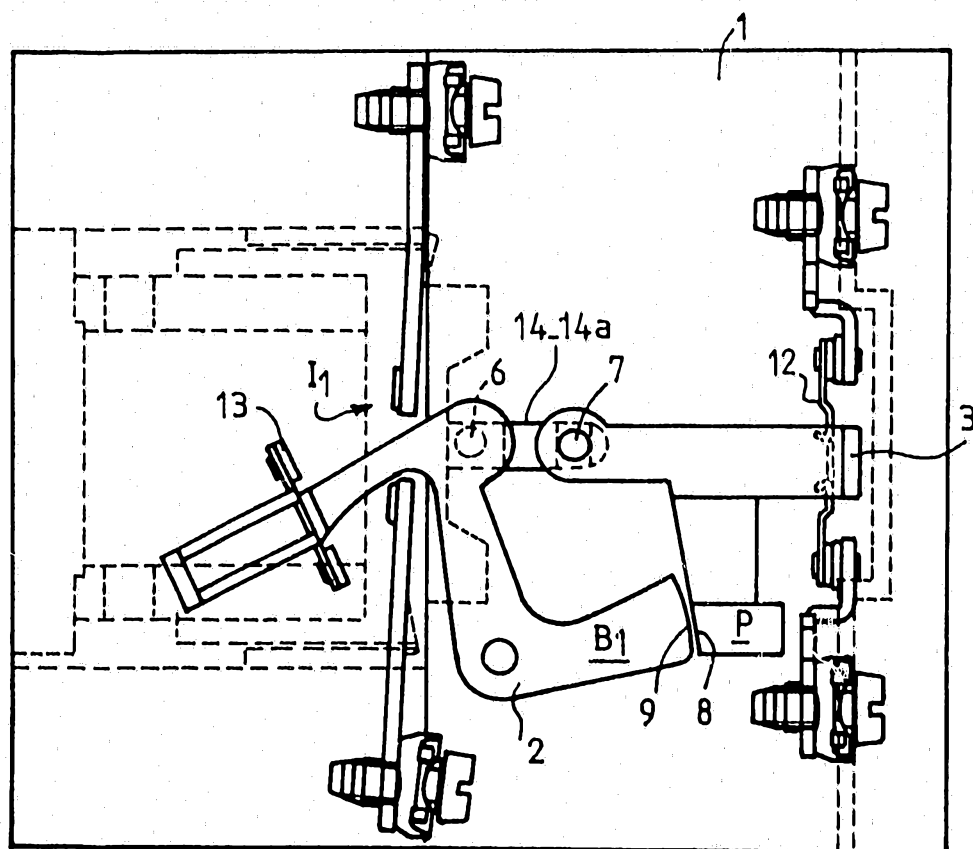


FIG. 4

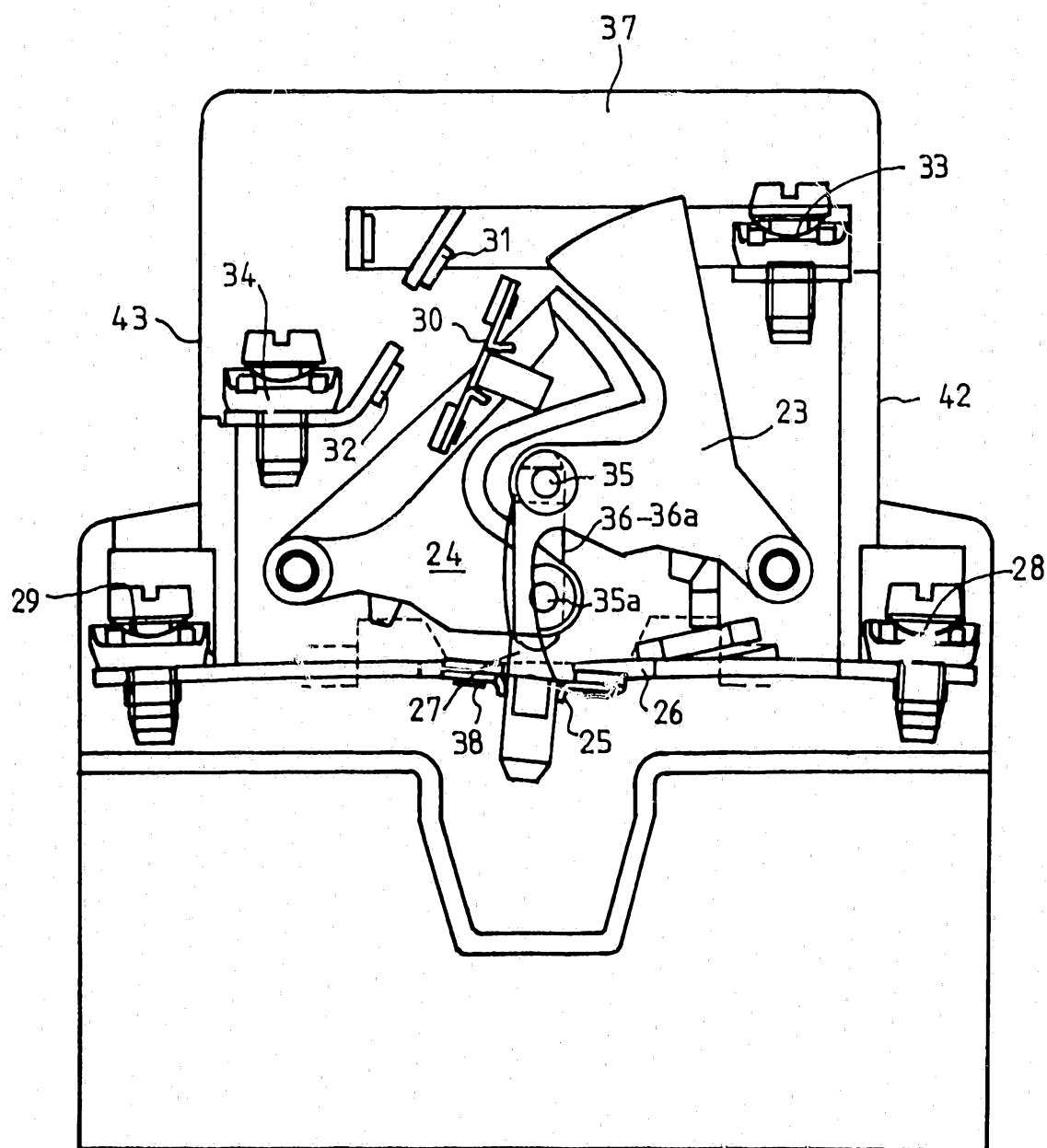


FIG. 5

