Feb. 13, 1968 F. W. KUSSY ETAL 3,369,100

MECHANISM FOR SELECTIVELY OPERATING ONE OF TWO DEVICES

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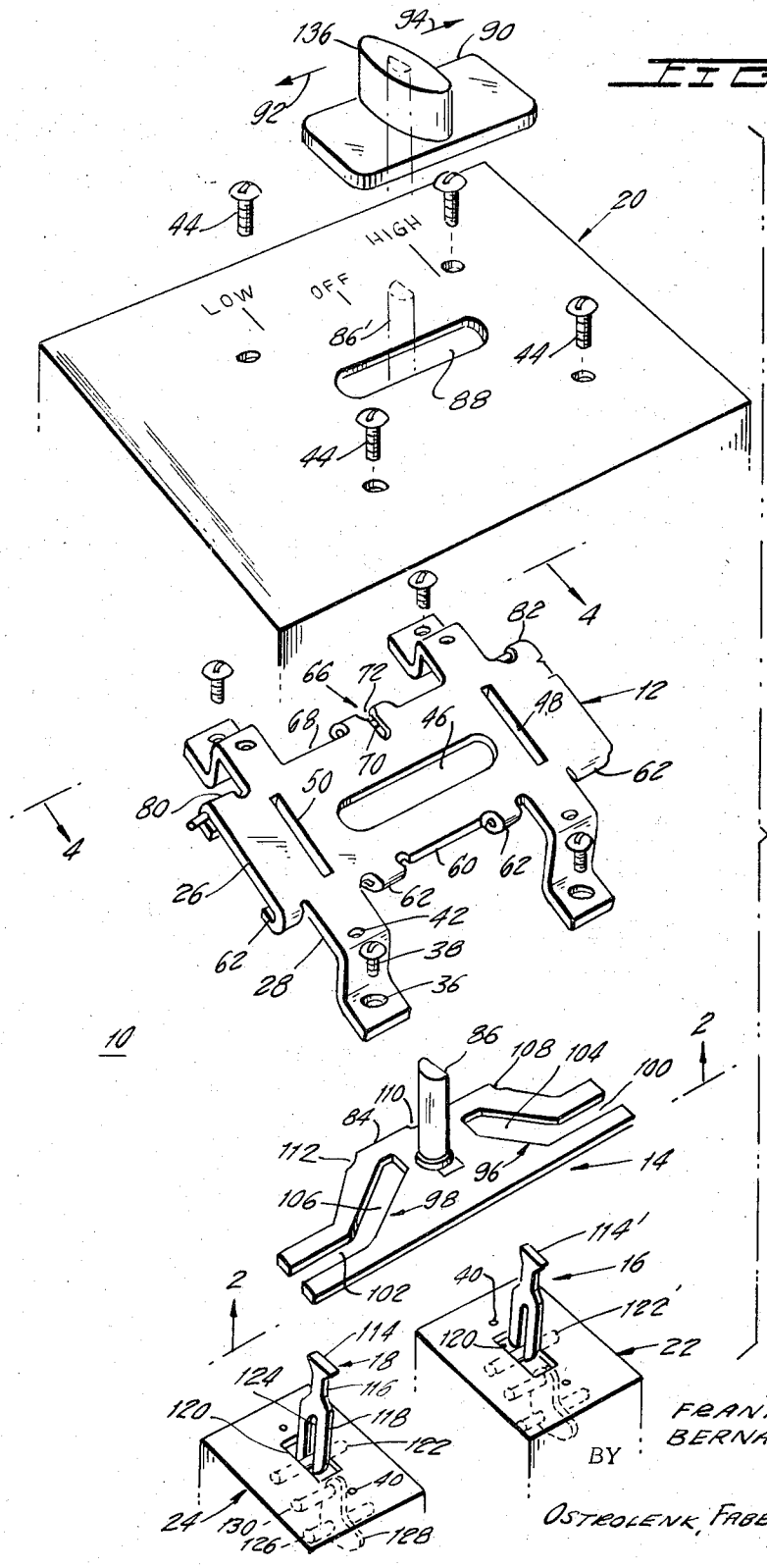
FIG. 1



INVENTORS
FRANK W. KUSSY
BERNARD D. MARCO

BY

OSTROLENK, FABER, GERB & SOFFEN
ATTORNEYS

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FIG. 2.

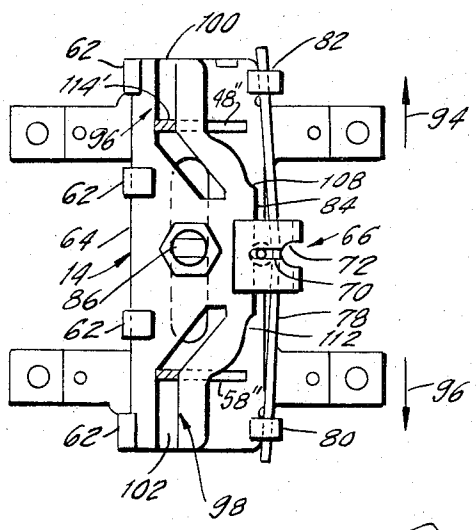
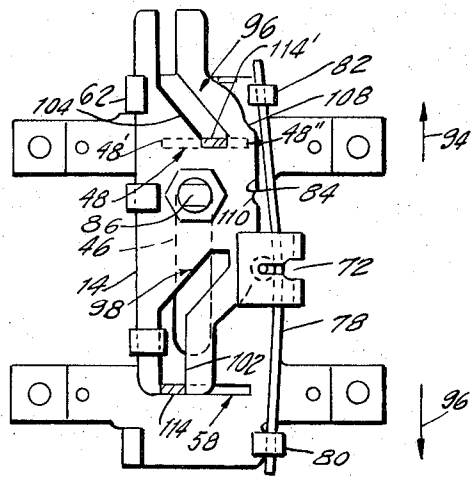


FIG. 3.



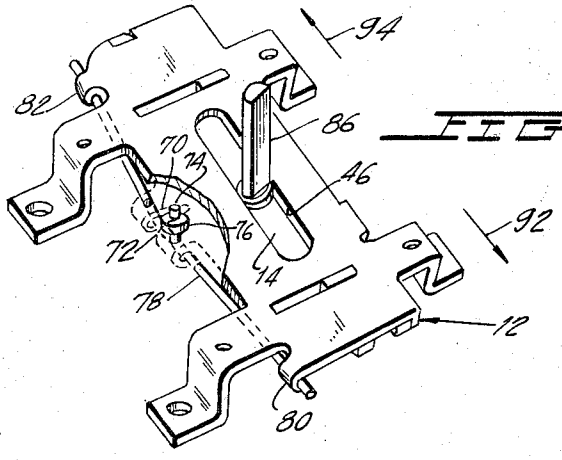


FIG. 4.

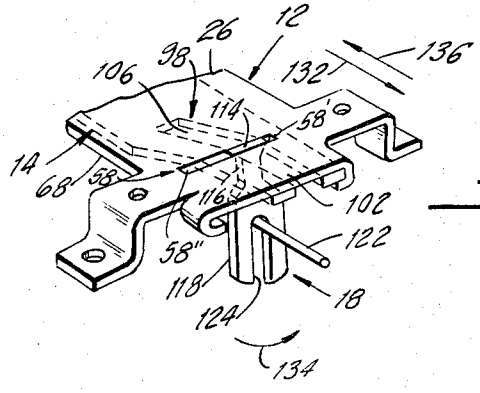


FIG. 5.

INVENTORS
FRANK W. KUSSY
BERNARD DI MARCO

BY

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

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MECHANISM FOR SELECTIVELY OPERATING ONE OF TWO DEVICES

Frank W. Kussy, Birmingham, and Bernard Di Marco, Lincoln Park, Mich., assignors to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

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ABSTRACT OF THE DISCLOSURE

A selector mechanism for activating only one of two devices at one time including a slide member captively holding a pair of keys, only one of which will be moved to actuate the associated device when the slide member is moved in a given direction.

This invention relates to a selector mechanism and more particularly relates to a mechanism for selectively operating one but not the other of two devices.

As is well known in the art, motor starters (viz., electromechanical devices selectively operable between open circuit and closed circuit positions), have been found useful for establishing or interrupting a current between a source and an electric motor being controlled by the starter. In many applications it has been found necessary to control two electric motors, or two windings of the same electric motor, for example, a high-speed and low-speed winding, in such a way that the two motors or two windings must never be energized simultaneously.

The instant invention is directed to a control mechanism whereby in the illustrative embodiment, two motor starters are controlled in such a manner that one, and only one, may be actuated to its closed circuit position at any one time. In a preferred embodiment the selector mechanism captively holds a pair of keys, each of which is adapted to be removably secured in operating relationship within its associated motor starter. Consequently, if the selector mechanism is removed from the motor starters, the captivated keys will also be disengaged thereby preventing unauthorized operation of the motor starters and possible simultaneous operation.

As a particularly advantageous feature of the instant invention, the selector mechanism is a pre-assembled unit which may be easily secured to the pair of motor starters with which it cooperates, in such a manner that the cover of the selector mechanism completely covers both starters to form a compact portable unit.

Although the instant invention has thus far been described, and will be further described, in conjunction with a pair of motor starters, and even more specifically with a pair of key operated motor starters, it is to be understood that the instant invention is not to be limited by such disclosure, but in fact, it is to be understood that the instant invention is particularly suitable for any environment in which it is necessary to selectively operate one but not the other of a pair of mechanical or electromechanical devices.

In accordance with the teachings of the instant invention the selector mechanism comprises a frame in which a spring biased slide member is guidingly maintained. The frame includes a pair of slots which extend in transverse direction with respect to the motion of the slide member. The slots are arranged to guide a pair of keys between a first and second position (corresponding to the open and closed circuit positions, respectively, of the associated motor starters), by means of a pair of angled grooves which are provided on opposite ends of the movable slide member. Such grooves captively maintain the keys within the selector mechanism and are oriented in such a manner that movement of the slide member in a first direction causes one but not the other of the keys to move between its first and second position thereby effecting the closing of one but not the other of the motor starters. Movement of the slide member in the opposite direction causes the second of the keys but not the first, to move between its first and second direction thereby effecting the closing of the second motor starter but not the first. When the slide member is in an intermediate position, both keys remain in their first position thereby maintaining both motor starters in their open circuit position.

The frame is provided with securing means by which the selector mechanism may be secured to the cooperating motor starters in such a manner that the captivated keys will be accurately aligned with the key receiving apertures provided on the motor starters. An index cover is removably secured to the frame and encompasses both starters so that the entire two-unit starter is provided within a single unit.

To effect operation of the device, the slide member is provided with a projecting handle which passes through aligned elongated slots in the frame and cover, respectively. The handle is terminated with a conveniently shaped hand-grasping handle by which the slide member may be moved between its first, second and intermediate position.

It is thus seen that an object of the instant invention is to provide a mechanism for selectively operating one, but not the other, of two devices.

It is another object of the instant invention to provide apparatus for use with a pair of devices operable between first and second positions, such apparatus comprising first and second activating means, each activating means movable in a predetermined direction to operate one of a pair of devices between first and second positions; and a slide member cooperating with such first and second activating means for selectively moving one but not the other in said predetermined direction.

It is another object of the instant invention to provide a mechanism for selectively operating one, but not the other, of a pair of motor starters between their open circuit and closed circuit position.

Still another object of the instant invention is to provide such a mechanism whereby the means for activating the associated motor starters comprises a pair of captivated keys which are disengaged from operating position within their motor starters when the selector mechanism is removed from the motor starters.

Yet another object of the instant invention is to provide a mechanism for selectively operating one, but not the other of a pair of motor starters, which mechanism is pre-assembled independent of the associated motor starters; is comprised of relatively few parts; and may be removably secured to a pair of motor starters in such a manner that the captively held operating keys thereof will be accurately aligned within the key receiving slots of the motor starter when the mechanism is secured to such motor starters.

Other objects and a fuller understanding of the instant invention may be had by referring to the following description and drawings, in which:

FIGURE 1 is an exploded perspective view of a selector mechanism constructed in accordance with the teachings of the instant invention;

FIGURE 2 is a view looking at the underside of the selector mechanism of FIGURE 1, and showing the selector mechanism in its intermediate position;

FIGURE 3 is a view similar to that shown in FIGURE 2, but shows the selector mechanism in one of its two motor starter operating positions;

FIGURE 4 is a perspective view of the selector mechanism of FIGURE 1, with its cover removed, and showing in detail the manner in which various parts thereof cooperate; and

FIGURE 5 is a detailed view of a portion of the selector mechanism of FIGURE 1, showing the manner in which the motor starting operating keys are captively maintained therein.

Referring to FIGURE 1 there is shown a selector mechanism **10** which includes a frame **12**, a slide member **14**, a pair of keys **16** and **18**, and a cover **20**. The assembled selector mechanism is intended to be secured to a pair of motor starters **22** and **24**, such that the operating keys **16** and **18** will be aligned in operating relationship within their associated motor starters **22** and **24**. As noted previously, the motor starters **22** and **24** are operable between an open circuit and closed circuit positions to connect a pair of motors (not shown), or a pair of windings (not shown) of a single motor, to an electrical source in such a manner that only one motor, or one winding, is intended to be energized at any one given time.

Frame **12** is seen to comprise a substantial planar surface **26** and four integrally extending Z-shaped legs **28**, by which the frame **12** may be secured to the cooperating motor starters **22** and **24**. For this purpose each of the Z-shaped leg members **28** includes an aperture **36**. Screws **38** pass through aperture **36** and into screw-threaded engagement with apertures **40** provided on the cooperating motor starters **22** and **24**. Each of the legs **28** is further provided with a tapped aperture **42** into which screws **44** may pass in securing cover **20** to frame **12**. It is apparent that any other suitable fastening means may be used to secure cover **20** to the frame **12**, and frame **12** to starters **22** and **24**.

The planar surface **26** of frame **12** further includes an elongated slot **46** which extends along the longitudinal axis of the frame **12** and a pair of transversely oriented slots **48** and **50**, the purposes of which will become apparent throughout the remainder of the specification.

As can be readily seen in FIGURE 1, one longitudinal edge **60** of frame **12** includes a plurality of rolled extensions **62**, the purpose of which is to guide the movement of one edge **64** of slide member **14** (see FIGURE 2). Rolled extensions **62** cooperate with a slotted rolled-over portion **66** which is provided on the opposite longitudinal edge **68** of frame **12** to guide and maintain the slide member **14** under the planar surface **26**.

As will be most clearly seen in FIGURE 4, rolled-over portion **66** is provided with a slot **70** which extends from its upper surface around and under to its lower surface (see FIGURE 2). Slot **70** is enlarged at **72** so that a pin **74** having an enlarged central portion **76** may be inserted and maintained within slot **70** by a biasing spring member **78** which is held in a biased position by rolled-over extensions **80** and **82** provided at opposite ends of the longitudinal edge **68** of frame **12**.

Biasing spring member **78** maintains the enlarged portion **76** of pin **74** against one longitudinal edge **84** of slide member **14** (see FIGURES 2 and 3), and together with the under surface of rolled portion **66** and rolled-over extensions **62** maintain and guide the slide member **14** under the lower surface of frame **12**.

Slide member **14** is seen to comprise a generally flat member which includes an upstanding handle **86** which, as seen in FIGURE 4, extends through longitudinally extending slot **46** of frame **12**. As further shown by the phantom representation **86'** in FIGURE 1, handle **86** further passes through an elongated slot **88** provided on the face of cover **20**. A grasping handle **90** fits on upstanding handle **86** and may be moved from its intermediate position, shown in FIGURE 1, in either of the directions indicated by the arrows **92** and **94**, to effect operation of either motor starter **22** or **24** in a manner to be presently described.

As most clearly seen in FIGURE 1, slide member **14** includes a pair of open ended angled slots **96** and **98** at opposite ends thereof. Angled slots **96** and **98** comprise a straight section **100** and **102**, respectively, and an angled portion **104**, **106**, respectively, which form acute angles with the longitudinal axis of slide member **14**. Edge **84** of slide member **14** includes three indentations, **108**, **110**, **112**, the purposes of which will be explained in greater detail.

Referring to FIGURE 5, there is shown a detailed view of the key **18** and the manner in which such key is captively held within the angled slot **98** of slide member **14** while at the same time being slidably movable between opposite ends of the slot **58** in frame **12**.

The upper portion of key **18** is seen to comprise an enlarged head portion **114** and a thinner neck portion **116** from which an enlarged U-shaped bottom portion **118** is seen to extend. The enlarged head portion **114** resides within slot **58** and is captively held within such slot by the portions of slide member **14** which surround the neck portion **116** of the key. Neck portion **116** extends through angled slot **98** so that the lower U-shaped portion **118** thereof may enter the key receiving slot **120** in motor starter **24** (see FIGURE 1).

For the purpose of illustration, motor starter **24** is shown to include a fixed pin **122** which resides in slot **124** provided in U-shaped portion **118** when the key **18** is inserted into the motor starter. Additionally, the motor starter **24** is shown to have a rotatable pivot pin **126** on which is rotated a bell crank **128**, one end of which carries a fixed pin **130**, which also resides within slot **124** of U-shaped portion **118** when the key **18** is inserted within the key receiving aperture **120**.

Although the details of a motor starter form no part of the instant invention, for the purposes of explanation of the instant invention it may be assumed that rotation of key **18** about fixed pin **122** effects rotation of pin **130** to rotate bellcrank lever **128** and thereby effect opening and closing of the contacts of the motor starter **24**.

It is to be understood that the enlarged head portion **114'** of key **16** is maintained within slot **48** of frame **12** in the same manner that was described with respect to key **18**. Similarly, operation of the motor starter **22** is effected by rotation of key **16** about fixed pin **122'**.

From FIGURE 5 it is seen that the head portion **114** of key **18** resides at one end **58'** of slot **58** while at the same time neck portion **116** resides within the straight section **102** of angled slot **98**. It will be apparent that if slide member **14** is moved in the direction shown by arrow **132**, enlarged head portion **114** of key **18** will be moved (because of the cooperation of angled portion **106** of slot **98** and neck **116**) to the opposite end **58''** of slot **58** thereby effecting rotation of key **18** about fixed pin **122** of motor starter **24** in the direction shown by arrow **134**. As explained previously, with respect to FIGURE 1, such rotation will cause the contacts of motor starter **24** to be moved to their closed circuit position.

When the slide member **14** is returned to the position of FIGURE 5, enlarged head portion **114** will be returned to end **58'** of slot **58**, under the reverse guidance of angle portion **106** of slot **98**, thereby opening the electrical contacts of motor starter **24**.

If slide member **14** had originally been moved from the position shown in FIGURE 5 in the direction of arrow **136**, it is apparent that head portion **114** of key **18** would not have moved to end **58''** of slot **58**; since during the entire movement of the slide **114**, neck **116** would have remained in the straight section **102** of angled slot **98**. Thus it is apparent that from the position shown in FIGURE 5, only movement of the slide **14** in the direction of arrow **132** will effect operation of the motor starter **24**.

Referring to FIGURE 2, there is shown an under view of the mechanism of the instant invention in which the slide member **14** is in an intermediate position whereby the enlarged head portions **114** and **114'** of keys **18** and

16, respectively, are each within straight portions 102 and 100, respectively, of angle slots 98 and 96, respectively. Such positions, if desired, could correspond to the motor starters 22 and 24 being in their open circuit positions. The slide member 14 is seated in its intermediate position by means of the enlarged portion 76 of pin 74 being biased by spring member 78 into indentation 110 provided on edge 84 of the slide member. A visual indication of the condition of motor starters 22 and 24 is provided by the grasping handle 90 pointing to the notation "off" on the face of the cover 20.

In the illustrative embodiment of FIGURE 1 the mechanism of the instant invention is shown controlling the operation of motor starters which selectively energize the high and low speed windings of an electric motor (not shown). As will be shown, only one of the motor starters may be operated at one time and consequently only one of the two motor windings will be energized at any one time.

If it is desired to energize the high speed winding of the electric motor being controlled, thereby necessitating the closing of the contacts of motor starter 22, the grasping handle 90 is moved in a direction corresponding to arrow 94 until the pointer shaped front portion 136 thereof is opposite the indexed line which is directed to the word "high" printed, scratched or otherwise noted on the cover 20. Such movement moves the slide member 14 from the position shown in FIGURE 2 to that shown in FIGURE 3 whereby the angled portion 104 of angle slot 96 guides enlarged head portion 114' of key 16 from its position at end 48' of slot 48 to its position at end 48'' of slot 48. As noted previously, such movement effects rotation of key 16 thereby closing the contacts of motor starter 22 and energizing the high-speed winding of the controlled electric motor.

Movement of the slide member 14 in the direction of arrow 94 is automatically halted when upstanding handle 86 reaches the end of slot 46 provided in frame 12. Furthermore the slide member 14 is firmly seated in its high-speed position by the means of enlarged portion 76 of pin 74 being urged by spring member 78 into indentation 112 provided on slide member 14.

While head portion 114' of key 16 has been moved from the position shown in FIGURE 2 to that shown in FIGURE 3, it will be observed that head portion 114 has remained in the position which is occupied in FIGURE 2. This necessarily follows since during the entire movement of slide member 14, head portion 114 remains within the straight section 102 of angle slot 98.

Return of the slide member 14 to its position shown in FIGURE 2 will cause the head portion 114' of key member 16 to be returned to the position shown in FIGURE 2 whereby the contacts of motor starter 22 will be opened.

To effect energization of the low-speed winding of the controlled electric motor the grasping handle 90 is moved in the direction indicated by arrow 92 until its forward pointing portion 136 is opposite the indication marked "low" on cover 20. In this operation head portion 114 of key 18 will be moved to the opposite end of slot 58 to effect operation of motor starter 24 while head portion 114' of key 16 will undergo no transverse motion. It is thus apparent that the instant invention assures that only one motor starter and hence only one winding or motor can be energized (or operated) at any one time.

As a further feature of the invention it will be apparent that when the selector mechanism is removed from the motor starters 22 and 24, the captivatingly held keys 16 and 18 must necessarily be withdrawn from their cooperating motor starters. Such feature assures unauthorized operation of the motor starters and therefore necessarily prevents simultaneous operation thereof.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

What is claimed is:

1. Apparatus for use with a pair of devices operable between first and second positions comprising:
   - first and second key means, each key means movable in a predetermined plane of motion between a first and second position; and
   - slide means captively connected to said first and second key means and selectively movable from a first position in which said first and second key means are in their first position, in two directions, to second and third positions, both of said two directions being transverse to the plane of motion of said first and second key means, said slide means including motion translating means captively cooperating with said first and second key means for causing said first key means to move from its first to its second position when said slide means is moved in one of its two directions to its second position and for causing said second key means to move from its first to its second position when said slide means is moved in the other of its two positions to its third position.

2. The apparatus of claim 1 and further including frame means for guiding the movement of said slide means, said frame means including means for guiding the movement of said key means between their first and second positions.

3. The apparatus of claim 2 wherein said frame means includes biasing means for selectively holding said slide means into its first, second and third position, respectively.

4. The apparatus of claim 1 wherein said motion translating means comprises a pair of angled channels in said slide means, each of said channels having one of said key means inserted therethrough.

5. The apparatus of claim 4 wherein each of said channels comprises a straight section extending parallel to a longitudinally extending edge of said slide means and an angled portion which forms an acute angle with said longitudinally extending edge of said slide means, and wherein each of said key means resides in the straight section of its respective channel when said slide means is in its first position; and one of said key means resides in the angled portion of its respective channel while the other key means resides in the straight section of its respective channel when said slide means is in its second or third position, respectively.

6. The apparatus of claim 5 wherein said channels each have an open end at opposite edges of said slide means which are transverse to said longitudinally extending edge.

7. The apparatus of claim 5 and further including frame means for guiding the movement of said slide means, said frame means including means for guiding the movement of said key means between their first and second positions.

8. The apparatus of claim 7 wherein said last-named means comprises a pair of slots aligned transversely with respect to the straight sections of said channels, each of said slots receiving one of said key means.

9. In combination with a pair of motor starters having slots therein for the reception of activating keys, a selector mechanism comprising:
   - first and second keys removably fitted within cooperating slots in said pair of motor starters, said keys movable between a first and second position to operate the motor starters between an open and closed position; and
   - movable slide means captively cooperating with said first and second keys for selectively moving one of said key means between its first and second positions without moving the other of said key means between its first and second position.

10. The combination of claim **9** and further including frame means for guiding the movement of said slide means, said frame means including slot means for guiding the movement of said key means between their first and second direction.

11. The combination of claim **10** wherein said frame member has first securing means securing said frame member to said pair of motor starters; and second securing means securing a cover over said frame member, said slide means being provided with handle means which passes through said frame member and said cover.

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MILTON KAUFMAN, *Primary Examiner.*