

Oct. 10, 1950

O. L. TAYLOR

2,525,501

MECHANICAL INTERLOCK

Filed June 19, 1948

3 Sheets-Sheet 1

Fig. 1.

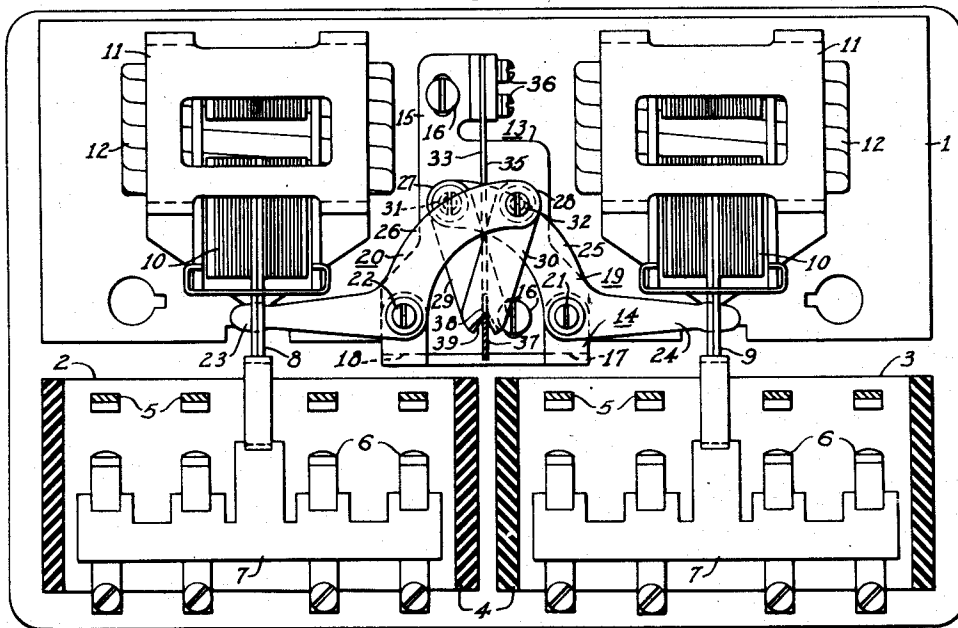


Fig. 2.

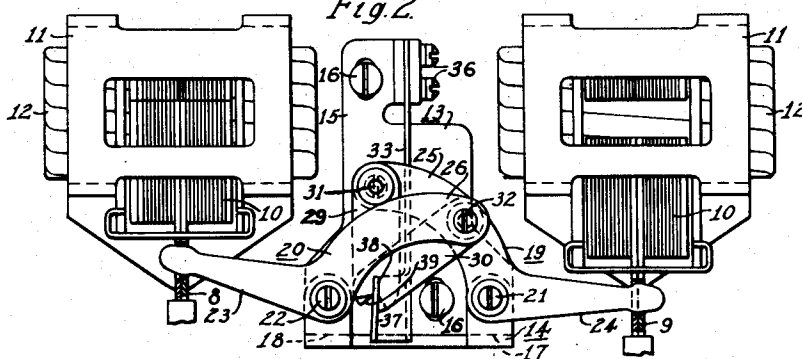
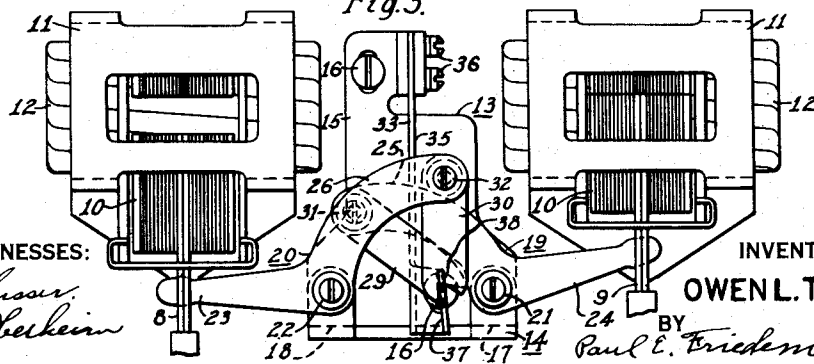


Fig. 3.



WITNESSES:

H. F. Lusser
E. L. Oberheim

INVENTOR

OWEN L. TAYLOR.

BY
Paul E. Friedmann
ATTORNEY

Oct. 10, 1950

O. L. TAYLOR
MECHANICAL INTERLOCK

2,525,501

Filed June 19, 1948

3 Sheets-Sheet 2

Fig. 4.

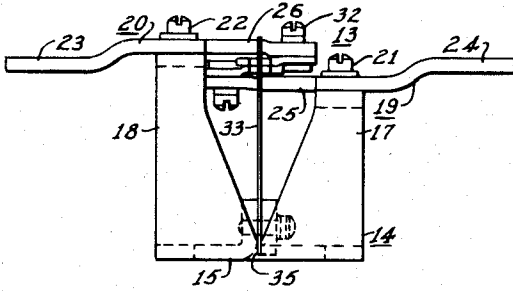


Fig. 5.

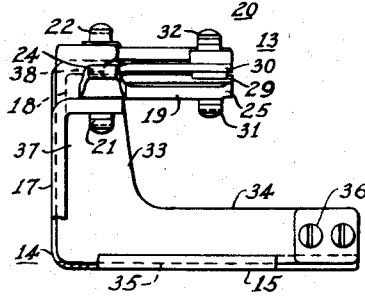
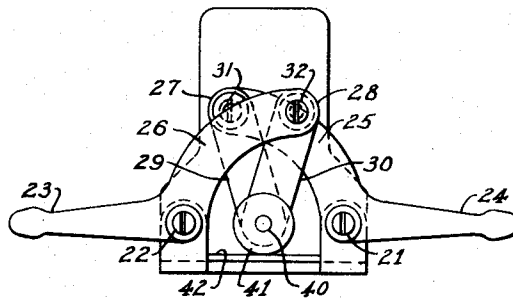


Fig. 6.



WITNESSES:

N. F. Sussner.
E. H. Overheim

INVENTOR

OWEN L. TAYLOR.

BY
Paul E. Friedmann
ATTORNEY

Oct. 10, 1950

O. L. TAYLOR
MECHANICAL INTERLOCK

2,525,501

Filed June 19, 1948

3 Sheets-Sheet 3

Fig. 10.

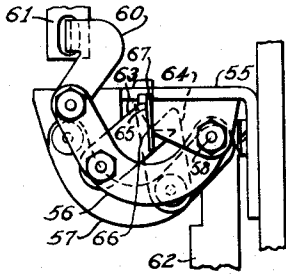


Fig. 9.

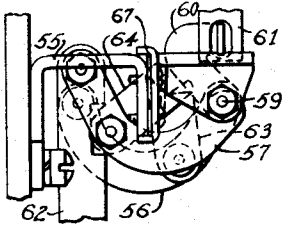
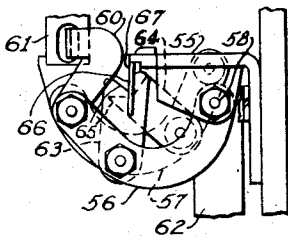


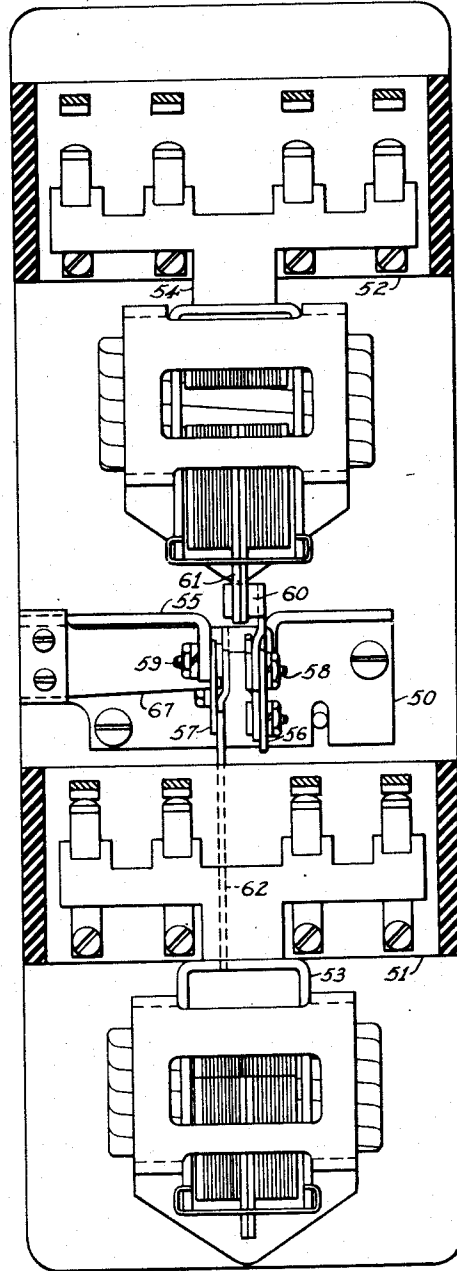
Fig. 8.



WITNESSES:

H. F. Lusser,
E. H. Cherkov

Fig. 7.



INVENTOR

OWEN L. TAYLOR.

BY

Paul C. Friedmann
ATTORNEY

UNITED STATES PATENT OFFICE

2,525,501

MECHANICAL INTERLOCK

Owen L. Taylor, Beaver Falls, Pa., assignor to
Westinghouse Electric Corporation, East Pitts-
burgh, Pa., a corporation of Pennsylvania

Application June 19, 1948, Serial No. 34,036

10 Claims. (Cl. 74-483)

1

This invention relates, as indicated, to a mechanical interlock for interlocking the operation of two relatively movable members and, more particularly, to an improved arrangement of interlocking mechanism for a pair of electromag-

netically operated switches controlling reversing or multiple speed electrical connections to a motor. The switches on reversing or multiple speed contactors must be interlocked in order to prevent the completion of a circuit through more than one switch at any given instant. This requires that an operating circuit through the contacts on one of the switches must be open before a circuit can be established through the contacts on another switch. The interlock must not only be capable of preventing simultaneous physical contact engagement in more than one switch, but in addition must be effective to prevent contact engagement by a second switch prior to extinguishment of the arc drawn by the contacts of the switch being opened. Premature contact engagement of the switch being closed before extinguishment of the arc drawn by the switch being opened would otherwise result in a short circuit. The problem of preventing such premature contact engagement is rendered difficult by relays of modern design due to their design tendencies toward small moving parts having low inertia, the use of high-speed magnets with small magnet travel, and a smaller open gap distance between the stationary and movable contacts.

Generally stated, the problem of arc extinguishment may be taken care of by an interlock which will operate to effect movement of one set of switch contacts to their full open position as determined by their open gap distance before allowing the other set of switch contacts to move substantially out of full open position. Such interlocks have approached this problem by causing the different sets of contacts to move at unequal rates of travel whereby those opening are moved initially at a high rate of speed into substantially full open position while those closing move at a relatively slow rate of speed only a small distance of their total travel from full open position. However, interlocks designed along this line have run into a condition known as jamming which is caused by the interlock operating to hold a first switch in its closed position in response to force applied thereto upon energization of a magnet operating coil for a second switch. This condition will cause the operating coil for the second switch to fail in

2

a short period of time if it is maintained energized.

One of the principal objects of this invention is to provide an improved arrangement of interlocking mechanism for a pair of electromagnetically operated switches which is effective to prevent completion of a circuit through both of the switches under any condition, and which will accomplish its function without jamming the operation of either of the switches.

A further object of this invention is to provide interlocking mechanism for a pair of electromagnetically operated switches which is effective to maintain one of the switches substantially in its full open position until such time as the other of the switches moves to its substantially full open position.

A still further object of the invention is to provide interlocking mechanism for a pair of electromagnetically operated switches which will operate to lock one of the switches in its full open position immediately upon movement of the other of the switches out of its full open position.

Another object of the invention is to provide a simplified arrangement of interlocking mechanism which may be produced at a minimum of cost and which will operate indefinitely without failure.

Another object of this invention is to provide an improved arrangement of interlocking mechanism in which the interlocking action is provided by a pair of locking links connected together for angular movement relative to each other and having operating connections respectively with the moving parts which they operate to interlock.

Another object of this invention is to provide interlocking mechanism of the character just referred to in which the common connection for the locking links is provided by a flat leaf spring having knife edge engageable in V-shaped notches formed in the locking links.

Other objects and advantages of this invention will become apparent from the following description.

In the drawings there are shown several embodiments of the invention. In this showing:

Figure 1 is a plan view, with parts thereof being shown in section, of a pair of electromagnetically operated switches illustrating the application thereto of a preferred embodiment of interlocking mechanism constructed in accordance with the principles of this invention;

Fig. 2 is a partial plan view, similar to Fig. 1,

showing the position of the interlocking mechanism when one of the switches is in its closed position;

Fig. 3 is a view similar to Fig. 2, showing the position of the interlocking mechanism when the other of the switches is in its closed position;

Fig. 4 is a bottom plan view of the interlocking mechanism shown in Figs. 1, 2 and 3;

Fig. 5 is a side elevational view looking from the right of the interlocking mechanism shown in Fig. 4;

Fig. 6 is a plan view of a modified form of interlocking mechanism;

Fig. 7 is a plan view of a pair of vertically-spaced electromagnetically-operated switches illustrating the application thereto of interlocking mechanism constructed in accordance with the principles of this invention;

Fig. 8 is a broken away side elevational view of the interlocking mechanism shown in Fig. 7 looking from the right;

Fig. 9 is a view similar to Fig. 8 looking from the left of the interlocking mechanism; and

Fig. 10 is a view similar to Fig. 8 illustrating a different position of the interlocking mechanism.

The preferred embodiment of the invention is shown in Figs. 1 through 5. Referring to Fig. 1, the numeral 1 designates a support on which is mounted in horizontally spaced relation a pair of electromagnetically operated switches indicated as a whole by the numerals 2 and 3. Each of the switches 2 and 3 is provided with an insulated housing or arcing chamber 4 containing a set of stationary contacts 5 and a set of movable contacts 6. Each set of movable contacts 6 is mounted in a conventional manner on a movable contact carrying member 7 for movement from the full open position shown in Fig. 1 to a closed position in which the stationary contacts 5 are electrically engaged with the movable contact 6. The movable contact carrying parts 7 of the switches 2 and 3 are provided respectively with operating parts 8 and 9 which are movable in parallel paths for effecting movement of the respective switches to circuit completing positions. Operation of each of the operating parts 8 and 9 is effected by an armature 10 constituting part of an electromagnet 11 having an energizing coil 12. Upon energization of a selected one of the coils 12, its armature 10 will operate to move the operating part 8 or 9 to which it is connected in an upward direction, as viewed in Fig. 1, to move one of the switches 2 or 3 to its closed position.

Operation of the operating parts 8 and 9, and thereby the operation of the switches 2 and 3, is controlled by interlocking mechanism indicated as a whole by the numeral 13. As best shown in Figs. 4 and 5, the interlocking mechanism 13 comprises a supporting bracket 14 having a back portion 15 by which it may be secured to the support 1 as by screws 16. Projecting outwardly from the bracket portion 15 are a pair of legs 17 and 18 of unequal length. Bell crank levers 19 and 20 are connected to the outer ends of the legs 17 and 18 by pivots 21 and 22. The bell crank 20 is provided with an outwardly projecting arm 23 having its end operatively connected to the operating part 8 of a switch 2 so that operation of the switch 2 will be effective to impart pivotal movement to the bell crank 20. The bell crank 19 is similarly provided with an outwardly projecting arm 24 which is operatively connected to the operating part 9 of the switch 3 so that operation of the switch 3 will

impart pivotal movement to the bell crank 19. The bell cranks 19 and 20 are provided respectively with arms 25 and 26 projecting inwardly toward each other and in overlapping relation so that their respective ends 27 and 28 are positioned on opposite sides of a center line between the pivots 21 and 22. Locking links 29 and 30 are connected respectively to ends 27 and 28 by pivots 31 and 32. The lower ends of the locking links 29 and 30 are connected together for angular movement relative to each other by a flat leaf spring 33. As best shown in Fig. 5, the leaf spring 33 is L-shaped and has a back portion 34 thereof anchored to the bracket 14 by means of a slot 35 formed in the bracket part 15 in which the one edge of the leaf spring portion 34 is receivable. An end of the leaf spring portion 34 is secured to the bracket 14 by threaded fastening members 36. A flexible portion 37 of the spring 33 projects outwardly from its back portion 34 to a position between the pivots 21 and 22 as best shown in Figs. 1 through 3. A slot is formed in the upper edge of the flexible spring 37 to provide a knife edge 38 which projects upwardly into the apex of V-shaped notches 39 formed in the lower ends of the locking links 29 and 30. The knife edge 38 on the flexible portion 37 of the spring 33 thus provides a common connection for the links 29 and 30 at their lower ends about which the links 29 and 30 may move relative to each other in a manner and for a purpose to be described.

Attention is particularly invited to the fact that the parts of the interlocking mechanism 13 are symmetrically arranged with respect to the flexible spring 37 when both switches 2 and 3 are in the open position as shown in Fig. 1. It will be noted in particular that the pivots 21 and 22, which form the fulcrums for the bell cranks 19 and 20, are spaced equal distances from and on opposite sides of the flexible spring 37 which can flex in a direction toward and away from such pivots. It will also be noted that the arms 23 and 24 extend in opposite directions to their points of engagement with the operating parts 8 and 9 of the switches 2 and 3. It will also be noted that the unequal length of the parts 17 and 18 of the support 14, as shown in Fig. 4, together with the offset construction of the bell cranks enables the inwardly projecting arms 25 and 26 to overlap each other with their end points 27 and 28 on opposite sides of the spring 33. The symmetrical arrangement is completed by the common connection provided by the knife edge 38 at the lower ends of the locking links 29 and 30 which have their upper ends pivoted at 31 and 32 to the ends 27 and 28 of the bell cranks 19 and 20.

With both switches 2 and 3 in their full open position as shown in Fig. 1, closure of either switch 2 or 3 may be readily effected by energization of the appropriate magnet 11. Assuming that the switch 2 is closed by energization by its operating magnet 11, the first action that will take place will be upward movement of the operating part 8 for the switch 2. As the operating part 8 moves upwardly, the bell crank 20 will be pivoted in a clockwise direction, and the end point 28 of its arm 26 will move downwardly. As the end point 28 moves downwardly, the locking link 30 will operate to flex the spring 37 to the left, and such action will cause the locking link 29 to rotate in a clockwise direction. When the switch 2 moves into its fully closed position, its operating part 8 and the parts of the interlocking mechanism

nism 13 will occupy the position shown in Fig. 2. In this position it will be noted that the locking link 29 is effective to prevent rotational movement of the bell crank 19 in a counterclockwise direction and thus upward movement of the operating part 9 for the switch 3. This locking action is due to the movement of the knife edge 38 to a position substantially underneath the pivot 31 as shown in Fig. 2. While this movement is taking place, the link 29 is pivoting in a clockwise direction about its pivot 31, and such pivotal movement takes place without any perceptible movement being imparted to the bell crank 19. In addition, substantially all of the flexing of the spring 37 and movement of the knife 38 to the left takes place during the initial portion of the closing movement of the switch 2. At the moment the closing action begins to take place, it will be noted that pivot 32 will move downwardly toward the spring 37 and its knife edge 38, thus tending to shorten the distance between the pivot 32 and the knife edge 38. This results in a rapid movement of the knife edge 38 to the left from the position shown in Fig. 1, and the switch 2 will have barely moved out of its open position when the locking link 29 will become operable to prevent movement of the bell crank 19 and consequent movement of the switch 3 out of its full open position. During the final closing action of the switch 2 to the position shown in Fig. 2, it will be noted that the pivot 32 is moving substantially tangentially with respect to a circle having as its center the knife edge 38. As a result there will be very little movement of the spring 37 during the final movement of the switch 2 to its closed position.

The above-described movements of the interlocking mechanism 13 must be reversed to return the parts to the position shown in Fig. 1 before the operating part 9 may move upwardly to effect closing of the switch 3. This means that the operating part 8 for the switch 2 must be lowered from the position shown in Fig. 2, and during its initial movement very little movement of the knife edge 38 is permitted. Most of the flexing movement of the spring 37 during the return of the knife edge 38 to its center position, as shown in Fig. 1, takes place during the final movement of the switch 2 to its full open position. It will thus be seen that as the switch 2 moves into its full open position, the switch 3 will still be in its full open position.

When the operating part 9 moves upwardly to effect a closing of the switch 3, the parts of the interlocking mechanism 13 will move to the position shown in Fig. 3. In this position the link 30 is operative to prevent clockwise movement of the bell crank 20 and upward movement of the operating part 8 to close the switch 2. The movement of the parts into the position shown in Fig. 3 is accomplished in the same manner and at the same rates of travel as described in connection with Fig. 2.

From the foregoing, it will be apparent that a small movement of either switch toward its closed position will be effective to lock the other of the switches against movement to its closed position. It will also be noted that the switch which has moved toward or into its closed position must be returned to substantially its full open position before the other switch can move toward or into its closed position.

In addition to the action of the spring 37 in cooperation with the locking links 29 and 30 to insure movement of both switches to a full open

position before either can be closed, it will be noted that the tension imparted to the spring 37 by closure of one of the switches is effective to produce a biasing force for returning a switch to its open position upon deenergization of its operating magnet 11. In the event that the operating magnet for a switch in open position is energized prior to movement of the other position to its full open position, the closing force applied by the magnet energized will be transmitted in a direction assisting the spring 37 in the return of the other switch to its full open position.

Referring to Fig. 2, it will be noted that the knife edge 38 is positioned slightly to the right of a position directly underneath the pivot 31. Referring to Fig. 3, it will be noted that the knife edge 38 is positioned slightly to the left of a position directly underneath the pivot 32. The positions of the knife edge 38 illustrated respectively in Figs. 2 and 3 represent the extreme end portions of the path of movement of the knife edge 38. By constructing the parts in such manner that the end points of the path of movement of the knife edge 38 are maintained within the outer limits of the pivots 31 and 32, jamming action by reason of energization of one of the operating magnets prior to deenergization of the other operating magnet is effectively prevented. This action will be best understood by referring to Fig. 2 and assuming that the magnet 11 to the right of Fig. 2 is energized prior to deenergization of the magnet 11. Since the knife edge 38 is positioned to the right of the pivot 31, the force applied to the bell crank arm 24 upon energization of the magnet to the right is applied to the bell crank 20 through the interlocking mechanism 13 in a direction tending to move the operating part 8 for the switch 2 downwardly and to its open position. Consequently, upon deenergization of the magnet 11, this force will be effective immediately to open the switch 2 without any jamming action tending to hold the switch in its closed position.

The modified form of interlocking mechanism illustrated in Fig. 6 is essentially the same as the interlocking mechanism shown in Figs. 1 through 5, and like parts have been designated by like numerals. In this construction, the common connection at the base of the links 29 and 30 is provided by a pivot pin 40 about which the links 29 and 30 may move angularly relative to each other. A roller 41 is carried by the pivot 40 and is engageable with a surface 42 during the back and forth movement of the common connection or pivot 40 between the pivots 21 and 22. The operation of this structure during opening and closing movements of a pair of switches is substantially the same as that described in connection with Figs. 1 through 3.

The modification, illustrated in Figs. 7 through 10, illustrates the application of interlocking mechanism, designated as a whole by the numeral 50, and constructed in accordance with the principles of this invention, to a pair of switches 51 and 52 mounted in vertically spaced relation and respectively having electromagnetically actuated operating parts 53 and 54. The interlocking mechanism 50 comprises a support 55 on which a pair of arcuately-shaped levers 56 and 57 are pivotally mounted respectively by pivots 58 and 59. The arrangement of the pivots 58 and 59 will be best understood by referring to Figs. 8 and 9 which show the interlocking mechanism 50 from opposite sides thereof. As best shown in Figs. 7 and 8, the lever 56 is pivotally

connected to an actuating member 60, which in turn is connected to a vertically movable actuating part 61 of the switch 52. As best shown in Figs. 7 and 9, the link 57 is pivotally connected to a vertically movable operating part 62 of the switch 51. A locking link 63 is pivotally connected to the lever 56 and a locking link 64 is pivotally connected to the lever 57. The links 63 and 64 are provided with V-shaped notches 65 at their lower ends, and a knife edge 66 provided on a flat leaf spring 67 extending transversely of the levers 56 and 57 projects upwardly into the notches 65 to provide a common connection at the lower ends of the locking links 63 and 64.

When both of the switches 51 and 52 are in their full open position, the locking links 63 and 64 will be symmetrically arranged with respect to the spring 67. Figs. 7, 8 and 9 show the relative positions of the parts with the lower switch 51 in a closed position. When the switch 51 moves to a closed position, the lever 57 moves upwardly about its pivot and causes the locking link 64 to move the spring 67 to the left as viewed in Fig. 8. With the locking link 63 in the position shown in Fig. 8, the spring 67 will function to prevent upward movement of the link 63 and pivotal movement of the lever 56 in a clockwise direction, as viewed in Fig. 8. Upward movement of the operating part 61 and consequent movement of switch 52 to a closed position will thus be prevented.

Fig. 10 illustrates the positions of the parts of the interlocking mechanism 50 when the operating part 61 has moved upwardly to close the switch 52. When the operating part 61 moves upwardly to close the switch 52, the lever 56 is pivoted in a clockwise direction, as viewed in Fig. 10, and the locking link 63 moves the spring 67 to the right as viewed in Fig. 10. In this position upward movement of the link 64 is prevented by reason of its engagement with the spring 67. Consequently, upward movement of the lever 57 and downward movement of the operating part 62 connected to the magnet for the switch 51 is prevented, and closure of the switch 51 is likewise prevented.

In the arrangement shown in Figs. 7 through 10, the levers 56 and 57, together with the locking links 63 and 64, and the common connection provided by the spring 67 is effective to prevent movement of one of the switches out of its full open position upon movement of the other switches toward or into its closed position. In addition, the interlocking mechanism 50 is effective to insure that the switch in closed position is returned to its full open position before the other switch can be moved to its closed position.

Since certain changes may be made in the above-described construction and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all the matter contained in the above description and shown in the accompanying drawings shall be considered as illustrative and not in a limiting sense.

I claim as my invention:

1. An interlocking mechanism comprising a pair of bell cranks respectively having a fulcrum and a pair of arms disposed in fixed relative angular positions, said fulcrums being located at spaced points, one arm on each of said bell cranks projecting outwardly and each being constructed and arranged to have a force applied thereto to move the associated one of said bell

cranks, the remaining arm of each of said bell cranks extending inwardly toward the remaining arm of the other bell crank, the end points of the remaining arms lying in overlapping relation to provide end points on opposite sides of a center-line between said spaced fulcrums, a pair of locking links, each of said end points on said remaining arms having a pivot to which one of said links is connected, and a common connection interconnecting said links for angular movement relative to each, said common connection having a position located substantially centrally with respect to said fulcrums prior to movement of either of said bell cranks.

2. An interlocking mechanism comprising a pair of bell cranks respectively having a fulcrum and a pair of arms, said fulcrums being located at spaced points, one arm on each of said bell cranks projecting outwardly and being constructed and arranged to have a force applied thereto to move the associated one of said bell cranks, the remaining arm of each of said bell cranks extending inwardly toward the remaining arm of the other bell crank, the end points of the remaining arms lying in overlapping relation to provide end points on opposite sides of a centerline between said spaced fulcrums, a pair of locking links, each of said end points on said remaining arms having a pivot to which one of said links is connected, and a flat leaf spring positioned centrally of said bell cranks and mounted for flexing movement toward and away from said fulcrums, each of said locking links having V-shaped notches provided therein, said spring having a knife edge projecting into said notches to provide a common connection about which said links may move angularly relative to each other.

3. An interlocking mechanism comprising a pair of bell cranks respectively having a fulcrum and a pair of arms, said fulcrums being located at spaced points, one arm on each of said bell cranks projecting outwardly and being constructed and arranged to have a force applied thereto to move the associated one of said bell cranks, the remaining arm of each of said bell cranks extending inwardly toward the remaining arm of the other bell crank, the end points of the remaining arms lying in overlapping relation to provide end points on opposite sides of a center-line between said spaced fulcrums, a pair of locking links, each of said end points on said remaining arms having a pivot to which one of said links is connected, a common pivot interconnecting said links for angular movement relative to each other, said pivot being located an equal distance from each of said end points, a roller carried by said pivot, and a support having a surface extending between said fulcrums with which said roller is engageable.

4. An interlocking mechanism for a pair of levers for locking one lever upon movement of the other which comprises a pair of pivotally mounted levers, a pair of locking links, each of said links having a separate pivotal connection to one of said levers, and a flat leaf spring positioned between said levers, each of said locking links having V-shaped notches provided therein, said spring having a knife edge projecting into said notches to provide a common connection about which said links may move angularly relative to each other.

5. An interlocking mechanism for a pair of levers for locking one lever upon movement of the other which comprises a pair of levers respectively having a pivot mounting, said pivot

mountings being located at spaced points, said levers extending toward each other and in overlapping relation from their respective pivot mountings and having end points positioned on opposite sides of a center-line between said mountings, a pair of locking links, each of said end points having one of said links pivotally connected thereto, and a common connection connecting said locking links for angular movement relative to each other, said common connection being located substantially centrally of said pivot mountings prior to movement of either of said levers, pivotal movement of one of said levers being effective through the locking link connected thereto and said common connection to move the other of said locking links into a locking position with respect to the other of said levers to prevent movement of the other of said levers.

6. An interlock for a pair of relatively movable members operable to lock one of said members against movement in response to movement of the other of said members which comprises a pair of levers respectively having a pivot mounting and a connection operable to effect pivotal movement thereof in response to movement of one of said members, a pair of locking links, each of said levers having one of said locking links pivotally connected thereto, and a flat leaf spring mounted for flexing movement between said levers, each of said links being provided with a V-shaped notch, said spring having a knife edge projecting into both of said notches to provide a common connection between said links about which they may move angularly relative to each other, pivotal movement of one of said levers in response to movement of one of said members being effective through the locking link connected thereto and said common connection to move the other said links into a locking position with respect to the other of said levers for preventing movement of the other of said levers.

7. An interlock for a pair of relatively movable members operable to lock one of said members against movement in response to movement of the other of said members which comprises a pair of levers respectively having a pivot mounting and a connection with one of said members so that movement of either of said members will impart pivotal movement to one of said levers, said pivot mountings being located at spaced points, said levers extending toward each other and in overlapping relation from their respective pivot mountings and having end points positioned on opposite sides of a center-line between said pivot mountings, a pair of locking links, each of said end points having one of said locking links pivotally connected thereto, and a common connection connecting said links for angular movement relative to each other, said common connection being located substantially centrally of said pivot mountings prior to movement of either of said members, pivotal movement of one of said levers in response to movement of one of said members being effective through the locking link connected thereto and said common connection to move the other of said locking links into a locking position with respect to the other of said levers to prevent movement of the other of said members.

8. An interlock for a pair of relatively movable members operable to lock one of said members against movement in response to movement of the other of said members which comprises a pair of levers respectively having a pivot mounting and a connection with one of said members so that

movement of either of said members will impart pivotal movement to one of said levers, said pivot mountings being located at spaced points, said levers extending toward each other and in overlapping relation from their respective pivot mountings and having end points positioned on opposite sides of a center-line between said pivot mountings, a pair of locking links, each of said end points having one of said locking links pivotally connected thereto, and a flat leaf spring positioned between and mounted for flexing movement toward and away from said pivot mountings, each of said links being provided with a V-shaped notch, said spring having a knife edge projecting into both of said notches to provide a common connection for said links about which they may move angularly relative to each other, said common connection being located substantially centrally of said pivot mountings prior to movement of either of said members, pivotal movement of one of said levers in response to movement of one of said members being effective through the locking link connected thereto and said common connection to move the other of said locking links into a locking position with respect to the other of said levers to prevent movement of the other of said members.

9. An interlocking mechanism for a pair of levers for locking one lever upon movement of the other which comprises a pair of levers respectively having a pivot mounting, said pivot mountings being spaced from each other, said levers extending toward each other and in overlapping relation from their respective pivot mountings and having end points positioned on opposite sides of a center-line between said pivot mountings, a pair of locking links, each of said end points having one of said links pivotally connected thereto, and a flat leaf spring mounted between said pivot mountings for flexing movement toward and away from said pivot mountings, each of said locking links having a V-shaped notch formed therein, said spring having a knife-edge projecting into said notches to provide a common connection between said links about which said links may move angularly relative to each other, said common connection being normally located substantially centrally of said pivot mountings prior to pivotal movement of either of said switches, pivotal movement of one of said levers being effective through the locking link connected thereto and said common connection to move the other of said locking links into a locking position with respect to the other of said levers to prevent operation of the other of said levers.

10. An interlocking mechanism for a pair of levers for locking one lever upon movement of the other which comprises a pair of levers respectively having a pivot mounting, said levers being positioned side-by-side and having their pivot mountings spaced from each other, a flat leaf spring extending transversely of said levers and mounted for flexing movement toward and away from said pivot mountings, each of said levers having a locking link pivotally connected thereto, each of said locking links having a V-shaped notch formed therein, said flat leaf spring having a knife edge extending into said notches to provide a common connection about which said locking links may move relatively to each other, movement of one of said levers being effective through the link connected thereto to flex said leaf spring, flexing movement of said spring being effective to pivot the other of said links into

11

a locking position with respect to the other of said levers to prevent operation of the other of said levers.

OWEN L. TAYLOR.

REFERENCES CITED

The following references are of record in the file of this patent:

12**UNITED STATES PATENTS**

Number	Name	Date
1,117,198	Langley -----	Nov. 17, 1914
1,200,447	Albers -----	Oct. 10, 1916
1,439,905	Lull -----	Dec. 26, 1922
2,108,634	Wilms -----	Feb. 15, 1938
2,349,616	Ellis -----	May 23, 1944
2,359,606	Bellon -----	Oct. 3, 1944