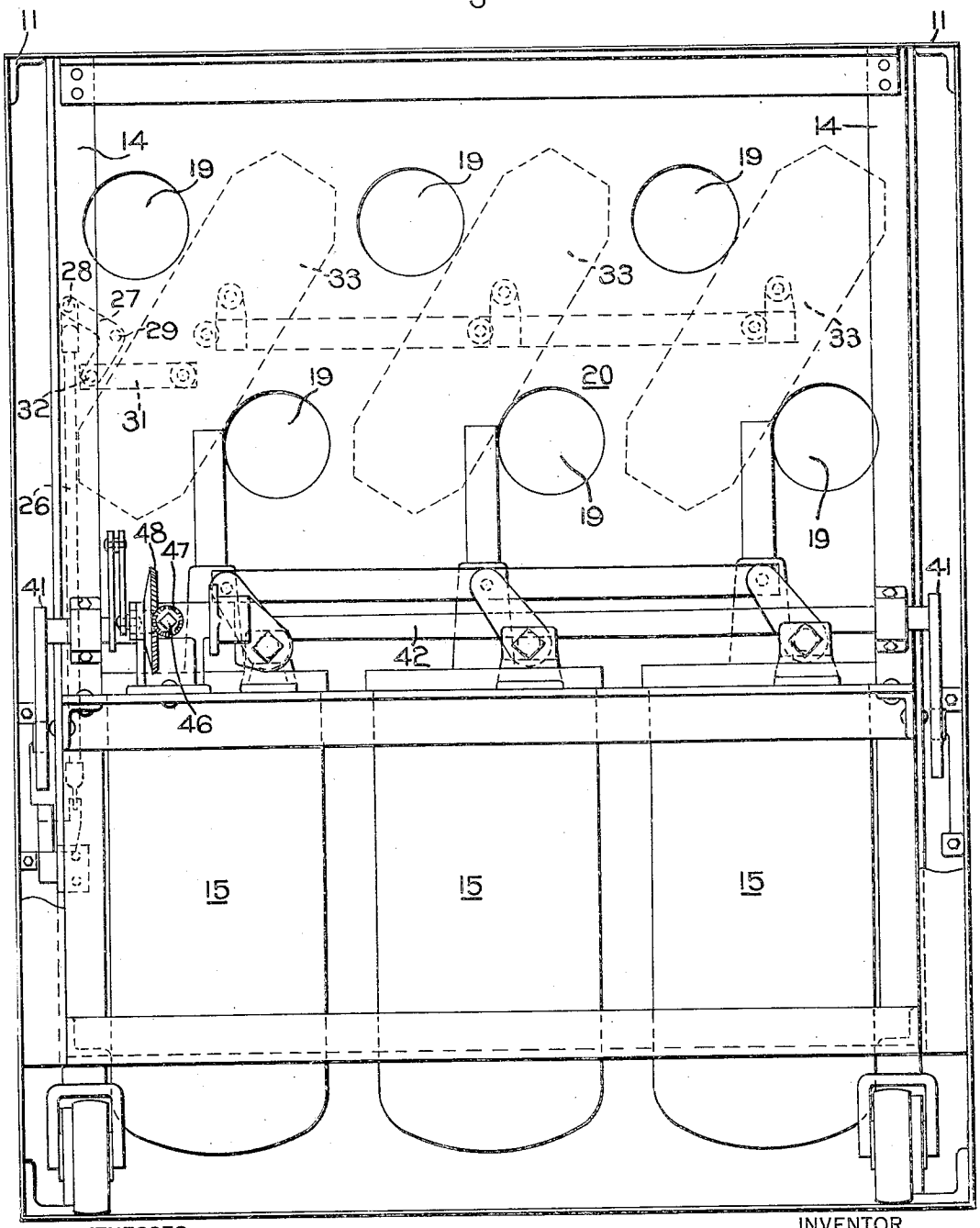
Oct. 1, 1929. J. M. BROWN 1,729,864

SWITCH MECHANISM

Filed Dec. 20, 1926 4 Sheets-Sheet 1

Fig. 1.



WITNESSES:
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Harrison Bates.

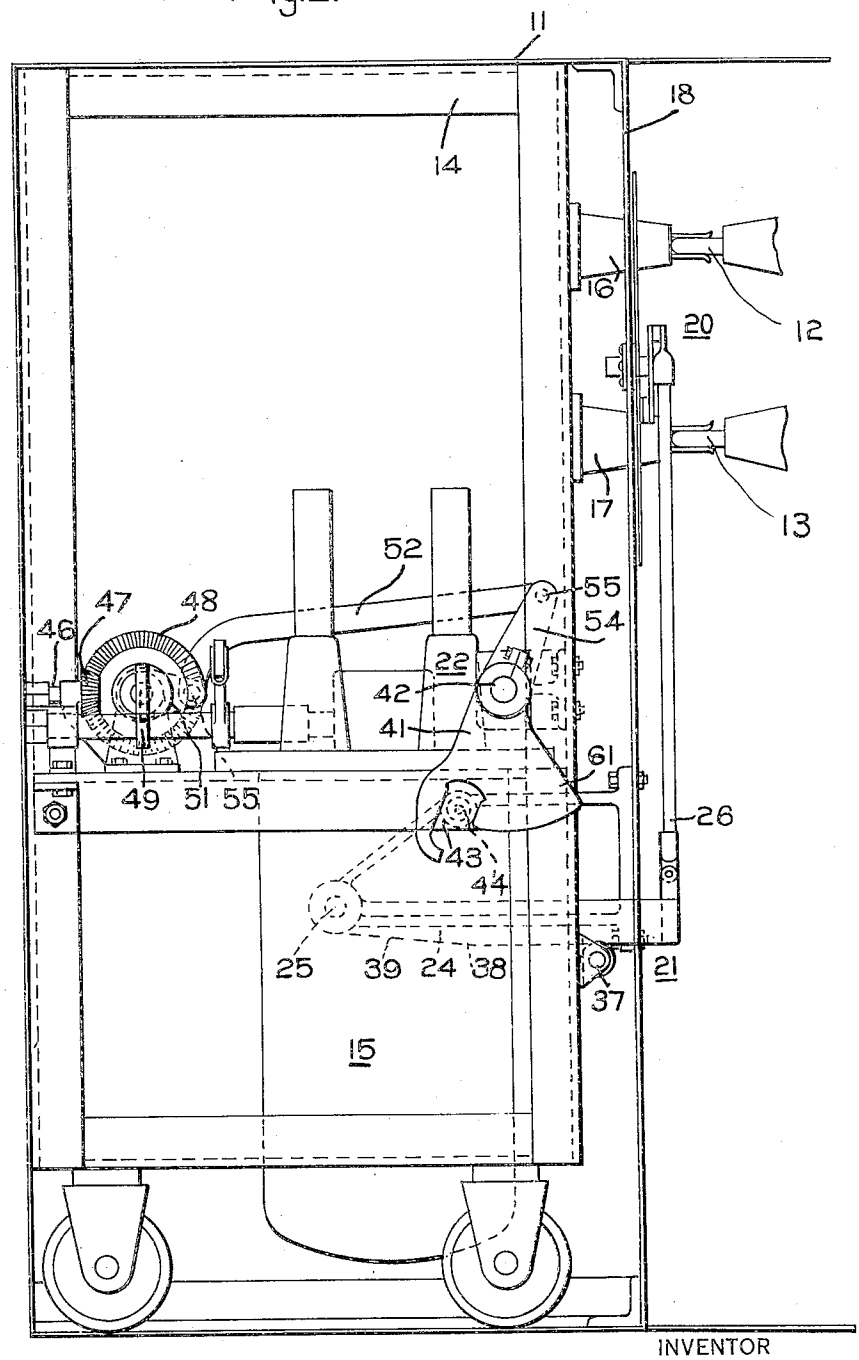
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SWITCH MECHANISM

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Fig.2.



WITNESSES:
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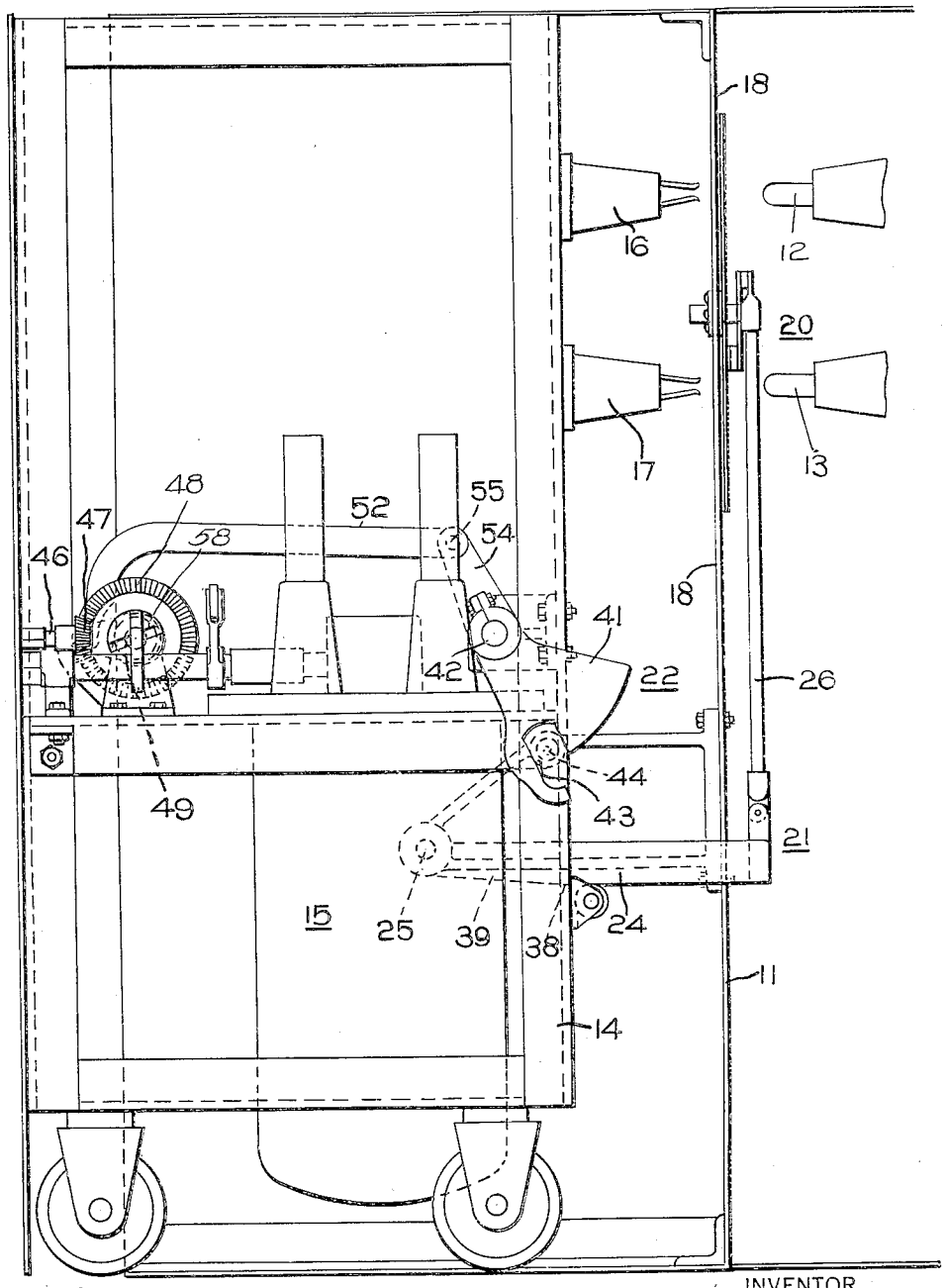
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SWITCH MECHANISM

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Fig. 3.



WITNESSES:
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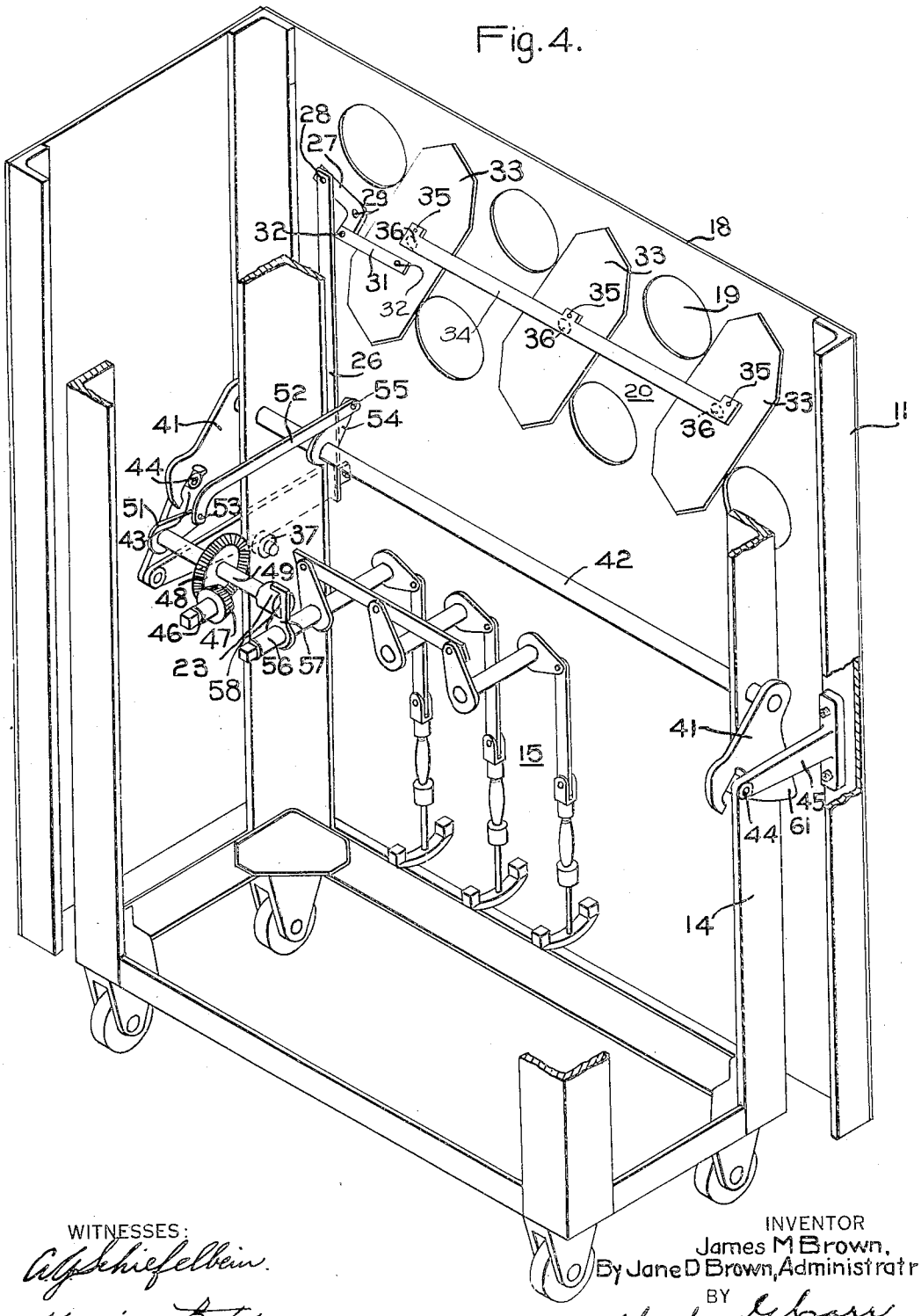
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SWITCH MECHANISM

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Fig. 4.



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UNITED STATES PATENT OFFICE

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SWITCH MECHANISM

Application filed December 20, 1926. Serial No. 155,807.

This invention relates to switch mechanisms and particularly to switch mechanisms of the cell type.

One object of this invention is to provide a switch mechanism comprising two relatively movable structures with means that shall predetermine the relative positions of the structures.

Another object of this invention is to provide a switch mechanism comprising a stationary structure, a movable structure and a partition therebetween having openings therein, with means that shall automatically close or open the openings in response to relative movement of the structures toward or away from each other.

Another object of this invention is to provide a switch mechanism comprising a stationary structure having fixed contact members disposed therein, and a relatively movable structure having a circuit breaker and contact members for cooperating with the fixed contact members, with means that shall prevent the separation of the corresponding contact members so long as the circuit breaker is closed.

Another object of this invention is to provide a switch mechanism comprising a stationary structure having fixed contact members therein, a relatively movable structure having a circuit breaker and contact members for engaging the fixed contact members, a partition between the two structures having openings therein, a shutter mounted on the partition for closing the openings, and a mechanism for prying the movable structure into a predetermined position, with a mechanical connection between the shutter, the circuit breaker and the prying mechanism that shall render the mechanical connection inoperative when the circuit breaker is in its closed position.

The inventor has found it to be advisable to pry the movable switch structure into or out of the stationary switch structure, because of the resistance encountered between the co-operating contact members in closing or separating the structures, and, at the same time to prevent the separation of the co-operating contact members when the circuit breaker is closed. He has, accordingly, provided the switch mechanism with means for prying the structures into a predetermined position, means for rendering the prying mechanism inoperative so long as the circuit breaker is closed, and means for automatically closing or opening the entrances to the live parts in the stationary structure in response to relative movement of the structures away from or toward each other.

It is a further object of this invention to provide a switch mechanism having the above characteristics that shall be practical in operation, inexpensive to manufacture and be capable of rendering complete safety to the operator.

In the accompanying drawings:—

Figure 1; is the front view, in elevation, of a switch mechanism embodying this invention.

Fig. 2, is a side view, in elevation, of a switch mechanism embodying this invention, showing the structure in closed position.

Fig. 3, is a side view, in elevation, of a switch mechanism embodying this invention, showing the structure in a partially open position.

Fig. 4, is a broken isometrical view of a switch mechanism embodying this invention.

In practicing this invention, he provides a stationary structure 11 having fixed or stationary contact members 12 and 13 disposed therein and a relatively movable structure 14 having a circuit breaker 15 and contact members 16 and 17 for engaging and co-operating with the fixed contact members 12 and 13. A partition 18 is disposed between the structures and is provided with openings 19 therein for permitting access to the stationary contact members 12 and 13. A shutter mechanism 20 is mounted on the partition 18 for closing the openings 19 and is automatically controlled by a mechanism 21. A mechanism 22 is provided for prying the movable structure 14 into and out of the stationary structure 11 and a mechanical connection 23 co-operates with the shutter mechanism 20, the circuit breaker 15 and the prying mechanism 22 for preventing the separation of the structures 11 and 14 so

long as the circuit breaker 15 is in its closed position.

Referring to Figs. 2 and 3, as a matter of simplicity I will hereinafter refer to the structures 11 and 14 as having three relative positions, viz;—a closed position, illustrated in Fig. 2, an open position illustrated in Fig. 3, and a full-open position (not shown) when the structures are completely separated.

Referring to Figs. 1 and 2, the structures 11 and 14 are here shown in a closed position, and the shutter mechanism 20 is in an open position, thereby permitting the engagement of the corresponding contact members 12, 16 and 13, 17. The shutter mechanism 20 remains in an open position so long as the structures 11 and 14 are in their closed position.

The mechanism 21 for automatically operating the shutter mechanism 20 comprises a lever 24 pivotally mounted on one side of and within the stationary structure 11 by means of the pivot 25. The other end of the lever 24 is pivotally connected to the lower end of a rod 26. The upper end of the rod 26 is pivotally connected to one end of a bell-crank 27 by means of the pivot 28. The bell-crank 27 is pivotally mounted on the partition 18 by the pivot 29. The other end of the bell-crank 27 is pivotally connected to a connecting link 31 by means of the pivot 32, and the other end of the connecting link 31 is pivotally connected to the shutter mechanism 20 by means of the pivot 32. The shutter mechanism 20 consists of a plurality of shutter plates 33 that are pivotally connected together by a connecting member 34 by means of pivots 35, and, as the shutter mechanism is pivotally mounted on the partition by means of the pivot 36, the shutter plates 33 are simultaneously moved together.

A roller 37 is provided on the side of the moveable structure 14 and is adapted to engage the lower surface of the lever 24 for raising or lowering it, as the structures 11 and 14 are moved toward or away from each other. Fig. 2 shows the lever 24 in its uppermost position and, as the movable structure 14 is separated from the stationary structure 11, the roller 37, moving along the lower surface of the lever 24, prevents it from moving in a downward direction until the roller 37 reaches the point 38 on the lower surface of the lever. At the point 38, the lever 24 is provided with a tapered surface 39 for permitting the lever 24 to move in a downward direction as the roller 37 moves outwardly, thereby moving the rod 26 in a downward direction.

The rod 26, being pivotally connected to the bell-crank 27, moves it in a counter-clockwise direction about the pivot 29 during its downward movement. The connecting arm 27, in turn, moves the connecting link 31 to the right, thereby turning the shutter plates 33 about their respective pivots 36 to their closed positions to prevent access to the fixed terminals 12 and 13 disposed in the stationary structure 11.

The lower surface of the lever 24 to the right-hand of the point 38, is designed to prevent the lever 24 from moving in a downward direction until the contact members 16 and 17 disposed in the movable structure 14 have been drawn out of the path of the shutter mechanism 20, and upon further separation of the structures 11 and 14 the shutter mechanism 20 is permitted to move to its closed position, thereby preventing access to the contact members 12 and 13 and other live conducting parts disposed in the stationary structure 11.

Referring to Figs. 2, 3 and 4, the prying mechanism 22 comprises cam members 41 disposed at the opposite ends of a shaft 42 to which they are rigidly connected for movement therewith. The cam members 41 are provided with slots 43 which are adapted to receive and co-operate with lugs 44. The lugs 44 are disposed on supporting members 45 that are rigidly fastened to the sides of the stationary structure 11, as shown in Fig. 4.

The prying mechanism 22 is further provided with an operting shaft 46, having a pinion 47 to engage and co-operate with a gear 48 that is disposed on a shaft 49. The shaft 49 is provided at its left-hand end, with an arm 51 that is rigidly fastened thereto. The arm 51 is pivotally connected to one end of a connecting link 52 by means of a pivot 53. The other end of the connecting link 52 is pivotally connected to one end of a connecting arm 54 by means of a pivot 55. The other end of the arm 54 is rigidly connected to the shaft 42 and is adapted to move therewith.

The operating shaft 46 may be operated by any suitable handle, and the pinion 47, cooperating with the gear 48, which is rigidly fastened to the shaft 49, turns the shaft 42 through the co-operation of the connecting arm 51, the connecting link 52, and the connecting arm 54; and, as the cam shaped members 41 are rigidly connected to the shaft 42 and are adapted to move therewith, the cam members 41 are oscillated in response to the movements of the operating shaft 46. The cam members 41, co-operating with the lugs 44, pry the structures 11 and 14 into their open or closed positions in response to movement of the operating shaft 46.

Referring to Fig. 4, the circuit breaker 15 is diagrammatically shown in a closed position. The circuit breaker 15 is provided with an operating shaft 56 which may be operated by any suitable handle. An arm 57 is provided on the shaft 56 that is adapted

to engage and to co-operate with a slot 58 disposed in the shaft 49 for preventing the operation of the shaft so long as the circuit breaker 15 is in its closed position.

In order to operate the prying-mechanism-operating shaft 46, it is first necessary to turn the circuit-breaker-operating shaft 56 in a clockwise direction, thereby disengaging the arm 57 from the slot 58. Then the operating shaft 46 may be turned in a counter-clockwise direction, and, through the co-operation of the gear 48, the shaft 49, the arm 51, the connecting link 52, the arm 54, the shaft 42, the cam members 41, the slot 43, and the lugs 44, the structures 11 and 14 are moved toward their open positions.

The shaft 49 is permitted to turn through an angle of 180 degrees and, during this movement, the structures 11 and 14 are moved by the prying mechanism 22 from closed positions to their open positions. Therefore, the arm 57 is prevented from engaging the slot 58 so long as the prying mechanism 22 is not in either its closed or its open position, thereby preventing the closing of the circuit breaker 15 so long as the prying mechanism 22 is not in either its closed or its open position.

Referring to Fig. 3, which illustrates the structure as in a partially open position, when the movement of the prying mechanism 22 is continued to its full open position, the movable structure 14 may be pulled out to its full-open position for inspection and repair. If the prying mechanism 22 is moved to its closed position, and the circuit breaker 15 is closed while the movable structure 14 is separated from the stationary structure 11, the structures are prevented from being moved to their closed positions while the circuit breaker 15 and prying mechanism 22 are in their closed positions, as it is necessary to turn the prying mechanism 22 to its open position in order that the slots 43 may receive the lugs 44, and it is necessary to first open the circuit breaker 15 in order to move the prying mechanism 22 to its open position. Accordingly, the structures 11 and 14 are prevented from being moved to their closed positions excepting when the prying mechanism 22 and the circuit breaker 15 are in their open positions.

Should an attempt be made to move the structures to their closed positions such movement would be prevented by the body portions of the cam members 41 being interposed in the path of the lugs 44, thereby rendering it impossible to move the structure 14 to its closed position so long as the circuit breaker 15 is closed.

From the foregoing, it will be seen that the inventor has provided a switch mechanism comprising a fixed switch structure having contact members and other electrical conducting parts disposed therein, a movable switch structure having a circuit breaker, contact members and other well-known switchboard apparatus for co-operation with the contact members disposed in the stationary cell; a partition disposed between the two structures and having openings therein; a shutter mounted on the partition for automatically closing the openings; a mechanism for prying the movable structure into a predetermined position; and a mechanical connection between the shutter, the circuit breaker and the prying mechanism, together with means for operating the circuit breaker, prying mechanism and the shutter, whereby the shutters are automatically opened or closed in response to movement of the structures toward or away from the other, and whereby the structures are prevented from separation so long as the circuit breaker is in its closed position; and are prevented from closing so long as the circuit breaker is in a closed position, and whereby the prying mechanism is rendered inoperative when the structures are in a closed position except when the circuit breaker is in its open position.

While the inventor has illustrated only one embodiment of the invention, it will be apparent to those skilled in the art that certain changes, modifications, additions and omissions may be made in the above described apparatus without departing from the spirit and scope of the appended claims.

I claim as the invention:

1. In a switch mechanism, the combination with a stationary structure, a separate movable structure, and a circuit breaker mounted in the movable structure, of a prying mechanism for moving the movable structure relative to the stationary structure, said prying mechanism comprising a cam shaped member having a slotted portion disposed to engage a portion of the stationary structure, and means for operating the cam shaped member.

2. In a switch mechanism the combination with a stationary structure, a separate movable structure, and a circuit breaker mounted in the movable structure, of a prying mechanism for moving the movable structure, said prying mechanism comprising a cam-shaped member provided with a slotted portion disposed to engage a portion of the stationary structure, a rotatable member mounted in the movable structure, and gears and a link for connecting the rotatable member and the cam member.

3. In a switch mechanism, the combination with a stationary cell structure, a movable structure, a circuit breaker mounted in the movable structure, and means for operating the circuit breaker, of a prying mechanism for moving the movable structure relative to the stationary structure, and a latch mounted on the means for operating the cir-

cuit breaker and disposed to engage a portion of the prying mechanism when the circuit breaker is closed thereby preventing the operation of the prying mechanism so long as the circuit breaker is closed.

4. In a switch mechanism, the combination with a stationary cell structure, a movable structure, a circuit breaker mounted in the movable structure, and means for operating the circuit breaker, of a projection disposed on the stationary structure, a prying mechanism disposed on the movable structure for engaging the projection and moving the movable structure into and out of the stationary structure, said prying mechanism having a projecting portion disposed to engage the projection and prevent the closing of the movable structure and the stationary structure when the prying mechanism is not in an open position, and a projection mounted on the circuit breaker operating means and disposed to engage a part of the prying mechanism to prevent the opening of the prying mechanism so long as the circuit breaker is in a closed position.

5. In a switch mechanism, the combination with a stationary cell structure, a movable structure, a circuit breaker mounted in the movable structure, and means for operating the circuit breaker, of a projection disposed on the stationary structure, a prying mechanism disposed on the movable structure for moving the movable structure into and out of the stationary structure, said prying mechanism comprising a prying member having a cam faced portion provided with a slot disposed to engage the projection on the stationary structure, and said cam faced portion being so disposed on the prying member as to engage the projection and prevent the closing of the movable structure and the stationary structure when the prying mechanism is not in an open position.

6. Switch mechanism comprising a cell, a movable circuit-breaker unit within the cell, an operating shaft for the circuit-breaker contacts, an operating shaft for moving the unit with respect to the cell and disposed at right angles to the first shaft and means on the first shaft interlocking with means on the end of the second shaft for preventing movement of the unit when the contacts are in closed position.

7. Switch mechanism comprising a cell, fixed contacts on the cell, a movable circuit-breaker unit within the cell, contacts on the unit for detachably engaging the contacts on the cell, an operating shaft for the circuit-breaker contacts, an interlocking member on the said shaft, an operating shaft for moving the unit and disposed at right angles to the first shaft and having a notch in the end thereof for receiving the interlocking member when the unit is in operative position and the circuit-breaker contacts are closed, for preventing movement of the unit when the circuit-breaker contacts are in closed position.

In testimony whereof, I have hereunto subscribed my name this 16th day of December, 1926.

JANE D. BROWN,
Administratrix of the Estate of James M. Brown, Deceased.