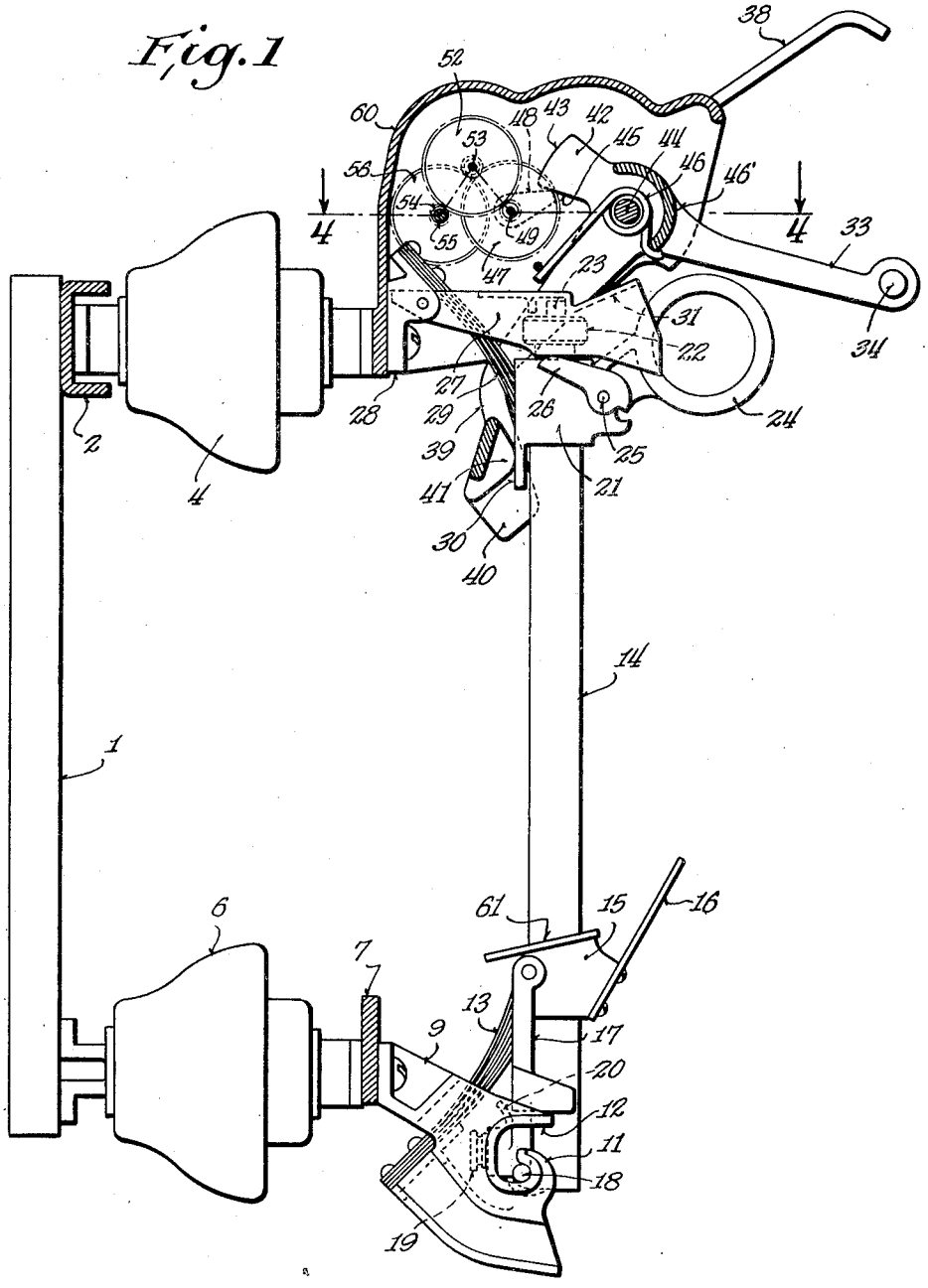
Dec. 22, 1942. W. O. SCHULTZ ET AL 2,305,996

REPEATING FUSE CONSTRUCTION

Filed May 25, 1940 3 Sheets-Sheet 1

Fig. 1



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REPEATING FUSE CONSTRUCTION

Filed May 25, 1940 3 Sheets-Sheet 2

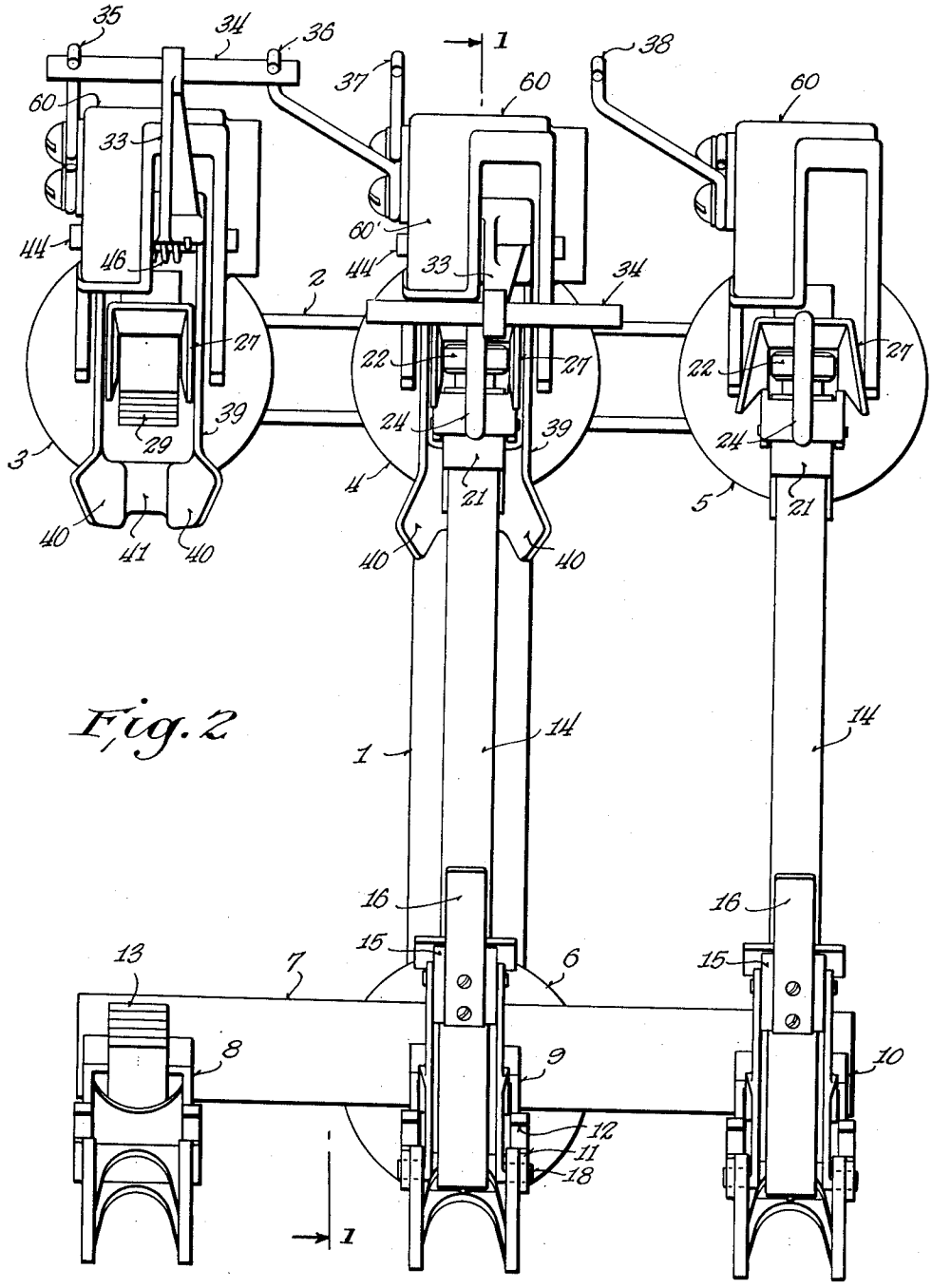

Fig. 2

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REPEATING FUSE CONSTRUCTION

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Fig. 3

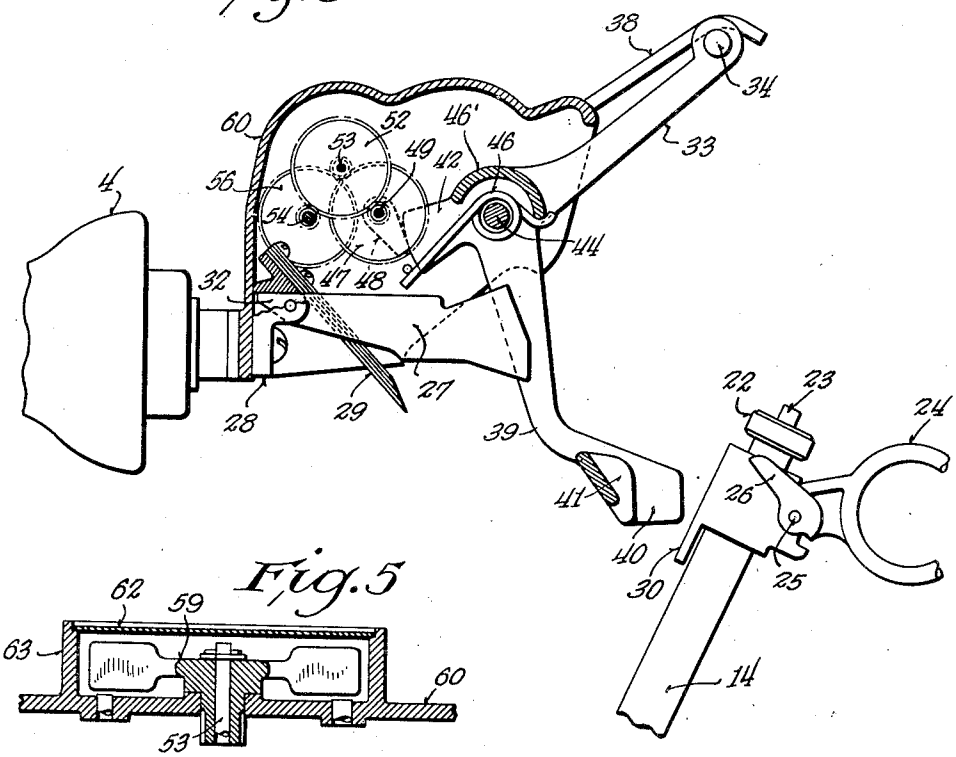

Fig. 5

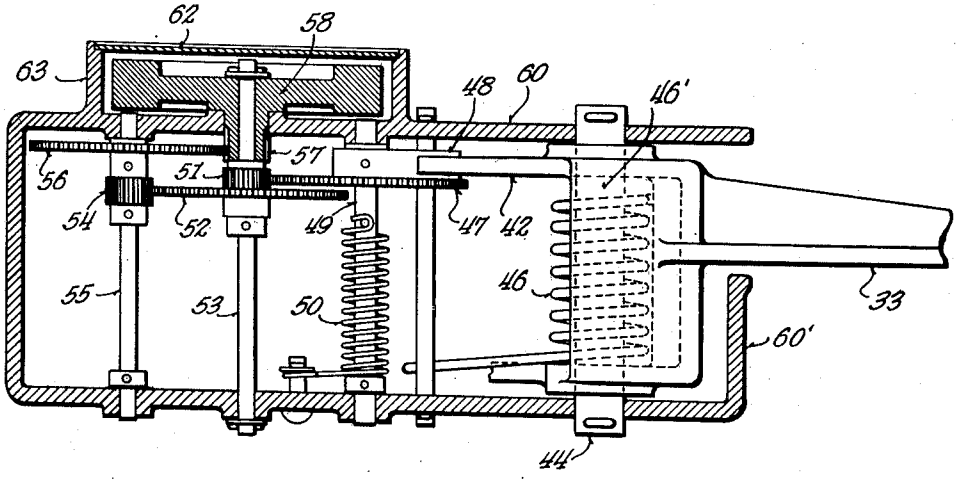

Fig. 4

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UNITED STATES PATENT OFFICE

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REPEATING FUSE CONSTRUCTION

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Application May 25, 1940, Serial No. 337,195

14 Claims. (Cl. 200—126)

This invention relates to a repeating fuse construction and is particularly directed to a construction in which a device is provided which recloses the circuit after the blowing of a fuse and connects a fresh or reserve fuse in the circuit, such device being capable of repeating as many times as the device is designed for.

The advantage of this automatic repeating fuse construction is that the device lends itself to transmission service and customer's substation service. Frequently in these services short-circuits occur due to any one of many causes, such as a tree falling across a pair of lines, a pair of lines being whipped together by a wind, a flashover, a temporary ground, or the branch of a tree which in a violent wind may be blown against the line. Under these and similar conditions it frequently happens that the trouble is only temporary and that it either ceases of itself or the fault is burned out almost immediately.

This invention is designed to provide a device which will take care of conditions such as outlined above, which will electrically disconnect the blown fuse from the line, and after a predetermined brief interval immediately connect a reserve or fresh fuse in the line, such device providing for the successive operation of as many fuses as the device is equipped to handle, and to provide a device of this type in which the time delay interval is obtained by an automatic time delay device.

Further objects are to provide a construction in which the device is well suited for high voltage lines, in which each fuse as it blows drops downwardly and swings outwardly clear of the upper contact to thereby provide maximum spacing at the open portion of the circuit, and in which switch mechanism is provided for connecting the succeeding fuse, the switch mechanism being so constructed that when open a wide spacing is obtained between the contacts of the switch, and in which the switch closes with a quick final motion so that arcing even under heavy load conditions is minimized.

This invention provides for the renewal of a blown fuse without interrupting the service, and objects of this invention are to provide a construction which permits the ready removal and refusing of the blown fuse, which permits the ready restoring of such refused fuse, and the automatic disconnecting of the next adjacent auxiliary or reserve fuse without at any time interrupting the circuit during this restoring operation.

Further objects of this invention are to provide a construction in which no fuse has to be first mechanically moved into place before it is ready to operate upon the blowing of a preceding or first fuse, in which the auxiliary or reserve fuses although mechanically in place are nevertheless automatically electrically connected in service in succession as the preceding fuse or fuses blow.

Further objects are to provide a drop-out fuse construction of the repeating fuse type in which the several fuse units are so made that positive contact is maintained between the stationary contact of the housing and the contact carried by the fuse tube, which ultimately moves away from the stationary contact, such positive contact being maintained for an appreciable interval of time to insure complete clearing of the fuse tube prior to the breaking of the contact between one of the fuse tube contacts and one of the contacts carried by the housing, thus guarding against any possibility of arcing at this point.

Further objects are to provide for the quick withdrawal of the fuse link prior to the interruption of the circuit between the stationary contact and one of the contacts of the fuse tube so that the chance of arcing at this point is minimized, and in which means are provided which in addition to the action of gravity afford positive means for moving the fuse tube bodily out of service.

Further objects are to provide a construction for repeating fuses in which the blown fuse may be readily removed by a switch stick and may be readily replaced after refusing by such switch stick without requiring the lineman to handle any portion of the fuse structure while it is connected to either side of the high tension circuit.

Further objects are to provide a repeating fuse construction in which upper and lower stationary contacts are provided for the several fuses, in which the transfer switches for connecting successive fuses are located adjacent closed upper ends of the fuse tubes at a position remote from the open lower ends thereof so that the blast from the open lower ends is at a zone far removed from the transfer switches and so that there is no chance of the whipping of any remaining portion of the fuse link into accidental damaging contact with another of the fuse devices.

Further objects are to provide a construction in which a simple type of mechanical escapement mechanism is provided for the time delay means, in which the time delay means is housed and protected from sleet, rain and snow, and in which

the time delay mechanism automatically restores itself when the refused tube is replaced and rocked back into service. The self-restoring of the time delay mechanism is, however, accomplished by motive means carried by the time delay mechanism itself so that there can be no excess strains imposed on any part of the time delay means, although the refused tube may be suddenly rocked back into service position.

Embodiments of the invention are shown in the accompanying drawings, in which:

Figure 1 is a side elevation, with parts sectioned off, showing one of the fuse units and the associated transfer switch mechanism, such view corresponding to a section on the line 1—1 of Figure 2.

Figure 2 is a face view of the device with one of the fuses removed.

Figure 3 is a sectional detail of the upper portion of one of the fuse constructions showing it while a refused fuse unit is being rocked back into place and just before it has been completely rocked back into place.

Figure 4 is a sectional view on the line 4—4 of Figure 1, such view being extended laterally so as to show the gear train more clearly.

Figure 5 is a fragmentary view showing a further form of escapement device.

Referring to the drawings, it will be seen that the repeating fuse construction comprises a rear supporting member 1 which is provided with a transverse upper channel member 2. This channel member carries a plurality of spaced insulators 3, 4 and 5, three having been shown though any number may be employed depending on the number of fuse units. The lower end of the member 1 carries an insulator 6 which supports a transversely extending conducting bar 7 to which the lower stationary contacts 8, 9 and 10 are rigidly attached.

The lower stationary contacts are duplicates and comprise the hook-shaped spaced fingers 11 which preferably have an overhanging portion 12 and which are provided with brush contacts 13.

The drop-out fuse units are all of similar construction and comprise in each instance a fuse tube 14 which is provided with a collar 15 near its lower end, such collar being provided with a projecting arm 16 adapted to be received by a suitable portion of a switch stick in a well known manner during removal and replacing of the fuse tube. A lever 17 is pivoted at its upper end to the collar 15 and its lower end is provided with laterally projecting trunnions 18 which removably seat within the hooks 11 of the lower stationary contact. The lever 17 is provided with a suitable clamping means as indicated at 19 for clamping the end of the fuse link 20 in place. The upper end of the fuse tube is provided with an upper contact 21 which terminates in a threaded neck which receives the upper cap 22, such upper cap being provided with an upwardly projecting pin 23 adapted to be received by a latching member hereinafter described.

The upper contact carries an eye 24 which is pivoted at 25 and spring urged to the position shown in Figure 1. This eye is rigidly clamped with a pair of fingers 26 located on opposite sides of the upper contact 21 of the fuse tube so that when the eye is pulled downwardly by a switch stick, it will raise the latch 27 which latter is pivotally carried by the upper stationary contact indicated generally at 28.

All of this construction is similar to that shown in our prior Patent No. 2,176,227 of October 17, 1939. The upper cap 22 as shown in the prior patent is for the purpose of clamping the upper buttonhead of a fuse link of any suitable type, such for example as that shown in the above mentioned patent, the fuse link preferably having a fusible section as shown in the patent adjacent its upper end and having a flexible leader extending therefrom and clamped by the thumb nut or other clamping means 19 to the lower lever 17. The upper stationary contact is also provided with a brush contact 29 which bears outwardly against the flat face 30 of the upper contact 21 of the fuse tube.

The latch 27 is generally channel-shaped and is provided with a cam-shaped upwardly slanting outer end 31 beneath which the pin 23 of the upper contact of the fuse tube rides when the fuse tube is rocked back into service after refusing. The latch is provided with a shouldered portion as shown in Figure 1 which hooks in front of the pin 23 and thus retains the fuse tube against outward dropping motion under normal conditions.

When the fuse blows, the fuse link is ruptured and releases the lever 17 allowing the lower end of the fuse tube to rock downwardly and outwardly and withdrawing the pin 23 from engagement with the latch and thus allowing the fuse tube to rock outwardly and downwardly at its upper end, as shown in Figure 3. This rocking motion continues until the fuse tube rocks downwardly to an inverted position.

In order to prevent the latch 27 from rocking downwardly below a predetermined point when out of engagement with the fuse tube, such latch is provided with a rearwardly projecting tongue 32, see Figure 3, which seats beneath a shoulder formed on the terminal 28.

It is to be noted that all of the bottom stationary contacts are electrically connected to the conducting bar 7 and that each of the upper stationary contacts is insulated from every other upper contact under normal conditions. One line wire connects to the upper left-hand terminal in any suitable manner not shown, and the other line wire connects to the conducting bar 7 in any suitable manner not shown. The circuit, therefore, is closed through the left-hand fuse under normal conditions and when this fuse is ruptured, it drops downwardly and outwardly as described hereinabove and thereafter an automatic transfer switch comes into operation which connects the second upper terminal member to the first upper terminal member, as shown in Figure 2. An automatic transfer switch mechanism is provided for all except the last upper terminal member so that as successive fuses blow, the upper line terminal is connected successively to the upper terminal members. Obviously as many units may be employed as desired, three having been shown as illustrative.

The automatic transfer switch mechanism comprises a switch arm 33 which carries a switch blade or bar 34. This switch blade or bar may be freely floating if desired and connects the contact arm 35, electrically connected to the upper terminal of the first fuse, to the contact arm or bar 36 electrically connected to the second upper terminal.

The second upper terminal is provided with a contact arm 37 which is adapted to be connected by the corresponding contact bar 34 of the next transfer switch to the upper contact arm 38 of the third upper contact. Each of these upper

contact arms 35, 36, 37 and 38 may be made slightly resilient if desired and are so made that a scraping contact is obtained between the contact bar 34 and the corresponding pairs of arms, to thus insure adequate electrical connection.

The switch arm 33 is provided with an extension 39, see Figure 1, which is provided with a pair of outwardly divergent lips 40 between which the fuse tube 14 is normally positioned. It is also provided with an outwardly projecting web portion or contact portion 41 which engages the flat face 30 of the upper contact 21 of the corresponding fuse tube. The divergent lips 40 do not engage or grip the fuse tube but merely act as guides when the fuse tube is being rocked back into place, as shown in Figure 3.

The switch arms are associated with time delay mechanism of the mechanical escapement type. The switch arms and the time delay mechanism are identical. Each switch arm is provided with a rearwardly projecting extension 42 which is provided with a circular face 43 concentric with the pivot pin 44 about which the switch arm rocks. This extension 42 is also provided with a cam face 45 which extends in any suitable manner, for example, radially outwardly as shown in Figure 1.

The switch arm is urged towards switch closed position by means of the spring 46 and the switch arm may be provided with a housing 46' at least partially surrounding the spring 46 as shown in Figure 1. It is restrained from closing motion by the engagement of the portion 41 with the face 30 of the upper contact of the fuse tube. In other words, a portion of the fuse tube itself engages a part of the switch arm and restrains the switch arm from closing as long as the fuse tube is in service. When the fuse tube drops out of service, either upon overload or when it is manually removed as previously described, the switch arm closes and connects the next adjacent fuse in service. Obviously when a blown fuse is refused and is rocked back into position, it automatically opens the switch. Opening of the switch does not occur until after the contact 41 of the switch arm engages the upper contact 21 of the fuse tube being rocked back into service and thus there is no break in the service when a refused fuse is rocked back into service position.

The mechanical escapement time delay device may comprise a train of gears, the first of which 47 is rigidly attached to a projecting arm or switch restraining member 48, both of which are rigid with the shaft 49 as shown most clearly in Figure 4. The member 48 is in the path of travel of the extension 42 of the switch arm, see Figure 1, so that when the switch arm rocks upwardly when released by the outward dropping of the corresponding fuse tube, it operates the time delay mechanism by driving the shaft 49 through engagement between the members 42 and 48.

Mechanical escapement means are provided for delaying the rotation of the shaft 49, as will hereinafter be described, and thus the closing of the switch arm is mechanically delayed for a predetermined interval of time until the circular face 43 of the extension 42 of the switch arm, see Figure 1, is in a position to pass by the restraining member 48. When this occurs, which is during the final closing stroke of the switch, it is apparent that the switch arm is no longer restrained and thus makes a quick closing stroke, thus avoiding arcing during closing.

The extension 42 with the faces 45 and 43 constitutes a cam and such member, together with the member 48, constitutes the mechanism whereby the time delay device is driven from the spring or biasing means 46 of the switch.

The shaft 49 is provided with a spring 50 which tends to drive the member 48 in a counterclockwise direction, as viewed in Figure 1, such spring being shown in Figure 4 and constituting restoring means for restoring the time delay mechanism to its initial position when the switch is rocked back to open position. The spring 50 is a considerably lighter spring than the spring 46 and its action is readily overpowered by that of the spring 46 when the switch is released. The gear 47 is in mesh with a pinion 51 rigid with a gear 52, such gear and pinion forming a unit and being carried by the shaft 53. The gear 52 meshes with a pinion 54 which is fast to the shaft 55. The shaft 55 also rigidly carries a driving gear 56 which meshes with a pinion 57 formed as a unitary structure with a flywheel 58. Either the flywheel 58 or the unit consisting of the pinion 51 and gear 52 may be loose on the shaft 53, or if desired both may be loose on the shaft.

It will be seen that when the switch is released by the outward dropping of the corresponding fuse unit, that the switch arm tends to move towards closed position and drives the arm 48 of the time delay mechanism in a clockwise direction, thus rotating the flywheel 58. In view of the inertia of the flywheel, it does not immediately come up to full speed but gradually speeds up and thus provides a time delay for the closing of the switch. The switch, therefore, is delayed in its closing stroke until the rounded portion 43 of the arm 42 passes by the arm 48 of the escapement mechanism at which time the switch makes a quick final closing stroke.

It is to be noted at this point that instead of having the switch completely released from the time delay mechanism as described, that the increasing speed of the flywheel itself provides for an increasing closing speed of the switch as the switch approaches its final position, but this is not the preferred arrangement. The preferred arrangement is, as stated above, to have the arm 42 pass by the arm 48, see Figure 1, so that the switch will be free of restraint of the time delay mechanism and the final portion of the closing stroke of the switch will be extremely rapid.

In place of the flywheel 58 a simple type of fan construction indicated at 59 in Figure 5 may be employed, or if desired other types of mechanical escapement can be used than these shown, two forms of mechanical escapement however being shown for the purpose of illustration.

It is to be noted from reference to Figure 1 that the upper terminal 28 carries a housing 60 which houses the pivoted portion of the switch together with its spring 46 as well as the time delay mechanism and the upper end of the fuse tube. This housing projects over the latch 27 and over the brush contacts 29 and over the contact portion 41 of the extension of the switch arm and thus adequately protects these parts from snow, ice and sleet.

It is customary to provide a shielding plate 61 formed integrally with the lower collar 15 to afford limited protection at least for the link 17 and brush contact 13 and lower portion of the fuse structure.

The operation of the apparatus is as follows:

When the first fuse unit blows, the lever 17 is released and allows the lower end of the fuse tube to rock downwardly and outwardly and allows the upper end of the fuse tube to rock downwardly out of engagement with the latch 27. The fuse tube then drops outwardly and swings downwardly below the lower stationary contact.

When the fuse tube has dropped outwardly, it no longer restrains the extension or arm 38 of the switch and the switch under the biasing action of its spring 46 moves towards closed position. In so doing, the extension or cam member 42, see Figure 1, drives the time delay mechanism which causes the first portion at least of the closing stroke of the switch to be relatively slow and thus provides the time delay. Thereafter in the form shown, the rounded portion 43 finally rides past the arm 48 of the time delay mechanism and the switch is then no longer restrained by such time delay mechanism and thus quickly closes, connecting the electric line through the next fuse unit.

Obviously if the overload continues, the next fuse unit will drop out of circuit and release its transfer switch for connecting the third fuse unit in service. The third fuse unit is not usually provided with a transfer switch unless a fourth fuse unit is to be added. Obviously as many fuse units as needed could be employed.

Assume that the first fuse unit has blown and dropped outwardly and downwardly and the transfer switch has functioned to connect the next fuse unit in service. The blown fuse unit is readily detached from the hooks 11 by means of a switch stick engaging the portion 16 of the fuse tube, see Figure 1. The fuse tube is lifted down from position, is refused, is replaced, and is rocked back into service, the switch stick, after having positioned the fuse tube in place being detached from the member 16 and hooked into the eyelet 24. Thereafter the refused tube is rocked back into position by means of a switch stick. It engages the contact portion 41 of the extension 39 of the switch arm, see Figure 1, and rocks the switch arm back to open position as shown. This backward rocking of the switch arm to open position does not drive the time delay mechanism and consequently no strain is imposed on the time delay mechanism, although the refused fuse unit may be rocked back into position in a very rapid manner. Obviously as the extension or cam member 42 of the switch arm is rocked in a clockwise direction from the position shown in Figure 3 to the position shown in Figure 2, the time delay mechanism will be automatically returned by means of its restoring spring 50, see Figure 4, and will ultimately come to rest with the arm 48 thereof in engagement with the face 45 of the extension 42 of the switch arm.

It is obvious that when the refused unit is rocked back into place, that it does not open the circuit for its upper contact 21 is in engagement with the contact portion 41 of the extension 39 of the switch arm before the switch arm starts to move away from its closed position. In its final position the upper contact 21 of the fuse tube engages the brush contact 29 of the upper stationary terminal member and the fuse tube is temporarily locked in position.

It is obvious that any of the fuse units may be removed from service position by pulling downwardly and outwardly on the eyelet 24 by means of a switch stick. When this is done, the arms 26 raise the latch 27 and release the upper end of the fuse tube, allowing the fuse tube to be rocked outwardly without breaking the fuse link.

It is obvious that if the first or second fuse tubes were detached manually as described, that the corresponding transfer switch would ultimately close to connect the next succeeding fuse in service.

It is to be understood that the flywheel 58, see Figure 4, or fan 59, see Figure 5, may be housed and protected from the weather in any suitable manner. For instance, the housing 60 may have a cap 62 secured in place in any suitable manner to a cylindrical or other shaped extension 63 of the housing 60.

It is also clear from an examination of Figure 4, that the housing 60 may have an inturned front portion 60' whose inner end is spaced from the opposite wall of the housing to provide a space through which the switch arm 33 can project, as shown in Figure 1.

It will be seen that a simple type of repeating drop-out fuse device has been provided in which mechanical escapement time delay means is employed for delaying the connecting of the next succeeding fuse unit in service. It will also be seen that the switch is released by the outward dropping of the fuse tube of the corresponding fuse unit but that a portion at least of the closing stroke of the switch is retarded by the time delay means.

It will be seen further that a very simple type of mechanical time delay means may be employed and that this time delay means is wholly automatic in its operation, restraining the switch during a portion at least of the closing motion of the switch and providing for the sudden release of the switch during the final portion of its closing stroke and also being unstressed during the opening stroke of the switch due to the rocking of the refused unit back into service or operative position, the time delay means itself being provided with restoring means for restoring it to its initial position.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

We claim:

1. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units including a fuse tube having a discharge opening at one end, each of said fuse units being normally held in operative position, means for releasing said first fuse unit upon blowing of said first fuse unit, an electric line normally connected through said first fuse unit, normally open switch means permanently biased towards closed position and located at a point remote from the open end of said first fuse unit for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, and time delay means including a mechanically rotated member operatively connected to and rotated by said switch means a plurality of times when said switch means is moving towards closed position for a portion only of the closing stroke of said switch and being operatively free of said switch for the final portion of the closing stroke of said switch.

2. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units including a fuse tube having a discharge opening at the bottom, each

of said fuse units being normally held in operative position, means for releasing said first fuse unit upon blowing of said first fuse unit, an electric line normally connected through said first fuse unit, normally open switch means permanently biased towards closed position and located at a point adjacent the upper end of said repeating fuse construction for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, and time delay means including a mechanically rotated member operatively connected to and rotated by said switch means a plurality of times when said switch means is moving towards closed position for a portion only of the closing stroke of said switch and being operatively free of said switch for the final portion of the closing stroke of said switch.

3. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units being normally held in operative position, an electric line normally connected through said first fuse unit, normally open transfer switch means for transferring the electric circuit to the second fuse unit upon blowing of said first fuse unit, and mechanical escapement time delay means operatively connected to said switch means and including a revoluble member rotated a plurality of times when said switch means is moving towards closed position, said switch means being restrained from closing motion by said first fuse unit until said first fuse unit has blown and being released by said first fuse unit upon blowing thereof, said mechanical escapement time delay mechanism controlling said switch means and said switch means having a closing stroke, the first portion of which being retarded by the mechanical escapement time delay means and the last portion being free of said time delay means.

4. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units being normally held in operative position, an electric line normally connected through said first fuse unit, normally open transfer switch means for transferring the electric circuit to the second fuse unit upon blowing of said first fuse unit, and mechanical escapement time delay means operatively connected to said switch means, said switch means being restrained from closing motion by said first fuse unit until said first fuse unit has blown and being released by said first fuse unit upon blowing thereof, said mechanical escapement time delay mechanism controlling said switch means, the first portion at least of the closing motion of said switch means being retarded by the mechanical escapement time delay means, said switch means being operatively free from the retarding action of said mechanical escapement time delay means during the latter part of the stroke of said switch means and making a quick final closing motion during said latter part of the closing stroke of said switch means.

5. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally held in open position by said first fuse unit and being released upon blowing of said first fuse unit, and mechanical escapement means driven by the biasing means of said switch means and delaying the closing motion of said switch means when said switch means is released, said escapement means having self-restoring means.

6. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally restrained by said first fuse unit and being released upon blowing of said first fuse unit, and mechanical escapement time delay means driven by said biasing means when said switch means is released and including a rotary member whose rotation is retarded, said mechanical escapement means being operatively free of said switch during the final portion of the closing stroke of said switch.

7. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally restrained by said first fuse unit and being released upon blowing of said first fuse unit, and time delay means for retarding a portion at least of the closing stroke of said switch means, said time delay means comprising a rotary member and a gear train interposed between said rotary member and said switch means, said gear train being driven from said switch means and driving said rotary member, said time delay means having self-restoring means.

8. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally restrained by said first fuse unit and being released upon blowing of said first fuse unit, and time delay means for delaying a portion of the closing stroke of said switch means, said time delay means comprising a flywheel driven from said switch means, said switch being free of said time delay means during the final portion of the closing stroke of said switch.

9. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally restrained by said first fuse unit and being released upon blowing of said first fuse unit, and time delay means for delaying a portion of the closing stroke of said switch means, said time delay means including a fan driven from said switch means, said switch being free of said time delay means during the final portion of the closing stroke of said switch.

10. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units including a fuse tube normally held in operative position, means

for releasing the fuse tube of said first fuse unit upon blowing of said first fuse unit, an electric line normally connected through said first fuse unit, normally open switch means permanently biased towards closed position and having an arm normally in engagement with said first fuse unit and being restrained against closing motion by said first fuse unit and being released when the fuse tube of said first fuse units drops out of operative position upon blowing of said first fuse unit, and mechanical time delay means delaying a part of the closing stroke of said switch means, said mechanical time delay means including a rotary member driven from said switch means, said switch being free of said time delay means during the final portion of the closing stroke of said switch.

11. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units including a fuse tube normally held in operative position, means for releasing the fuse tube of said first fuse unit upon blowing of said first fuse unit, an electric line normally connected through said first fuse unit, normally open switch means permanently biased towards closed position and having an arm normally in engagement with said first fuse unit and being restrained against closing motion by said first fuse unit and being released when the fuse tube of said first fuse unit drops out of operative position upon blowing of said first fuse unit, and mechanical time delay means delaying a part of the closing stroke of said switch means and being inoperatively related to said switch during the final portion of the closing stroke of said switch, said mechanical time delay means including a rotary member driven by said switch means.

12. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, each of said fuse units including a fuse tube having a discharge opening at the bottom, each of said fuse units being normally held in operative position, means for releasing said first fuse unit upon blowing of said first fuse unit to allow said first fuse unit to drop out of operative position, an electric line normally connected through said first fuse unit, normally open switch means normally biased towards closed position and located adjacent the upper end of said first fuse unit for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, mechanical escapement time delay means including a rotary member for delaying a portion of the closing stroke of said switch means, and means operatively connecting said time delay means and said switch means during a portion of the closing stroke of said switch means to drive said rotary member from said switch means and inoperatively relating said switch means to said time delay means during the final portion of the closing stroke of said switch means.

13. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally restrained by said first fuse unit and being released upon blowing of said first fuse unit, and time delay means, said time delay means including restraining means for preventing immediate closing of said switch means after blowing of said first fuse unit and a rotary member for controlling the motion of said restraining means, said time delay means having self-restoring means for returning said time delay means to its original position when said switch is moved to open position.

14. An automatic repeating fuse construction comprising a first fuse unit and a second fuse unit, an electric line normally connected through said first fuse unit, switch means for connecting said electric line through said second fuse unit upon blowing of said first fuse unit, biasing means biasing said switch means towards closed position, said switch means being normally held in open position by said first fuse unit and being released upon blowing of said first fuse unit, mechanical escapement means driven by the biasing means of said switch means and delaying the closing motion of said switch means when said switch means is released, and biasing means for returning said mechanical escapement means to its original position when said switch means is moved to open position.

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