Jan. 27, 1959 G. G. PICATTI 2,871,009

CLOSURE OPERATING MECHANISM AND AUTOMATIC CONTROL SYSTEM THEREFOR

Filed March 9, 1955 2 Sheets-Sheet 1

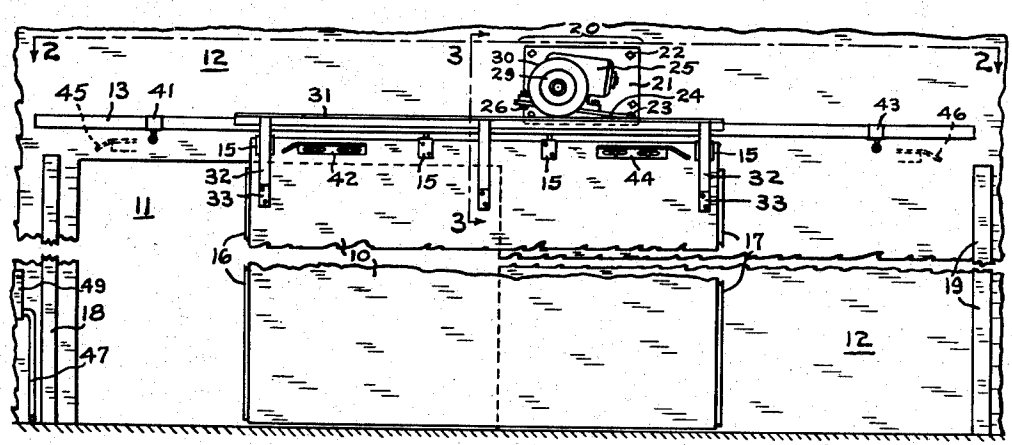


Fig. 1

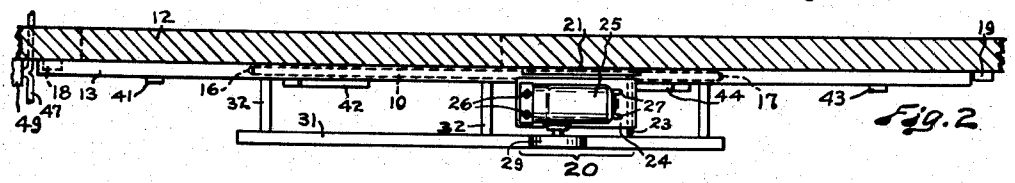


Fig. 2

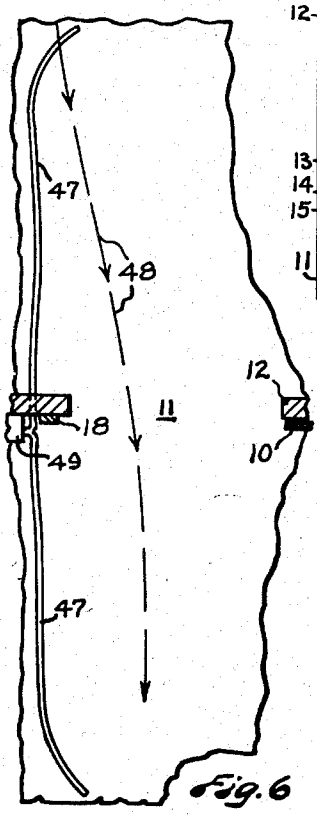


Fig. 6

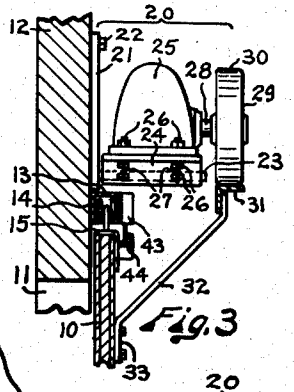


Fig. 3

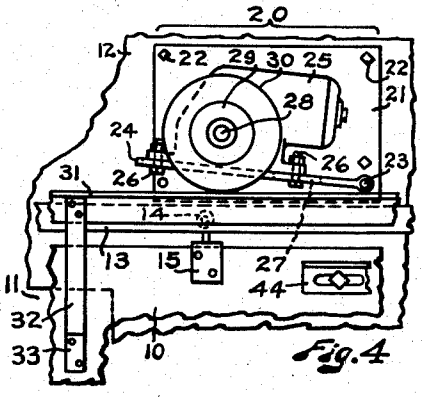


Fig. 4

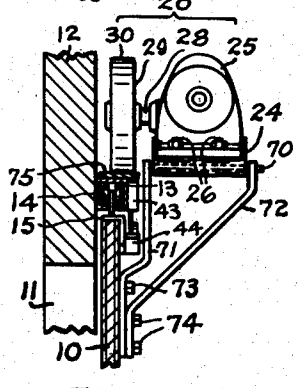


Fig. 9

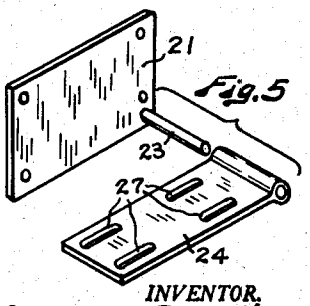


Fig. 5

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CLOSURE OPERATING MECHANISM AND AUTOMATIC CONTROL SYSTEM THEREFOR

Filed March 9, 1955 2 Sheets-Sheet 2

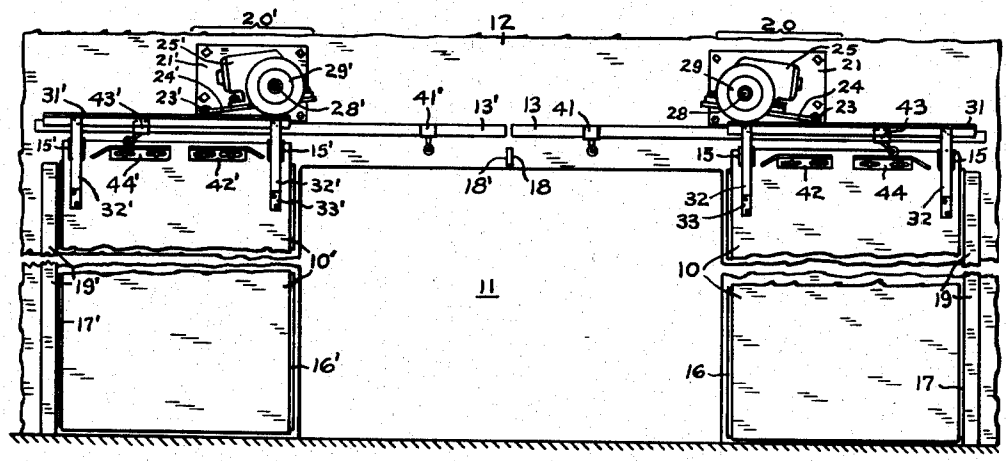


Fig. 7

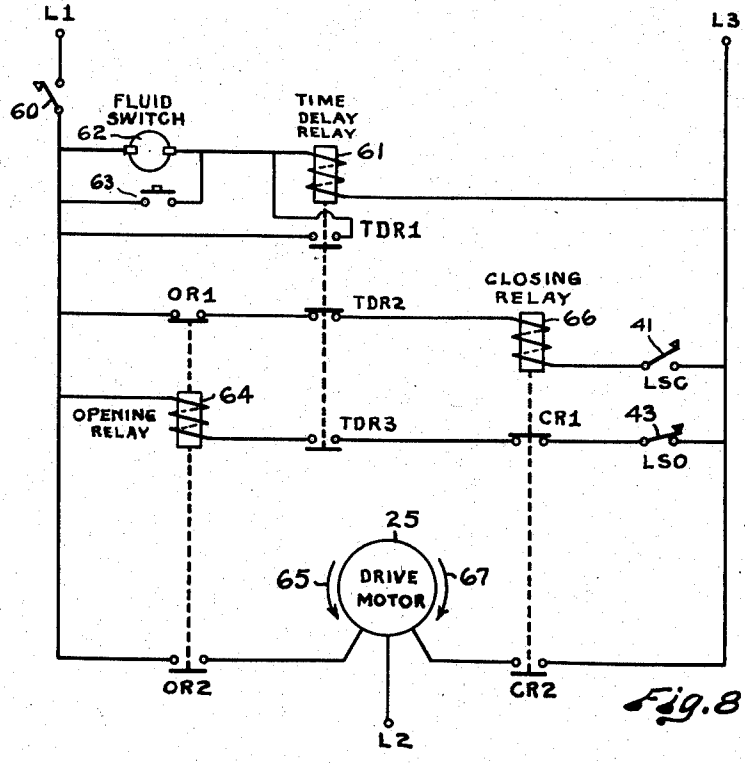


Fig. 8

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2,871,009

CLOSURE OPERATING MECHANISM AND AUTOMATIC CONTROL SYSTEM THEREFOR

George G. Picatti, Yakima, Wash.

Application March 9, 1955, Serial No. 493,161

7 Claims. (Cl. 268—49)

This invention relates to power mechanism for operating one or more movable members, and more particularly relates to mechanism for selectively actuating and automatically operating one or more closure members of the sliding door type.

A primary object of the present invention is to provide for selective remote actuation and automatic operation of a closure member by mechanism which may be safely and readily interrupted in its operation to prevent damage or injury to objects interposed in the closure area.

It is a further object of the present invention to provide closure actuating and operating mechanism exhibiting features of positive and safe operation throughout long periods of use, coupled with simplicity of construction and ease of maintenance not attributable to known conventional automatic closure control systems.

A further object of the present invention is to provide an improved opening and closing mechanism for automatically operating a sliding door or the like, wherein the operation of such door may be initiated from a remote point to cause an opening and closing cycle, and wherein such cycle of operation may be adjustably and automatically controlled to allow passage of a vehicle or other movable object through the closure area without further attention from an operator.

Yet another object of the present invention is to provide an electrical control circuit for a door operating mechanism whereby the door is automatically returned to or maintained in closed position except when actuated by selective remote control to cause an opening and closing cycle. A further and related object of the invention is to provide an automatic closure operating mechanism particularly adapted to commercial installations where normal activity requires a large number of opening and closing cycles to accommodate passage of commercial vehicles through an accessway, and where the closure member is automatically maintained in a closed position when no access is required, such as in refrigerated or heated warehouses, and the like.

Yet another and primary object of the present invention is to provide an improved door operating mechanism including a drive unit assembly mounted either on the stationary structure or on the movable closure member, such operating mechanism further including a driven track mounted on the other such structure or member as the case may be, wherein said drive unit assembly is maintained in what may be termed "floating" engagement with the driven element, as by being pivotally mounted in an unbalanced manner so that at least a portion of the weight of said drive unit assembly provides the sole tractive pressure between the drive element of said drive unit assembly and the driven track element.

Other objects of the invention will be apparent to those skilled in the arts to which my invention relates from the following description taken in connection with the accompanying drawings, wherein like numerals designate like parts, and wherein:

Figure 1 is a side elevational view illustrating a typical single closure member embodying the present invention, with the drive unit mounted on the stationary structure and the associated driven track element mounted on the closure member;

Fig. 2 is a cross-sectional view, taken generally along the line 2—2 of the embodiment of the invention illustrated in Figure 1;

Fig. 3 is a detail partial section of the embodiment of the invention illustrated in Figure 1, taken generally along the line 3—3 thereof;

Fig. 4 is a fragmentary side view illustrating in enlarged detail the drive unit assembly mounting and a portion of the driven track mounting of the arrangement illustrated in Figure 1;

Fig. 5 illlustrates in exploded perspective view the fixedly mounted base plate and pivotally mounted hinge plate for the power drive unit, as provided by the form of the invention typified in Figure 1;

Fig. 6 is a floor plan view in diagrammatic form illustrating a typical fluid hose system, operating in conjunction with a fluid actuated switch, to show one manner of selective remote energization for actuation of the opening and closing cycle of operation according to the present invention;

Fig. 7 illustrates in side elevational view a modified form of the present invention, wherein double closure members are operated automatically in conjunction with a single accessway;

Fig. 8 is a schematic ladder diagram illustrating a typical electrical control circuit for the novel operating mechanism presented in Figure 1; and

Fig. 9 presents in end elevational cross-section a further modified form of the present invention, generally comparable to the view of Fig. 3, wherein the further modified form of the invention includes the mounting of the power drive unit assembly on the closure member and arrangement of the driven track on the stationary structure.

In one of its aspects, the present invention contemplates a door operating mechanism, wherein a power drive assembly is mounted in a pivoted, unbalanced manner to place such drive unit in tractional engagement with a driven track by virtue of the weight of the drive unit. A further aspect of the present invention resides in a remotely actuated electrical system for automatically controlling the operation of such mechanism with maximum safety and simplicity from the point of view of operating personnel and equipment.

More specifically, the door operating mechanism of the present invention contemplates the actuation and operation of a closure member of the sliding door type wherein the operating mechanism comprises a power drive assembly including a rotatable drive element for reciprocating the closure member along a supporting rail, and a driven track, said drive element and driven track being arranged for tractive drive therebetween, with one such tractive element situated on said closure member and the other such tractive element situated on the stationary structure, the power drive unit being pivotally mounted in an off-center manner so as to constitute at least a portion of its weight the sole tractive pressure between said drive element and said driven track.

The present invention further contemplates an electrically actuated automatic control system whereby selective remote actuation of such operating mechanism will cause a complete opening and closing cycle of operation without further attention from the operator. As will be understood from the more detailed description hereinafter, the arrangement of the power driven unit on a pivotal or equivalent mounting in a manner to

provide at least a portion of its weight the sole tractive pressure between the drive unit and the driven track produces inherent advantages in terms of safety of operation and simplicity of structure, in that the drive action on the closure member may be readily interrupted by slippage of the drive element on the driven track, as by an object interposed in the accessway during the closing phase of the cycle of operation or by manually applied force against the drive in any emergency situation which may arise, and in that all complicated drive interrupt or release mechanisms are thereby eliminated. The inherent safety feature afforded by such slippage of the drive element is particularly advantageous in protection of small children or in the protection of easily damaged produce from injury by encounter with the closure member.

Turning to a more detailed consideration of one specific embodiment of the present invention as presented in Figs. 1 through 5, Figure 1 illustrates in side elevational view with certain elements in broken view, a single closure member **10** in partially open position, associated with an accessway **11** arranged in a stationary structure **12**, a support rail **13** being mounted on stationary structure **12** to accommodate generally conventional closure member suspension rollers **14** (Fig. 3), and hanger straps **15** affixed to said closure member **10**. Generally conventionally resilient seals **16** and **17** are provided on the upright edges of closure member **10** for contact with physical stop members **18** and **19**, respectively at the limits of travel of closure member **10**.

In the embodiment of the invention illustrated in Figs. 1 through 5, closure operating mechanism **20** comprises a base plate **21** affixed to the stationary structure **12** by suitable means such as bolts, one being shown at **22**, said base plate **21** in turn mounting a horizontally arranged pivot pin **23** accommodating a power drive assembly comprising a hinge plate **24**, an adjustably mounted motor unit **25**, such adjustability being provided by suitable means such as bolts, one being **26**, and slot means, one being indicated at **27**, provided in hinge plate **24**, said power drive assembly further comprising drive shaft **28** and a rotatable traction drive element **29**. It will be understood that motor unit **25** includes in its housing suitable reduction gearing from the prime mover to drive shaft **28** and rotatable traction element **29**, all such elements being designed to be driven by the former at the desired closure member transfer speed. Traction member **29** is advantageously provided with a circumferential covering of resilient material **30**, and may simply be a pneumatic rubber tire of the type commonly used on small transfer implement wheels.

In tractive engagement with drive element **29** of the power drive assembly **20** is a driven track member **31** supported by straps, one such strap being indicated at **32**, in turn attached to closure member **10**, as indicated at **33**.

From the novel drive unit assembly mounting, including hinge plate **24** supported only adjacent one end thereof, and the tractive engagement of drive element **29** with driven track **31**, it will be apparent that the tractive pressure provided for movement of the closure member is contributed solely by the pivotally supported components of the power drive assembly, namely comprising motor unit **25**, drive element **29**, and hinge plate **24**. It is further apparent that an adjustable tractive pressure is available by virtue of suitable means such as bolts **26** cooperating with slots **27** in the hinge plate **24**. Practice has demonstrated that the degree of tractive pressure contributed by such drive assembly is sufficient to drive the closure member **10** with respect to the stationary structure **12** when such transfer is not otherwise impeded, but is not sufficient traction to drive the closure member forcibly against an object interposed by accident or otherwise in accessway **11**. The positiveness and practicality of this manner of operation of the drive mechanism arrangement here presented has been demonstrated throughout wide variations in climate and atmospheric conditions. Stated otherwise, to illustrate the wide flexibility of use of the disclosed drive arrangement, slippage will occur readily between drive element **29** and the driven track **31** when the movement of closure member **10** is impeded by an intervening object, the novel drive mechanism here presented also allowing manual transfer of the closure member against the driving force of drive element **29**, or in the absence of a driving force in element **29**, in the event an emergency situation should warrant such manipulation.

Practice has further demonstrated that the pivotal or floating mounting arrangement of the motor unit and drive element comprising the drive assembly presents the further feature of inherently and automatically accommodating for any unevenness or difference in level between the supporting rail **13** and drive track element **31**, thus rendering precise alignment of these elements in the initial installation or during use unnecessary.

Suitable limit switch actuation and remote energization of the electrical control circuit are also provided by the present invention in order to accomplish automatic operation of an opening and closing cycle of the closure member **10** with respect to accessway **11**, to maintain the closure member **10** in a closed position except when ingress or egress is desired, and in order to further provide selective actuation from approach positions with respect to accessway **11**. In this connection, certain elements of the control system are illustrated in Figs. 1 through 4, with a typical general arrangement and mode of selective energization of the fluid hoses being shown in Fig. 6. Further details and description of operation of a typical electrical control circuit are presented in Fig. 8.

The control system elements illustrated in Figs. 1 through 4 (from which connector wires have been omitted for the sake of clarity of illustration) are normally closed limit switch **41**, maintained with its contacts open when closure member **10** is in closed position by adjustable limit switch camway **42**, and normally closed limit switch **43**, maintained in open contact condition by adjustable limit switch camway **44** when closure member **10** is in open position, the position of the leading edges of camways **42** and **44** at the respective closed and open positions of closure member **10** being indicated by dotted line at **45** and **46**. Experimentation has demonstrated that there is a lag time between the de-energization of the motor unit **25** and the time closure member **10** actually comes to rest from a moving condition, and that the span of travel beyond such point of energization of motor unit **25** is on the order of several inches, this span of travel proving to be about six inches in a typical commercial installation. Accordingly, limit switches **41** and **43** are positioned with respect to the leading edges of limit switch camways **42** and **44** by pre-selection of the limit switch positions on supporting rail **13** and adjustment of the horizontal position of the camways **42** and **44** to allow for the closure member to come to rest in closed position with the resilient edge **16** adjacent to or contacting physical stop **18** or to come to rest in open position with resilient member **17** adjacent to or contacting physical stop **19**, as desired.

Selective remote actuation of the system is advantageously accomplished by means of fluid hose **47**, with sections thereof arranged generally as indicated in the floor plan of Fig. 6, the same being connected to a control box **49** incorporating a fluid actuated switch (see **62**, Fig. 8). The operator desiring passage through accessway **11** can proceed along a course of travel typified at **48** to actuate the hose **47**, the entering approach section thereof being indicated by way of example, during approach to accessway **11**, the operator then proceeding in a manner, as indicated, along course **48** so as not to contact the hose **47** on the path of departure. From the typical electrical control system hereinafter

discussed in connection with Fig. 8, it will be seen that an appropriate time delay is provided between the instant of remote actuation and the time of re-closure of closure member **10** so that passage through accessway **11** will not be delayed or otherwise interferred with in normal operation.

Turning to a consideration of a modified form of the present invention, Fig. 7 illustrates in side elevational view with certain elements in broken view, a single accessway **11** having associated therewith double closure members **10** and **10'**, shown in open position, the operating mechanism utilized for movement of the right-hand closure member **10** being essentially identical with that presented in the single-closure embodiment illustrated in Figs. 1 through 5. The operating mechanism for the left-hand closure member **10'** merely involves a left-hand duplication of the operating mechanism, such left-hand duplicate arrangement and parts being indicated by corresponding primed numerals. Such double-closure member arrangement offers readily apparent advantages for larger accessways. Beyond the duplication of parts indicated, such double-closure arrangement does not unduly complicate the control circuit, since drive motor **25'** may be energized from the same control system as drive motor **25**, with a reversal of leads to accomplish reversal of direction of drive of drive element **29'**. Preferably, however, drive motor **25'** is subject to separate control from a separate electrical control system including a common fluid switch, limit switches **41'** and **43'**, and limit switch camways **42'** and **43'**, such system being otherwise a duplicate of that presented in Fig. 8. The latter arrangement is considered preferable for the reason that closure member **10'** may not under all circumstances be in a position comparable to closure member **10** with respect to the center line of accessway **11**, and a separate control system for closure member **10'** will ensure complete automatic closing of both closure members **10** and **10'** under all conditions of operation.

A more detailed consideration will now be given of a typical electrical control circuit providing selective remote or local actuation and automatic operation of a closure member according to the present invention, with particular reference to the single-closure embodiment thereof illustrated in Figs. 1 through 6. It will be readily apparent that any suitable drive mechanism **25**, consistent with the reversible drive feature here presented, can be employed.

Thus, drive motor **25** may be of the polyphase type, reversible single-phase, or reversible D.-C., as desired, a three-phase power supply control circuit being illustrated in Fig. 8 for purposes of illustration, the three line system being indicated on the latter diagram at L1, L2, and L3. Selective energization and automatic operation control components are related to two lines of the control system, L1 and L3 being shown by way of example, with the third line, L2, being connected directly to the drive motor **25**. A manual line switch **60** for the system is provided in line L1 to deliver power to the control circuitry, in which what may be termed the dominant feature is a time-delay relay **61**, preferably of the adjustable pneumatic type which, upon actuation, immediately delivers the contacts thereof to the energized position and releases the contacts to a de-energized position after a predetermined time delay adjustably controlled through a spring-pressed pneumatic assembly. In the typical system here presented a fluid switch **62**, actuated by contact of the operator with fluid hose **47**, energizes time-delay relay **61**, with optional local energization of the relay being provided by a manual switch **63**, as desired. Normally open contact TDR1 of time-delay relay **61** is an interlock contact to deliver power from line L1 across the time-delay relay **61** after the relatively instantaneous actuation of fluid switch **62** or manual switch **63** in a manner generally conventional with this type of relay. The condition of operation illustrated in Fig. 8 is with the system in de-energized or normal condition and with the closure member in closed position, with normally closed limit switch **41** (labeled LSC—Limit Switch, Closed) being held in open position by camway **42** and with limit switch **43** (labeled LSO—Limit Switch, Open) in the normal, closed position. Energization of drive motor **25** after closing of line switch **60** is caused by selective connection of line L1 to the drive motor **25** under control of an opening relay **64** through contact OR2 thereof, the resultant direction of drive of drive motor **25** being schematically indicated at **65**. Transfer of the closure member in a closing direction is accomplished by connection of line L3 to drive motor **25** through contact CR2 of the closing relay **66**, the resultant direction of drive being schematically indicated at **67**, contact CR1 under control of closing relay **66** being positioned in series with the energization circuit for opening relay **64**, and contact OR1 under control of opening relay **64** being in series with the energization circuit for closing relay **66** to provide for connection of only one of lines L1 and L3 to drive motor **25** at any given instant during the cycle of automatic operation herein provided. Time-delay relay **61**, in addition to interlock contact TDR1, further controls the position of normally closed contact TDR2 in the closing relay **66** energization circuit, and normally open contact TDR3 in the opening relay **64** energization circuit, it being apparent that only the opening relay **64** circuit is capable of energization when time-delay relay **61** is in energized position, and only the closing relay **66** circuit is capable of being energized when time-delay relay **61** is in de-energized condition. In the energization circuit for closing relay **66** a further normally closed contact OR1 under control of opening relay **64** is provided as a further safety feature ensuring that the closure member is opened to the point where limit switch **43** is opened before the closing relay **66** is energized.

Considering the operation of the electrical control circuit in the light of the foregoing elements thereof, with the closure member in closed position, energization of the time-delay relay **61** through fluid switch **62** or manual switch **63** will cause contacts TDR1, TDR2, and TDR3 to be transferred to energized position, closing interlock contact TDR1 and closing contact TDR3 in the opening relay circuit, which is completed by contact CR1 of closing relay **66** being in de-energized closed position (limit switch **41** being held in open position), thus energizing opening relay **64** and closing contact OR2 thereof to connect line L1 to drive motor **25** which is thereupon driven to rotate the prime mover thereof in the direction indicated at **65** to move the closure member in an opening direction with respect to the accessway. The delay period of time-delay relay **61** is pre-set by the adjustable means therein provided, as previously indicated, to provide a delay at least as long as the period of time necessary to transfer the closure member from closed to open position and of sufficient duration to permit passage through accessway **11** under all normal conditions. As the closure member approaches open position, normally closed limit switch **43** is opened by the associated camway **44** on the closure member and interrupts the circuit energizing opening relay **64**, whereupon contact OR1 is returned to closed position, normally closed limit switch **41** in the meantime having been restored to normally closed position by the opening movement of the closure member. At such time as time delay relay **61** is de-energized, contact TDR2 thereof is returned to closed position, completing the circuit for closing relay **66** which automatically connects line L3 to drive motor **25** through contact CR2, resulting in drive motor **25** being driven in the direction indicated at **67** to accomplish closing of the closure member through the mechanism previously described. The closure operation continues until such time as the closing relay **66** circuit is de-energized by opening of limit switch **41**, the circuit thereupon assuming the normal inoperative condition with all of relays **61**, **64**, and **66** de-energized until

the selective actuation of the next cycle of operation by fluid switch 62 or manual switch 63.

The automatic closing feature of the typical control circuit presented will be apparent from a reconsideration of the energization circuit for closing relay 66, wherein contacts OR1 and TDR2 are in closed position when the associated relays are deenergized, and wherein closing relay 66 circuit is energized whenever limit switch 41 is closed, which condition is maintained except when the closure member is in closed position. Thus, should the opening and closing cycle of operation be interrupted as by an object impeding the path of travel in accessway 11 or by manual transfer of closure member 10 along support rail 13 against the tractive pressure of drive element 29 in the event an emergency situation should warrant such manipulation. Thus, the superposed drive element, by virtue of the floating mounting of the drive unit assembly according to the present invention, can slip with respect to the track, the closing operation nevertheless continuing after such interruption until such time as the closure member becomes re-established in closed position.

Fig. 9 illustrates in partial side elevational cross-section a modified form of the drive mechanism according to the present invention, wherein the power drive assembly is mounted on the closure member 10 and the driven track is mounted on the stationary structure 12, the view of Fig. 9 otherwise corresponding to the view of Fig. 3 in the previously described embodiment of the invention, like parts being indicated by like numbers. In this embodiment of the invention, the motor unit 25 is mounted on a hinge plate 24 having provided at the near end thereof a pivot pin 70, in turn supported from closure member 10 by a mounting bracket 71 adjacent closure member 10 and a second bracket member 72, as desired, outwardly from closure member 10, the attachment to closure member 10 being through suitable bolt means 73 and 74. The driven track element in the embodiment illustrated in Fig. 9, corresponding to track element 31 in Figure 1, is driven track 75 affixed to supporting track 13 in a desired manner, as by welding. Aside from the indicated reversal of mounting of the drive assembly and driven track element, it will be readily apparent that the operation and tractive advantage of the invention are similarly available from the modification presented in Fig. 9.

While, as has been indicated, the present invention is considered to have particular utility in commercial installations where the closure member is subject to a relatively large number of opening and closing operations and where the closure member is to be maintained in closed position at all times when access is not required, such as in warehouses involving refrigerated or heated storage of produce or other products, it is to be understood that the invention has other fields of application and use, garage and elevator doors providing further examples in this regard.

Other modifications of the present invention will be apparent to those skilled in the art. Thus, wide variation of electrical control circuits and the particular form of time delay employed readily suggest themselves within the basic modes of operation disclosed. Similarly, various arrangements for the limit switches or other closure position responsive control elements may be employed. Further, it will be apparent that various selective remote control actuation means can be provided, such as by light-interrupting devices of the so-called electric eye type or by mechanically linked or electrical circuit actuating platforms. Additionally, other means for predetermining and/or adjusting the degree of traction of the drive unit assembly on the driven track are readily available, other than by slot means 27 and hinge plate 24, such as by a plurality of alternatively employed pivot pin receiving apertures in the motor mounting plate, by counterbalance weight means extending from the pivot axis, or by other mechanical arrangements by means of which at least a portion of the drive assembly weight is utilized for tractive pressure.

I claim:

1. Selective energization and operating mechanism for a closure member of the sliding door type, wherein said closure member is mounted for reciprocal movement with respect to an associated stationary structure in turn provided with an accessway, comprising a reversible power drive assembly including a rotatable drive element in floating, tractive engagement with a driven track, one such tractive element being situated on said closure member and the other such tractive element being situated on such stationary structure, and an automatic control system enabling selective actuation of such operating mechanism to cause a complete opening and closing cycle of the operation without further attention from an operator, said automatic control system comprising a time-delay relay, an opening relay, and a closing relay, switch means for selectively energizing said time-delay relay, limit switch means contacted by associated camways arranged in the path of travel of said closure member adjacent the limits thereof, a first such limit switch means being established in an open contact condition when said closure member approaches an open position with respect to said accessway, and a second such limit switch means being established in an open contact condition when said closure member approaches a closed position with respect to said accessway, the energization circuit for said opening relay comprising a normally open time-delay relay contact, a normally closed closing relay contact, and said first limit switch means, the energization circuit for said closing relay comprising a normally closed opening relay contact and said second limit switch means, the energization circuit for said time-delay relay including a normally open interlock contact in parallel with said selectively actuated switch means, said opening relay further having a normally open contact which, when closed, energizes the drive motor of said power drive assembly to cause rotation thereof in a first or opening direction opening said closure member and said closing relay further comprising a normally open contact in an energization circuit for said drive motor to cause rotation thereof in a direction closing said closure member.

2. Mechanism according to claim 1, wherein said switch means for selectively energizing said time-delay relay includes a fluid-actuated switch in communication with an actuator therefor arranged in an approach path of said accessway.

3. Selective energization and automatic operation mechanism for a closure member of the sliding door type, wherein said closure member is mounted for horizontal movement with respect to an accessway in a commercial warehouse of the refrigerated or heated type, comprising a reversible power drive assembly arranged on a hinge plate pivotally mounted adjacent only one end thereof to place the drive element of said power drive assembly in floating tractional engagement with a driven track, said power drive assembly being situated on the stationary structure of said warehouse and said driven track being situated on said closure member; and an automatic control system enabling selective remote actuation of such operating mechanism to cause a complete opening and closing cycle of the operation without further attention from an operator, said automatic control system comprising a time-delay relay, an opening relay, and a closing relay, switch means for selectively energizing said time-delay relay from an approach position with respect to said accessway, limit switch means contacted by associated camways arranged in the path of travel of said closure member adjacent the limits thereof, a first such limit switch means being established in an open contact condition when said closure member approaches an open position with respect to said accessway, and a second such limit switch means being established in an open condition when said closure approaches a closed position with re-

spect to said accessway, the energization circuit for said open relay comprising a normally open time-delay relay contact, a normally closed closing relay contact, and said first limit switch means, the energization circuit for said closing relay comprising a normally closed opening relay contact and said second limit switch means, the energization circuit for said time-delay relay including a normally open interlock contact in parallel with said selectively actuated switch means, said opening relay further having a normally open contact which, when closed, energizes the drive motor of said power drive assembly to cause rotation thereof in a direction opening said closure member and said closing relay further comprising a normally open contact in an energization circuit for said drive motor to cause rotation thereof in a direction closing said closure member.

4. Mechanism according to claim 3, wherein said switch means for selectively energizing said time-delay relay from an approach position with respect to said accessway includes a fluid-actuated switch in communication with a fluid-containing hose arranged in the path of the operator passing through said approach position.

5. Selective energization and automatic operation mechanism for closure members of the sliding door type, wherein said closure members are mounted for reciprocal movement with respect to an associated stationary structure in turn provided with an accessway common to said closure members, comprising each such closure member having associated therewith a power drive assembly and a driven track, each of said power drive assemblies including a rotatable drive element in tractive engagement with the associated driven track, one such tractive element being situated on said closure member in each instance, and the other such tractive element being situated on said stationary structure in each instance, each such rotatable drive element mounting enabling floating engagement thereof with the associated driven track to provide tractive pressure between said rotatable drive element and said driven track from at least a portion of the weight of the power drive assembly, each said mechanism further comprising an automatic control system enabling selective remote actuation of the associated closure operating mechanism to cause a complete opening and closing cycle thereof without further attention from an operator, said automatic control system including a time-delay relay, an opening relay, and a closing relay, switch means for selectively energizing said time-delay relay, limit switch means contacted by associated camways arranged in the path of travel of the associated closure member adjacent the limits of travel thereof, a first such limit switch means being established in an open contact condition when said associated closure member approaches an open position with respect to said accessway, and a second such limit switch means being established in an open condition when said associated closure member approaches a closed position with respect to said accessway, the energization circuit for said open relay comprising a normally open time-delay relay contact, a normally closed closing relay contact, and said first limit switch means, the energization circuit for said closing relay comprising a normally closed opening relay contact and said second limit switch means, the energization circuit for said time-delay relay including a normally open interlock contact in parallel with said selectively actuated switch means, said opening relay further having a normally open contact which, when closed, energizes the drive motor of said power drive assembly to cause rotation thereof in a direction opening said associated closure member and said closing relay further comprising a normally open contact in an energization circuit for said drive motor to cause rotation thereof in a direction closing said associated closure member.

6. Mechanism according to claim 5, wherein said switch means for selectively energizing said time-delay relay further comprises a fluid-actuated switch in communication with a fluid-containing hose arranged in the path of an operator approaching said accessway.

7. Selective energization and operating mechanism for a closure member mounted for reciprocal movement with respect to an associated stationary structure in turn provided with an accessway, such mechanism comprising a reversible power drive assembly including a rotatable drive element in tractive engagement with a driven track, one such tractive element being situated on said closure member and the other such tractive element being situated on said stationary structure, and an automatic control system enabling selective actuation of such operating mechanism to cause a complete opening and closing cycle of the operation without further attention from an operator, said automatic control system comprising a time-delay relay, an opening relay, and a closing relay, switch means for selectively energizing said time-delay relay, limit switch means contacted by associated camways arranged in the path of travel of said closure member adjacent the limits thereof, a first such limit switch means being established in an open contact condition when said closure member approaches an open position with respect to said accessway, and a second such limit switch means being established in an open contact condition when said closure member approaches a closed position with respect to said accessway, the energization circuit for said opening relay comprising a normally open time-delay relay contact, a normally closed closing relay contact, and said first limit switch means, the energization circuit for said closing relay comprising a normally closed opening relay contact and said second limit switch means, the energization circuit for said time-delay relay including a normally open interlock contact in parallel with said selectively actuated switch means, said opening relay further having a normally open contact which, when closed, energizes the drive motor of said power drive assembly to cause rotation thereof in a first or opening direction opening said closure member and said closing relay further comprising a normally open contact in an energization circuit for said drive motor to cause rotation thereof in a direction closing said closure member.

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