Aug. 11, 1931. H. C. BLODGETT 1,817,909

ELECTRIC DOOR CONTROL

Filed March 16, 1928 4 Sheets-Sheet 1

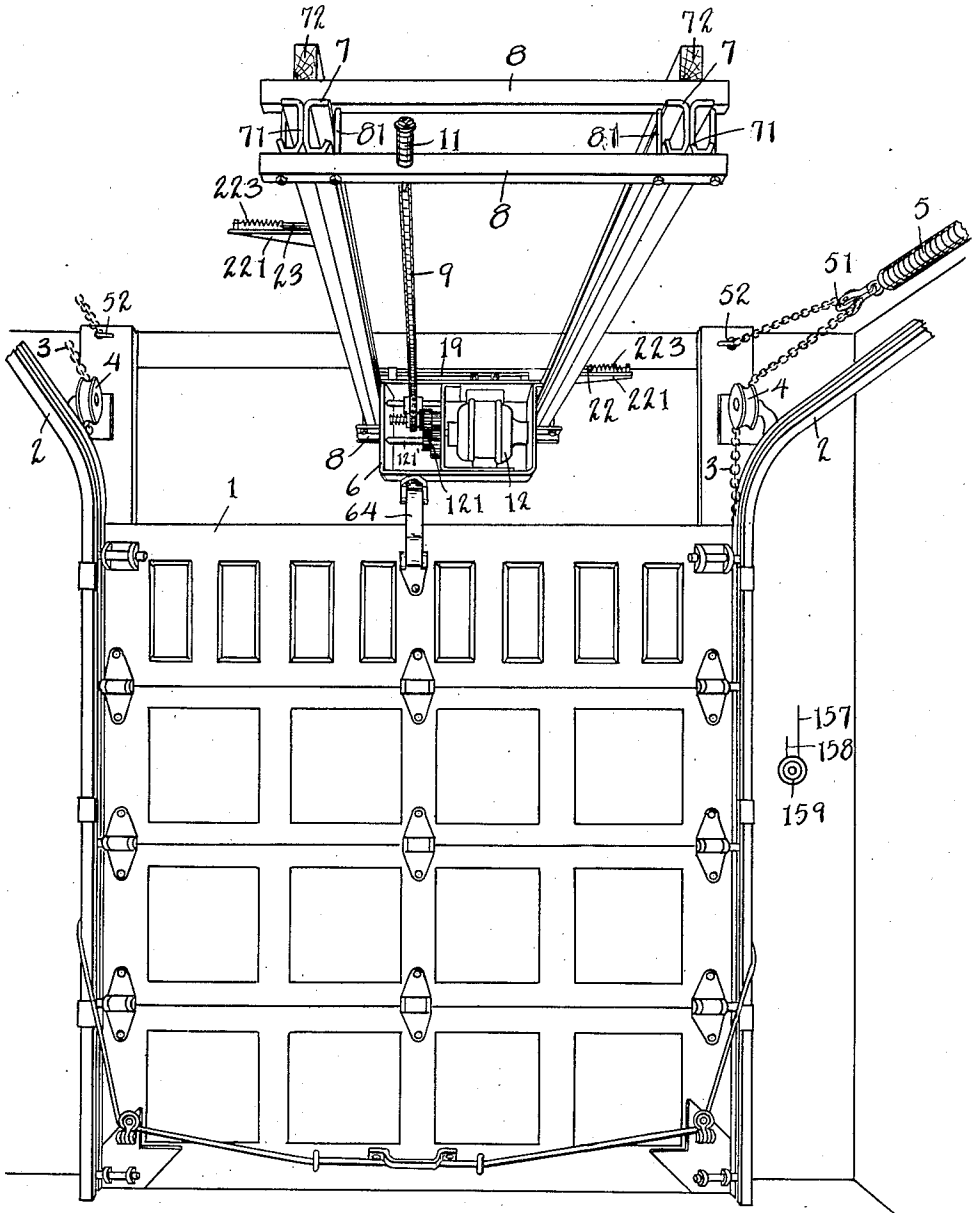


Fig. 1

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ELECTRIC DOOR CONTROL

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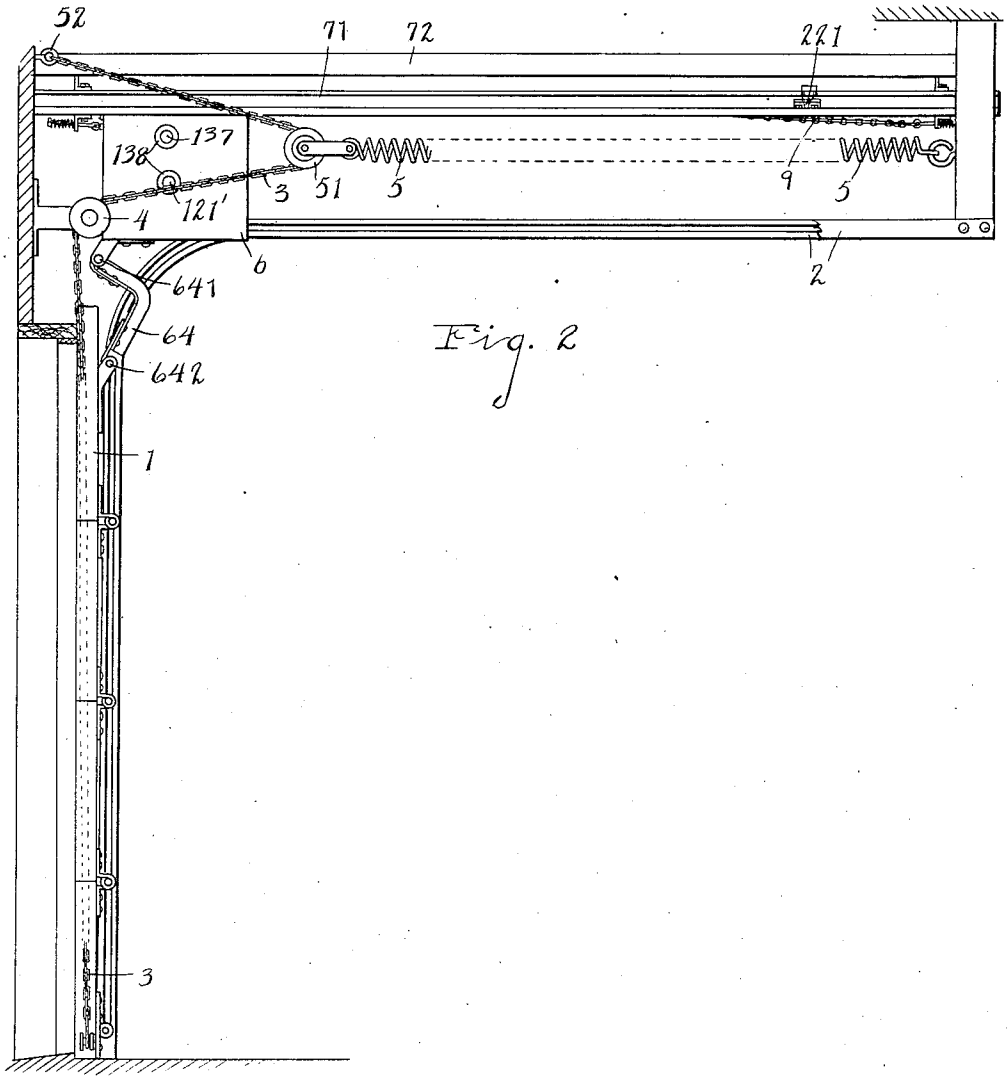


Fig. 2

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ELECTRIC DOOR CONTROL

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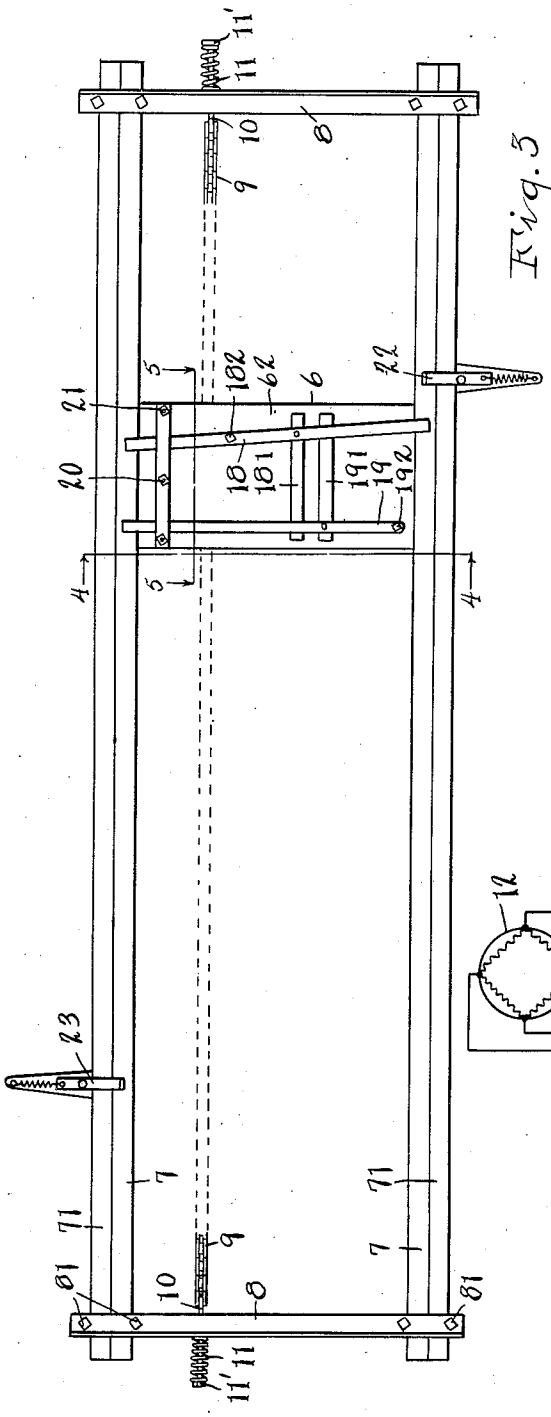


Fig. 5

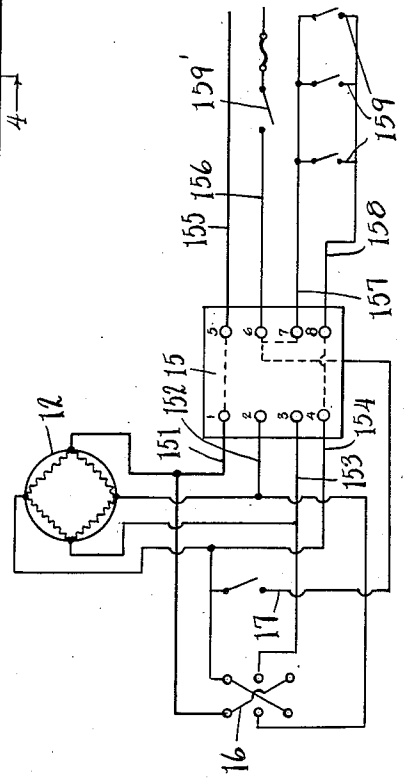


Fig. 6

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ELECTRIC DOOR CONTROL

Filed March 16, 1928 4 Sheets-Sheet 4

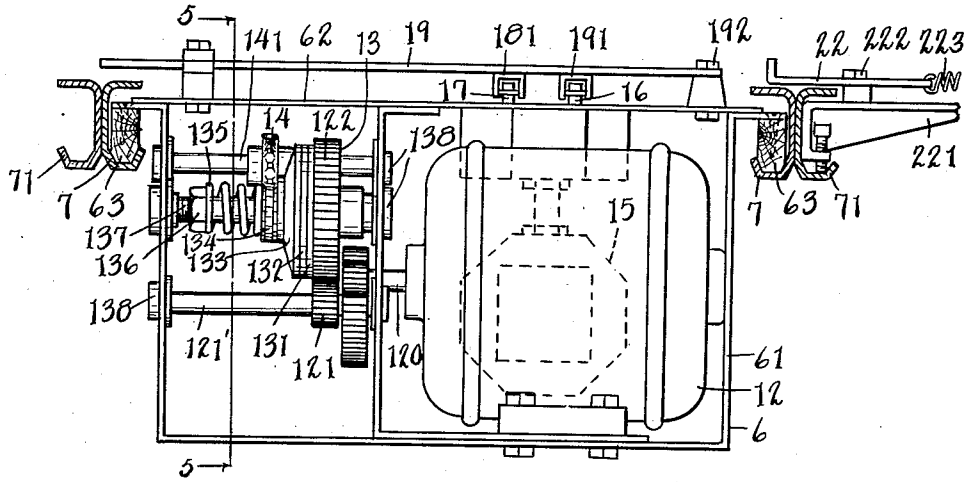


Fig. 4

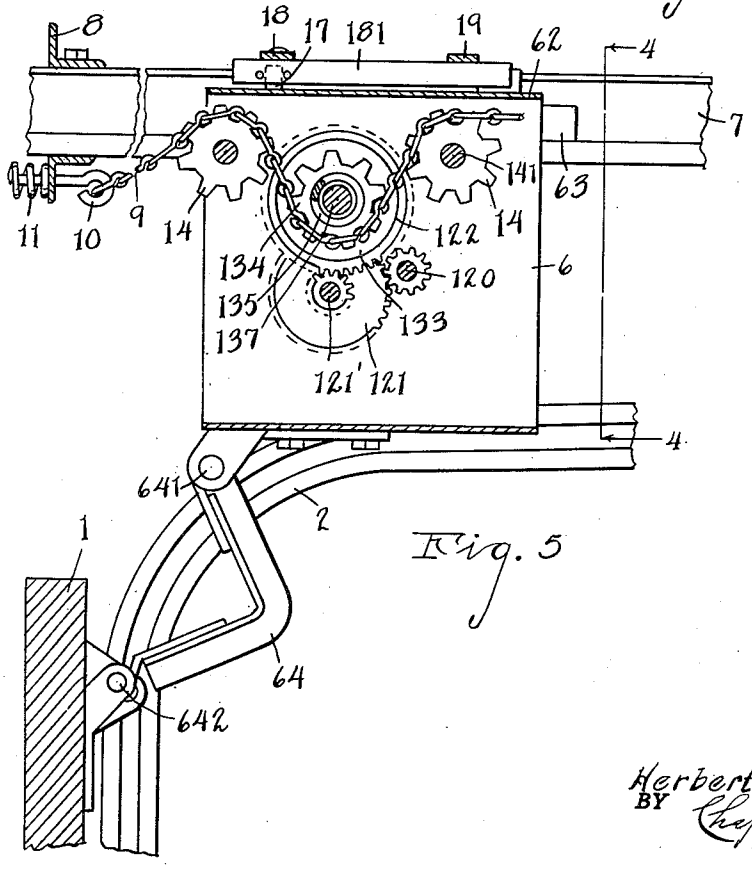


Fig. 5

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Patented Aug. 11, 1931 1,817,909

UNITED STATES PATENT OFFICE

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ELECTRIC DOOR CONTROL

Application filed March 16, 1928. Serial No. 262,309.

The objects of this invention are:

First, to provide an effective and economical electrically controlled door.

Second, to provide such a structure in an overhead door.

Third, to provide an electric control carriage for such a door.

Fourth, to provide an improved traction connection for such door structure.

Fifth, to provide an improved yieldable friction drive device for such a door structure.

Sixth, to provide improved reverse and cut-out means for such a door structure.

Objects pertaining to details of construction and operation will appear from the detailed description to follow. The invention is defined in the claims. A structure which is a preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a detail perspective view from the inside of a building, with one of my improved electrically controlled door structures installed, the upper inner part of the door track being broken away.

Fig. 2 is a vertical elevation view showing diagrammatically the relation of the door, the track and the counterbalance means, and my improved controller carriage in position.

Fig. 3 is a plan view of the improved controller carriage, carrying track and reversing devices, the traction chain being in dotted lines.

Fig. 4 is an enlarged detail transverse sectional elevation on line 4—4 of Figs. 3 and 5, showing details of the controller carriage and the slides or runners, portions being indicated by dotted lines.

Fig. 5 is an enlarged detail sectional view taken on line 5—5 of Figs. 3 and 4, the carriage being located at the end of the track in the position in which the door is closed, and portions of the track and door and the connection thereto to the carriage being illustrated.

Fig. 6 is the wiring diagram.

The parts of the drawings will be identified by numerals of reference which are the same in all the views.

1 is a door made up of horizontal sections hinged together to travel to the overhead position. 2 is the track with vertical and horizontal parts. 3 is the counterbalance cable disposed over guide pulley 4. 5 is the counter-balance spring connected to guide pulley 51 for the counter-balance cable at one end and to the wall 52 and disposed horizontally above the horizontal portion of the track.

These parts are all substantially shown and described in U. S. Patent 1,508,886 issued September 16, 1924, to Dautrick, Johnson and Kraska for overhead door, in which patent will be found complete detail not necessary to include here.

6 is the door controller carriage which is electrically driven.

The controller carriage 6 comprises the steel frame 61 on which the entire electrical mechanism is mounted. 62 is a steel top plate or cover for the purpose of carrying a portion of the mechanism, as well as binding the frame together at the top for the purpose of strength. 63, 63 are wooden runners secured at each side of the carriage and slide on suitable rails. These runners cause the proper amount of friction on the rails to prevent the carriage overrunning. 64 is a bent link connected at 641 to the carriage and at 642 to the door. The bent form of link 64 enables full travel of the carriage without clash with the top of the door, see Figs. 2 and 5, at one end of the travel and with the carriage at the opposite end of the travel, which is of advantage where space is limited. This permits very free movement without load in starting to open the door, giving the motor a good start. In closing, the door stops without undue jar or slamming. The form of the link permits it to act somewhat like a toggle when the door is in its closed position, as seen in Fig. 2, and the door is locked against opening. It is thus not possible for a person from the outside to lift the door open. The pivot 641 being in vertical alignment with pivot 642, the vertical movement of the door is not possible until the carriage is moved carrying the pivot to the inner side of the vertical plane. It can only be opened by actuating the carriage.

7 is a channel-shaped track for accommodation of the runners 63. 71 is a stiffening channel bar, like track 7, secured back to back to track 7 and affords adjustable attachment for switch levers and trips and the like. 8, 8 are the spreaders with clamp bolts for holding the track in position. 72 are the beams above which carry the entire structure, being secured to the ceiling or end walls of the building, as the case may be, this detail not being here shown. 9 is a stationary sprocket chain carried at its ends by the cross pieces or spreaders 8. 10 are the chain bolts with hook ends at each end of the chain. 11 are the springs disposed on the bolts 10 under compression nuts 11′ 11′ on said bolts, so that the chain yields in either direction by the compression of these springs. This cushions the device and also permits easy starting of the carriage, thus accommodating its action to the action of the electric motor which drives it. Any spring cushion could be provided.

12 is the electric motor supported in carriage 6 and furnishing power for the operation of the said controller carriage. It is of alternating current, and in practice is adjustable to 110 to 220 volts of the various cycles.

120 is the motor spindle. 121 is a reduction gearing on shaft 121′ serving to reduce the motor speed and deliver power to the main gear 122 which is on shaft 137. 133 is the friction drive unit. It consists of the main gear 122 on shaft 137 which provides the drive connection through suitable friction means to the sprocket drive wheel 134 which engages the said stationary sprocket traction chain 9. The friction means comprises a circular fiber disk 131 secured to the gear 122. This contacts with the fiber disk 132 secured to the metal disk 133, both of which are secured to and carried by the sprocket wheel 134. 135 is the friction spring also disposed on shaft 137. 136 is the adjustable spring retaining nut. These parts are all supported on the shaft 137.

138 are the ball bearings pressed into the steel frame to support the shafts for these structures. 14, 14 are idler sprockets wheels on shaft 141 disposed in proximity to and coacting with the sprocket wheel 134 and maintain the sprocket chain 9 in proper operative relation to sprocket wheel 134.

It will be seen that if the carriage or the parts which it drives encounter any undue resistance, the friction disks 131 and 132 slip and permit the motor to run without driving the door or the carriage. The door being counterbalanced, very slight power is required and the friction is adjusted to low resistance, thus making it impossible for the door which is counterbalanced to seriously injure anyone because of this frictional connection to the motor which drives it.

The electric connections and controls will be explained in connection with the diagram Fig. 6 along with Figs. 3, 4 and 5. The motor leads are suspended in loops and swing with the carriage and motor as they move back and forth.

15 is the switch panel for the motor which is provided with connections 151, 152, 153 and 154 for the motor leads, 151 and 154 being the running leads, while 152 and 153 are the directional leads which are controlled by the reversing switch to be described. 155 and 156 are the power terminals, and 157 and 158 are the push button terminals. Push buttons 159 at various places serve to control the structure and initiate its operation (see diagram Fig. 6). A manual cutout switch 159′ is provided in proximity to the push buttons so that when it is desired to stop the motor and the door manually, it can be done by cutting off the power lead manually.

16 is a reversing switch of usual construction. 17 is a cut-out switch. 18 is the switch lever connected to the U-channel slide 181 for the purpose of operating the cut-out switch 17. 19 is a switch lever with a U-channel slide 191 connected for operating the reversing switch 16. 20 is a stop means for the switch lever 19 and 21 is a stop means for the switch lever 18. Switch lever 19 is fulcrumed at one end at 192. Switch lever 18 is fulcrumed intermediate its length at 182 (see Fig. 3), and projects at both sides of the control carriage to actuating positions.

22 is a yielding spring trip, disposed upon the channel 71 to cooperate with one end of lever 18 to cut out the motor when the door is fully open. 23 is a similar yielding spring trip disposed on the track to act on the projecting ends of switch lever 19 to reverse the switch and on lever 18 to cut out the motor when the door reaches its closed position. Because the trip finger yields, the lever, after being tripped by the same, passes the trip, the carriage having sufficient momentum to carry the same by the trip. The details of the yielding spring trip appear in Figs. 1, 3 and 4. They comprise each a bracket 221 adjustably secured to rail 72 to which the spring trip finger is fulcrumed at 222, and a spring 223 is connected to the outer end of the finger, and at its outer end to the projecting arm of the bracket, putting tension on the finger so that it yields in either direction. It is thus held yieldingly in the central position to trip the levers when they are carried past by the controller carriage and permit travel freely in either direction.

I have described all the parts of my structure and will now briefly indicate their operation. Assume the door to be in the open position and the carriage at the extreme left of Fig. 3. One of the push buttons is then closed which starts the motor. The end of lever 18 strikes the trip 23 and automatically closes this cut-out, and as the carriage is car-

ried forward the end of lever 19 strikes the said rip 23 and reverses the reversing switch. This, however, due to the character of the motor, does not reverse the motor until it stops and starts again, it being necessary for the motor to come to a stop before it can be reversed. The carriage travels, carrying the door to the closing position, and the opposite end of the cut-out lever 18 strikes the spring finger 22 and it is tripped and cuts out the motor, and there is sufficient momentum to carry the door to the completely closed position.

When is is desired to open the door, the push button is again pressed, and because the reversing switch has been reversed the motor starts in the opposite direction and opens the door. As soon as the lever 18 passes the trip finger 22 it cuts the motor in again and it continues to travel until the door is open. The reversing switch lever 19 first strikes the spring finger 23 and throws it to the reverse position, and the end of the lever 18 then strikes the trip 23 and cuts out the motor and stops it, the over throw motion being sufficient to completely open the door.

If, in closing the door, after the door is started in its travel, it is desired to stop it, it can be done by opening the manually controlled cut-out switch 159'. When the door comes to a stop and the push button switch is again closed, the motor reverses because the reverse switch has already been reversed when the door started to close. It is thus possible to control the door by manipulation of the manually controlled switches.

The control means can be very readily adapted to the usual sliding or swinging doors or any of the multitude of garage door designs and would be of advantage. It is preeminently for an overhead door control.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination of an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on the said track, a traction sprocket chain parallel to said auxiliary track, spring cushion support for said chain, a reversible electric motor carried by said carriage with gear train to drive the same by sprocket wheel engaging said traction chain, friction drive disks interposed in said gear train adjustable to yield under pressure, a cut-out switch therefor with projecting lever for automatic operation thereof, a reversing switch with a projecting lever for automatic operation, a yielding spring trip for engaging said levers to operate the same automatically when the carriage passes the trip, switch means to close the circuit to initiate operation, and a control switch in the power circuit.

2. The combination of an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on said track, a traction sprocket chain parallel to said auxiliary track, a reversible electric motor carried by said carriage with gear train to drive the same by sprocket wheel engaging said traction chain, friction drive disks interposed in said gear train adjustable to yield under pressure, a cut-out switch therefor with projecting lever for automatic operation thereof, a reversing switch with a projecting lever for automatic operation, a yielding spring trip for engaging said levers to operate the same automatically when the carriage passes the trip, and switch means to close the circuit to initiate operation.

3. The combination of an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on said track, spring cushion support for said chain, a reversible electric motor carried by said carriage with gear train to drive the same by sprocket wheel engaging said traction chain, a cut-out switch therefor with projecting lever for automatic operation thereof, a reversing switch with a projecting lever for automatic operation, a yielding spring trip for engaging said levers to operate the same automatically when the carriage passes the trip, and switch means to close the circuit to initiate operation.

4. The combination of an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on the said track, a traction sprocket chain parallel to said auxiliary track, spring cushion support for said chain, a reversible electric motor carried by said carriage with gear train to drive the same by sprocket wheel engaging said traction chain, a cut-out switch therefor with projecting lever for automatic operation thereof, a reversing switch, a yielding spring trip for engaging said lever to operate the same automatically when the carriage passes the trip, and switch means to close the circuit.

5. The combination of an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on the said track, a traction sprocket chain parallel to said auxiliary track, spring cushion support for said chain, a reversible electric motor carried by said carriage with gear train to drive the same by spocket wheel engaging said traction chain, a reversing switch with a projecting lever for automatic operation, a yielding spring trip for engaging said levers to oper-

ate the same automatically when the carriage passes the trip, and switch means to close the circuit.

6. The combination with an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on said track, a traction sprocket chain parallel to said auxiliary track, and a reversible electric motor carried by said carriage with gear train to drive the same by sprocket wheel engaging said traction chain.

7. The combination with an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage with runners slidable on said track, and a reversible electric motor carried by said carriage to drive the same.

8. The combination with an overhead door with track ways therefor for guiding the same from a vertical to a horizontal position, auxiliary horizontal track means, a carriage, and a reversible electric motor carried by said carriage to drive the same.

9. The combination with an overhead door with trackways therefor for guiding the same from a vertical closed position to a horizontal open position, auxiliary horizontal track means, a control carriage adapted to travel on said track, a traction chain supported parallel to said auxiliary track, a reversible electric motor carried by said carriage with gear train to drive the same by a wheel engaging said traction chain, a bent link connection between the said carriage and the said door to permit overtravel of the carriage when the door is closed to permit easy closing and free starting movement of the motor in opening, an automatic reverse switch means for said motor, an automatic cut-out therefor, and a manual switch for starting the motor.

10. The combination with an overhead door with trackways therefor for guiding the same from a vertical closed position to a horizontal open position, auxiliary horizontal track means, a control carriage adapted to travel on said track, a traction chain supported parallel to said auxiliary track, a reversible electric motor carried by said carriage with gear train to drive the same, a connection between the said carriage and the said door to permit overtravel of the carraige when the door is closed to permit easy closing and free starting movement of the motor in opening, an automatic reverse switch means for said motor, an automatic cut-out therefor, and a manual switch for starting the motor.

11. The combination with an overhead door with trackways therefor for guiding the same from a vertical closed position to horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, a reversible electric motor carried by said carriage with gear train to drive the same, a connection between the said carriage and the said door to permit overtravel of the carriage when the door is closed to permit easy closing and free starting movement of the motor in opening, a reverse switch means for said motor, and switches to control said motor.

12. The combination of an overhead door with a counterbalance with track ways therefor for guiding the same from a vertical closed position to a horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, a traction chain supported parallel to said auxiliary track, a reversible electric motor carried by said carriage to drive the same, a bent link connection between said carriage and door arranged to permit over-travel of the carriage in closing the door to carry the upper pivot beyond the plane of the door whereby the door is locked, and switches to control said motor.

13. The combination of an overhead door with a counterbalance with track ways therefor for guiding the same from a vertical closed position to a horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, a traction chain supported parallel to said auxiliary track, a reversible electric motor carried by said carriage to drive the same, a link connection between said carriage and door arranged to permit over-travel of the carriage in closing the door to carry the upper pivot beyond the plane of the door, and switches to control said motor.

14. The combination of an overhead door with a counterbalance with track ways therefor for guiding the same from a vertical closed position to a horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, means for actuating said carriage, a bent link connection between said carriage and door arranged to permit the over-travel of the carriage in closing the door to carry the upper pivot beyond the plane of the door whereby the door is locked when closed.

15. The combination of an overhead door with a counterbalance with track ways therefor for guiding the same from a vertical closed position to a horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, means for actuating said carriage, and a link connection between said carriage and door arranged to permit the over-travel of the carriage in closing the door to carry the upper pivot beyond the plane of the door whereby the door is locked when closed.

16. The combination of an overhead door with a counterbalance with track ways there-

for for guiding the same from a vertical closed position to a horizontal open position, an auxiliary horizontal track means, a control carriage adapted to travel on said track, means for actuating said carriage, and a link connection between said carriage and door arranged to travel past center and lock the door when closed.

17. The combination with a reciprocating door, of an auxiliary track means, a carriage with runners slidable on said track, yielding traction means, a motor carried by the carriage geared to the yieldable traction means, and a friction drive therefor.

18. The combination with a reciprocating door, of an auxiliary track means, a carriage with runners slidable on said track, yielding traction means, and a motor carried by the carriage geared to the yieldable traction means.

In witness whereof I have hereunto set my hand.

HERBERT CADY BLODGETT.