

May 13, 1969

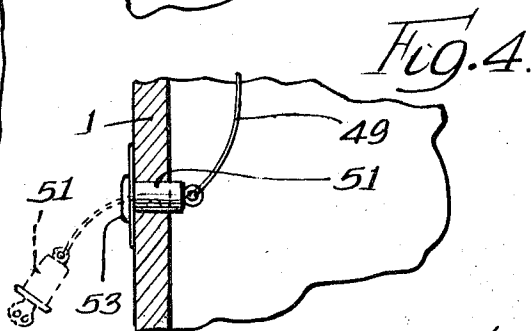
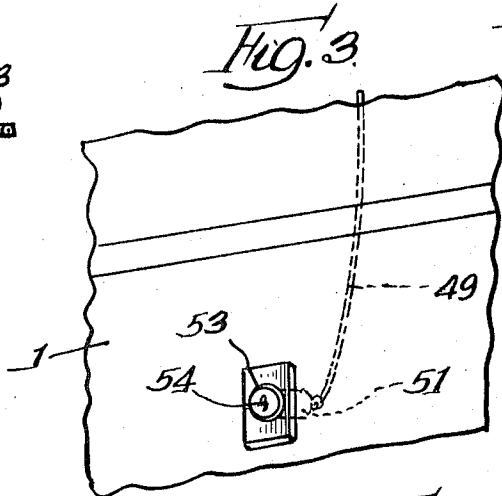
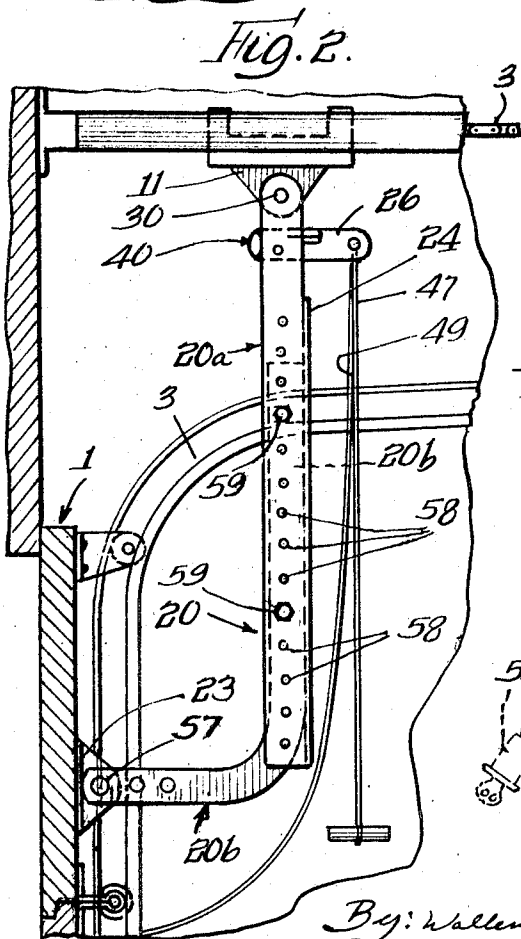
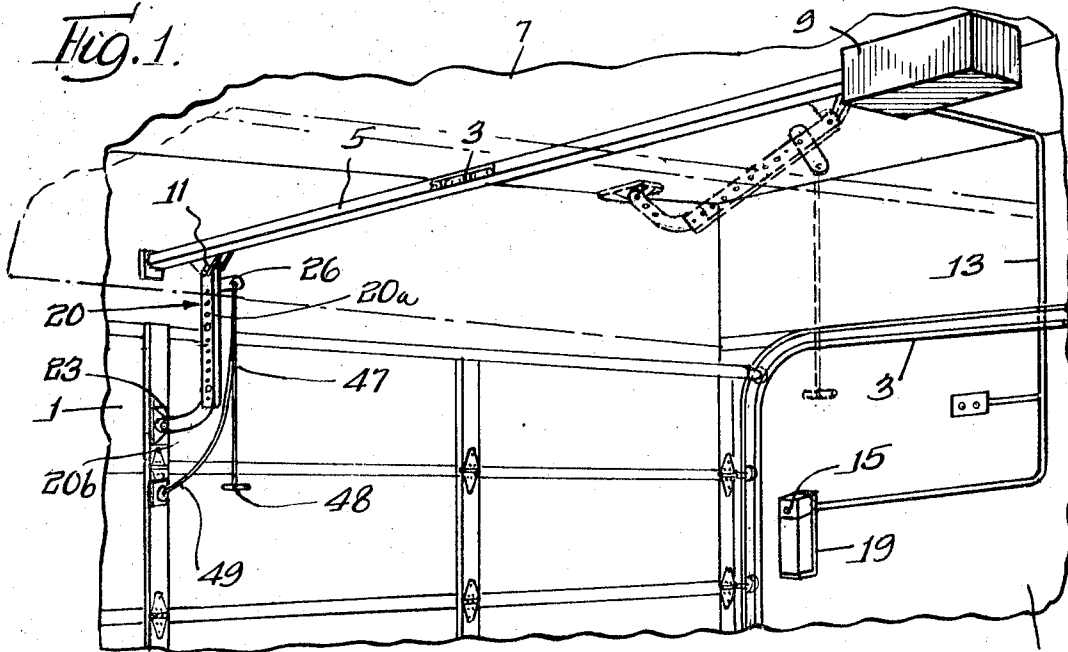
R. GOLDSTEIN

3,443,339

RELEASE MECHANISM FOR GARAGE DOOR CONNECTING ARM

Filed March 7, 1967

Sheet 1 of 2



Inventor
Richard Goldstein

By: Wallenstein, Spangenberg, Kettner & Stampf

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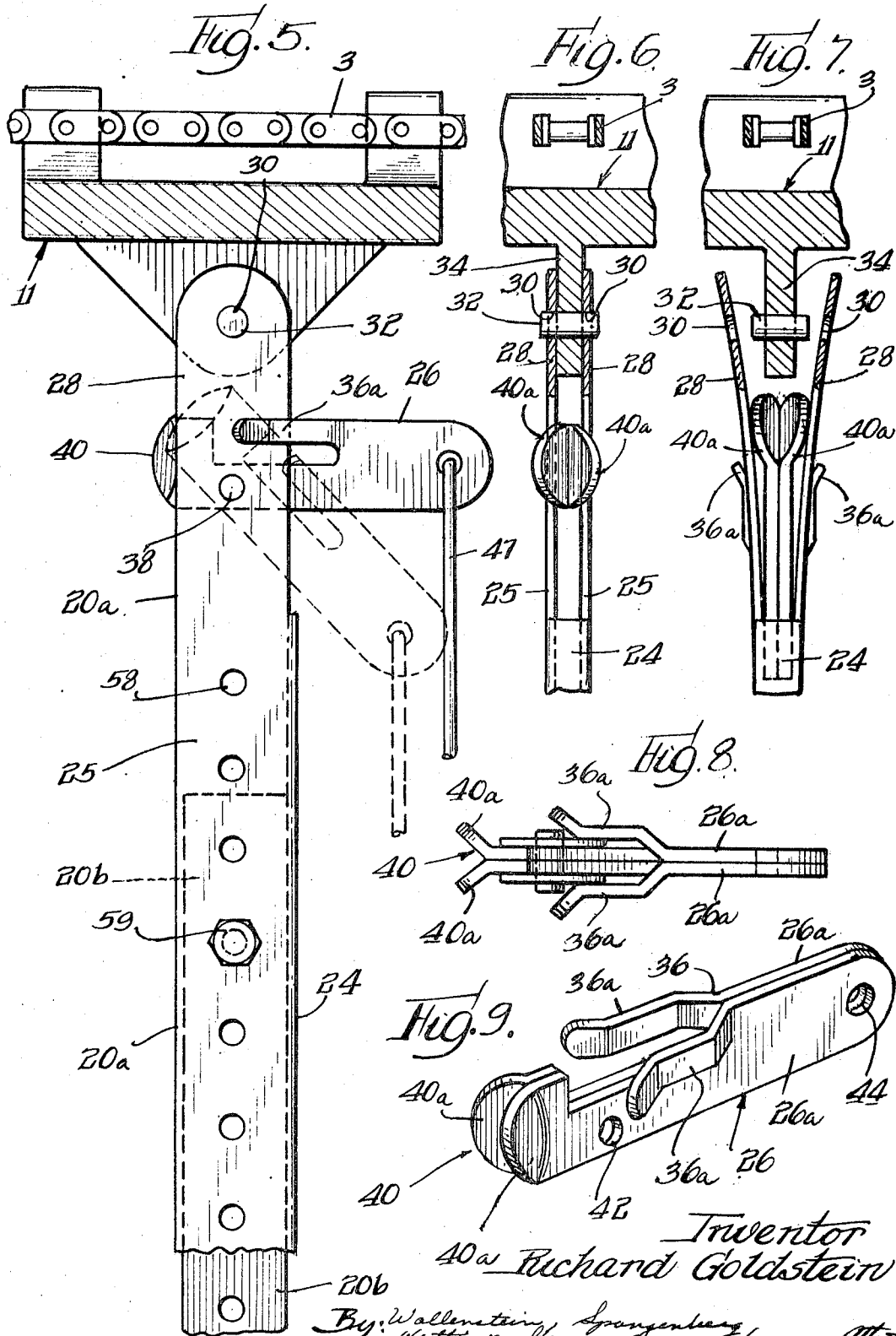
R. GOLDSTEIN

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Sheet 2 of 2



Inventor
Richard Goldstein

By: Wallenstein, Spangenberg,
Kottis & Shannell

Attys.

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**RELEASE MECHANISM FOR GARAGE DOOR
CONNECTING ARM**

Richard Goldstein, Deerfield, Ill., assignor, by mesne assignments, to Chamberlain Manufacturing Corporation, Elmhurst, Ill., a corporation of Iowa

Filed Mar. 7, 1967, Ser. No. 625,904

Int. Cl. E05c 15/02; E05b 65/10

U.S. Cl. 49-141

8 Claims

ABSTRACT OF THE DISCLOSURE

A door mounted for movement between a lowered substantially vertical position and a raised substantially horizontal position is connected to an overhead horizontally movable motor driven door operator means by a connecting arm assembly pivotally mounted at its bottom end to the door. The upper end of the connecting arm assembly has a pair of confronting resilient arm portions free to flex between relatively closely spaced and spread apart positions. A coupling member carried by the door operator means is securely sandwiched between the spaced arm portions. When the arm portions are spread apart, the connecting arm assembly falls away from the coupling member. The spaced arm portions are spread apart by means including an operating member pivotally supported between the spaced arm portions and having on one side of its pivot axis a protuberance which, upon a downwardly pull on a pull cord attached to the opposite side thereon, moves between and spreads apart the spaced arm portions of the connecting arm assembly.

This invention has its most important application in residential motor driven garage door installations. Most residential garage doors are mounted for movement between a substantially vertical lowered position and a substantially horizontal raised position. A motor driven door operator means is mounted on the ceiling of the garage for movement between extreme forward and rearward positions. The door operator means is connected to the door involved by a connecting arm assembly extending between the door operator means and the door. The aforementioned connecting arm assembly assumes a number of different angular positions as the door moves between its lowered vertical position and its raised horizontal position and, to permit this variation in angular position, is pivotally mounted at one end to the door operator means and at the other end to the garage door. The connecting arm assembly usually extends vertically down from the door operator means when the garage door is in its lowered position. An electric motor controlling the door operator means moves the door operator means from one of its extreme positions to the other in response to the momentary depression of a wall mounted push button switch or the momentary reception of a radio signal pulsation transmitted from the owner's car.

This invention deals with the means for quickly and easily disconnecting the door involved from the door operator means so that the door can move independently of the door operator means. Such a disconnection is required, for example, when the electric motor or the controls therefor become inoperable and it is desired to open or close the door manually.

Various means have been developed heretofore for disconnecting the connecting arm assembly from the door operator means or from the garage door, but these have been unsatisfactory for a number of reasons including the fact that the disconnecting operation was not always easy to achieve. Thus, in many instances, it was difficult for unskilled persons like housewives to effect

the release operation. The present invention provides an improved connecting arm assembly which can quickly and easily be disconnected by a modest downward pull on a pull-cord or the like for all of the various angular positions of the connecting arm assembly. In the preferred form of the present invention, the connecting arm assembly is connected to the door operator means by a releasable coupling including a pair of confronting horizontally spaced (confronting) resilient arm portions forming free extensions at the top of the connecting arm assembly when the door is in its lowered position. The spaced confronting arm portions form an opening into which extends a coupling member carried by the movable door operator means. The coupling member may, for example, have a pair of aligned laterally projecting portions which fit into openings in the confronting arm portions when the latter are in relatively closely spaced positions. The confronting arm portions are dis-engaged from the coupling member by spreading apart the confronting arm portions. (It should be understood that the broad, but less advantageous, aspects of the invention include an arrangement of parts which is the reverse of that just described, wherein the confronting arm portions are engaged on the outside rather than on the inside by the coupling member and the connecting arm assembly is dis-engaged from the coupling member by bringing the confronting arm portions closer together.)

In the most preferred form of the invention, the confronting arm portions are moved between relatively closely spaced and spread apart by an operating member pivotally mounted between the confronting arm portions intermediate its ends and having a protuberant portions at one end thereof. A pull-cord is attached to the other end thereof. When the pull-cord is pulled downwardly, the end containing the protuberance moves upwardly between the confronting arm portions to force the same further apart. As the spaced arm portions are thus spread apart, the connecting arm assembly will pivot initially under the force of the pull on the pull-cord and then under the force of gravity away from the coupling member to release the connecting arm assembly therefrom.

The point of connection of the pull-cord with the operating member is, for all the angular positions of the connecting arm assembly, substantially spaced from and is on the same side of a vertical plane passing through the pivot axis of the operating member so that a downward component of force applied to the pullcord can always pivot the operating member into a release position. In the preferred form of the invention, there is provided on the operating member on the side of the pivot axis opposite the one containing the protuberance a bifurcated portion which normally closely straddles the opposite sides of said confronting arm portions of the connecting arm assembly to hold the same in their relatively closely spaced positions. When the operating member is pivoted into its release position, the bifurcated portion thereof moves away from the confronting arm portions to enable the protuberant portion of the operating member to spread the same further apart.

The above and other advantages and features of the invention will become apparent upon making reference to the specification to follow, the claims and the drawings wherein:

FIG. 1 shows the inside of a garage provided with equipment for automatically raising and lowering the garage door;

FIG. 2 is an enlarged side elevational view of the releasable connecting arm assembly of the invention forming part of the equipment shown in FIG. 1;

FIG. 3 is a fragmentary view of the outside of the garage door showing a removable lock assembly carried

on the door which, when unlocked, allows a pull-cord to be pulled through the lock-receiving opening in the garage door for releasing the connecting arm assembly of FIG. 2;

FIG. 4 is a fragmentary vertical sectional view through the portion of the garage door shown in FIG. 3;

FIG. 5 is a greatly enlarged fragmentary elevational view of the upper end portion of the connecting arm assembly of FIG. 2;

FIGS. 6 and 7 are fragmentary end elevational views, partially in section, of the upper end of the connecting arm assembly with the confronting arm portions thereof respectively in coupling member engaging and coupling member dis-engaging positions;

FIG. 8 is a plan view of the operating member which separates the confronting arm portions of the connecting arm assembly to release the same; and

FIG. 9 is a perspective view of the operating member shown in FIG. 8.

Referring now to FIG. 1, a garage door operator system is there shown for a garage having a garage door 1 which rides on side tracks 3, only one of which is shown. Means for opening and closing the garage door is shown comprising a chain 3 mounted for movement in a guide channel 5 secured to the ceiling 7 of the garage. The chain 3 is moved forward and backward within the channel in a well known manner by means of a motor and electrical control apparatus contained within a housing 9 or the like also secured to the ceiling 7. The chain 3 carries a suitable motion coupling member 11 which is moved by the chain 3 between extreme front and rear limits, FIG. 1 showing the forwardmost position thereof. A conduit 13 extending from the housing 9 contains conductors for delivering energizing current to the motor and control current for the control circuitry within the housing 9. The control current is under the control of a manual push button switch 15 mounted on the wall 17 of the garage and a radio receiver 19 also mounted on the wall. The radio receiver is designed to receive radio control signals of a particular assigned frequency from a transmitter in the owner's automobile and close a circuit in response thereto. The depression of the push button switch 15 or the reception of a radio signal of the assigned frequency will cause a control current to flow in a conductor in the conduit 13 which effects operation of the aforesaid motor which moves the chain 3 to carry the coupling member 11 from one extreme position.

The movement of the coupling member 11 is transmitted to the garage door 1 by a connecting arm assembly 20. It can be seen from FIG. 1 that, as the coupling member 11 moves from the front to the rear position shown in FIG. 1, the connecting arm assembly 20 will progressively vary in angular position. When the coupling member 11 is in its front extreme position, the section 20a of the connecting arm assembly 20 which engages the coupling member 11 extends vertically. The connecting arm assembly has a section 20b extending transversely and forwardly from the bottom end of the section 20a. The forward end of the arm assembly section 20a is pivotally connected to a bracket 23 secured to the garage door 1. When the coupling member 11 is in its rear extreme position, the connecting arm assembly section 20a inclines rearwardly and upwardly as shown by the dashed lines in FIG. 1.

The means for releasing the connecting arm assembly from the coupling member 11 most advantageously is in the form of an operating member 26 projecting transversely and rearwardly from the connecting arm assembly section 20a. The operating member is pivotally connected to the connecting arm assembly section 20a. A downward pull on the rearwardly projecting portion of the operating member releases the connecting arm assembly section 20a from the coupling member 11 in a manner to be described which causes the connecting arm assembly

bly to fall away from the coupling member as it pivots about the pivot axis formed by the bracket 23.

As best shown in FIGS. 5-7, connecting arm assembly section 20a is a channel member having a web 24 joining side flanges 25-25. The web 24 terminates short of the upper end of the channel member to leave a pair of spaced confronting resilient flexible arm portions 28-28 unconnected at the outer ends thereof. The confronting arm portions 28-28 have a pair of holes 30-30 adapted to receive the laterally projecting ends of a pin 32 which is fixedly secured to a tongue 34 closely sandwiched between the confronting arm portions 28-28 of the connecting arm assembly 20. The confronting arm portions 28-28 are preferably normally held or maintained in relatively closely spaced relation by a flaring bifurcated portion 36 forming part of the operating member 26.

The operating member 26 is pivotally mounted in any suitably way between the spaced confronting arm portions 28-28 of the connecting arm assembly. As illustrated, a pivot pin 38 (FIG. 5) passing through an opening 42 (FIG. 4) in the operating member pivotally supports the operating member at a point between the ends thereof. The illustrated operating member 26 is formed from a pair of welded together metal bars 26a-26a having arms 36a-36a struck therefrom and bent outwardly to form the aforementioned flaring bifurcated portion 36 located on the rear side of the pivot axis thereof. A protuberant portion 40 is preferably formed on the front end of the operating member 26 by bending the rounded ends of the metal bars 26a-26a outwardly along a line extending generally transversely of the lengths thereof, to form outwardly diverging tongues 40a-40a. These tongues are normally located beyond the margins of the confronting arm portions 28-28 of the connecting arm assembly section 20a. When the rear end of the operating member 26 is pulled downwardly, the diverging tongues 40a-40a become wedged between the spaced arm portions 28-28 which are thereby forced apart to an extent shown in FIG. 7, where the confronting arm portions 28-28 clear the margins of the pin 32 carried by the coupling member 11. When this occurs, the connecting arm assembly falls away from the coupling member 11 in the direction of the pull on the operating member to release the connecting arm assembly completely from the coupling member 11. The connecting arm assembly 20 can be reattached to the coupling member 11 by merely swinging the same upward into position where the coupling member pin 32 is opposite the openings 30-30 of the confronting arm portions 28-28. The rear end of the operating member 26 is then pushed upward to withdraw the protuberant portion 40 from between the confronting portions which spring back into position against or adjacent to the coupling member tongue 34. The bifurcated portion 36 of the operating member 26 once again straddles the confronting arm portions 28-28.

As best shown in FIG. 9, the rear end of the operating member 26 is provided with a hole 44 for receiving pull-cords 47 and 49. The pull-cord 47 has a handle 48a at the bottom thereof and the pull-cord 49 extends to a key body (FIGS. 3-4) which is normally locked in place within an opening 53 in the garage door 1.

Due to the shape of the connecting arm assembly, the point of connection of the pull-cords 47 and 49 to the operating member 26 will be substantially rearwardly spaced from a vertical plane passing through the pivot axis of the operating member 26 for all positions of the connecting arm assembly, so that a downwardly pull on the pull cord 47 or 49 will always effect sufficient pivoting of the operating member 26 to bring the protuberant end portion 40 into a connecting arm assembly release position.

The pull-cord 49 is only used when the garage door is in a lowered position and the operator does not have the use of his car installed radio transmitter and he does not

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have a way to get into the garage to operate the push button switch 15. In such case, the key body 51 has an accessible key-receiving slot 54 exposed on the outside of the garage door to receive a key which releases the key body 51 from the door. The key body is pulled from the door opening along with the pull-cord 49. In so doing, the operating member is pivoted into a connecting arm release position.

Referring now more particularly to FIGS. 2 and 5, the connecting arm assembly section 20b is an angular-shaped bar with a relatively short front leg 20b' having an opening for receiving a pivot bolt 57 or the like. The connecting arm assembly section 20b has a relatively long rear leg 20b'' extending between the flanges 25—25 of the channel member constituting the connecting arm assembly section 20a. The latter leg 20b'' and the flanges 25—25 are provided with longitudinally spaced holes for receiving nut and bolt assemblies 59—59, the bolt portions of which pass through selected pairs of holes to provide a connecting arm assembly of the desired overall length.

It should be understood that numerous modifications may be made in the most preferred form of the invention described above without deviating from the broader aspects of the invention.

I claim:

1. In combination with a door mounted for movement between a lowered fully closed position and a raised fully open position over the entrance to an enclosed space, door operating apparatus including door operator means supported for movement between given limits near the top of said enclosed space and including electrical means for controlling the movement of the door operator means between said limits and connecting arm means having one end connected to one of said door operator means and said door, the improvement comprising releasable coupling means interconnecting the other end of said connecting arm means with the other of said door operator means and said door so the door moves between said lowered and raised positions as said door operator means moves between said given limits, said releasable coupling means comprising: a pair of spaced confronting arm portions extending from one of the means to be interconnected, said spaced confronting arm portions being movable between relatively closely spaced positions and relatively spread apart positions, a coupling member on the other of said means to be interconnected which coupling member normally fits between said spaced arm portions and engages with said spaced arm portions when the latter is in one of said positions and readily separates therefrom when said arm portions are in the other of said positions, and manually operable means for moving said spaced arm portions between said relatively closed spaced positions and said relatively spread apart positions, said manually operable means including protuberant means which is movable between said spaced arm portions into a position which forces the same apart to dis-engage the coupling member from said spaced arm portions.

2. In combination with a door mounted for movement between a lowered fully closed position and a raised fully open position over the entrance to an enclosed space, door operating apparatus including door operator means supported for movement between given limits near the top of said enclosed space and including electrical means for controlling the movement of the door operator means between said limits and connecting arm means having one end connected to one of said door operator means and said door, the improvement comprising releasable coupling means interconnecting the other end of said connecting arm means with the other of said door operator means and said door so the door moves between said lowered and raised positions as said door operator means moves between said given limits, said releasable coupling means comprising: a pair of spaced confronting arm portions extending from one of the means to be interconnected, said spaced confronting arm portions being movable between

relatively closely spaced positions and relatively spread apart positions, said spaced arm portions being horizontally spaced with respect to one another and made of a resilient material where the resiliency thereof normally urges the same into said relatively closely spaced positions, a coupling member on the other of said means to be interconnected which coupling member engages with said spaced arm portions when the latter is in one of said positions and readily separates therefrom when said arm portions are in the other of said positions, said coupling member engaging with said spaced arm portions when the latter are in their relatively closely spaced positions and being dis-engaged therefrom when said spaced arm portions are in said relatively spread apart positions, and manually operable means for moving said spaced arm portions between said relatively closed spaced positions and said relatively spread apart positions.

3. In combination with a door mounted for movement between a lowered fully closed position and a raised fully open position over the entrance to an enclosed space, door operating apparatus including door operator means supported for movement between given limits near the top of said enclosed space and including electrical means for controlling the movement of the door operator means between said limits and connecting arm means having one end connected to one of said door operator means and said door, the improvement comprising releasable coupling means interconnecting the other end of said connecting arm means with the other of said door operator means and said door so the door moves between said lowered and raised positions as said door operator means moves between said given limits, said releasable coupling means comprising: a pair of spaced confronting arm portions extending from one of the means to be interconnected, said spaced confronting arm portions being movable between relatively closely spaced positions and relatively spread apart positions, said spaced arm portions of said coupling means being made of a resilient material, the resiliency of which urges the arm portions into their relatively closely spaced positions, a coupling member on the other of said means to be interconnected which coupling member engages with said spaced arm portions when the latter is in one of said positions and readily separates therefrom when said arm portions are in the other of said positions, manually operable means for moving said spaced arm portions between said relatively closed spaced positions and said relatively spread apart positions, said manually operable means comprising an operating member between said arm portions which is pivotally mounted for movement between its ends about a horizontal axis extending transversely of said arm portions, one end of said member on one side of the pivot axis thereof having a protuberant portion which in a raised position of said one end of said operating member spreads apart said spaced arm portions, and the opposite end of said operating member having attached thereto a pull-cord dangling downwardly therefrom and terminating in a handle portion adapted to be grasped by the user and pulled downwardly to raise the opposite end thereof to bring said protuberant portion into said arm portion spreading position.

4. The combination of said claim 3 wherein said operating member includes a bifurcated portion which normally closely straddles the opposite sides of said spaced arm portions to hold the same in said relatively closed spaced positions and in the lowered position of said opposite end of said operating member permits the spreading apart of said spaced arm portions.

5. The combination of claim 1 wherein said manually operable means includes holding means mounted for movement with said protuberant means and normally engaging the outer sides of said spaced arm portions to hold the same in said relatively closely spaced positions, said holding means moving away from said spaced arm portions as said protuberant means moves into said spreading position, to permit the arm portions to be spread apart.

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6. The combination of claim 3 wherein said spaced arm portions are at one end of the connecting arm means and the angle of extent of said connecting arm means and said spaced arm portions vary with the position of said door operator means and the door, and the point of connection of said pull-cord to said opposite end of said operating member being on the same side of a vertical plane passing through the pivot axis of said operating member for all positions of said door operator means and said door, so a downward pull on said pull-cord will always pivot the operating member into a position where the protuberant portion thereof will spread apart the arm portions.

7. A connecting arm assembly to be connected between a door and a door operator means where the door is movable between a lowered substantial vertical position and a raised substantially horizontal position and the door operator means is mounted for generally horizontal movement at the top of an enclosed space, the entrance to which is to be covered by said door, said connecting arm assembly comprising: a connecting arm section which, in the lowered position of the door, is to extend generally upwardly from the door to be connected with the door operator means at the top thereof, the top of said connecting arm section having a pair of upwardly extending spaced apart confronting resilient arm portions unconnected at the upper ends thereof and movable between relatively closed spaced positions to relatively spread apart positions, the resiliency of said arm portions forcing the arm portions to their relatively closely spaced positions, means on the arm assembly for connecting the bottom of said connecting arm section to said door and for supporting the same for pivotable movement between a raised position where the top thereof is connected to the movable door operator means and a lowered position spaced therefrom, a generally horizontally extending operating member mounted

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for pivotable movement intermediate its ends between said spaced arm portions at a point below the uppermost ends thereof, the operating member having on one side of the pivot axis thereof protuberant means which, when the end of said operating member on the other side of the said pivot axis is pulled down, moves between said spaced arm portions to spread the same apart to release a coupling member sandwiched between the spaced arm portions, and a pull-cord connected to said operating member on said other side of the pivot axis thereof, said pull-cord depending downwardly from the operating member and having a handle at the bottom thereof to be grasped by the operator.

8. The connecting arm assembly of claim 7 wherein said operating member has on said other side of the pivot axis thereof a bifurcated portion which normally closely straddles the opposite sides of said spaced arm portions to hold the same in said relatively closed spaced positions, and, when the pull-cord is pulled down, moves away from said spaced arm portions to permit the spreading apart of said spaced arm portions.

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DENNIS L. TAYLOR, *Primary Examiner.*

U.S. Cl. X.R.

70-92