Oct. 2, 1951 O. LEWIS ET AL 2,569,614

OVERHEAD COUNTERBALANCED DOOR

Filed Nov. 6, 1946 2 Sheets-Sheet 1

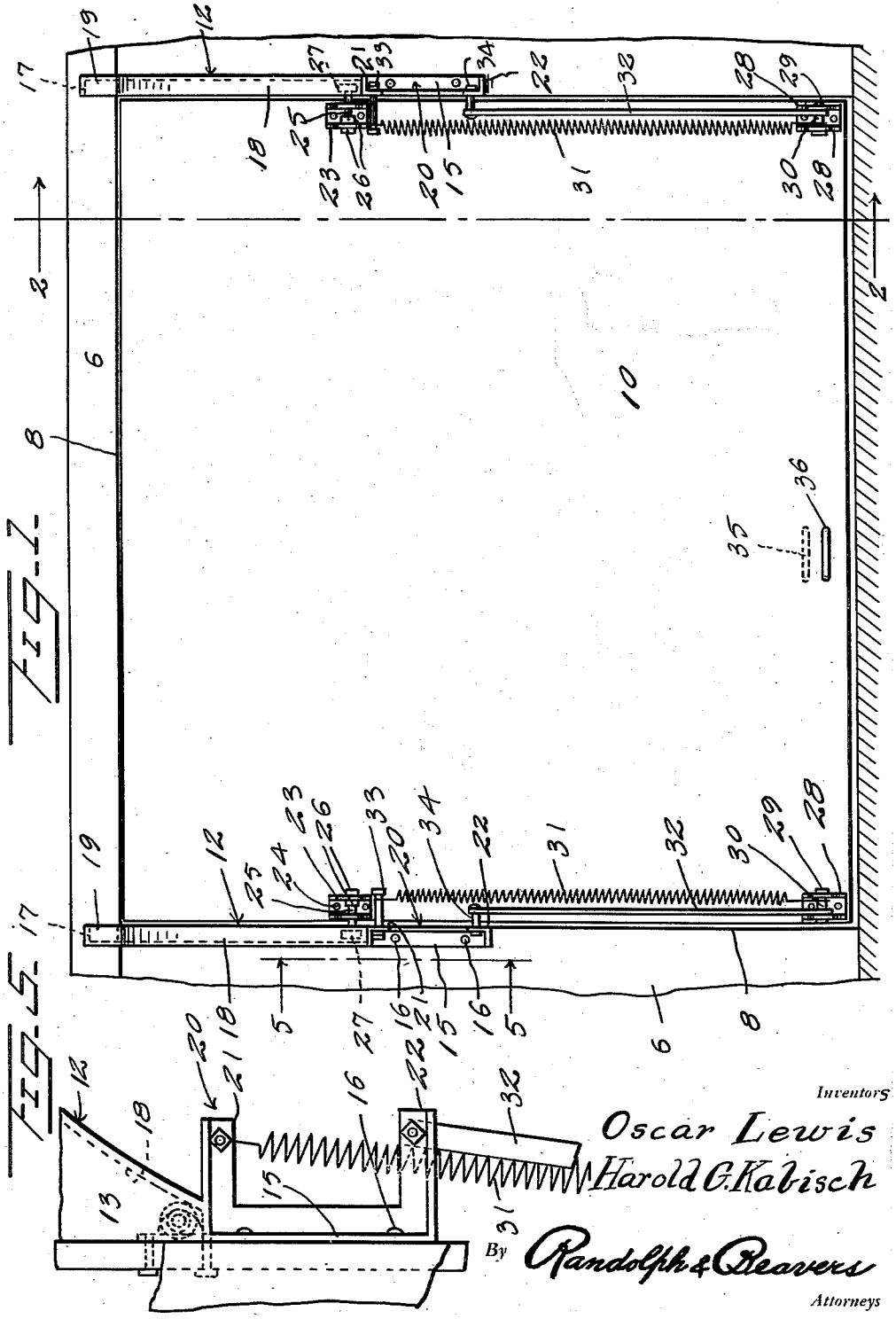


FIG. 1.



FIG. 2.

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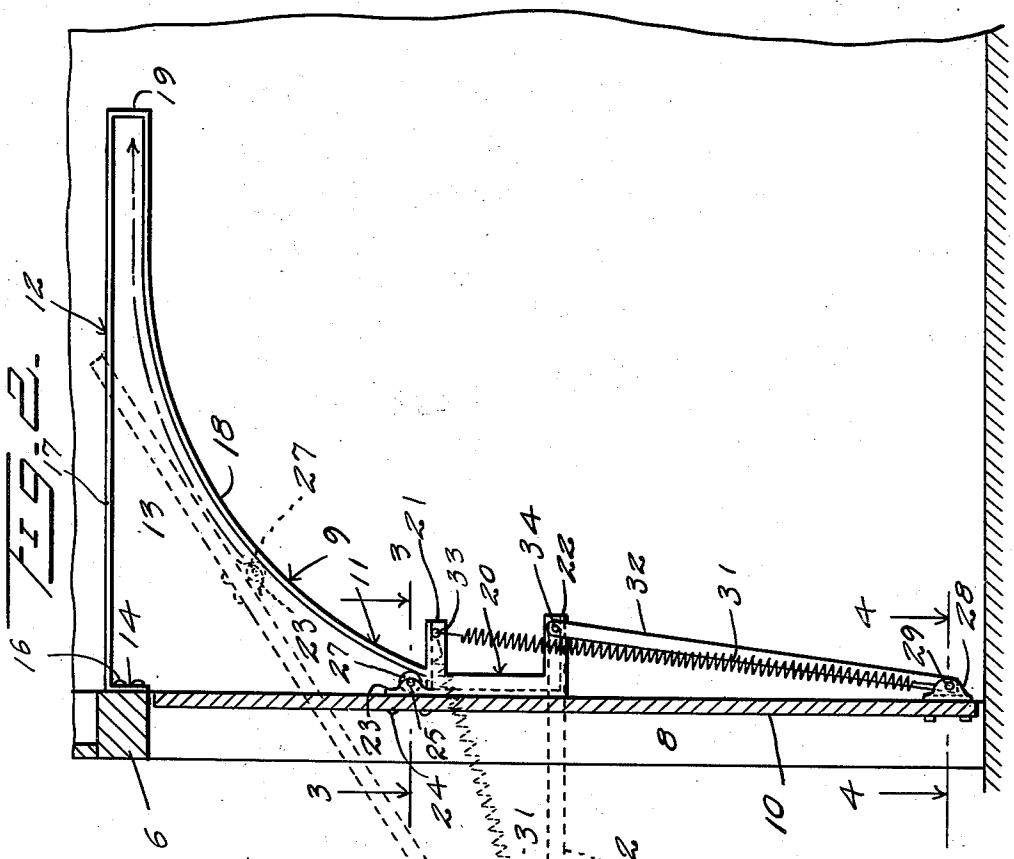


FIG. 2.

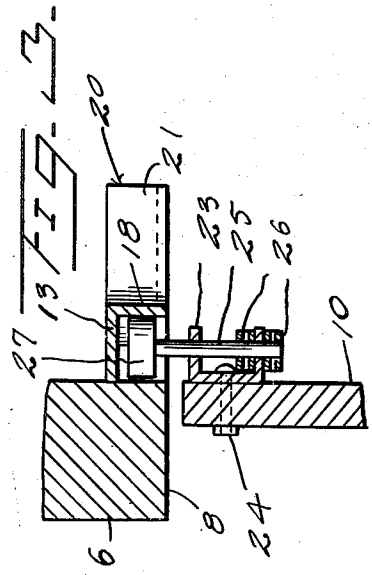


FIG. 3.

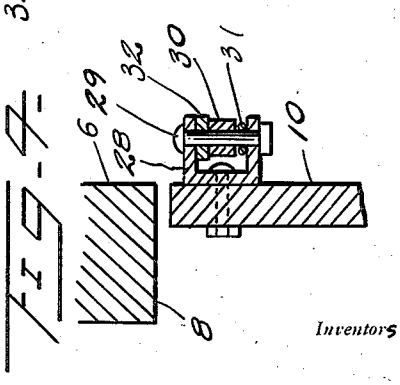


FIG. 4.

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# UNITED STATES PATENT OFFICE

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## OVERHEAD COUNTERBALANCED DOOR

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Application November 6, 1946, Serial No. 708,050

3 Claims. (Cl. 20—19)

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This invention relates to a novel construction of door or closure of the type generally employed in connection with garages or other large entrance and exit openings and has particular reference to a door or closure of the type which is moved from a vertical, closed position to a substantially horizontal overhead, open position.

The majority of doors or closures of this type employ complicated systems of cantilevers, rollers and rails in conjunction with doors or closures which are formed of a plurality of sections which are transversely hinged, in order to accommodate the movement of the door to and from closed and open positions.

It is a particular object of the present invention to provide a closure of this type of greatly simplified construction, employing not only a sliding but also a pivoting movement of the closure to facilitate its movement to and from open and closed positions and to provide a means capable of being utilized with a door of rigid construction.

Still a further object of the invention is to provide a closure of the aforedescribed character wherein the supporting structure of the closure may be mounted on the wall containing the opening to be closed by the door and adjacent to said opening, and thereby eliminate the need for connecting parts of the supporting structure of the closure to other walls or the roof of the enclosure.

Still a further object of the invention is to provide a closure which is so constructed that it cannot be accidentally moved to a partial open position.

Numerous other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein:

Figure 1 is a front elevational view showing a preferred embodiment of the door or closure in a closed position and looking toward the door or closure, from the inner side thereof;

Figure 2 is a vertical sectional view taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is a similar view taken substantially along a plane as indicated by the line 4—4 of Figure 2, and

Figure 5 is a fragmentary side elevational view of a portion of the structure taken substantially along a plane as indicated by the line 5—5 of Figure 1.

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Referring more specifically to the drawings, 6 designates generally a wall of an enclosure 7 and which is provided with a relatively large opening 8, such as an entrance or exit opening for a motor vehicle of the type normally provided in garages.

The closure and closure operator, designated generally 9 and comprising the invention, includes a door 10 which is preferably of solid construction and of a size to substantially close the opening 8 and which is movably supported with respect thereto by the closure support and operating means, designated generally 11.

The closure support and operating means 11 includes a pair of corresponding elongated brackets, each designated generally 12, one of which is mounted adjacent to each vertical side edge of the opening 8 on the inner side of the wall 6. As best illustrated in Figure 2, the supporting brackets 12 each include a relatively wide end, partially formed by the widened end of a plate 13 and which is provided with flange portions 14 and 15, as seen in Figures 2 and 1, respectively; said flanges being disposed in abutting engagement with the inner side of the wall 6 and secured thereto by suitable fastenings 16. The plate 13 of each bracket 12, as best seen in Figure 2, is provided with an upper inwardly projecting, substantially horizontal flange 17 and a lower inwardly extending partially straight and partially arcuate flange 18. The end of the flange 18 which is disposed remote to the wall 6 is disposed adjacent and substantially parallel to the upper flange 17 and said flanges are joined at their rear ends by an inwardly extending perpendicular flange 19. The opposite and longer portion of the lower flange 18 is curved downwardly and away from the upper flange 17 in a direction toward the wall 6 to define the widened inner end of the plate 13.

Each of the brackets 12 includes a substantially U-shaped supporting member, designated generally 20, and which forms an integral depending extension of its lower, inner end. The flange portion 15 forms a part of the bight of the supporting member 20 and extends in the opposite direction to the flanges 17, 18 and 19. As clearly illustrated in Figures 1 and 5, the supporting members 20 are each of angular cross-section and have outwardly extending upper and lower legs 21 and 22, respectively, which project from the ends of the bight portion thereof.

The door 10, on its inner side, is provided adjacent its side edges with a pair of substantially U-shaped bracket members 23 which are fastened

to the inner side of the door 10 by nut and bolt fastening means 24. As best seen in Figure 1, the brackets 23 are disposed at substantially the same level and with the outwardly projecting legs thereof positioned in a substantially vertical plane to receive a journal pin or shaft 25 which extends through the legs of each bracket 24. The pins or shafts 25 are anchored at their inner ends by collars 26 to the inner legs of the brackets 23 which support said shafts or pins and project outwardly beyond the outer legs of said brackets and beyond the adjacent side edge of the door 10. A roller or wheel 27 is journaled on the outer end of each pin or shaft 25 and is disposed to engage the inner side of the flange 18 and just above its supporting member 20, when the door 10 is in closed position, as illustrated in Figures 2 and 5.

As seen in Figures 1 and 4, the door 10 is also provided with a second pair of U-shaped brackets 28 which are secured to its inner side and adjacent its bottom edge and also adjacent its vertical side edges. A nut and bolt fastening 29 extends through and is anchored to the legs of each bracket 28 and the shank of each fastening 29 carries a spacing sleeve 30 which is disposed between and is spaced from the bracket legs. A spring 31 is fastened at one end thereof to each of the fastening shanks 29 between the inner bracket leg and sleeve 30 and a connecting rod 32 is pivotally mounted on each fastening shank and at end thereof, between its spacing sleeve 30 and the outer leg of its bracket 28. The spring and connecting rod of each bracket 28 extend upwardly therefrom and the opposite end of the spring 31 is fastened to the inner side of the upper leg 21 of the supporting member 20, disposed substantially directly thereabove by means of an elongated pin 33 which extends inwardly from said leg 21, for positioning the upper end of the spring 31 inwardly from the supporting member 20 and in substantially a vertical plane. The upper end of each connecting rod 32 is pivotally connected to a pin 34 which extends inwardly from the lower leg 22 of the complementary supporting member 20 and which is shorter than the pin 33, so that the levers 32 are spaced outwardly relatively to the spring 31, as clearly illustrated in Figure 1.

The door 10 is provided with handles 35 and 36 on its outer and inner side, respectively, which are disposed intermediate of its side edges and adjacent its bottom edge, as seen in Figure 1.

As best illustrated in Figure 2, when the door is in a closed position, it is disposed within the opening 8 and with the upper edge thereof substantially abutting the upper part of the opening and with the bottom edge of the door substantially abutting the bottom part of the opening. When the door 10 is thus disposed, the springs 31 and connecting rods 32 are disposed substantially vertical with the springs 31 tensioned and positioned to urge the lower edge of the door 10 inwardly or toward a closed position. To move the door 10 to an open position, the operator grasps either of the handles 35 or 36 to manually swing the lower portion of the door 10 outwardly relatively to the opening 8, causing the upper edge of the door to swing inwardly and out of engagement with the upper part of the opening 8. This swinging movement is accomplished by the door 10 pivoting on the rollers 27 which are engaging the upper edges of the supporting members 20 and the flanges 18. This initial movement of the door, just previously described, causes the springs 31 to move past the dead centers of the pivot of the connecting rods 32 so that after the door 10 has been swung sufficiently to move its upper edge out of engagement with the door opening 8, said springs will begin to retract to counterbalance the weight of the door 10 and to urge the door upwardly, by a sliding and swinging movement, from the position previously described, the rollers 27 engaging the flanges 18, which function as rails, for accommodating both the sliding and pivotal movement of the door 10. The door 10 moves from a closed position, in the manner previously described, upwardly and outwardly to substantially an intermediate position, as illustrated in dotted lines in Figure 2. From the dotted line position of Figure 2, the door is swung upwardly at its outer end and pushed inwardly relatively to the brackets 12 until the rollers 27 abut against the flanges 19 which form stops for limiting the inward movement of the door 10. When the rollers 27 are disposed adjacent the stops 19, the door 10 will be in substantially a horizontal position and the springs 31 will have again crossed the dead centers of the pivots of the connecting rods 32 so as to function to prevent casual movement of the door downwardly and toward a closed position.

The door 10 is returned to a closed position by the opposite of the movement previously described in reference to the opening of the door, and the final movement of the door as it approaches its fully closed position is a pivotal or swinging movement by means of which the upper edge of the door is moved into the door opening 8 and during which the springs 31 again cross the dead centers of the pivots of the rods 32 to retain the door 10 to prevent it from accidentally being rocked or swung to a partially open or ajar position, as frequently occurs on windy days with conventional overhead garage doors.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit and scope of the invention as hereinafter defined by the appended claims.

We claim:

1. In combination with a wall having a large entrance and exit opening, a pair of rail members secured to an inner side of said wall adjacent the side edges of the opening and extending upwardly and inwardly relatively thereto, each rail member having a substantially straight horizontally disposed inner end and an arcuate opposite end extending downwardly from the inner end toward said wall and forming a curved continuation of said inner end, said arcuate end having a lower portion disposed a substantial distance beneath the top of the wall opening, a closure disposed in said opening when in a closed position, journal members projecting from an inner side of said closure and extending beyond the side edges thereof and spaced a substantial distance from the upper edge of the closure, rollers journaled on said journal members and spaced outwardly from the side edges of the closure and engaging said rail members, a supporting arm secured to and extending inwardly from the wall on each side of the opening, said supporting arms being disposed beneath the rail members, a pair of connecting rods having complementary ends pivotally connected to the inner side of the closure adjacent its bottom edge, the opposite ends of the connecting rods being pivotally connected to the supporting arms and spaced a substan-

tial distance from the plane of the wall, said rail members, rollers and connecting rods cooperating to slidably and swingably support the closure in its movement relatively to the wall between an upright closed position and a substantially horizontal overhead open position, a second pair of supporting arms extending inwardly from said wall below the rail members and above the first mentioned supporting arms, a pair of contractile coiled springs each having an end anchored to one of the last mentioned supporting arms, the opposite ends of the coiled springs being connected to the closure on its inner side and adjacent its bottom edge and constituting the sole counterbalancing means of the closure in its movement to and from opened and closed positions, the axes of the coiled springs being disposed adjacent and on one side of the axes of the connecting rods, said springs remaining out of axial alignment when the closure is in either a fully opened or fully closed position whereby the springs yieldably retain the closure in a fully closed position and cooperate with the connecting rods to retain the closure in a fully opened position.

2. A structure as in claim 1, the point of connection of the connecting rods to the first mentioned supporting arms being spaced a greater distance from the plane of the wall than the point of connection of the springs to the last mentioned supporting arms.

3. In combination with a wall having a large entrance and exit opening, a pair of rail members secured to an inner side of said wall adjacent the side edges of the opening and extending upwardly and inwardly relatively thereto, each rail member having a substantially straight horizontally disposed inner end and an arcuate opposite end extending downwardly from the inner end toward said wall and forming a curved continuation of said inner end, said arcuate end having a lower portion disposed a substantial distance beneath the top of the wall opening, a closure disposed in said opening when in a closed position, journal members projecting from an inner side of said closure and extending beyond the side edges thereof and spaced a substantial distance from the upper edge of the closure, rollers journalled on said journal members and spaced outwardly from the side edges of the closure and engaging



said rail members, a supporting arm secured to and extending inwardly from the wall on each side of the opening, said supporting arms being disposed beneath the rail members, a pair of connecting rods having complementary ends pivotally connected to the inner side of the closure adjacent the bottom edge, the opposite ends of the connecting rods being pivotally connected to the supporting arms and spaced a substantial distance from the plane of the wall, said rail members, rollers and connecting rods cooperating to slidably and swingably support the closure in its movement relatively to the wall between an upright closed position and a substantially horizontal overhead open position, a second pair of supporting arms extending inwardly from said wall below the rail members and above the first mentioned supporting arms, a pair of contractile coiled springs each having an end anchored to one of the last mentioned supporting arms, the opposite ends of the coiled springs being connected to the closure on its inner side and adjacent its bottom edge and constituting the sole counterbalancing means of the closure in its movement to and from opened and closed positions, said connecting rods and springs being disposed at acute angles to the plane of the closure when the latter is in an upright, closed position, and the angle thus formed by the closure and connecting rods being greater than the angle formed by the closure and springs, the angle formed by the closure and springs being greater than the angle formed by the springs and connecting rods, when the closure is in a closed position, whereby said springs yieldably retain the closure in a fully closed position.

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