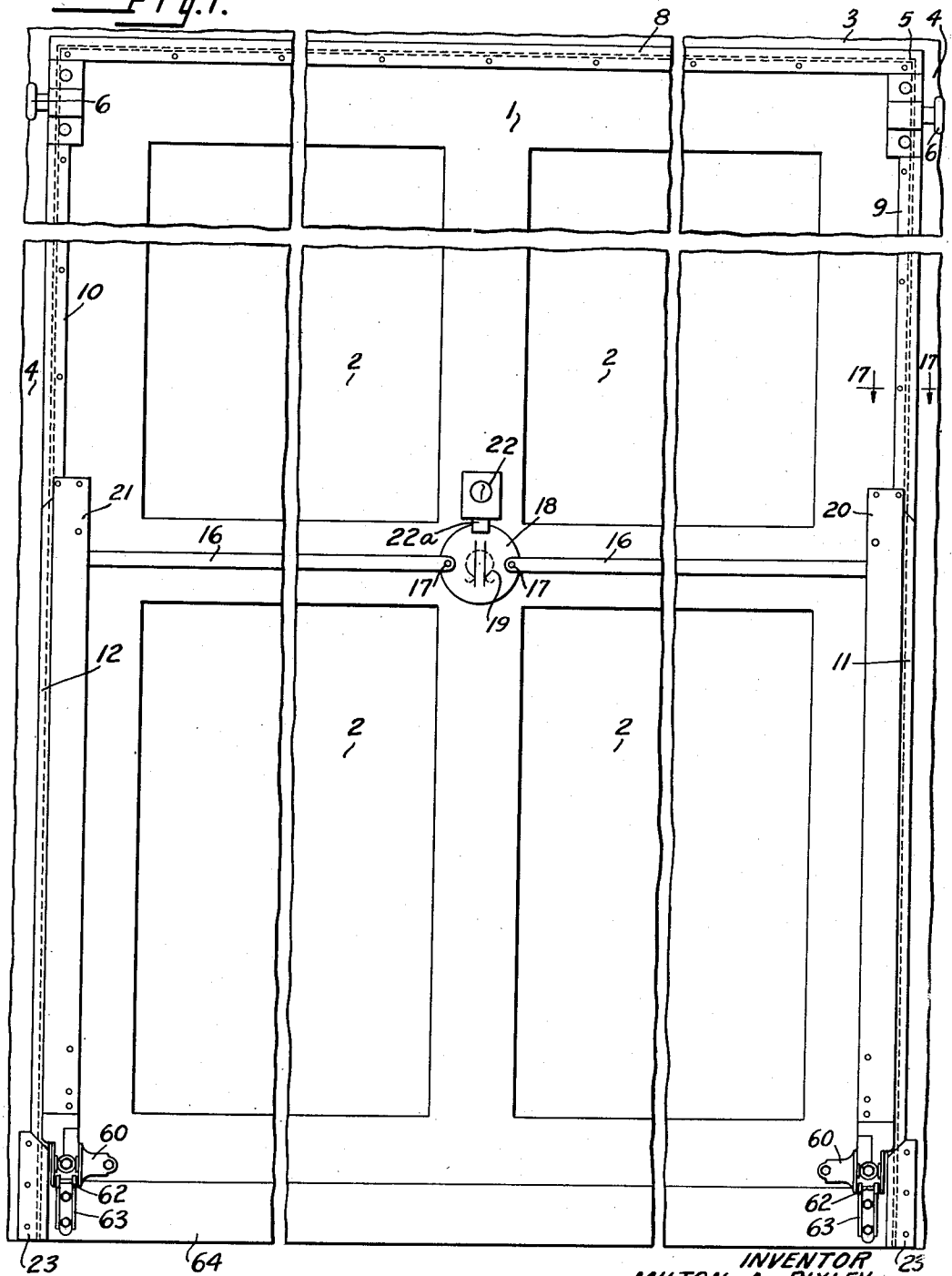
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Fig. 1.



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Fig. 2.

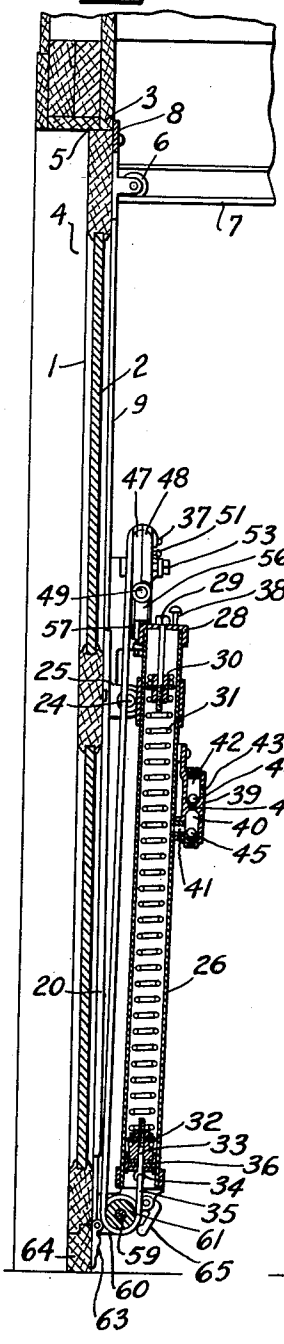


Fig. 4.

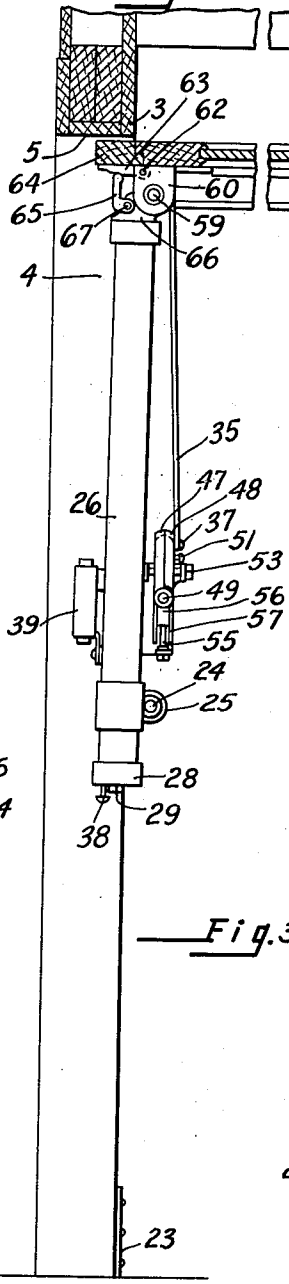
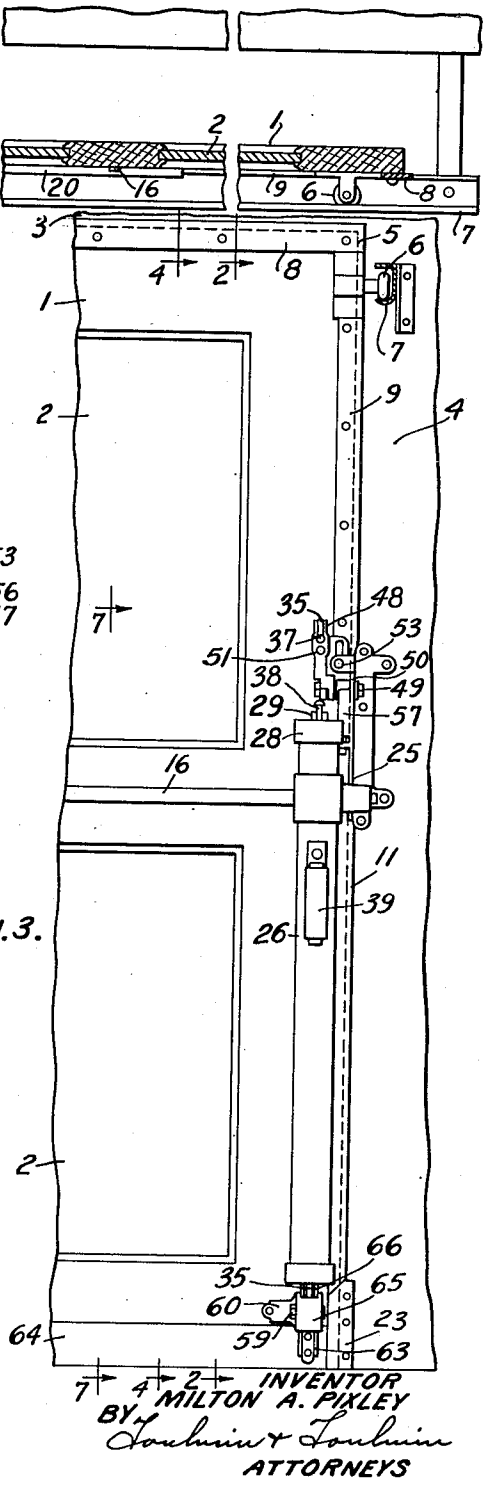


Fig. 3.



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Fig. 5.

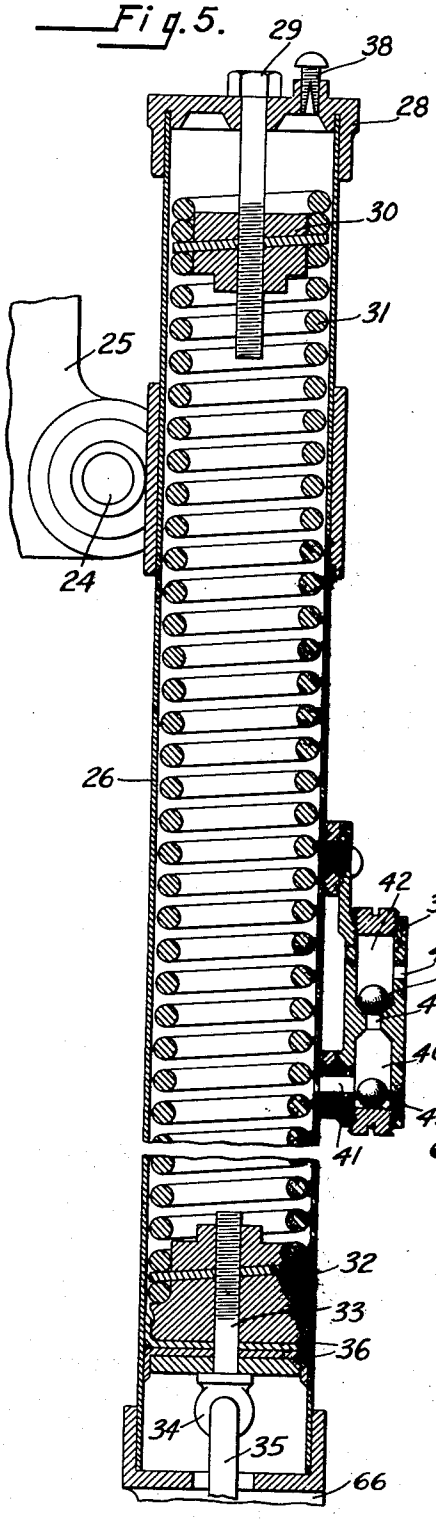


Fig. 6.

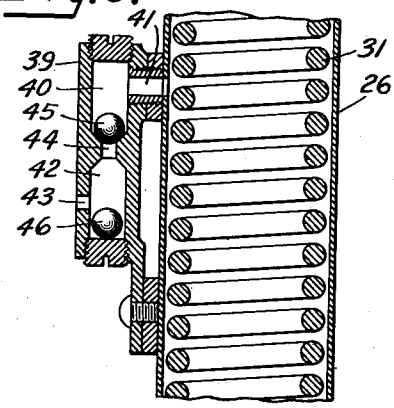
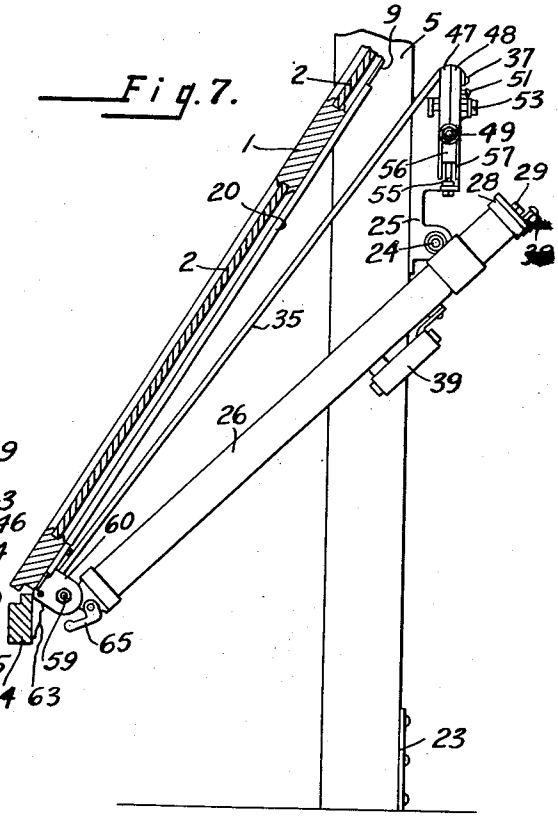


Fig. 7.



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Fig. 8.

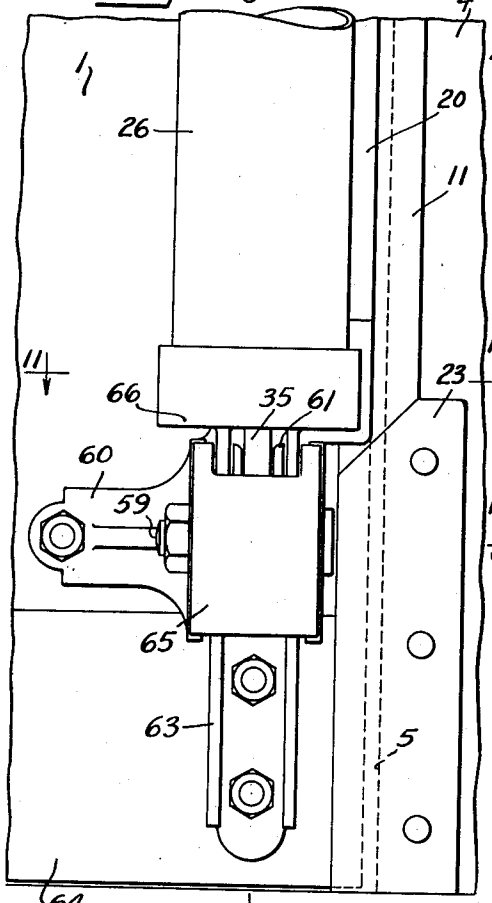
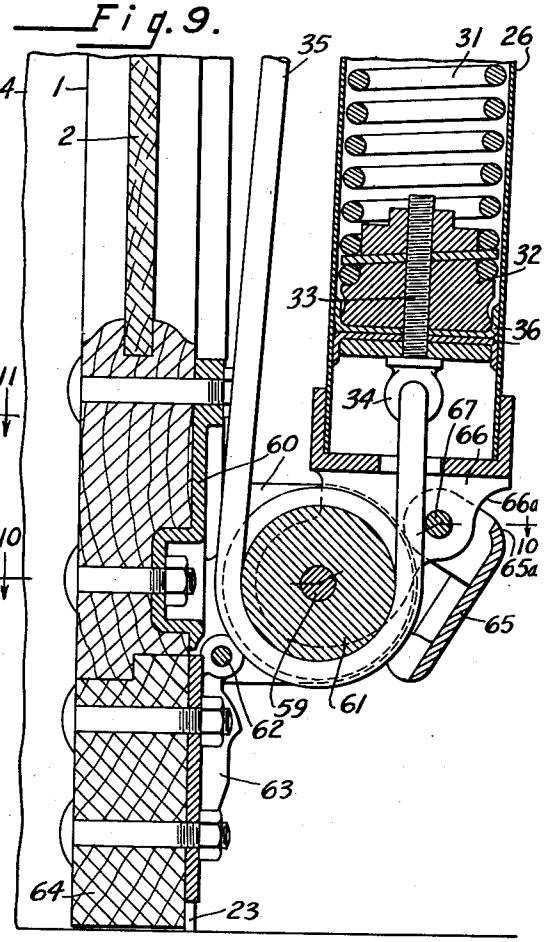


Fig. 9.



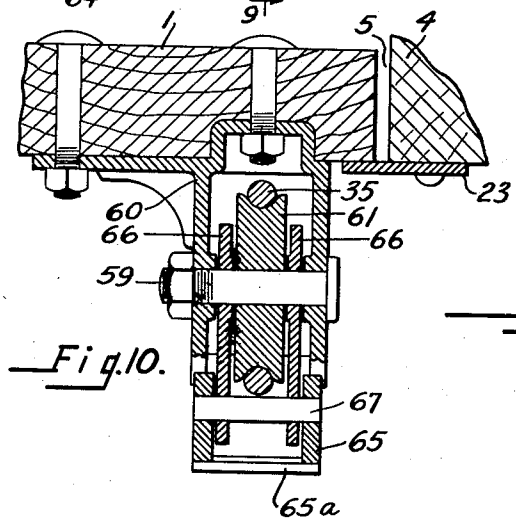


Fig. 10.

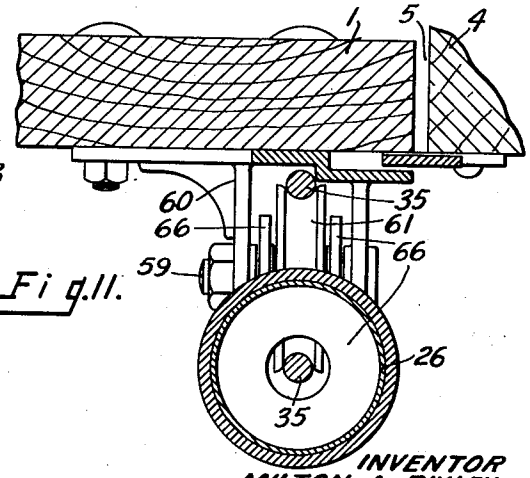


Fig. 11.

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Fig. 12.

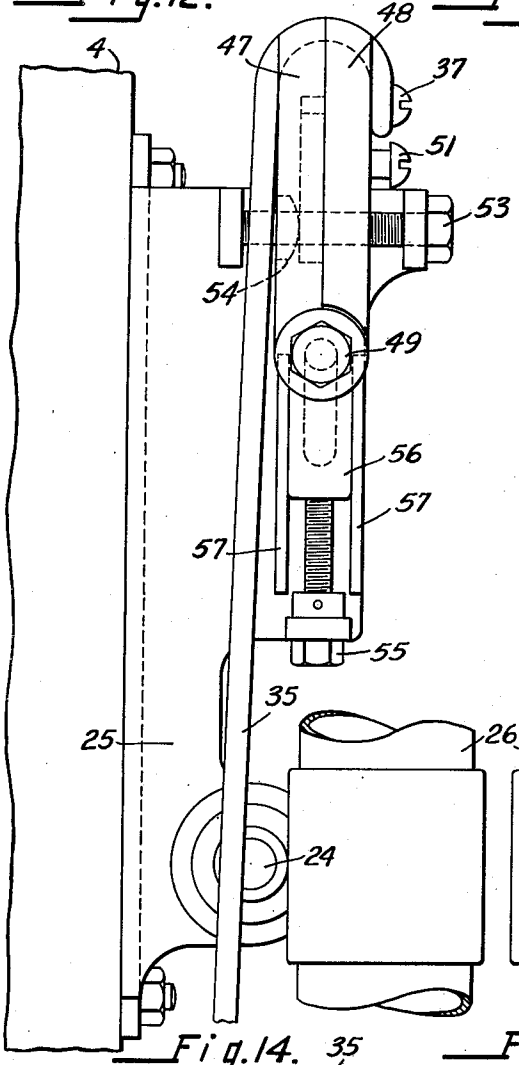


Fig. 13.

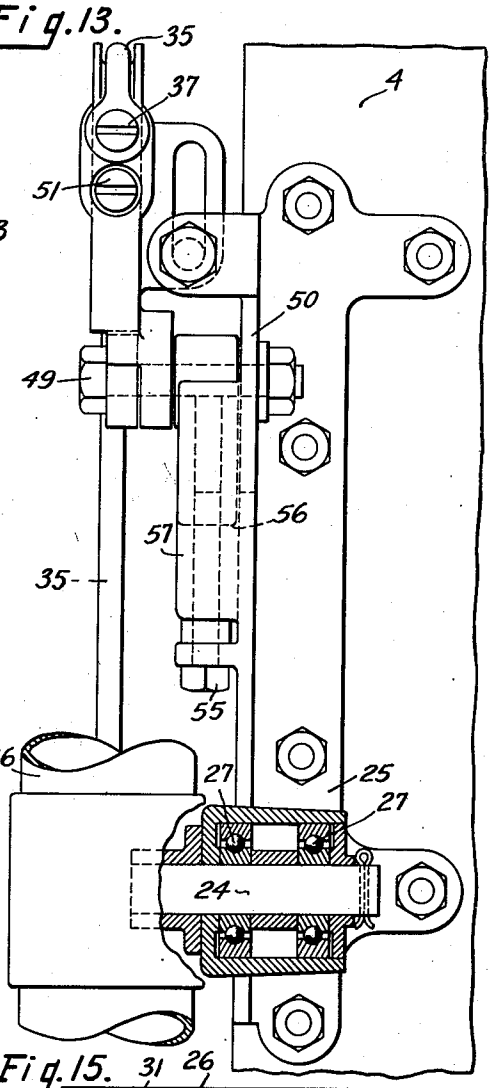


Fig. 14.

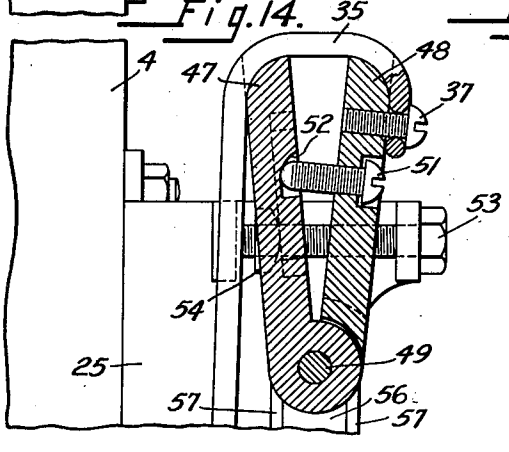
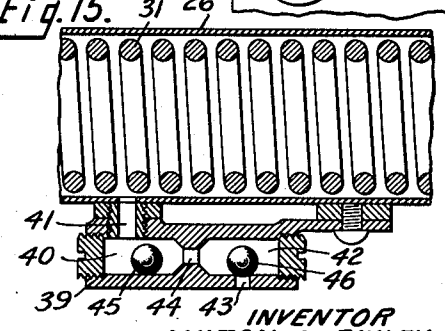


Fig. 15.



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Fig. 16.

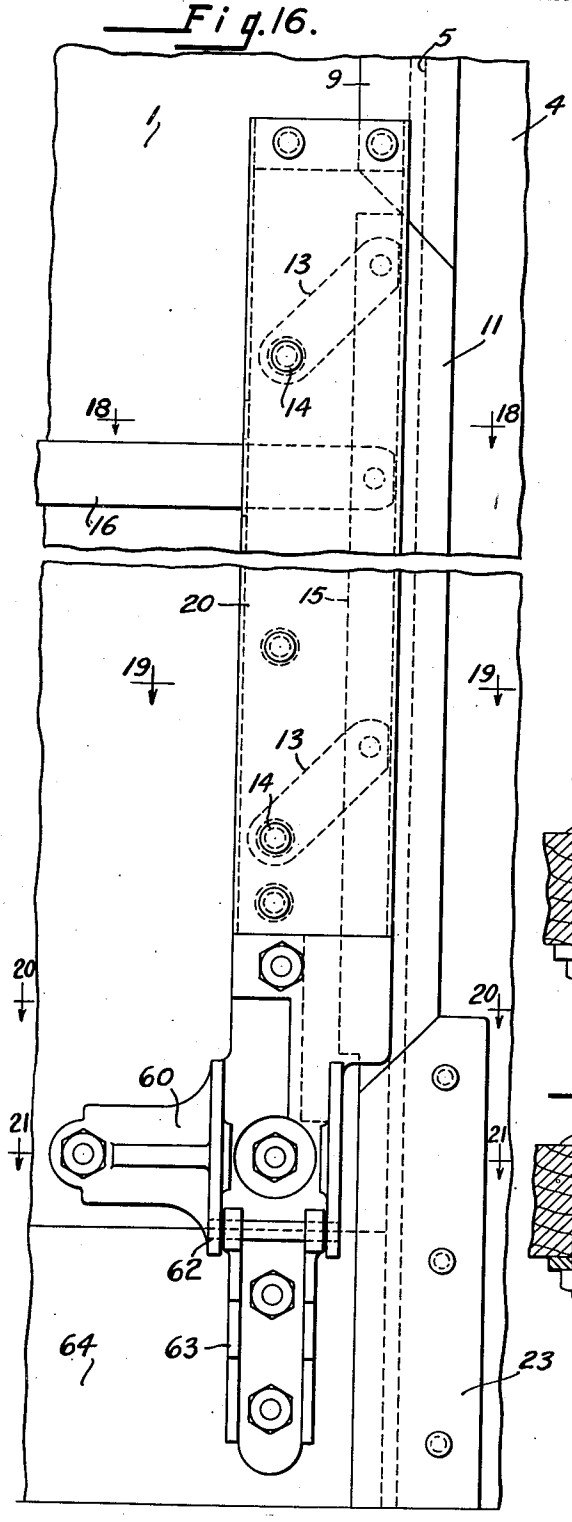


Fig. 17.

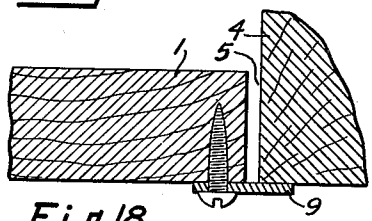


Fig. 18.

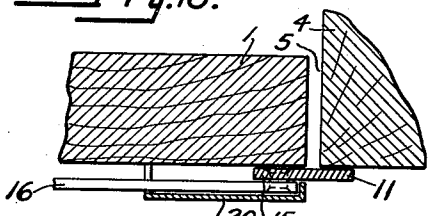


Fig. 19.

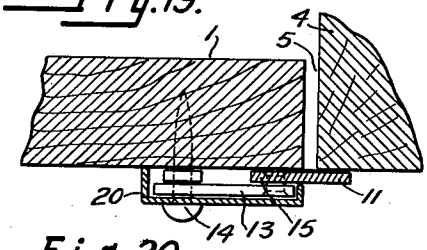


Fig. 20.

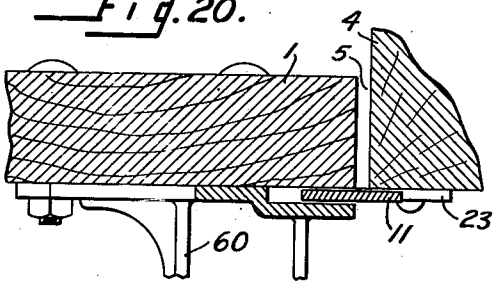
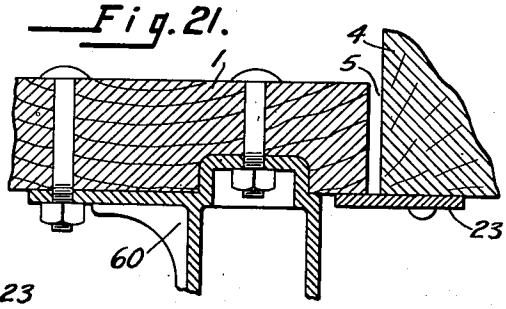


Fig. 21.



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Fig. 22.

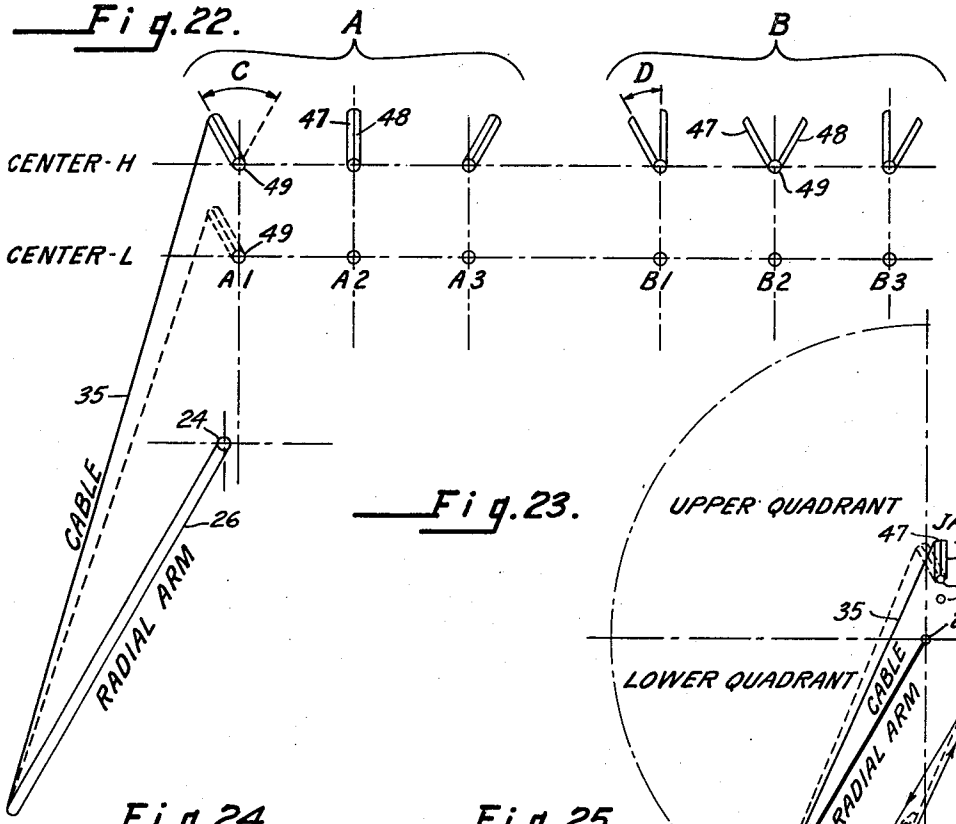


Fig. 23.

Fig. 24.

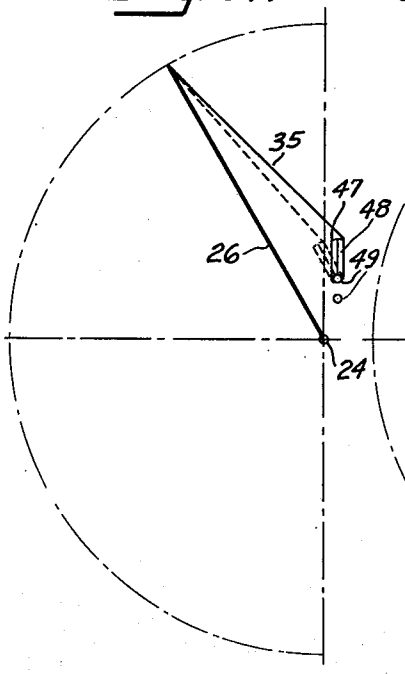
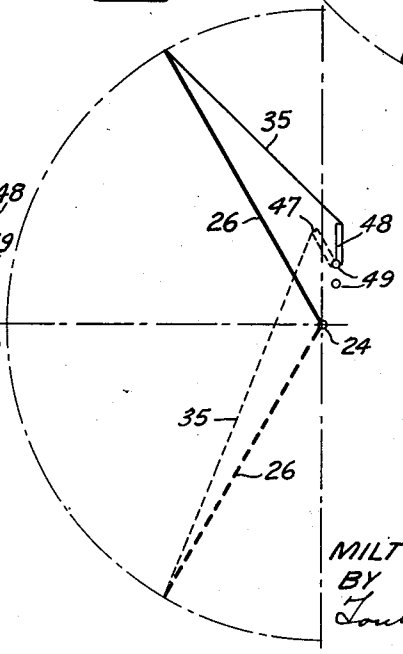


Fig. 25.



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Patented Apr. 2, 1940 2,195,875

UNITED STATES PATENT OFFICE

2,195,875

DOOR

Milton A. Pixley, Columbus, Ohio

Application June 27, 1935, Serial No. 28,705

34 Claims. (Cl. 20—19)

The object of my invention is to provide a one piece overhead door with a counterbalancing mechanism.

It is my particular object to provide the dangerous part of the counterbalancing mechanism fully enclosed to prevent danger to life and property when the door is being operated.

It is a further object to provide a counterbalancing mechanism with an air cushion and air control means for regulating the movement of the door from one position to the other.

It is an additional object of the invention to provide means of adjusting the counterbalancing mechanism by a simple adjustment so that it can be accommodated to different doors and the doors to varying types of installations without a modification of the operation of the counterbalancing mechanism and the doors.

It is a further object of the invention to provide a totally enclosed counterbalancing spring mechanism to prevent injury to life or person if the spring breaks and to associate with the totally enclosed spring a cylinder and piston arrangement and means of regulating the entrance and exit of air to the cylinder so as to secure a cushioning effect on the counterbalance mechanism as the door proceeds from one position to another.

It is an additional object to provide an overhead door that has a continuous movement from one position to the other and which eliminates the dual movements now characteristic of overhead doors by which the door first moves upwardly and then in an arc to a horizontal position.

It is a further object of the invention to provide a two-part door consisting of the main door structure and a bottom sealing strip so arranged as to seal the bottom of the door in closed position and to permit the door at the bottom to immediately swing in a continuous arc from closed position to open position without the necessity of lifting the door preparatory to such swinging movement. It is my object to thereby provide a door which can swing at the bottom outwardly and upwardly irrespective of any obstructions in front of the base portion of the door.

It is an additional object of my invention to eliminate the sealing weather strip as arranged on present day doors, in which present day doors the upper half of the weather strip is attached to the door and the lower half is attached to the door jambs. The attaching of the lower half of the weather strip to the door jambs is objectionable as it reduces the width of the opening by the amount of the inward projection of the weather strips. When such weather strips are made of metal, they are a constant source of annoyance and expense as they injure the vehicles passing through the door opening.

It is my object to eliminate these lower half weather strips. It is my object to provide the upper half of the weather strip on the door in a fixed position and to provide the lower half, except for an extreme bottom section of minor length, by attaching it to the moving door itself by links.

It is a further object of my invention to move one part of the weather strip on the lower half of one side of the door downwardly and the other half of the weather strip upwardly on the other side of the door, thereby balancing the two lower half weather strips on opposite sides of the door and so interconnecting them with the locking device on the door as to permit of the movement of the weather strip halves on the door upon the unlocking of the door preparatory to movement of the door.

It is a particular object to provide door-mounted, retractible, movable weather strips on the lower halves of the door interconnected with the door lock and automatically rotatable to opening position upon unlocking of the door. It is my object to provide movable weather strips of balanced construction, preferably interconnected with the door lock.

It is a further object to provide stationary weather strips at the lower corners of the door of lesser height than the running board of automobiles using the door opening so as not to interfere therewith.

Referring to the drawings,

Figure 1 is a rear elevation of the door with the counterbalancing mechanism removed.

Figure 2 is a section on the line 2—2 of Figure 3 showing the door in closed position.

Figure 3 is a rear elevation of one side of the door in closed position.

Figure 4 is a section on the line 4—4 of Figure 3 showing the door in open position.

Figure 5 is a section through the spring cylinder, air cylinder and air valve with the door in closed position.

Figure 6 is a similar view through a portion of the spring, air and spring cylinder and air valve in the open position.

Figure 7 is a section on the line 7—7 of Figure 3 showing the door in partially open position.

Figure 8 is a detailed inside elevation of the lower end of the spring cylinder, the means of

pivotally attaching it to the bottom of the door, the hinged construction of the movable leaf of the bottom of the door and the lower stationary section of the weather strip.

Figure 9 is a section on the line 9—9 of Figure 8.

Figure 10 is a section on the line 10—10 of Figure 9.

Figure 11 is a section on the line 11—11 of Figure 8.

Figure 12 is a side elevation of the cable adjusting mechanism.

Figure 13 is a rear elevation thereof.

Figure 14 is a section through the cable adjusting mechanism in its expanded position.

Figure 15 is a section through the air check valve when the valve is in its horizontal position.

Figure 16 is a detailed, inside elevation showing the movable weather strip carried on the lower half of the door.

Figure 17 is a section on the line 17—17 of Figure 1.

Figure 18 is a section on the line 18—18 of Figure 16.

Figure 19 is a section on the line 19—19 of Figure 16.

Figure 20 is a section on the line 20—20 of Figure 16.

Figure 21 is a section on the line 21—21 of Figure 16.

Figure 22 is a diagram showing two groups of adjustments of the cable.

Figure 23 shows a position of adjustment with the door in the lower quadrant.

Figure 24 shows a position of adjustment with the door in the upper quadrant.

Figure 25 shows the effect of the decreased pull in the lower quadrant.

This invention deals with a door of the overhead type consisting of a single door structure, with the exception of a movable base strip or bottom strip to facilitate the movement of the door outwardly in an arc without the necessity of first lifting the door to clear the floor. I provide a counterbalancing mechanism to facilitate the raising and lowering of the door and in association with the counterbalancing mechanism I provide an air cushioning device working by pressure in one direction and by vacuum in the other direction as a snubber or brake.

I provide means of adjusting this air control, means to adjust the tension of the counterbalancing spring, and means to adjust the cable connection between the spring and the door so that the entire mechanism may be made in a standard form and then adjusted to each installation and easily adjusted from time to time for uniform operation, depending upon the state of the spring and the adjustment of the air valves.

To prevent serious accidents from the breaking of this powerful spring when it is at a position adjacent to persons or property, I enclose it in a tube, which also acts as the air cylinder, as well as the protecting tube for the spring and a guide for the spring. The door is adapted to move from a vertical position when it is closed to a horizontal position when it is open and to swing from one position to the other in a continuous arc.

Referring to the drawings in detail, 1 is a door having a plurality of panels 2. This door fits within a door frame having a top 3 and side walls 4 that form the outline of a door opening 5. The upper corners of the door are provided with rollers 6 that rest in horizontally disposed tracks 7 adjacent the upper corners of the door.

The door is provided on its upper edge with a metal weather strip 8 that overlaps the wall 3 of the building. The door is also provided with vertical weather strips on the upper half of the door on either side thereof as at 9 and 10. The lower halves of the door are provided with movable metal weather strips 11 and 12, which are pivotally mounted on the side walls on the inside of the door as indicated in Figures 1, 16, 18, 19 and 20. The weather strips so pivotally mounted are supported on a plurality of links 13 that are pivoted at 14 to the door. These links are connected together by a vertical portion of the strip 15 that in turn is connected to a horizontal actuating pitman 16. This pitman 16 is pivoted at 17 to a spring actuated disk 18 moved by the spring 19 normally so as to withdraw the metal weather strips 11 and 12 inwardly beneath the cover plates 20 and 21 and within the margin of the door so as to permit the door to swing with its lower half outwardly while its inner half swings inwardly. When the door is in closed position, the disk 18 is held against such rotation and the weather strips 11 and 12 are in their extended position so as to overlap the door jamb. This is accomplished by the lock 22 which has a locking bolt 22*a* that engages the disk 18 and retains it in position against the action of the spring 19.

The lower edges of the door are overlapped and engaged by the short vertical sections of weather-stripping 23 mounted on the door jamb but of lesser height than the running board of an automobile so they will not interfere with an automobile. Thereby I eliminate the stationary weather strip on the door jamb which now is used in the doors of the prior art. Such a door strip damages the automobiles passing through the doorway and restricts the doorway opening. By my movable strips 11 and 12 I completely eliminate this disadvantage.

Counterbalancing mechanism

I pivotally support, preferably on either side as at 24 upon the bracket 25 which is mounted on the door jamb, the tube 26. A bearing 27 supports the shaft 24 in the bracket 25.

This tube is closed at its upper end by a cap 28 which is provided with a bolt 29 that extends into the interior of the tube and supports at 30 a coil spring 31. The lower end of the spring 31 is connected at 32 to a second bolt 33 which has on its outer end an eye 34 to which is attached the cable 35. On 32 is mounted a pair of washers 36 which engage with the inner side walls of the tube 26 and form a piston (Figures 2, 5 and 9).

The cable 35 passes to a permanent but adjustable anchor to which it is fastened by the retaining bolt or screw 37. This anchor is mounted upon the side wall of the door opening on a part of the bracket 25. It will be described in detail hereinafter.

Air control

In order to provide an air cushion or brake, I provide the piston 32. The quantity of air in the cylinder 26 is regulated by the bleed valve 38 and by the check valve 39. This valve has a chamber 40 communicating through the passageway 41 with the interior of the cylinder. It is also provided with a chamber 42 having an outside port 43. A port 44 connects the chambers 40 and 42. The balls 45 and 46 alternately control the port 44, depending upon the position of the valve as the valve moves with the cylinder. Thus I provide an automatically

controlled valve to accomplish a braking or retarding action.

In the closing operation, a partial vacuum is formed by the piston in its travel in the cylinder defined by the tube 26, downwardly, as seen in Figures 2 and 5. In the uppermost position of the door, the travel of the piston in the opposite direction provides a cushioning effect for the final substantially horizontal travel of the door by compressing the air in the tube, the valve position being that shown in Figure 6 of the drawings. The force of this compression acts in opposition to the tension of the spring and prevents pounding or battering of the door, which would be caused by the spring action if it were uncontrolled. The force of this compression increases as the door travels to its final open position; and when the door has reached its final position, the maximum compression force is encountered. This compression force may be varied by manipulation of bleed valve 38 although it is to be understood that it varies, as the position of the door changes, whatever the setting of the bleed valve 38 may be. This bleed valve 38 also varies the above-described vacuum force so that the two forces, so far as the bleed valve 38 is concerned, are directly proportional; this will be further described below. The effective length of the cable 35 is greater in the lower quadrant positions (Figures 23, 24 and 25) than in the upper quadrant positions due to the spacing of the jaws 47 and 48 (described below) above the pivot point 24 of the tube 26. This increases the spring tension and vacuum force in that quadrant, as will be hereinafter explained.

In the lower quadrant positions of the door, as illustrated particularly in Figures 2, 5, 7, 23, 24 and 25, the ball 46 closes the port 44 and prevents the entry of air through the passageway 41 into the cylinder defined by the tube 26. A partial vacuum is thus formed above the piston defined by washers 36, which, in conjunction with the tension of the spring, retards the downward movement of the piston (Figures 2 and 5), and there is thus transmitted to cable 35 a tension equal to the sum of the vacuum force and the tension of the spring. The degree of vacuum force is adjusted by means of the bleed valve 38, as explained above, and the tension of the spring 31 may be adjusted by means of the bolt 56. It is to be understood that the tension in the cable 35, in every position of the door, exerts a vertical force on the door due to the fact that there is naturally a vertical component for this force of the tension, which tension is angularly disposed with respect to the horizontal, save in one position; it will be therefore understood that this tension exerts a variable counterbalancing effect on the door, which is modified at the upper and lower end portions of the travel of the door, by the cushioning effect of the compression and vacuum forces in the tube 26, as explained above. The force of vacuum will be additive in the lower quadrant (Figures 23, 24 and 25) until, during the opening of the door, the tube 36 becomes substantially horizontal, in which position the valve balls will take the position shown in Figure 15. When the balls are in this position, the interior of the tube 36 is open to the atmosphere and the spring alone exerts tension on the cable 35.

The increase in effective length of cable 35 in the lower quadrant positions affects the travel of the piston in tube 26 and thus increases the effect of the spring in the vacuum. When the tube 36 is swung upwardly beyond the horizontal, during the operation of the door, the ball 45 seats and closes the port 44 and thus prevents escape of air from the cylinder defined by the tube 26, through passageway 41. This air is compressed by the travel of the piston defined by washers 36, and the force of this compression is opposed to the tension of the spring 31. The piston defined by the washers 36 in its travel in the cylinder defined by the tube 26 thus, in the lower quadrant position of the mechanism (Figures 23, 24 and 25), creates a vacuum force which is additive to the force of spring tension to provide tension in the cable 35. In the upper quadrant positions of the mechanism, the piston creates compression force which is opposed to the spring tension. In other words, in these latter positions, the tension in cable 35 amounts to the spring tension less the force of compression (both of which may be varied as desired).

It is to be understood that the tension in the cable 35 has a different vertical component for each position of the door, due to the dependency upon a trigonometric function of an angle, of the ratio of the vertical component to the whole and that, as the angle increases from zero to 90 degrees in the lower quadrant, and then from 90 degrees back to zero in the upper quadrant, while the door is being moved from closed to open position, this vertical component is varied. The tension further varies because the spring tension is dependent upon Hooke's law, and still further because the above-described vacuum and compression forces produced by the piston in the cylinder defined by tube 26 increase as the piston travels toward each respective end of the tube 26 during the opening operation. It will be seen that the counterbalancing effect of my device is dependent upon the tension in the cable 35, which tension varies, as pointed out above, and which may be controlled, as pointed out above, by manipulation of the bleed valve 38 and bolt 29. Further means for controlling the characteristics of this counterbalancing effect, which means are operable to adjust the cables 35, as may be desired, will be described below. By this means, described below, the increase in effective length of cable 35, which directly affects the spring tension and vacuum force in the lower quadrant positions of the door, may be widely varied for the purpose of further controlling the operating characteristics of my device.

Cable adjusting mechanism

Referring to the detailed drawings in Figures 12, 13 and 14, it will be noted that a plurality of adjustments are provided with respect to the effective length of the cable 35 and its anchorage at 37. The cable 35 passes over the arcuate ends of the jaw members 47 and 48. These jaw members are pivoted on one another upon the pivot pin 49 which is carried in the flange 50 of the bracket 25. The screw 51 on the member 48 engages on its end in the socket 52 the member 47 and determines how close these two members may approach one another. The screw bolt 53 has a nut 54 engaging with the member 47. Screw 53 moves the jaws 47 and 48 forward and backward over a sector having its center in the bolt 49 irrespective of whether or not jaws 47 and 48 are closed or spread apart.

In order to make the above clear, I refer to Figure 22 showing two groups: Group A with jaws closed; Group B with jaws spread.

It will be noted A1 shows the jaws closed and forward. A2 shows the jaws closed and perpendicular. A3 shows the jaws closed and rearward. B Group shows these same three positions with the jaws spread. The sector C shows the movement of the jaws forward and backward. Sector D shows the spreading movement of the jaws. Intermediate positions are also obtainable in both groups.

It will be noted the center line H shows the highest position of the bolt 49 and center line L shows the lowest position of the bolt 49, this high and low adjustment being obtained by bolt or screw 55 engaging in threaded position of 56.

In properly counterbalancing a door it is necessary to be able to make several adjustments; first, to increase or decrease the cable pull upon the spring over the whole circumference of the semicircle described by the end of the radial arm; second, to increase or decrease the pull of the cable on the spring for the lower quadrant; and third, to increase or decrease the pull of the cable on the spring in the upper quadrant.

It must be possible to increase or decrease the cable pull on the spring in one quadrant without changing the cable pull in the other quadrant. This is accomplished by varying the forward or rearward position of jaws 47 and 48 and also by spreading these jaws, moving the jaws forward from a perpendicular position decreases the cable pull in the lower quadrant and increases the pull in the upper quadrant, but by moving the jaw 47 forward and retaining jaw 48 in a vertical position would not change the cable pull in the upper quadrant; but by moving jaws rearwardly from a perpendicular position the conditions described above are reversed.

With reference to Figure 23, the solid lines represent a position in the lower quadrant. I have shown a force diagram in solid lines which corresponds to that position. It will be noted 60 lbs. is ¼ of the door weight acting vertically downward, which gives a cable pull of 320 lbs. If the jaws are moved forward as shown in the dot and dash lines the cable pull becomes 255 lbs.

Figure 24 shows the door positioned in the upper quadrant, the perpendicular jaws in solid lines and the forward position of the jaws in dot and dash lines which is identical with the position in Figure 23. This more acute angle increases the cable pull on the spring.

Figure 25 shows the effect of the decreased pull in the lower quadrant identical with the dot and dash lines on Figure 23. The solid line shows the same cable pull as shown on Figure 24 and this is obtained by spreading the jaws 47 and 48. In other words, it decreases the cable pull in the lower quadrant without increasing the cable pull in the upper quadrant.

The vertical position of these two members is determined by the adjusting screw or screw bolt 55 which is mounted on the bracket 25 and actuates the block 56 between the guides 57. Thus a spreading adjustment and an up-and-down adjustments are possible with this construction. The shifting of the point of attachment of the cable changes the angular pull and consequently the strain upon the cable, thereby allowing a wide variation for different door weights by using the same spring. The original spring tension is accomplished by adjusting the bolt 28 as that bolt is threaded into the head 30 carrying the spring 31.

The lower end of the tube 26 is pivotally mounted as at 59 on a bracket 60 mounted on the lower inner face of the door. This bracket has mounted upon it the guide roller 61 for guiding the cable 35.

The bracket also has pivoted at 62 a hinged plate 63 that carries the bottom strip 64 that interengages with the bottom of the door. When the door swings outwardly this bottom strip breaks away from the door and permits the free opening of the door. When the door assumes its horizontal position, the bottom strip 64 is held in horizontal position as a part of the door by the latch member 65 which is pivoted upon the bracket 66 as at 67. The member 65 is provided with a rib 65*a* that engages with the arcuate portion 66*a* so as to hold it in such position that when the door is open it supports the bottom strip 64 in a horizontal position.

Method of operation

When the door is unlocked by unlocking the lock 22, the disk 8 rotates under the influence of the spring 19 and moves the weather strips 11 and 12 inwardly. By pushing upon the door, the lower half moves outwardly with the bottom strip moving about its hinge 62. The upper half moves inwardly guided by the rollers 6 in the horizontal tracks 7. The spring and air cushion means counterbalance this movement, as pointed out above.

When the door approaches its final open position, the air cushion effect of the compression in tube 26 snubs or brakes the final movement of the door into position in a horizontal position parallel to the roof of the room. During this operation the balls 45 and 46 have changed position as indicated by the several views. When the reverse operation takes place, the counterbalancing mechanism again goes into play and the air mechanism, due to its vacuum action at the end of the downward movement of the door, serves to cushion the movement of the door to its home position, as clearly pointed out above.

While I have described in detail the various variable forces which may control the operating characteristics of the device in moving from vertical or closed to horizontal or open position, it is to be understood that in the reverse operation, the cycle will be reversed and the vacuum force will provide a cushioning effect and operate in the same direction as the spring, as the effective length of the cable 35 is increased, the piston being forced toward the lower end of the tube 26, as seen in Figure 5. Due to the various adjusting means, hereinbefore described, the operating characteristics may be changed as may be desired and to accommodate doors varying widely in weight. It is to be understood that my device in operation provides a desirable varying counterbalancing of the door during the cycle of operation, and in addition provides cushioning means to prevent pounding, battering, and other destructive action which would otherwise occur due to the inertia of the door.

It will be understood that it is desired to comprehend within this invention such modifications as may be necessary to adapt it to varying conditions and uses.

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

1. In combination, a door adapted to close an opening in a building, a counterbalance and lifting mechanism comprising a radial arm and a flexible tension member connected thereto and to the building and passing around a pulley on the door for counterbalancing and guiding the door from open to closed position and vice versa, and means on the door and building for guiding the door in its movements.

2. In combination, a door adapted to close an opening in a building, a counterbalance and lifting mechanism comprising a radial arm and a flexible tension member connected to the radial arm and to the building and passing around a pulley on the door in supporting relation for counterbalancing and guiding the door from open to closed position and vice versa, means on the door and building for guiding the door in its movements, and means adjustably secured to the building for regulating the relationship of said counterbalance and lifting mechanism with respect to the building and the door.

3. In combination, a door adapted to close an opening in a building, a horizontally disposed track located at right angles to the door when the door is closed, rollers on the door engaging the track, guiding arms pivoted to the building and to the door for guiding the end of the door opposite from the ends supported on the tracks, and yielding means including a pneumatic cushioning device for interconnecting said door and its guiding means with the building for counterbalancing the door.

4. In combination, a door adapted to close an opening in a building, a horizontally disposed track located at right angles to the door when the door is closed, rollers on the door engaging the track, guiding arms pivoted to the building and to the door for guiding the end of the door opposite from the ends supported on the tracks, yielding means including a pneumatic cushioning device for interconnecting said door and its guiding means with the building for counterbalancing the door, and means for adjusting the relationship of said counterbalancing means with respect to the door and the building.

5. In combination, a door, a counterbalance and lifting mechanism, rollers on a part of said door, track means for guiding a part of the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

6. In combination, a door, a counterbalance and lifting mechanism, rollers on a part of said door, track means for guiding a part of the door, said counterbalance and lifting mechanism being adapted to guide another part of said door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

7. In combination, a door, a counterbalance and lifting mechanism, rollers on a part of said door, track means for guiding a part of the door, said counterbalance and lifting mechanism being adapted to guide another part of said door, means to adjust the relationship of the counterbalance and lifting mechanism with respect to the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

8. In combination, a door, a counterbalance and lifting mechanism, rollers on a part of said door, track means for guiding a part of the door, means to adjust the relationship of the counterbalance and lifting mechanism with respect to the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

9. In combination, a door for closing a door opening in a building, a counterbalance and lifting mechanism connecting said building and said door, means on said building for guiding said door from one position to another, means of adjustably securing said counterbalance and lifting mechanism to the building for modifying the relationship thereof to the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

10. In combination, a door adapted to close an opening in a building, a counterbalance and lifting mechanism comprising a radial arm and a flexible tension member connected to the building and to the counterbalance and passing over a pulley on the door for counterbalancing and guiding the door from open to closed position and vice versa, means on the door and building for guiding the door in its movements, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

11. In combination, a door adapted to close an opening in a building, a counterbalance and lifting mechanism comprising a radial arm and a flexible tension member connected to the building and to the door for counterbalancing and guiding the door from open to closed position and vice versa, means on the door and building for guiding the door in its movements, means adjustably secured to the building for regulating the relationship of said counterbalance and lifting mechanism with respect to the building and the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

12. In combination, a door adapted to close an opening in a building, a horizontally disposed track located at right angles to the door when the door is closed, rollers on the door engaging the track, guiding arms pivoted to the building and to the door for guiding the end of the door opposite from the ends supported on the tracks, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

13. In combination, a door adapted to close an opening in a building, a horizontally disposed track located at right angles to the door when the door is closed, rollers on the door engaging the track, guiding arms pivoted to the building and to the door for guiding the end of the door opposite from the ends supported on the tracks, yielding means for interconnecting said door and its guiding means with the building for counterbalancing the door, and pneumatically controlled means for cushioning the movement of said door at the extremes of its open and closed positions.

14. In combination, a door adapted to close an opening in a building, a horizontally disposed track located at right angles to the door when the door is closed, rollers on the door engaging the track, guiding arms pivoted to the building and to the door for guiding the end of the door opposite from the ends supported on the tracks, yielding means for interconnecting said door and its guiding means with the building for counterbalancing the door, means for adjusting the relationship of said counterbalancing means with respect to the door and the building, and pneumatically controlled means for cushioning the

movement of said door at the extremes of its open and closed positions.

15. In combination, with a door, a counterbalancing mechanism comprising a spring connected to a building at one end and to a cable passing around a pulley rotatably mounted on the door at the other end, and means for enclosing said spring.

16. In combination, a building having a door opening, a door, a counterbalancing spring connected to said building and to a cable passing in supporting engagement around a pulley mounted on said door, a tube supporting said spring at one end, guiding it at the other end, and enclosing it from end to end.

17. In combination, a building having a door opening, a door, a counterbalancing spring connected to said building and to a cable passing about a rotatable pulley on said door, a tube supporting said spring at one end, guiding it at the other end and enclosing it from end to end, means for pivoting said tube to the building adjacent one end, and means to pivotally connect the tube to the door at the other end whereby the tube serves to guide the door in its movement and to enclose and guide the spring in its movement.

18. In combination with a building having a door opening, a door, a counterbalancing mechanism for counterbalancing said door in its movements comprising a spring supported in a casing pivotally connected to the building and connected to a flexible tension member passing around a pulley on the door.

19. In combination with a building having a door opening, a door, a counterbalancing mechanism for counterbalancing said door in its movements comprising a spring connected to the building and the door, means for enclosing said spring, means associated with said spring to form a piston in said enclosing means, and an air valve means for regulating the inlet and the egress of air to the spring enclosing means.

20. In combination with a building having a door opening, a door, a tube pivoted on the building at one end, means for supporting a spring on one end of said tube within the tube, a cable connected to the other end of the spring and passing around a pulley on the door, and roller guide means for guiding said cable to a point on the building adjacent the pivoted end of the tube.

21. In combination with a building having a door opening, a door, a tube pivoted on the building at one end, means for supporting a spring within the tube from one end thereof, a cable connected to the other end of the spring, and roller guide means on said door for guiding said cable to a point on the building adjacent the first end of the tube at a point above the pivotal support of the tube on the building.

22. In combination with a building having a door opening, a door, a tube pivoted on the building at one end and to the door at the other end, means for supporting a spring on one side of said tube within the tube, a cable connected to the other end of the spring, roller guide means for guiding said cable to a point on the building adjacent the first end of the tube at a point above the pivotal support of the tube on the building, and means to adjust the relationship of the cable to the building by the lateral movement of said adjusting means.

23. In combination with a building having a door opening, a door, a tube pivoted on the building at one end and to the door at the other end, means for supporting a spring on one side of said tube within the tube, a cable connected to the other end of the spring, roller guide means for guiding said cable to a point on the building adjacent the first end of the tube at a point above the pivotal support of the tube on the building, and means to adjust the relationship of the cable to the building by the lateral movement of said adjusting means and by the vertical movement of said adjusting means.

24. In combination with a building having a door opening, a door, means mounted on the building for pivotally supporting a spring tube, means for pivotally connecting said tube to the bottom of the door, yielding means in said tube supported thereby, a cable connected to said yielding means, means for guiding said cable to a point above the top of said tube, and means for attaching said cable to the same means that pivotally support said tube.

25. In combination with a building having a door opening, a door, means mounted on the building for pivotally supporting a spring tube, means for pivotally connecting said tube to the bottom of the door, yielding means in said tube supported thereby, a cable connected to said yielding means, means for guiding said cable to a point above the top of said tube, means for attaching said cable to the same means that pivotally support said tube, and means for laterally adjusting said cable attaching means to regulate the position of said cable with respect to the door and the building.

26. In combination with a building having a door opening, a door, means mounted on the building for pivotally supporting a spring tube, means for pivotally connecting said tube to the bottom of the door, yielding means in said tube supported thereby, a cable connected to said yielding means, means for guiding said cable to a point above the top of said tube, means for attaching said cable to the same means that pivotally support said tube, means for laterally adjusting said cable attaching means to regulate the position of said cable with respect to the door and the building, and means for effecting a vertical adjustment of the cable attaching means.

27. A new article of manufacture for use with a counterbalanced door comprising a bracket, pivoted jaws thereon for supporting one end of a cable, and means for adjustably spreading said jaws to regulate the length of the cable.

28. A new article of manufacture for use with a counterbalanced door comprising a bracket, pivoted jaws thereon for supporting one end of a cable, means for adjustably spreading said jaws to regulate the length of the cable, and means for vertically adjusting the position of said jaws for further adjusting the position of the cable.

29. A new article of manufacture for use with an overhead door comprising a bracket, a pair of jaws pivoted on one another, means for adjusting the relationship of said jaws with respect to one another, means for supporting the pivot for said jaws slidably on said bracket, and means for vertically adjusting said jaws as a unit on said bracket.

30. A new article of manufacture for use with an overhead door comprising a bracket, a pair of jaws pivoted on one another, means for adjusting the relationship of said jaws with respect to one another, means for supporting the pivot for said jaws slidably on said bracket, means for vertically adjusting said jaws as a unit on

said bracket, and means for positioning one of said jaws in its swinging movement with respect to said bracket.

31. A new article of manufacture for use with an overhead door comprising a bracket, means for adjustably supporting a pair of pivoted jaws on the upper end of said bracket for adjustably positioning a cable attached to one of said jaws and supported by both of them, and means on the lower end of said bracket for pivotally supporting a tube containing a spring connected to said cable whereby the tension on the spring and the position of the cable may be adjusted with respect to said bracket.

32. In combination, a door, a building having a door opening, a spring enclosing tube pivoted on the building and on the door, a spring therein connected to one end of the tube which is closed, a piston on the other end of the spring, a cable connected to said piston, means for guiding said cable from the open end of the tube to a point on the building, an air valve mounted on said tube comprising a plurality of chambers having a communicating port, balls in said chambers, a port from one chamber to the tube, and a port from the other chamber to the outside atmosphere whereby as said tube and door move from one position to the other, alternate compression and suction will be created in said tube to act as a shock absorber and bracket to cushion the movements of said door.

33. In combination, a door, a building having a door opening, a spring enclosing tube pivoted on the building and on the door, a spring therein connected to one end of the tube which is closed, a piston on the other end of the spring, a cable connected to said piston, means for guiding said cable from the open end of the tube to a point on the building, an air valve mounted on said tube comprising a plurality of chambers having a communicating port, balls in said chambers, a port from one chamber to the tube and a port from the other chamber to the outside atmosphere whereby as said tube and door move from one position to the other, alternate compression and suction will be created in said tube to act as a shock absorber to cushion the movements of said door, and an air valve in the closed end of said tube for regulating the air supply therein.

34. In combination, a door, a building having a door opening, a spring enclosing tube pivoted on the building and on the door, a spring therein connected to one end of the tube which is closed, a piston on the other end of the spring, a cable connected to said piston, means for guiding said cable from the open end of the tube to a point on the building, an air valve mounted on said tube comprising a plurality of chambers having a communicating port, balls in said chambers, a port from one chamber to the tube and a port from the other chamber to the outside atmosphere whereby as said tube and door move from one position to the other, alternate compression and suction will be created in said tube to act as a shock absorber to cushion the movements of said door, an air valve in the closed end of said tube for regulating the air supply therein, and means for adjusting the position of said cable in its attachment on the building.

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