June 9, 1936. W. D. REDRUP 2,043,490

OVERHEAD DOOR CONSTRUCTION

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FIG. 1

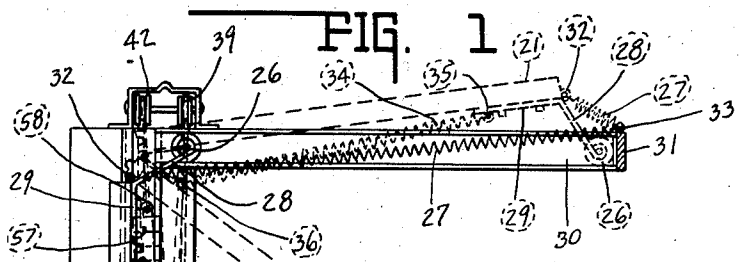


FIG. 2

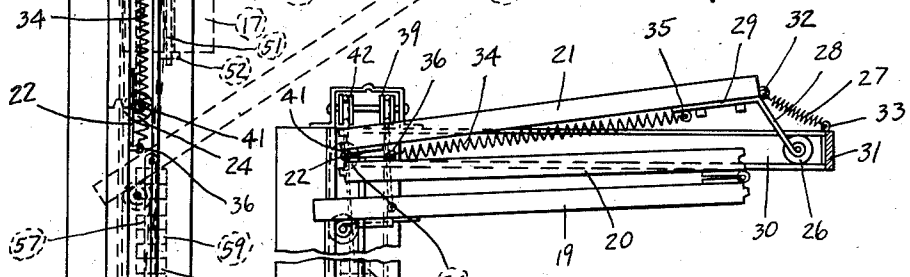
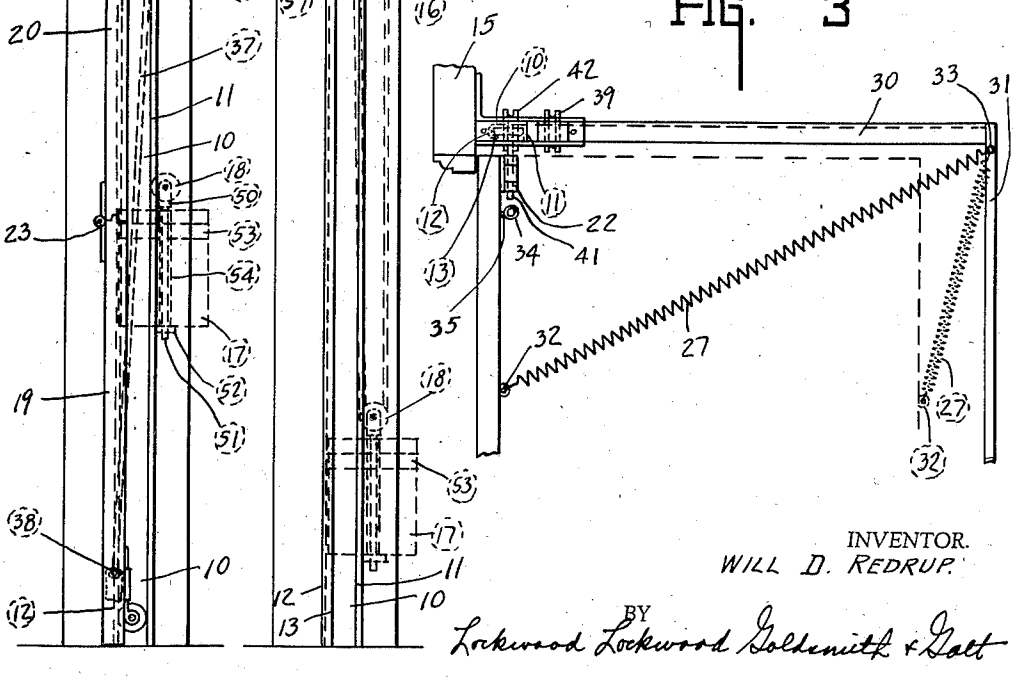


FIG. 3



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FIG. 4

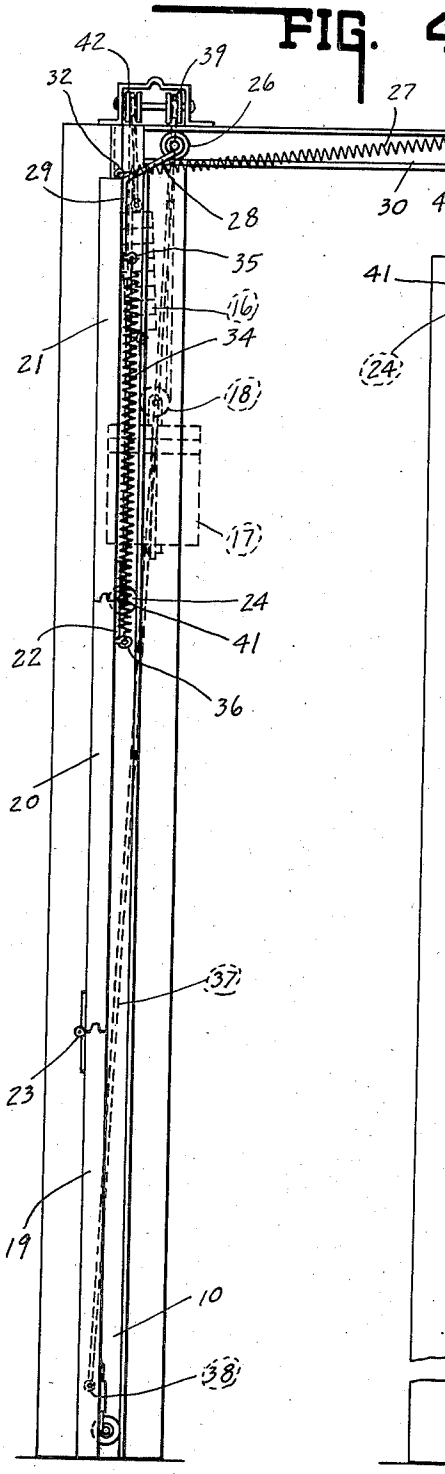
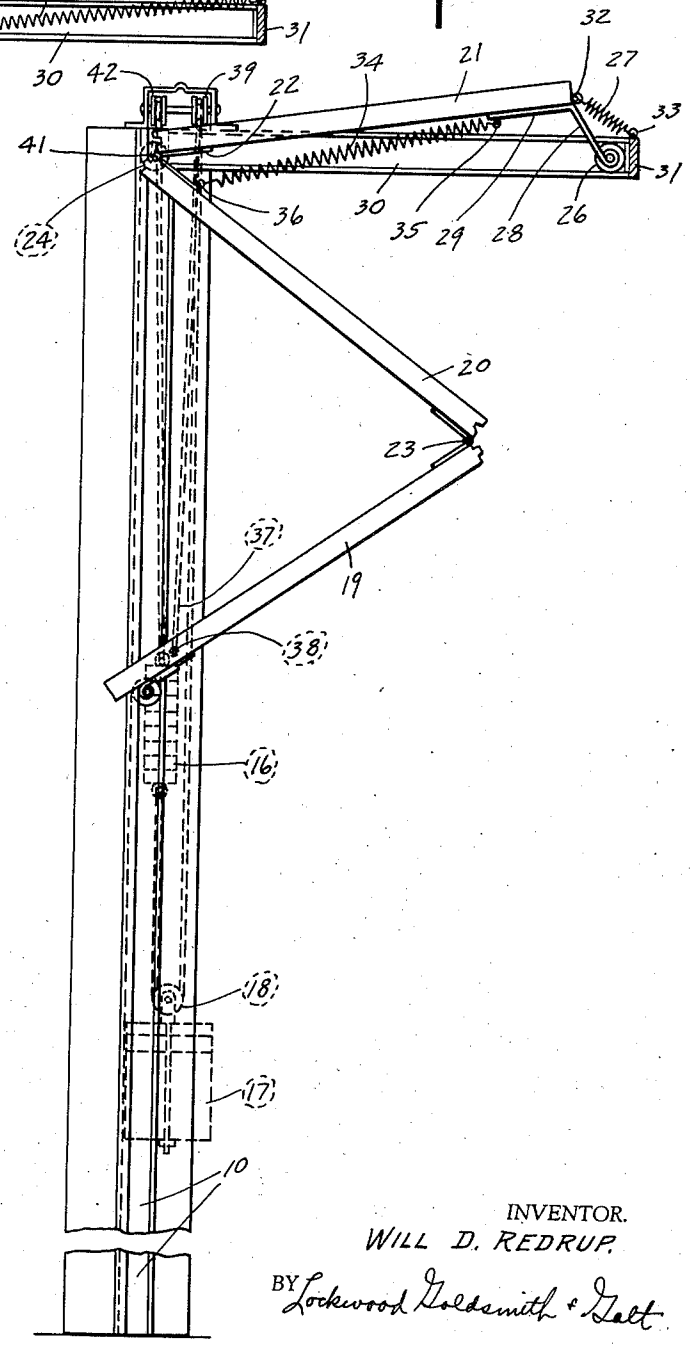


FIG. 5



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OVERHEAD DOOR CONSTRUCTION

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Application January 14, 1933, Serial No. 651,789

3 Claims. (Cl. 20—20)

This invention relates to a sectional door which is of the rolling and folding type such as disclosed in the co-pending application, Serial No. 574,716, filed November 13, 1931, entitled "Folding door construction", but is not necessarily solely restricted thereto.

The chief object of this invention is to produce an improved counterbalancing system, particularly for a door of the aforesaid types and generally for a folding door arrangement and wherein there is obtained a change in effectiveness of the system during the movement of the door from closed to open positions and vice versa.

The chief feature of the invention consists in modifying the effectiveness of a multiple counterbalance arrangement at a predetermined point in the movement of the door by changing the pulley and cable (or equivalent support) system from direct action to a modified action and vice versa.

One feature of the invention consists in anchoring both ends of the cable system to the door.

Another feature of the invention, when weights are utilized for counterbalancing, consists in providing an adjustable weight construction, and when dual weights are employed either or both may be of adjustable character.

The full nature of the invention will be more fully understood from the accompanying drawings and the following description and claims:—

In the drawings, Fig. 1 is a side elevation of the door and one of the side guide structures and associated parts, the door being shown in the door closing position, the dotted lines indicating an intermediate position.

Fig. 2 is a similar view of the upper portion of the guide structure with the door in the overhead and folded position.

Fig. 3 is a top plan view of the left half portion of the door and guide structure in the closed position, the dotted lines diagrammatically indicating the open position, the weights being omitted.

Fig. 4 is a diagrammatic view of the counterbalancing arrangement shown in the door closed position corresponding to Fig. 1.

Fig. 5 is a view similar to Fig. 4 of the same parts in the partially open position, shown dotted in Fig. 1.

In the drawings there is illustrated a pair of substantially vertical upwardly directed guide or trackway structures **10**, the same being oppositely directed and positioned at opposite sides of the door and including a face **11** and an opposite face **12**, the guide being of substantially channel arrangement. One or both of the face structures may have an inturned flange **13**. The side jamb **15** covers a weight box arrangement in which are mounted the weights.

Herein the door structure is shown of the sectional and folding type but is not necessarily limited thereto in its broadest phase with respect to the counterbalancing system. Herein also the door structure is illustrated as comprised of an odd number, to wit, three sections, although five sections or any additional odd number of sections may be utilized when the door has its upper section move rearwardly and the other sections fold into an overhead position beneath the top section. These sections also may be of equal or unequal length.

Herein the bottom section is indicated by the numeral **19**, the intermediate section by the numeral **20** and the upper section by the numeral **21**. Sections **20** and **21** are hingedly connected together at 22. Sections **19** and **20** are similarly connected together as at **23**. Certain of the sections mount guide members in the form of wheels **24** that travel in the upwardly directed track or guides before mentioned.

The upper door section near its upper edge carries the guide wheel **26** which is mounted in the projecting end **28** of an angular bracket member **29**, adjustably secured at the side of the door. This structure is duplicated at each side of the door and each guide wheel is associated with a horizontal rearwardly directed track **30**, the latter terminating in an abutment or stop which may be cushioned if desired. Herein said stop member is shown comprised of a transverse connection **31** that connects the rearward and free ends of the horizontal tracks which are channel shaped and oppositely directed. Member **31** serves as a spacing and bracing member. A coil spring **27** is suitably secured as at **32** to the upper edge of the upper door section at an appreciable distance in from the side edge thereof and the opposite end of the spring is secured at the rearward end of the rearwardly directed guide **30**, or may be secured to the member **31** when employed adjacent the connection of said member to the horizontal guide **30**, such connection being indicated at **33**. The rearward ends of members **30** and/or the rearward ends of springs **27** may be secured to the ceiling or supports depending therefrom.

In certain instances, the door may be provided with springs **34** which herein are shown positioned at each side of the door. A single spring **34** may be employed, if desired, and may, if desired,

be medianly positioned. The spring 34 is secured at one end as at 35 to the upper door section and its opposite end to the next lower door section at 36. The upper section has its upper end moved rearwardly, as indicated in Fig. 2. Said spring assists in the elevational movement of the second section, and the lower section or sections when more than three are employed, and also assists in breaking the door at the first hinged joint and assists in the automatic folding of the sections.

The counterbalancing structure, which is the chief feature of the invention, is provided in duplicate, one arrangement being positioned at each side of the door. Each counterbalancing arrangement, see Figs. 1, 2, 4 and 5 comprises a cable 37 secured as at 38 to the lower portion of the lower door section and at a point a considerable distance above the bottom of the door. Said cable is directed upwardly and rearwardly with reference to the side jamb passing over a guide pulley 39. The cable 37 after passing the guide pulley 39 passes under pulley 18 and attached thereto is one of the counterbalances, herein shown in the form of a weight and indicated generally by the numeral 17. The cable 37 thence passes upwardly and over a pulley 42 and is connected at 41 to an extension of the hinge pin which also serves as a support for the guide wheels 24 at the connection between the first and second top sections. In the run of the cable between the pulleys 18 and 42, there is interposed a second weight indicated generally by the numeral 16.

In the present form of the invention, it will be noted the cable is interrupted and the second or weight 16 is interposed therebetween.

The weight 16 is approximately 13½ percent of the weight of the first section plus the total weight of the second section, plus the weight of the glazing, if used, in either or both sections. The weight 17 is approximately 41 percent of the weight of the first section plus the weights of the second and third sections, plus the weight of any glazing used in any section.

As shown, the weight structure 17 is combined with pulley 18 and comprises a yoke 50 that supports the pulley and depending from the yoke is a bolt 51. A nut 52 mounted on the lower end retains the desired number of disc weights 53 perforated at 54 for mounting upon the bolt.

The cable 39, as before mentioned, is interrupted and the end 55 is suitably secured as at 56 to a weight supporting member 57, the other end thereof as at 58 connecting to the other end of the cable at the interruption. Suitably mounted on the member 57 are the desired number of disc weights 59, whereby the amount of counterbalancing included in weight 16 may be adjusted to that desired or necessary.

As the door opens, both weights travel downwardly, the distance between the two weights gradually increasing as the sections start folding. The weight 16 comes to rest when the guide 25 between said sections 21 and 22 reaches the top of the vertical track or, otherwise expressed, when the top section 21 is positioned, as shown in Fig. 2. Thereafter the weight 17 continues its movement downwardly until it reaches its lowermost position when all the sections are folded in the overhead relation, as shown in Fig. 2.

It will be apparent from the foregoing description and drawings that at a certain period in the movement of the weights, the full effectiveness of both weights is obtained and that at a certain position in the movement of the door, the effectiveness of weight 17 is divided. There may be intermediate positions where the effectiveness of the weight varies from that before mentioned. In certain instances when a latch mechanism is associated with the door construction and so-called full automatic opening is desired, the springs 34 are employed. In other instances, a latch mechanism may be employed and the springs 34 omitted or the latch and the springs 34 may be omitted. Such latch mechanism is disclosed in the pending application before mentioned.

Inasmuch as the two weights never pass each other, a single runway or housing is sufficient and in this particular the present invention differs from that shown in the co-pending application. In view of the fact that one run of the cable 37 moves along the side of the weight 16 in the weight housing, the weight 16 is preferably made in elongated form to permit clearance between the weight and the cable. The weight 17 may be made elongated or of any desired width and the discs both 59 and 53 may be either square, rectangular or circular in outline as found most practical. Usually the discs 53 will be square or rectangular, since it is easier to form a rectangular weight runway. In certain instances, spring means may be substituted for the counterweighting but counterweighting is preferable.

The invention claimed is:—

1. In a sectional door having a plurality of door sections hingedly connected end to end and adapted for movement into an overhead position to expose a door opening, a counterbalancing system at a side of the door including a single cable or the like connected at opposite ends to the same side of door, a pair of overhead pulleys stationarily mounted on the door frame or the like adjacent the opening each associated with said cable, a plurality of counterbalances, and a floating pulley operatively associated with said cable between the first mentioned pair of pulleys, said floating pulley constituting an anchorage for one end of one of the counterbalances, the other counterbalance having a relatively fixed connection with said cable between said first mentioned pair of pulleys.

2. A device as defined by claim 1 characterized by the counterbalances being of counterweight character, the pulley anchorage for one weight being of support character, one of said weights including an elongated member and perforated sectional weight members thereon for weight adjustment.

3. A device as defined by claim 1 characterized by the counterbalances being of counterweight character, the pulley anchorage for one weight being of support character, each of said weights including an elongated member and perforated sectional weight members thereon for weight adjustment.

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