Jan. 23, 1951 H. H. OLSEN 2,539,200

OVERHEAD DOOR MOUNTING

Filed July 8, 1946 3 Sheets-Sheet 1

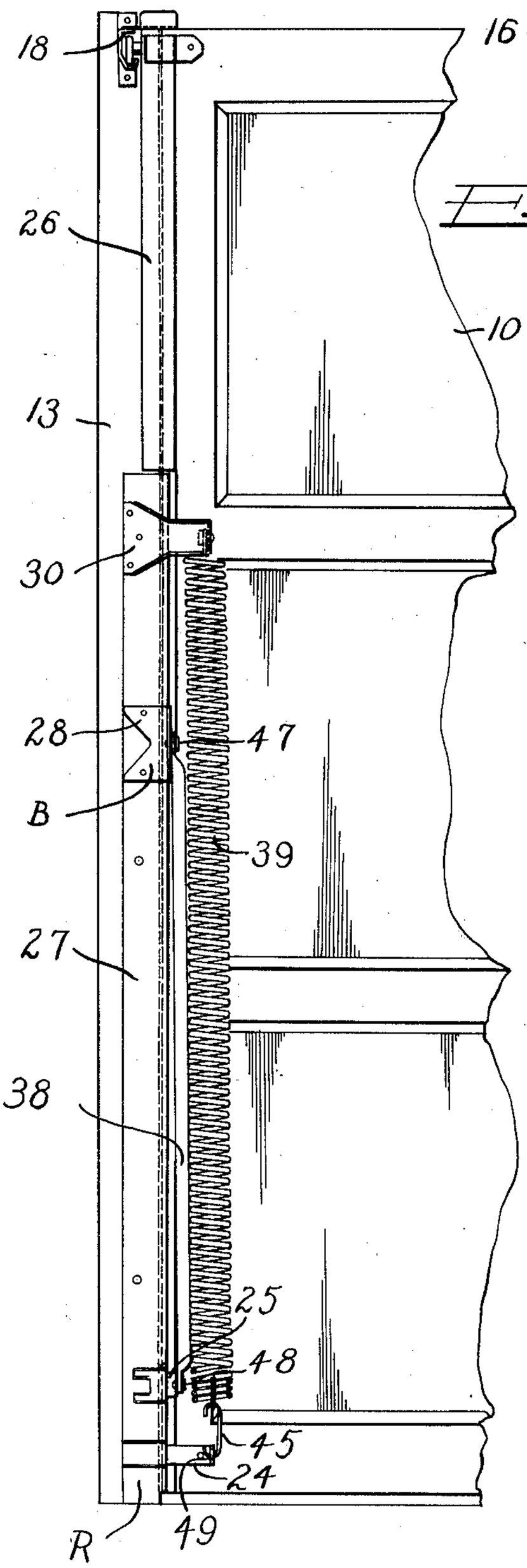

Fig. 1.

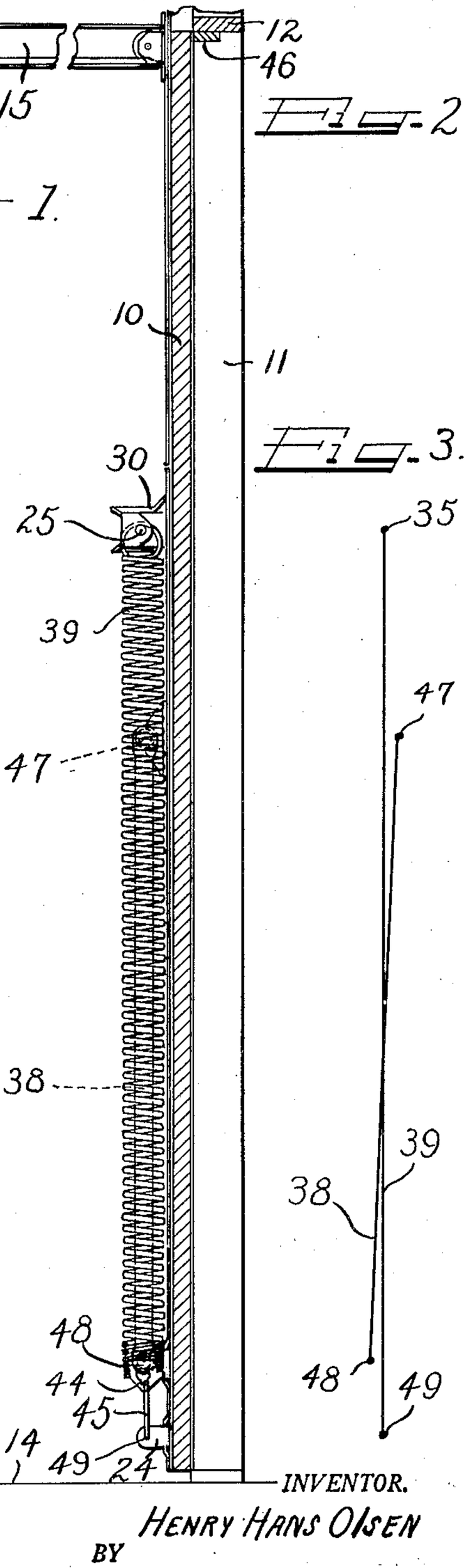

Fig. 2.

Fig. 3.

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OVERHEAD DOOR MOUNTING

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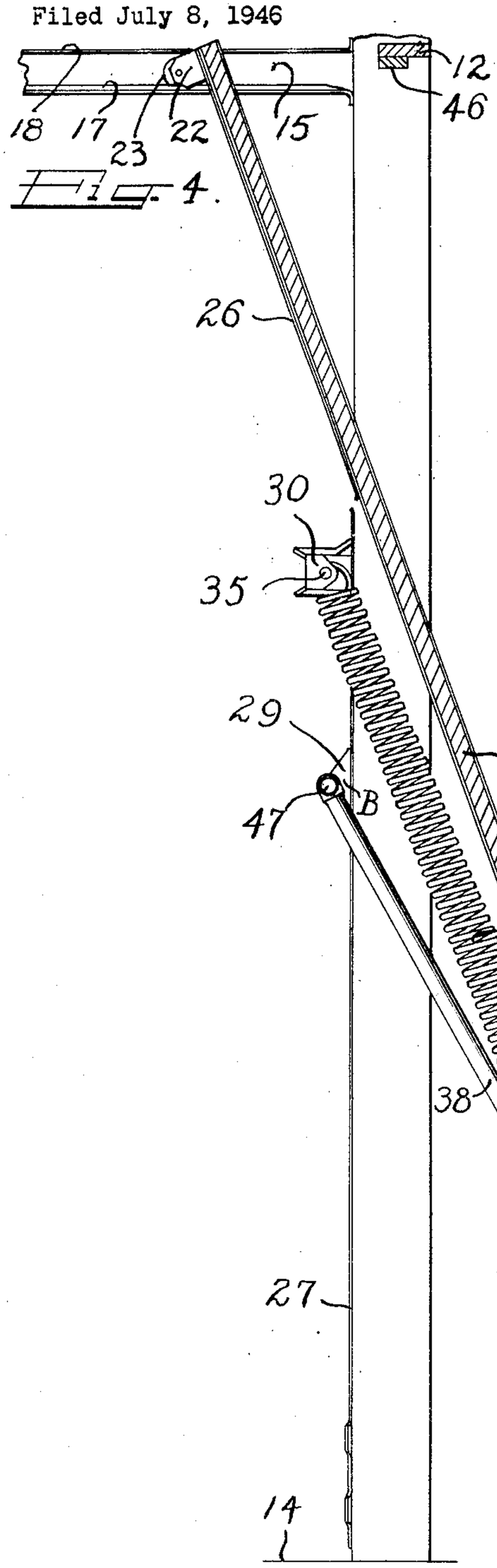

Fig. 4.

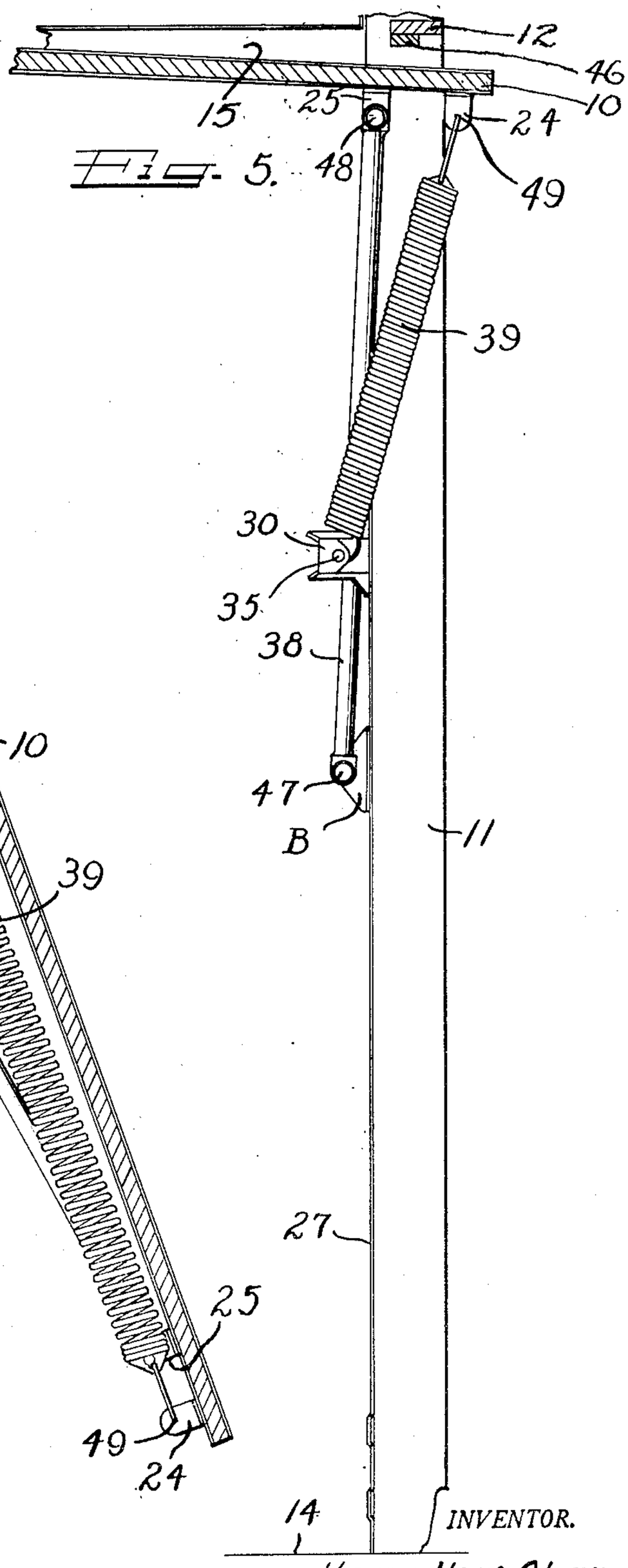

Fig. 5.

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OVERHEAD DOOR MOUNTING

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Fig. 6.

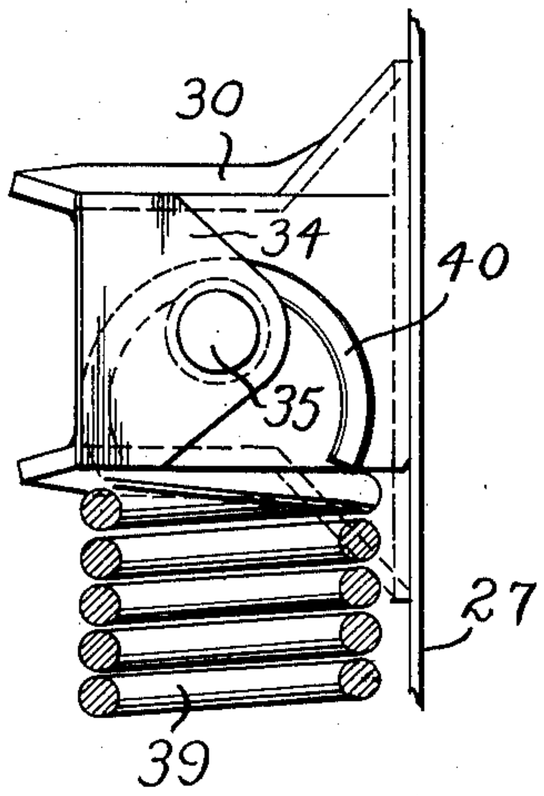


Fig. 8.

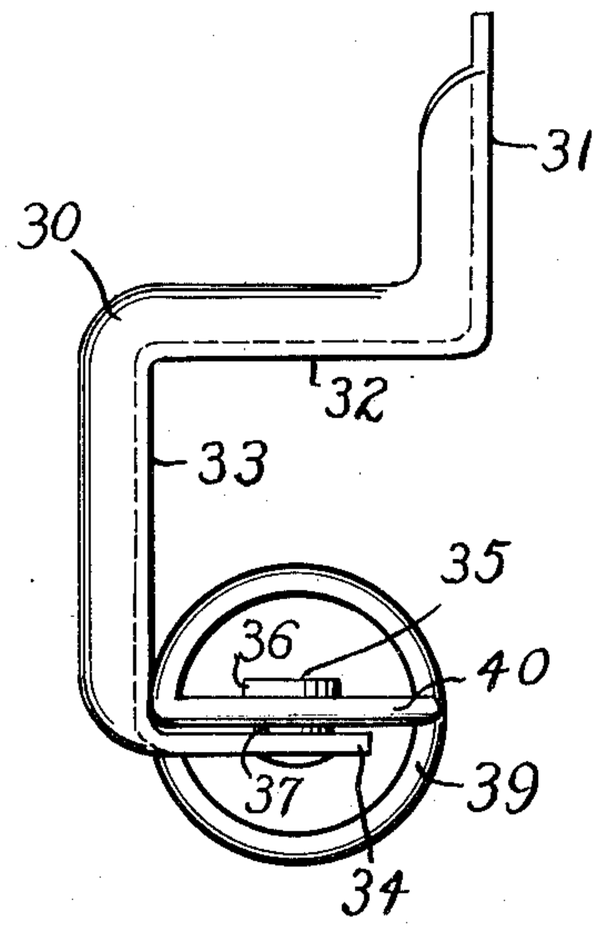


Fig. 7.

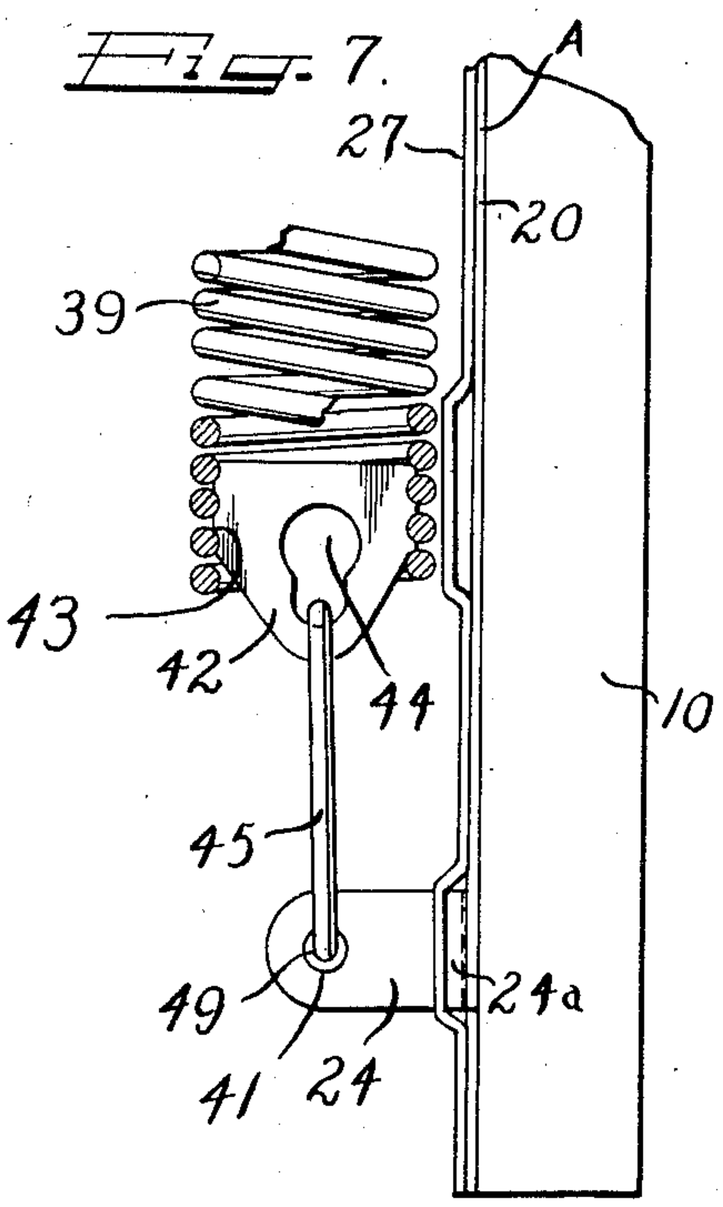
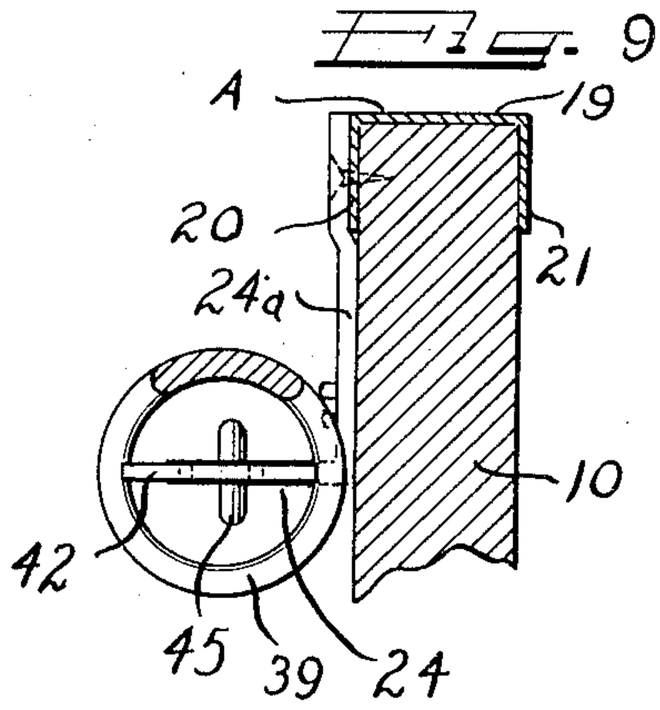


Fig. 9.



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2,539,200

UNITED STATES PATENT OFFICE

2,539,200

OVERHEAD DOOR MOUNTING

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Application July 8, 1946, Serial No. 681,941

1 Claim. (Cl. 20—19)

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The present invention relates generally to an overhead door mounting and more particularly to a simple arrangement of parts for counterbalancing the type of door that swings upwardly from a vertical closed position to a substantially horizontal overhead open position.

According to the present invention, an efficient, simple, and easily installed upwardly acting tilting type door construction is provided for producing all of the advantages of an overhead door without the heretofore encountered expense and installation difficulties.

Doors of the present invention are suspended by rollers movable along overhead horizontal tracks, and are swung on links or radius rods from closed vertical position to overhead substantially horizontal open position, and vice versa, the assemblies being capable of installation by an average home owner and are simple and can compete favorably, on a price basis, with hinged doors.

The hardware of an assembly of this invention includes, for one door, two metal strips for application over the side edges of a door, a roller on the upper end of a strip, two vertically spaced brackets secured near the lower end of a strip, two sub-assemblies each of which includes a weatherstrip plate to be secured to a jamb, a plate carries near its upper end a bracket for engagement by one end of a counterbalanced spring. A plate also carries, below the spring bracket, a pivot for the upper end of a radius rod. A radius rod is pivoted at its upper end to a pivot end at its lower end to the upper of the two brackets adjacent the lower end of a strip. The hardware includes also two springs, a pair of track ways, and necessary attaching means such as screws, bolts, or the like, for attachment of the hardware to the door and hanging of the door in a doorway.

The lower ends of the springs are attached to the lower brackets adjacent the lower ends of the strips.

The radius rods are connected to their pivots in such manner that the only relative movement therebetween is rotative movement.

The springs are connected to their pivots in such manner that the only relative movement therebetween is rotative movement.

In the present invention there is no relative shifting movement between any of the pivots and the door or door jambs.

The upper spring anchor pins are immovably fixed to the plates attached to the jambs while the lower spring anchor pins are immovably attached to the door.

The relationship of the pivots for the springs and the pivots for the links or radius rods is

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such that the component of spring tension acting in a direction toward the door at substantially right angles thereto will be sufficient to urge the lower margin of the door inwardly when the door is in either its substantially horizontal open position or vertical closed position. Such arrangement prevents slamming, and exerts inward pull on the door to hold it open or closed, as the case may be.

This end is accomplished by attachment of the lower ends of the springs to the door nearer to the door than the attachment of the lower ends of the links, while the upper ends of the springs are connected to the jambs farther from the door than the connections of the upper ends of the links to the jambs.

The metal strips extend along the entire height of the door on the side edges thereof and serve to secure the door sections together, if a plurality of sections be used, in addition to serving as supports and rigidifying means for the door. These metal strips preferably take the form of channels or angles which embrace the side edges of the door, and are suitably attached in place to support the door when it is suspended from its track ways.

The plates of the sub-assemblies are attached to the door jambs and constitute weatherstrips.

To operatively assemble a door of this invention in a doorway, the procedure is as follows:

The door is laid on suitable supports, such as horses, whereupon the metal strips are attached along the side edges of the door and secured in suitable manner. The overhead tracks are installed in the structure immediately behind the doorway. The door is tilted through the doorway and hung on the trackways by the rollers carried by the metal strips attached to the side edges of the door. The sub-assemblies are then applied, with the plates attached to the jambs and the door is then swung to open overhead position and the counterbalance springs hooked to their pivots on the jambs and door respectively.

The metal strips for attachment to the edges of the door may take the form of channels or angles. If channels, the flanges thereof engage opposite surfaces of the door and the webs engage the side edges. Such strips may take the form of angles, in which event one leg would be applied over the side edges of the door while the other leg would extend along the inner face of the door.

It is an object of the present invention to provide an inexpensive overhead door construction that can be readily installed by the average home owner without the aid of special tools, and without the aid of expert help.

Another object of the present invention is to provide pre-assembled door hardware, and precut doors for mounting such hardware, in order that upwardly acting doors may be quickly installed by unskilled labor.

A further object of the present invention is to provide a precut door and pre-assembled linkages of door hardware which hardware may be readily applied to the door and the door and hardware readily attached to door jambs for tiltably mounting the door in the doorway.

Another and further object of the present invention is to provide an overhead door construction wherein radius rods or links and counterbalance springs are pivotally connected to the door jambs and door, respectively, on fixed pivots or anchor pins, and in which the arrangement of the pivot pins is such that a component of spring tension acting in a direction toward the door will be sufficient to urge the lower portion of the door inwardly with respect to the doorway when the door is in either its substantially horizontal open position or vertical closed position.

The invention has for an additional object the positioning of fixed anchor pins for the counterbalance springs and radius rods or links of an overhead door construction to effect easy movement of the door between open and closed positions, and to apply a pulling action against the lower margin of the door to hold it in open overhead position as well as in closed vertical position.

The above, other and further objects of the present invention will be apparent from the following description and accompanying drawings, which, by way of preferred example only, illustrates one embodiment of the invention.

On the drawings:

Figure 1 is a fragmental elevational view of a doorway, from the inside thereof, with a door of the present invention mounted therein, and shown in closed position.

Figure 2 is a vertical sectional view through the door in closed position, showing the relationship of certain of the parts.

Figure 3 is a diagrammatic exaggerated view of the relative position of the springs and links when a door is in closed position.

Figure 4 is an elevational view of one of the jambs of the doorway, showing the door in tilted position somewhere between its fully closed and fully opened positions.

Figure 5 is a similar view showing the door in fully opened overhead position.

Figure 6 is an elevational view of one of the brackets carrying a fixed anchor stud for the upper end of a counterbalance spring, and showing a portion of the spring in section.

Figure 7 is a fragmental view, partially in elevation and partially in section, of the lower end of a counterbalance spring showing its manner of attachment to the door.

Figure 8 is a top plan view of the bracket of Figure 7, and

Figure 9 is a fragmental horizontal sectional view through a portion of the door and a compression spring.

As shown on the drawings:

In Figures 1 and 2, **10** designates a door for opening and closing a doorway **11** defined by a lintel **12**, side jambs **13** and a floor **14**.

Overhead tracks, one of which is shown at **15**, project inwardly from the doorway adjacent the lintel **12**. The tracks at their front ends are

suitably secured to the door frame, and at their ends are suitably attached to the frame structure of the building.

The tracks **15** are formed as troughs **17** in which rollers attached to the door **10** may travel, as will be more fully explained. As may be observed in Figure 1, the tracks **15** have upper flanges **18** to prevent the rollers from being accidentally displaced from the tracks.

Two metal strips A, one of which is herein shown, for application to the side edges of the door **10**, are illustrated as channels applied to the side edges of the door, with the webs **19** against the side edges and the flanges **20** and **21** against the inner and outer surfaces of the door along the edges. Attached to the upper end of each of the strips A is a bracket **22** supporting a roller **23** for movement in a track **15**. Adjacent the lower end of the channel A are two brackets, in vertically spaced relation. The lower bracket **24** is attached to the channel near its lower end, and the upper bracket **25** is attached to the channel a slight distance above the bracket **24**, as may be readily observed in Figure 4.

Secured along the upper end of the channel A is a weatherstrip **26** so disposed as to overlie the space between the door and a jamb when the door is closed, as illustrated in Figure 1. It will be noted that this weatherstrip extends downwardly along the channel partway of the length of the same.

The channels A constitute part of the sub-assemblies.

A sub-assembly includes a channel A and a plate **27**, the latter adapted to be applied along the inside of a jamb and constituting a weatherstrip to overlie the joint between the door and the jamb between the floor **14** and the lower end of the upper weatherstrip **26**.

Attached, as by welding or otherwise, to each plate **27**, is an angle member B having one flange **28** welded or otherwise secured to the plate **27** and its other flange **29** at right angles to the flange **28** and projecting inwardly from the plate **27**. The flange **29** is apertured.

Welded or otherwise secured to the upper end of the plate **27**, above the bracket B, is another bracket **30** constructed as shown in Figures 6 and 8. The bracket **30** includes a base **31** for attachment to a plate **27**, a right angled flange portion **32**, another flanged portion **33** parallel to the base **31** but spaced from it by the length of the portion **32**, and a back-turned flange **34** parallel to the flange **32** but of less horizontal extent. The margins of the flanges **32** and **33** and the base **31** are bent outwardly as shown in Figure 6 for the purpose of rigidity and strength.

The flange **34** is apertured to receive a stud **35**. The stud **35** is provided with a head **36** and a shank **37** which is entered in the aperture in the flange **34** and headed or otherwise fastened in place in the flange. It will be noted that the head **36** of the stud is spaced inwardly from the flange **34** of the bracket **30**.

The brackets **30** are made as right-hand and left-hand members and applied to the plates **27** so that the flanges **23** and **34** extend inwardly of the jambs to which the brackets are applied.

It is to be understood that there are two sub-assemblies per doorway, one for application to a left-hand jamb and the other for application to a right-hand jamb, along the inside surfaces of the jambs.

The sub-assemblies include, also, links or radius rods **38**. The upper end of a radius rod is

pivoted at 47 to the flange 29 of the bracket B in fixed pivotal relation. The lower end of a radius rod is pivoted at 48 to the bracket 25 on the channel A of the door in fixed pivotal relationship.

The brackets 25 are angle members each having an angle welded or otherwise secured to the channel A and the other flange at right angles to the inside surface of the door.

Referring to Figure 1, it will be noted that a radius rod 38 is arranged closely adjacent the jamb of the doorway.

There are two counterbalance springs per door, one of which is shown at 39. The counterbalance springs are coiled tension springs with the upper ends thereof formed with upstanding loops 40 to be hooked over stud 35 of the upper spring brackets 30.

The lower spring brackets 24 are shown as angle members having one flange 24*a* secured to the channel A, and another flange at right angles thereto which is provided with a hole 41.

A spring anchor 42 in the form of a plate has corrugated margins 43 to enable the plate to be screwed into the lower end of a spring 39. The plate 42 is formed with a keyhole slot 44, and a link 45 having its ends bent engages the keyhole slot 44 in the anchor 42 and the hole 41 in the bracket 24 to thus connect the lower end of a spring to the door. The tension of a spring 39 may be adjusted by screwing the anchor plate 42 with respect to the lower end of the spring, and then hooking it to the plate 27. The lower end of a spring 39 is pivoted at 49 to bracket 24 by the link 45.

The arrangement of the counterbalanced springs and radius rods, just described, makes it possible for easy manipulation of the door in opening and closing it without interference between the radius rods and springs.

It will be noted from Figure 3 that the lower ends of the springs 39 are pivotally connected to the door by pivots which are nearer the inside surface of the door than are the pivotal connections of the lower ends of the links 38 and that the pivotal connections of the upper ends of the springs are farther from the inside surface of the door than are the pivotal connections of the upper ends of the links 38, also that the lower pivots of the springs are below the lower pivots of the links while the upper pivots of the springs are above the upper pivots of the links, with the door closed. Such arrangement holds the door closed and, as the component of spring tension force in a direction toward the door decreases as the door approaches its fully closed position, the door will be closed without slam.

Fastened to the underside of the lintel 12 is a stop 46 against which the upper margin of the door strikes as it is moved to fully closed position.

Referring to Figures 2, 4 and 5, the door may be moved from vertical closed position to open horizontal overhead position by pushing against the lower margin of the door from the inside, or by pulling the door from the outside by suitable handle means. Figure 4 illustrates the arrangement of the door, counterbalance springs, and radius rods, as the door has been moved from closed position, or is approaching closed position. As the door approaches its overhead position the lengths of the springs decrease, thus reducing the force applied to the door as it nears its open position. Referring to Figure 5, it will be noted that, with the door in fully opened overhead position, the pivotal connections of the springs to the brackets 24 lie to the right of the

pivotal connection of the radius rods to the brackets 25. With the door in fully opened overhead position, it will be noted that the springs are inclined with respect to the jambs. With the parts as shown in Figure 5, there is thus a component of the spring tension which acts to the left, as viewed in Figure 5, which holds the door in opened position, that is to say, tends to urge it inwardly with respect to the door opening.

It is to be understood that suitable locking means may be applied to the door, for locking it in closed position. However, as such locking means forms no part of the present invention, it has not been illustrated.

All of the hardware parts for doors of the present invention may be formed by stamping operations on sheet metal. The strips for the weatherstrips and angle or channel strips may be made from the same strip stock. It has been found that strip stock of one and one-half inches wide and one-sixteenth inch thick is satisfactory for the average single garage door.

It will be observed that the present invention provides simple means for mounting an overhead door in a doorway. The means comprise metal parts which may be manufactured at minimum expense, with the sub-assemblies assembled, and the whole hardware set and door supplied to a user who may, without special tools and without experienced help, readily install the door in his garage or other building structure.

The door of the present invention may be made as a one-piece door, or might be made of separate panels which are connected together when the channels A are applied. It is to be understood that one of the panels may be provided with glass or other transparent material.

The relative positions of the link and spring pivots is such that a plane through the pivots of a link and which includes the link axis will intersect a plane through the spring pivots and which includes the spring axis.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claim.

I claim as my invention:

In an overhead door construction, a door frame having a door opening, a horizontally extending trackway adjacent the upper end of said door frame at each side of said door opening, a one piece tiltable door, a roller on the upper end of said door at each side thereof and carried by a corresponding one of said trackways, said door being movable on said trackways from a closed door position in said door opening to an open door position upwardly and rearwardly of said door opening, a link on each side of said door, a first pivotal connection between one end of each of said links and said door at a point intermediate the upper and lower ends of said door, a second pivotal connection between the other end of each of said links and said door frame at a point intermediate the upper and lower portions of said door opening, a coil spring on each side of said door, a first spring connection between one end of each of said springs and said door at a point between the lower end of said door and said first pivotal connections, and a second spring connection between the other end of each of said springs and said doorframe at a point between the upper portions of said door opening and the

said second pivotal connections, said first spring connections and said first pivotal connections being spaced apart laterally from one another with reference to the plane of said door to decrease the spring tensioning force as said door approaches the closed door position and spaced apart vertically on said door to impart a torque around said pivotal connections tending to hold said door open.

HENRY HANS OLSEN.

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