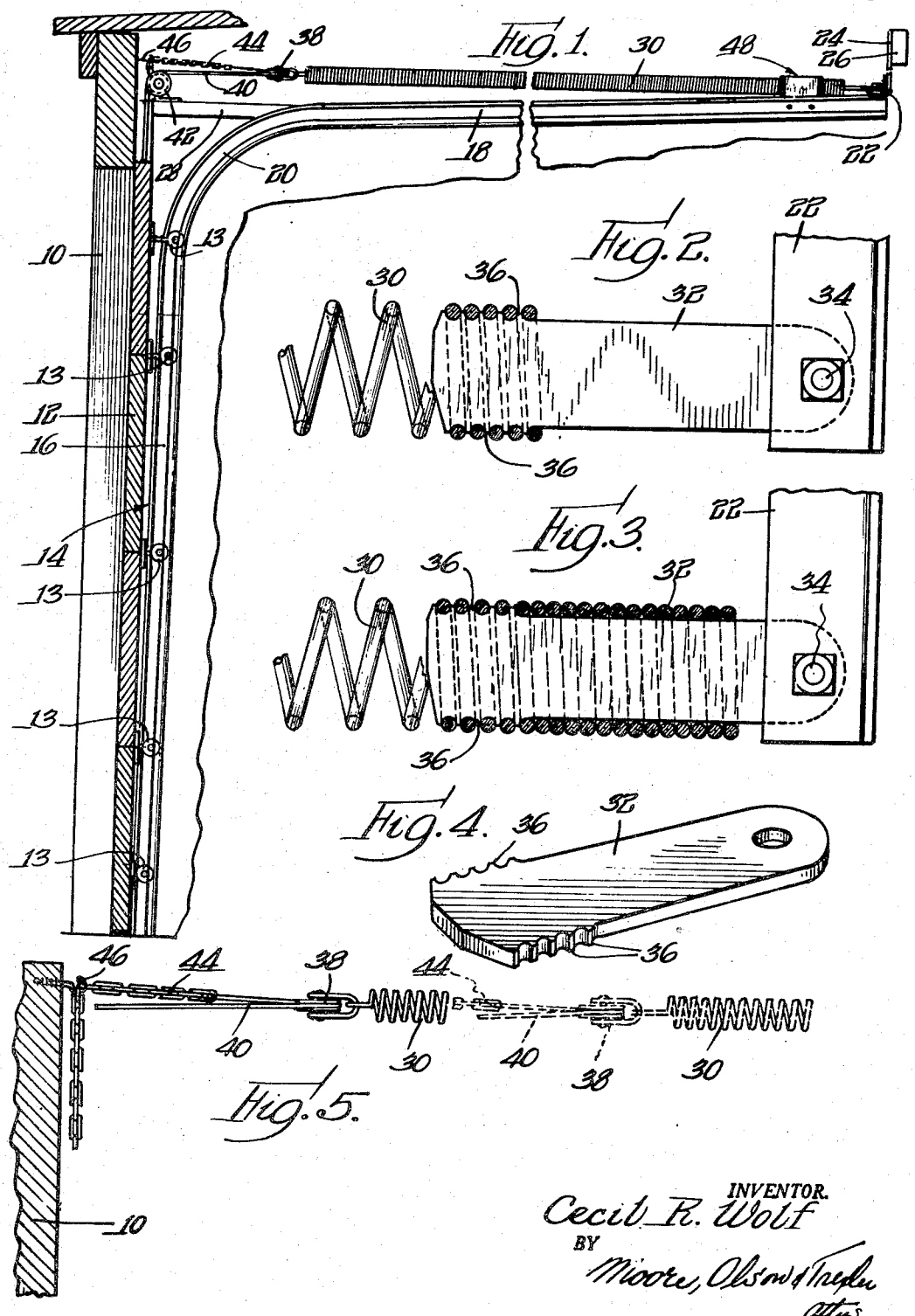
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OVERHEAD DOOR CONSTRUCTION

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Fig. 6.

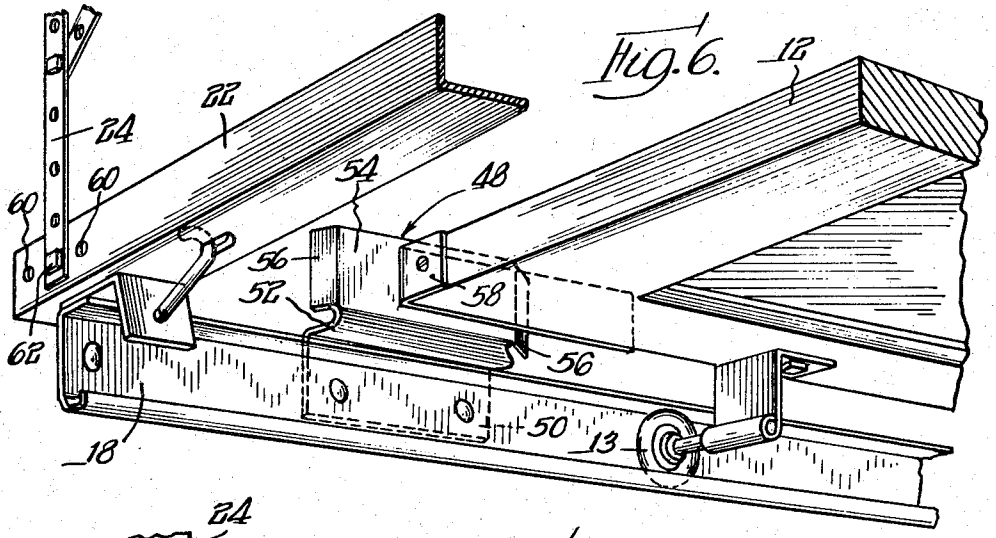


Fig. 7.

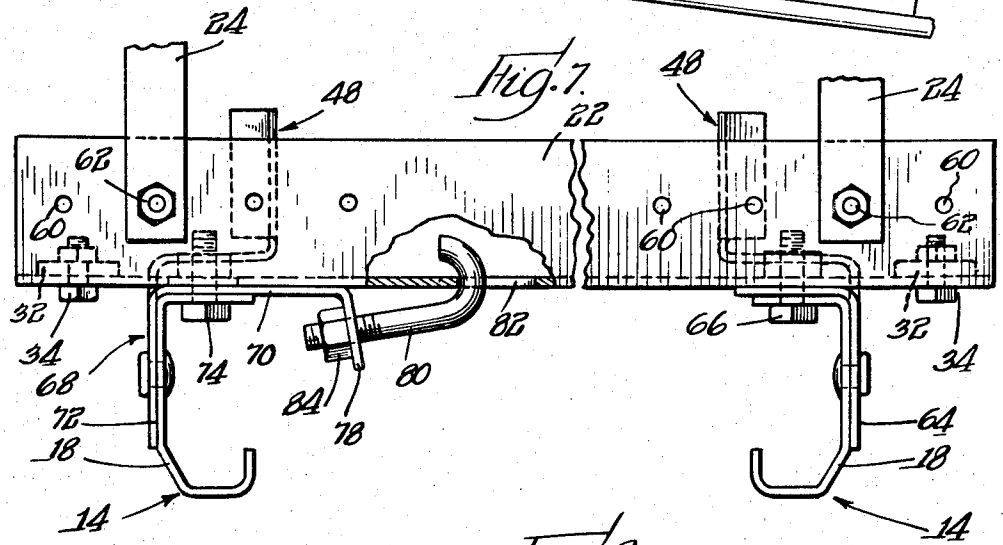
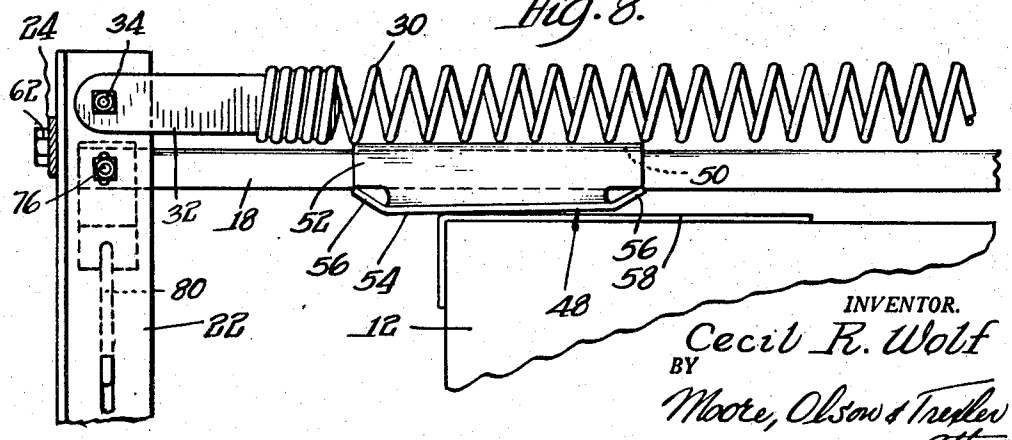


Fig. 8.



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OVERHEAD DOOR CONSTRUCTION

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8 Claims. (Cl. 160—201)

This invention is concerned generally with overhead garage doors and particularly with structure for preventing overshooting and rebounding of such doors.

Heretofore, garage doors of the overhead opening type have been beset with a common problem. As the doors reach overhead open position they are traveling at a considerable rate of speed and continue to move past their fully opened position and then rebound to a partially closed position. The door may oscillate several times about its fully opened position and all of the oscillations including, particularly, the original overshoot and rebound are quite noisy and are hard on the door mechanism. An objection of more serious consequence is that overhead doors frequently rebound sufficiently far and with sufficient force to injure the person raising the door.

Overhead garage doors are usually counterbalanced by means of springs so that a strong counterbalancing force may be exerted on the door when in closed position at which time the entire weight of the door must be counterbalanced, and a comparatively light force is exerted on the door when in overhead opened position where only a small part of the weight of the door must be counterbalanced. A stronger spring must be used to retard closing of the door and to aid in overcoming the inertia of the door when the door is first started upward toward opened position than is necessary to counterbalance the upwardly moving door to the same extent. Consequently, the spring action and the upward lift by the person operating the door imparts a considerable momentum to the door. This momentum along with the residual spring tension when the door is in overhead opened position are the forces causing the door to overshoot. When the door has overshot some distance, it encounters a stop which should be resilient to prevent damage to the door and associated mechanism and a resilient stop causes the door to rebound.

It is an important object of this invention to provide means for braking an overhead garage door when in nearly fully opened overhead position.

It is an ancillary object of this invention to provide overhead garage door braking structure which is adjustable to vary the braking effect.

Other and further objects and advantages of the present invention will be apparent from the following description when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a fragmentary longitudinal sectional view showing a garage door and associated mounting structure in a garage;

Fig. 2 shows one end of a spring and spring mounting structure in one position;

Fig. 3 is a view similar to Fig. 2 showing the spring and mounting structure in different relative positions;

Fig. 4 is a perspective view of the spring anchor member;

Fig. 5 is a fragmentary view showing part of the spring mounting and tension altering structure;

Fig. 6 is a fragmentary perspective view showing the door braking mechanism;

Fig. 7 is an end view of the track mounting structure showing the brake adjusting track; and

Fig. 8 is a fragmentary top view showing the door braking structure.

Generally, my door braking structure includes a brake plate mounted on each of the two door carrying tracks adjacent the ends of the tracks where the brake plate

will frictionally engage the upper edges of the door as the door approaches fully opened position. Structure is provided for varying the spacing between the two brake plates so that doors which vary somewhat in width can be accommodated and so that more or less braking force can be applied by causing the brake plates to bear against the edges of the door with greater or less force as is required.

A pair of counterbalancing springs is used with one end of each spring secured by means of a member threaded into the end of the spring. The distance that the member is threaded into the spring determines the effective length of the spring and hence the spring rate per inch of the spring or amount of weight required to stretch the spring per inch. By threading the member different distances into the spring the tension in door closed position may be altered while the tension in door opened position may be maintained substantially constant by a conventional connection at the other end of the spring to vary the degree which the spring is stretched in door opened position without altering the effective length of the spring.

A garage door construction is shown generally in Fig. 1 and comprises a door jamb **10** and a hinged sectional overhead opening door **12** of the usual type. The door is mounted by means of rollers **13** fitting in a substantially channel shaped track **14** having substantially vertical and substantially horizontal sections **16** and **18**, respectively, connected by a curved section **20**. As will be noted, the lower portion of the substantially vertical section of the track is mounted closer to the door jamb **10** than is the upper portion and the rollers **13** are spaced at correspondingly varying distances from the door **12** with the lower rollers being closest and the upper rollers being farthest from the door in order that the door may be wedged against the jamb as it is closed. The tracks **18** are supported at their rear extremities by means of a cross angle **22** and a plurality of straps or hangers **24** secured to any suitable cross member **26** such as a rafter of the garage. The tracks **14** are supported adjacent the curved sections **20** by means of a bracket **28** bolted or otherwise secured to the tracks and suitably secured to the door jamb or garage frame. The lower substantially vertical portions of the tracks are supported from the door jamb or garage frame in any desirable manner.

A counterbalancing helical spring **30** is secured on each side of the door and each spring is secured at its rear end by means of an anchor member **32** (Figs. 2, 3 and 4). Each anchor member **32** is secured to the horizontal flange of the cross angle **22** by means such as a bolt and nut **34**. Each anchor member **32** comprises a substantially flat bar apertured on one end for mounting on the cross angle **22** and provided at its opposite end with a section having scalloped or toothed edges. The scallops comprise half round grooves arranged substantially as a section of a helix so that the anchor member **32** may be threaded into the helical counterbalancing spring **30**. Each tooth is blunt at its outer edge in order to spread the coils of the helical spring slightly and this along with the constriction of the coils upon stretching the spring insure that the spring will tightly grip the anchor member.

The opposite end of each spring **30** has a sheave or pulley **38** secured to it in any suitable manner. A cable **40** passes over each pulley or sheave **38** and over a second pulley or sheave **42** and extends to the lower edge of the door **12**. Each cable **40** is suitably secured to a chain **44** having one link looped over a hook **46** mounted in the door jamb **10**.

To adjust each spring **30** to compensate for differences in door weight and in spring strength, the anchor member **32** is threaded into the spring **30** a greater or lesser distance to change its effective length in order to alter the spring rate per inch and hence the tension in stretched position when the door is in closed position. As is shown in Fig. 2, the anchor member **32** is threaded just into the end of spring **30** and the full length of the spring is active. In Fig. 3 the anchor member **32** has been threaded farther into the spring **30** so that the coils to the right of the toothed section of the anchor member are inactive, and the effective length of the spring has been

reduced with a consequent increase in the spring rate per inch. Due to the shorter active length of the spring a greater force is needed to stretch the spring a given distance and hence a heavier door may be counterbalanced. Besides shortening the effective length of the spring as a consequence of threading the anchor member 32 farther into the spring, the spring is stretched a slightly greater distance when the door is in overhead position. To compensate for this, the chain 44 is moved from the hook 46 and a link more remotely disposed from the left end of the spring 30 is looped over the hook 46. By adjusting both the distance the anchor member is threaded into the spring and by changing the link of the chain looped over the hook 46, the tension of the spring may be increased when the door is in closed position without materially altering the tension of the spring when the door is in overhead opened position.

The brake structure is shown in detail in Figs. 6–8. A brake plate 48 is secured to each horizontal section on track 18 adjacent the rear end thereof to engage each lateral edge of the door near the top of the door. Each brake plate comprises a depending portion 50 riveted, bolted or otherwise suitably secured to the outer face of the track 18. An offset portion 52 supports a friction plate section 54 having frictional braking surfaces and provided with bevelled or bent ends, 56. The friction plate section 54 may be faced with friction material if desired, although it has been found that a plain steel plate is satisfactory. A wear strip 58 is applied to each upper corner of the door particularly along each lateral edge to provide braking surfaces to engage the friction plate sections 54. As the door approaches fully opened position as shown in Figs. 6–8 the wear strip 58 encounters the friction sections 54 of each brake plate 48 and the door is frictionally brought to a stop. The bevelled ends 56 of the friction section act to center the door between the friction sections 54 and if the friction sections 54 are slightly twisted or canted as shown in Fig. 8, the door is wedged between the brakes. The wedging action increases with the distance the door moves between the brakes so that the spreading force is increased the farther the door moves.

It is not necessary to twist the friction sections 54 as shown in Fig. 8 as the braking force due to friction also increases with increasing surface area of contact. The friction sections may have their top edges tipped toward each other slightly to increase the braking action. The brakeplates will not bend, but the tracks are sufficiently resilient to twist slightly so that the brake friction surfaces may engage the wear strips evenly. By stopping the door with increasing brake action a smooth stop is insured without shocks.

As set forth previously in rather general terms, the rear ends of the tracks 18 are supported from a cross angle 22. The vertical flange of the cross angle acts as a positive stop to limit the rearward movement of the door and is provided with a plurality of apertures 60 adjacent each end so that supporting straps 24 may be attached at any convenient location. The straps 24 are perforated to receive bolts 62 in any of a plurality of positions so that the height of the cross angle 22 may be determined readily. One of the tracks 14, which is the right one, as shown in Fig. 7 is secured to the horizontal flange of the cross angle 22 by means of an L-shaped bracket 64 riveted or otherwise secured to the vertical face of the track. The bolt 66 passes through the upper face of the track, through the bracket 64 and through an aperture in the horizontal flange of the cross angle 22 and is secured in position by a nut threaded thereon. The other horizontal track section 18 is adjustably secured in position by means of a substantially U-shaped bracket 68 having horizontal and vertical flanges 70 and 72 lying in contact with the horizontal and vertical faces of the track section 18. The bracket may be secured to the track by means of a rivet or other suitable securing means while a bolt 74 passes through the track and the horizontal bracket flange 70 and through an elongated aperture in the horizontal flange of the cross angle 22. The bolt 74 is held in place by a nut 76 threaded on the upper end thereof. Due to the elongated aperture in the horizontal flange of the cross angle 22 the track 14 can be adjusted transversely to cause the brakes to engage the door with practically any desired force. The substantially U-shaped bracket 68 is provided with a depending flange 78 having an aperture through which a substantially J-shaped bolt 80 is fitted. The hook or bight portion of the bolt engages an aperture 82 in the horizontal flange of the cross angle 22 and a nut 84 threaded on the other end of the bolt pulls the bracket 68 and associated bracket 14 toward the aperture 82. If both tracks were mounted similarly to the right one by a bolt placed through a circular aperture in the horizontal flange of the cross angle 22, it would be impossible to adjust the spacing between the tracks to adjust the braking action. If an elongated slot were used alone in the horizontal flange of the cross angle 22 the tracks would gradually spread and the braking action would fail. The J-shaped bolt prevents such spreading and allows the left track to be pulled in so that any desired force can be exerted by the brakes on the door.

In the usual overhead door construction, the free or inner end of each track is rigidly supported so that the tracks cannot move relative to the garage or to each other. Due to the cross angle 22 the tracks as herein disclosed are not free to move relative to one another, but the mounting of the cross angle by the single straps 24 is sufficiently flexible to allow the tracks to shift as a unit. If the door is somewhat off center due to warping of the door or other factors it will strike one of the brakes 48 ahead of the other. The beveled edges 56 will supply a centralizing force between the tracks and the door, and the tracks, having less inertia than the door, will shift to a central position about the door to prevent any damage to the door or tracks.

It is apparent that an overhead door construction has been presented which eliminates overshooting and rebounding of the door. Simple and effective structure for braking the door when in nearly opened position has been disclosed and structure has been disclosed by means of which the braking action may be varied as desired.

Although a specific example has been shown and described it is apparent that this is for illustrative purposes only, and that my invention comprehends all that which may fall fairly within the spirit and scope of the appended claims.

I claim:

1. In a shiftable door construction, a door shiftable between closed and open positions, a plurality of substantially parallel tracks for guiding said door between said positions, and a pair of rigid members rigidly fixed on said tracks and providing frictional surfaces at opposite sides of said door when in one of said positions frictionally to engage opposite surfaces of said door to arrest said door in said position.

2. A door construction as set forth in claim 1 in which the rigid members providing the frictional surfaces are canted relative to adjacent edge surfaces of said door whereby to wedge said door between said pair of rigid surfaces and to centralize said door.

3. In a shiftable door construction, a door shiftable between closed and opened positions, a plurality of tracks for guiding said door between said positions, means providing a pair of surfaces mounted on opposite sides of said door and adjacent the rear inner ends of said tracks to frictionally engage opposite surfaces of said door to brake said door in that position, and means for adjusting the spacing between said surfaces to adjust the braking action exerted thereby.

4. In an overhead door construction, a door shiftable between lowered closed position and overhead opened position, a plurality of tracks for guiding said door between said positions, means for supporting said tracks in adjustable relation, a plate carried by each track and frictionally engageable with opposite edges of said door when in one of said positions, and means for adjusting the spacing between said tracks to vary the braking force exerted by said plates.

5. In an overhead door construction, a door shiftable between closed lowered position and overhead opened position, a plurality of tracks for guiding said door between said positions, means for supporting said tracks, a plate on each track frictionally engaging opposite edges of said door in one of said positions and means for adjusting the spacing between said tracks to vary the braking effect of said plates, said last named means including a bar supporting one of said tracks and having spaced apertures therein at least one of which is elongated, a connection from said track extending through said elongated aperture to support said track, a substantially J-shaped bolt extending substantially from said track

through another of said apertures, and a nut on the end of said substantially J-shaped bolt to force said track towards said latter aperture.

6. In an overhead door construction, a door shiftable between closed position and opened overhead position, a pair of tracks for guiding said door from closed to opened overhead position, a brake plate carried by each track adjacent the rear end thereof and frictionally engageable with opposite edges of said door as said door approaches opened overhead position, a rigid member interconnecting the rear ends of said tracks, and means for adjusting the position of at least one of said tracks on said rigid member to vary the spacing between said tracks and thus to vary the braking effect of said brake plates on said door.

7. In an overhead door construction, a door shiftable between closed and opened overhead positions, a pair of tracks for guiding said door from closed to opened overhead position, rigid means interconnecting the rear ends of said tracks, means for flexibly supporting the rear ends of said tracks, and cooperating camming means carried by said door and by said tracks near the rear ends thereof to apply a contralizing force between said tracks and said door as said door approaches opened overhead position to centralize the door and the tracks relative to one another, the flexibly supported rear ends of the tracks shifting transversely to effect such centralizing.

8. In an overhead door construction, a door shiftable between closed and opened overhead positions, a plurality

of substantially flexible tracks for guiding said door between said positions, a pair of rigid brake plates rigidly connected to the tracks, one brake plate being on each track, surfaces on opposite edges of said door being adapted to engage said brake plates when said door approaches one of said positions, and rigid means connecting the rear ends of said tracks to maintain substantially constant spacing between said tracks while allowing the tracks to flex as the rigid brake plates engage the opposite edges of said door.

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