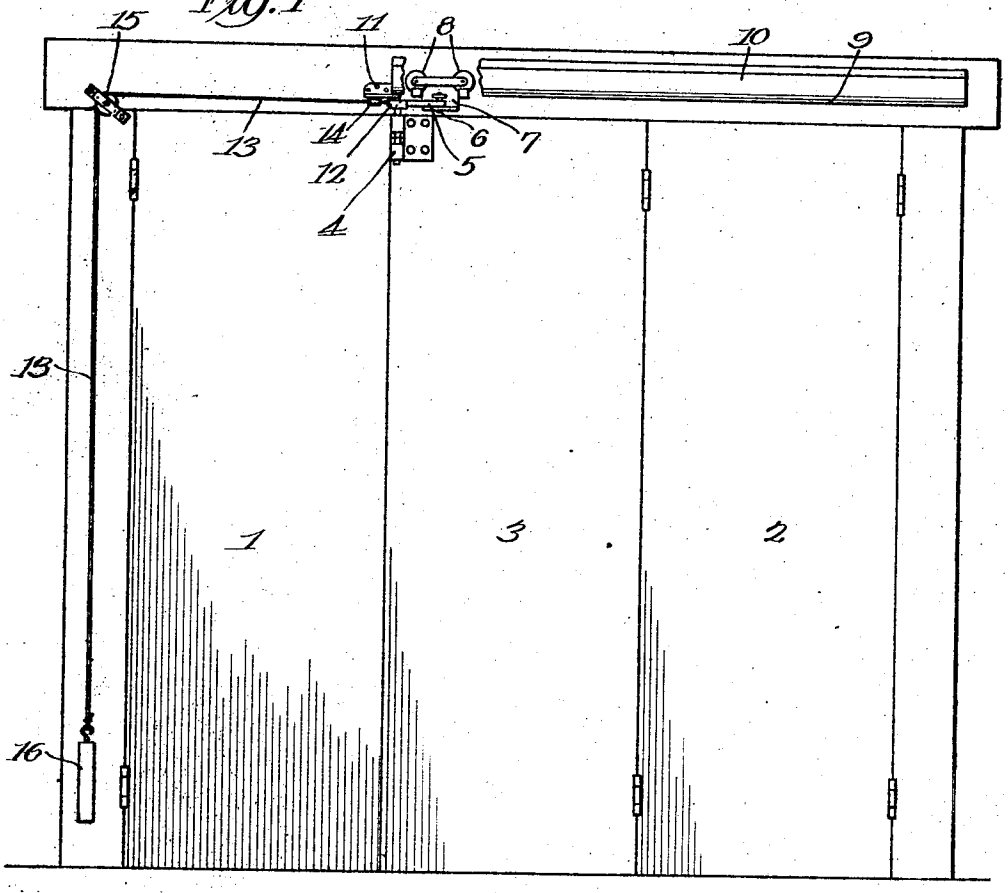
May 3, 1927. L. C. THORNE 1,626,764

FOLDING DOOR

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Fig. 1



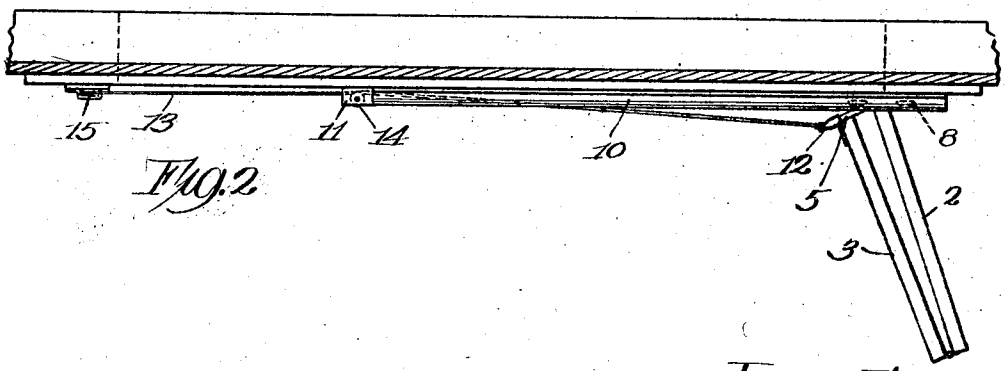


Fig. 2

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Fig. 3

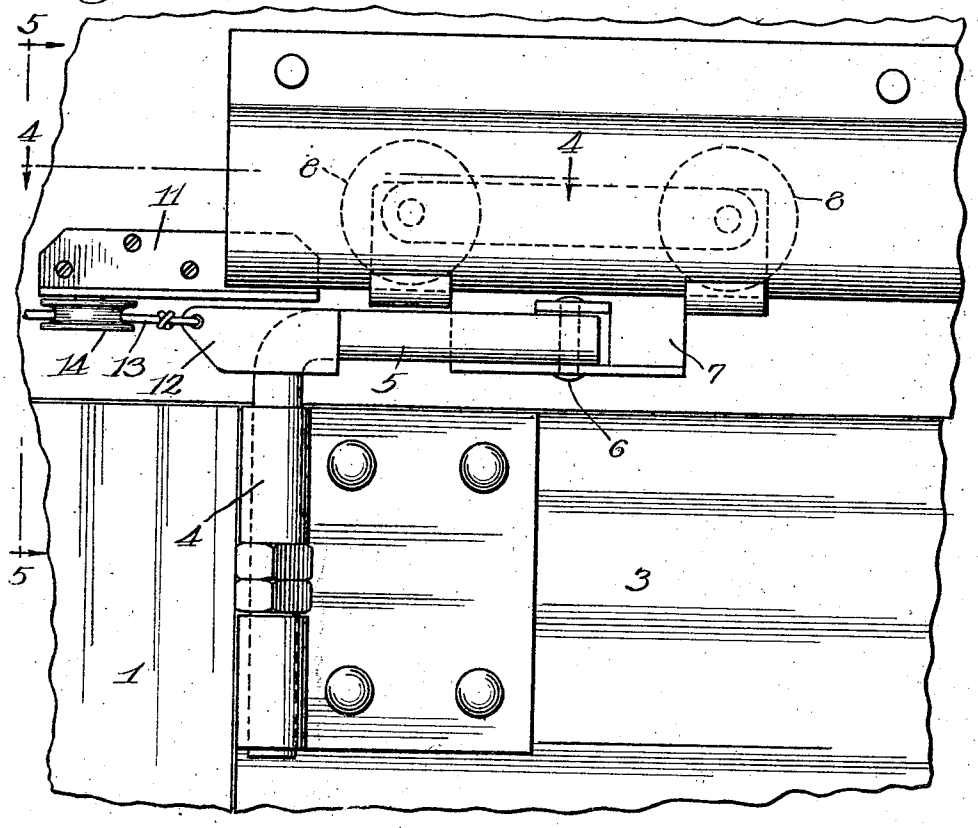


Fig. 4

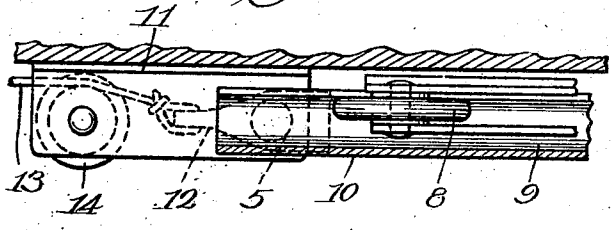
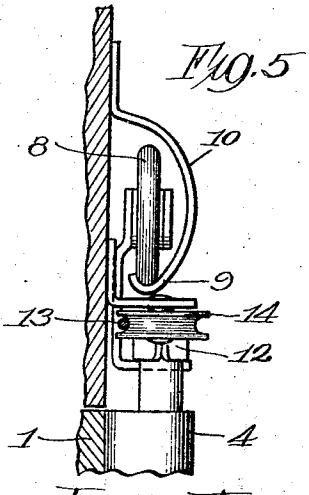


Fig. 5



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Patented May 3, 1927. 1,626,764

UNITED STATES PATENT OFFICE.

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FOLDING DOOR.

Application filed April 8, 1925. Serial No. 21,455.

This invention relates to swinging and folding doors, and more particularly to those employed on garages and similar buildings, such as those that involve a plurality of door sections hinged together, with one section hinged at the side of the doorway, so that the sections can fold together and swing back at one side of the doorway, when it is desired to open the door, whereby the sections may then unfold and be brought into the same vertical plane, which is the plane of the doorway, when it is desired to close the door.

Generally stated, therefore, the object of the invention is to provide a novel and improved arrangement for insuring a self-closing movement of the swinging and folding door, when it is released from its open position, and for causing the door to be fully closed and brought into its ultimate closed position with greater certainty than heretofore.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of a self-closing, swinging and folding door construction and arrangement of this particular character.

To the foregoing and other useful ends, the invention consists in the matters hereinafter set forth and claimed, and shown in the accompanying drawings, in which—

Fig. 1 is an inside elevation of a swinging and folding door construction involving the principles of the invention, showing the door in closed position.

Fig. 2 is a horizontal section taken just above the doorway, showing the swinging and folding door in open position.

Fig. 3 is an enlarged front elevation of the door hanger and adjacent parts employed on said door.

Fig. 4 is a detail, horizontal section on line 4—4 in Fig. 3.

Fig. 5 is a vertical section on line 5—5 in Fig. 3.

As thus illustrated, the left-hand door section 1 may be hinged to the left-hand side of the doorway in any suitable or desired manner. The right-hand section 2 is hinged in any suitable or desired manner on the right-hand side of the door frame, while the intermediate or third door section 3 is suitably hinged to the edge of the section 2, whereby the sections 2 and 3 constitute a swinging and folding door. All three sections are adapted to be brought into alignment and into the vertical plane of the doorway when it is desired to close the entire door structure. The section 1 may be opened inwardly and swung around to the left, and the sections 2 and 3 can be opened and folded together and swung around to the right, as indicated in Fig. 2 of the drawings.

For this purpose, therefore, the door section 3 is provided with a vertical swivel 4 for the horizontally disposed arm 5, which latter is in turn provided at its end with a vertical swivel or pivot 6 on the hanger body 7, which latter may be of any suitable character. Said hanger body is preferably provided with wheels 8 that travel in the track 9, which is integral with the housing 10, which is suitably secured to the inside of the building directly over the doorway. Thus the hanger is a double swivel affair, so to speak, having two vertical axes, whereby the sections 2 and 3 may be opened and folded together and swung around parallel with each other, and parallel to the track, at the right-hand side of the doorway, if such is necessary or desirable. A stop piece 11, of any suitable or desired character, but preferably in the form of a section of angle iron, is fastened to the door frame in position to engage the hanger body, should the arm 5 be swung far enough to the right of the pivot 6, and thus limit the motion of the hanger to the left in closing the door sections.

The self-closing arrangement for the doors comprises a clamp 12 of any suitable character, clamped upon the elbow of the swivel arm 5, and having a cord or other flexible connection 13 secured thereto. A pulley or sheave 14 is mounted on the under side of the stop piece 11, to rotate about a vertical axis, and engages the said cord or other flexible connection. A pulley or sheave 15 is suitably mounted on the door frame to rotate about a horizontal axis, at the left-hand side of the doorway, and the cord or other flexible connection 13 is supported on this pulley or sheave. The depending portion of the cord or flexible connection is provided with a weight 16, and the gravitation of this weight will pull the door into closed position.

Thus when the door is opened the weight 16 is raised, and the sections 2 and 3 may be

held in open position by any suitable or desired means (not shown), door catches for this purpose being common and well known. When the door sections 2 and 3 are released from their open position, the weight 16 acts through the cord or flexible connection 13 upon the elbow of the swivel arm 5 in a manner tending to swing this arm around into parallel relation to the track upon which the wheeled hanger travels, and thereby pulls the sections 2 and 3 to the left, and finally into alignment in the vertical plane of the doorway. Thus the folding door is self-closing, and in addition the left-hand edge of the section 3 is certain to finally arrive in exactly the right position, inasmuch as the pulley 14 is so located, it will be seen, that the final pull of the weight 16, when the folding door is fully closed, tends to keep the section 3 crowded outwardly against the jamb of the door frame, so that the left-hand edge of the section 3 will be exactly in line with the right-hand edge of the section 1 when the latter is also closed. Some difficulty has heretofore been experienced with swinging and folding doors of this kind, because of the inclination of the left-hand edge of the section 3 to remain open a little, being supported by the horizontally swinging arm 5 previously mentioned. However, with the arrangement shown and described, which is illustrative of one form of the invention, the closing movement of the section 3 is insured and is certain to be completed, as the weight 16 will not only unfold the sections 2 and 3 and bring them into closed position, but will also exert a pull outwardly on the elbow portion of the arm 5 (as shown in Fig. 4, the cord or flexible connection 13 pulls on the clamp 12 in a direction to force the section 3 outwardly against the door jamb) in such a manner that the tight closing of the door will be insured.

Of course, the body of the hanger 7 provides a stop at each side of the pivot 6, to limit the swinging movement of the arm 5 in either direction, so that this arm will be parallel with the track when in either extreme position thereof. Thus, when the door is in closed position, the pull of the weight 16 is exerted on the arm 5 in a manner to keep it against the stop formed by the hanger body, and this prevents further outward movement of the door section 3, regardless of whether a door jamb is used or not. It will be understood, furthermore, that the lower end of the section 3 can be provided with floor bolts (not shown) of any suitable character, thereby to hold the door firmly in closed position. The door sections all swing inwardly, and the section 1 is adapted to be opened first, from the outside, and is equipped with any suitable locking means (not shown) for locking it in closed position, and at such time the three sections 1, 2 and 3 are all in the same vertical plane. The hanger, it will be seen, is reversible and can be used on either a right or left door. The self-closing arrangement, when the hanger is used as shown, for a folding door that swings open to the right, will keep the arm 5 from swinging around to the right against the stop on the hanger body at the right of the pivot 6, as this is not necessary in opening the door, and the constant tendency will be for the arm 5 to swing to the left towards the left-hand end of the hanger body, and this is what happens when the folding door is released from its open position.

With the pull constantly exerted on the arm 5 by the weight, the arm is not as likely to swing around to the right of the pivot 6, and the hanger body is not likely to engage the stop 11, which latter is in position to keep the hanger from running off the end of the track. Thus it is impossible for the door to close finally with the arm 5 extending to the right of the pivot 6, even though the arm may do this while the door is open or partially closed.

Thus it will be seen that the flexible connection 13 extends between a fixed point on the door way, such as the sheave 14, and the arm 5, but this connection is movable and it permits opening and closing of the door in the manner described.

Without disclaiming anything, and without prejudice to any novelty disclosed, what I claim as my invention is:

1. The combination of door sections hinged together to fold back at one side of the doorway, one section being hinged at the said one side of the doorway, a double swivel hanger to support another section of the folding door thus provided, a flexible connection extending to said hanger, having one end attached thereto, and adapted to control said double swivel, to close the folding door, and means for exerting a pull on the other end of said flexible connection, whereby the folding door is pulled from its open position into its closed position.

2. A structure as specified in claim 1, comprising a stationary pulley engaging said flexible connection to cause the latter to pull the door outwardly into closed position.

3. A structure as specified in claim 1, said hanger having a horizontally swinging arm provided with a vertical swivel mounting at each end thereof, one said mounting on the door and the other on the traveling hanger, and said flexible connection being connected to the elbow portion of said arm.

4. A structure as specified in claim 1, said hanger having a horizontally swinging arm, a stop piece for limiting the motion of the hanger in closing the door, said flexible connection being connected to said arm, and a

pulley on said stop piece to engage said flexible connection, disposed in position to cause the flexible connection to pull the door outwardly into closed position.

5. A structure as specified in claim 1, said flexible connection extending above the doorway and then downwardly at the other side thereof, together with a plurality of stationary pulleys for engaging said flexible connection, and means for exerting a pull on said flexible connection, comprising a weight for the lower end thereof, adapted to gravitate and thereby pull the folding door into closed position, one of said pulleys being disposed in position to cause outward movement of the door into the exact closed position thereof.

6. A track over a doorway, a hanger to travel on said track, an arm provided on said hanger to swing horizontally, a closed door for said doorway, a pivotal connection between said door and said arm, and a movable connection between said arm and a fixed point on the doorway, adapted by movement to permit opening of the door.

7. A swinging and folding door comprising a plurality of hinge connected sections, a track over the doorway, a wheeled hanger body supported to travel on said track, an arm pivoted at one end on said body to swing horizontally, a swivel connection between the other end of said arm and one section of the door, stationary supporting means on the doorway, and movable means to connect said supporting means with said arm.

Specification signed this 31st day of March, 1925.

LAWRENCE C. THORNE.