

March 14, 1939.

W. D. FERRIS ET AL

2,150,321

OVERHEAD DOOR

Filed Aug. 11, 1937

2 Sheets-Sheet 1

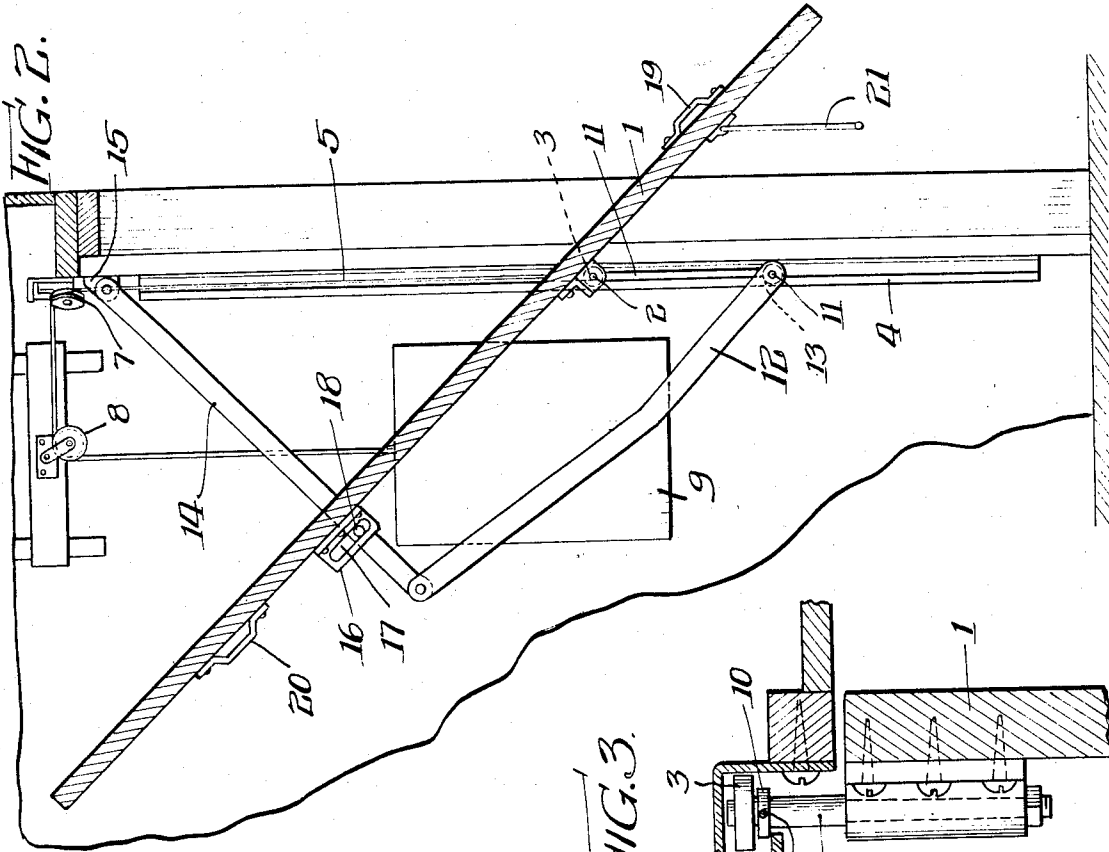
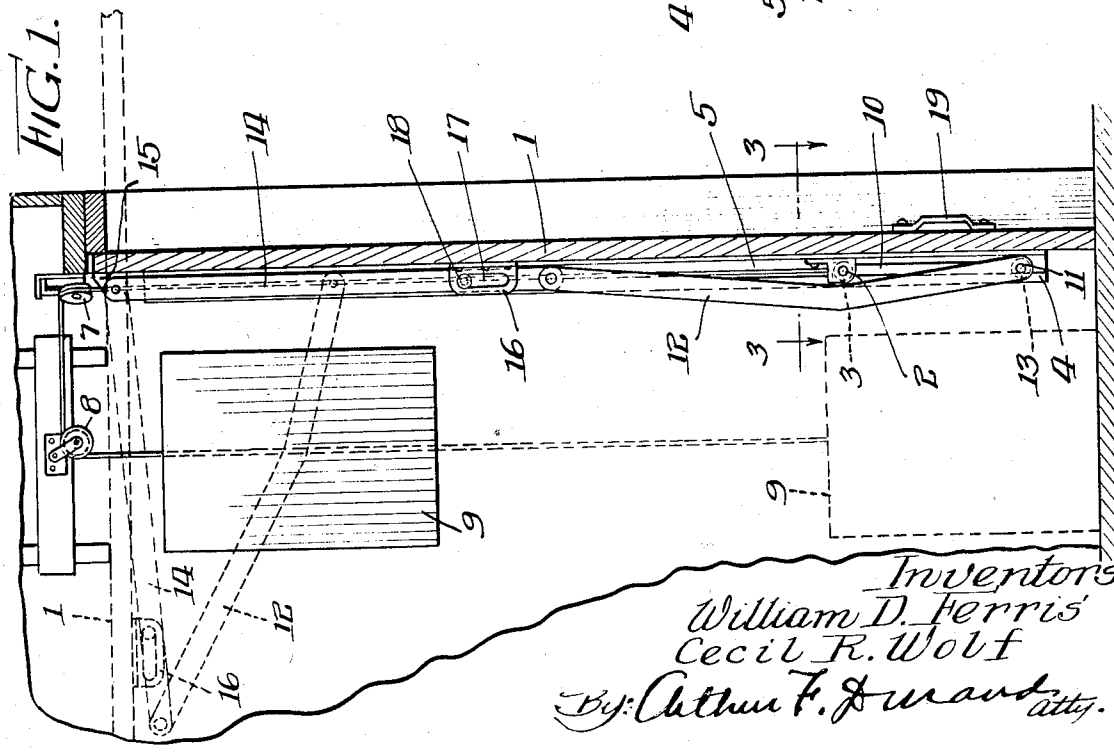
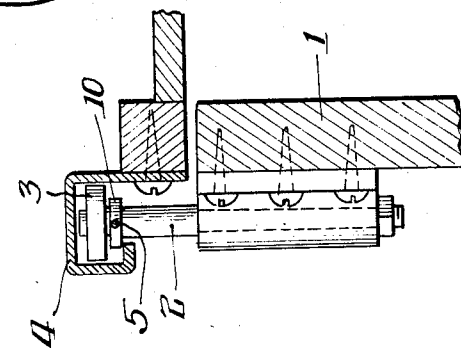


FIG. 3.



Inventors
William D. Ferris
Cecil R. Wolf
By: Arthur F. Durand atty.

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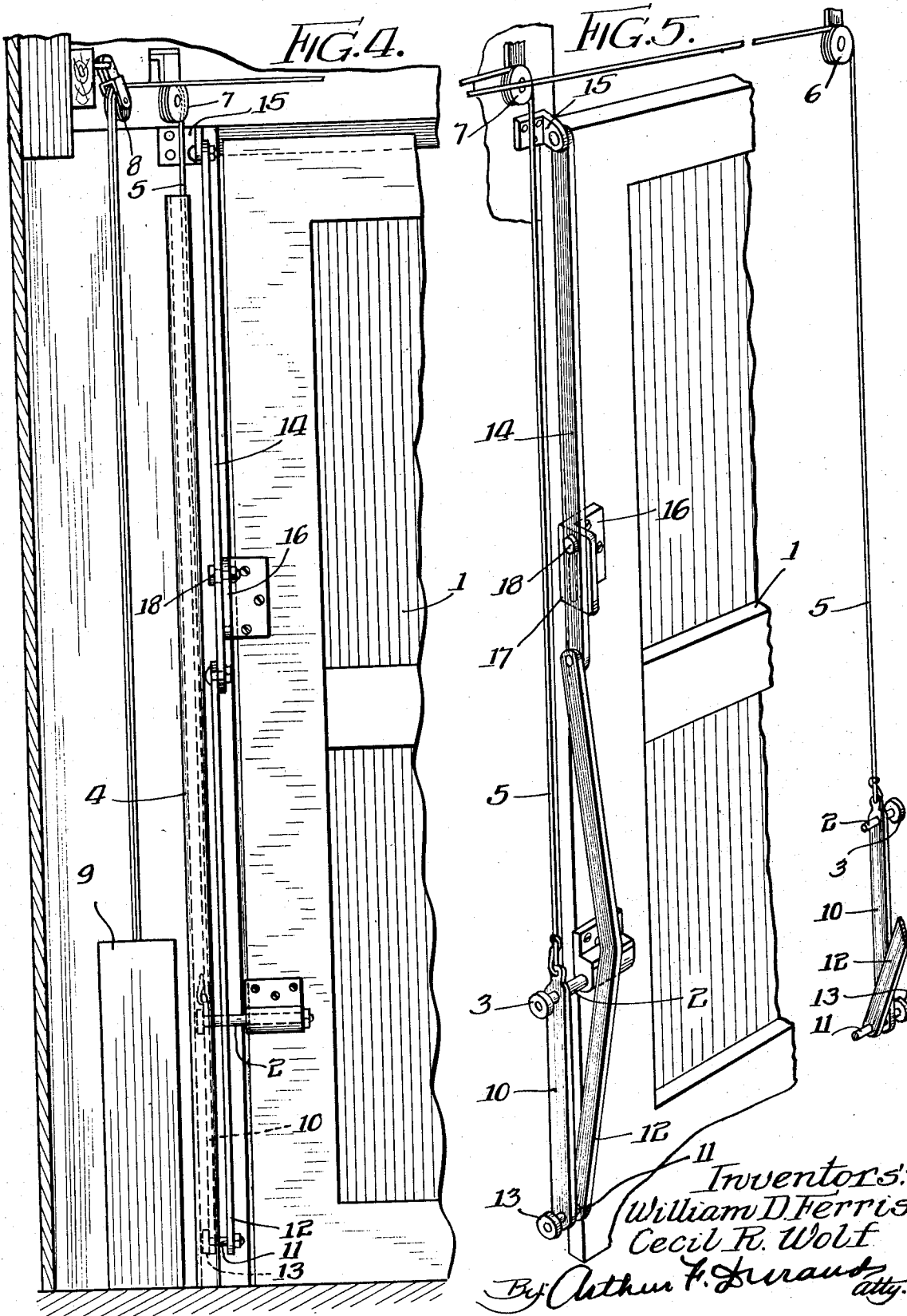
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Filed Aug. 11, 1937

2 Sheets-Sheet 2



Inventors:
William D. Ferris
Cecil R. Wolf
By Arthur F. Duvald atty.

UNITED STATES PATENT OFFICE

2,150,321

OVERHEAD DOOR

William D. Ferris, Sterling, and Cecil R. Wolf,
Rock Falls, Ill., assignors to Frantz Manufacturing Co., Sterling, Ill., a corporation of Illinois

Application August 11, 1937, Serial No. 158,550

15 Claims. (Cl. 20—19)

This invention relates to garage doors, and more particularly to those that involve only a single rigid section, together with means whereby the latter is movable upwardly into a horizontal overhead position when the door is open.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby an overhead door of this type is movably mounted in a manner that obviates the necessity of using horizontal overhead tracks for supporting the door, and whereby certain other advantages are obtained, as will hereinafter more fully appear.

It is also an object to provide certain details and features of construction tending to increase the general efficiency and desirability of an overhead garage door construction of this particular character.

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

Fig. 1 is a vertical section of a garage door construction embodying the principles of the invention.

Fig. 2 is a similar view, showing the door partially open.

Fig. 3 is an enlarged detail horizontal section on line 3—3 in Fig. 1 of the drawings.

Fig. 4 is an enlarged inside or rear elevation of a portion of said door construction.

Fig. 5 is a fragmentary perspective view of certain portions of said construction.

As thus illustrated, the invention comprises a door comprising a single rigid section 1, provided at its opposite side edges with studs 2, provided at their ends with wheels or rollers 3, that travel in the vertical tracks 4, arranged at the opposite sides of the doorway. The door is suspended on cords or flexible members 5 that are connected to said studs 2, and which extend upwardly and over sheaves 6, 7 and 8, and then downwardly to the weight 9 at one side of the doorway.

Each stud 2 has a link 10 extending downwardly therefrom, and the lower ends of these links are connected by pins 11 with the lever arms 12, and the pins 11 are provided with wheels or rollers 13 that travel in the vertical guides 4, previously mentioned. The lever arms 12 have their upper ends pivotally connected with the lever arms 14, and the latter have their upper ends pivoted on the stationary brackets 15 at the top of the doorway. Bracket plates 16 are provided on the back of the door, these plates each having a slot 17 for a pin 18 on the adjacent lever arm 14, so that each arm 14 has some lost motion connection with the door.

In use, to open the door, all that is necessary is to grasp a handle 19 on the outside of the door,

near its lower edge, and pull the door outwardly in the manner indicated in Fig. 2 of the drawings, and the weight 9 will then assist in raising the door into the horizontal position shown in dotted lines in Fig. 1 of the drawings. The door can be opened from the inside by using the handle 20, fastened to the back of the door. The door can be closed by pulling down on the depending rod or cord 21, fastened at the back of the door near the lower edge thereof.

In this way, by using the construction shown and described, no overhead horizontal tracks are necessary for supporting the door. By supporting the door, on the vertical links 10, which latter have upper and lower wheels or rollers that engage the vertical tracks 4, the operation of the door is steady and accurate, and the door is caused to open and close in an easy and satisfactory manner, and the predetermined movements thereof are rendered accurate and certain. In addition, it will be seen that no portion of the link and lever arm pivotal mounting is above the plane of the door when the latter is in its horizontal or open position. Again, the pull of the weight 9 is exerted not only at the points where the studs 2 are mounted on the door, but also through the lever arms 12 and 14 to the points where the brackets 16 are fastened to the door, so that the weight not only acts directly, but also indirectly through leverage on the door. It will be understood, of course, that the said weight also acts to cushion the downward or closing movement of the door, the said weight being such that it is not quite heavy enough to, in itself, pull the door into the overhead or open position thereof. But the weight is such that it is easy to open and close the door by hand.

Thus with the construction shown and described, which is illustrative of the invention, the portion of the door above the axis 2 may tilt inwardly through the doorway, while said axis is rising, so that the top of the door extends a distance inside the building when in overhead open position, it being observed that the said axis about which the door tilts is fixed on the door itself, but is movable up and down in the vertical plane of the vertical tracks 4 provided at opposite sides of the doorway.

What we claim as our invention is:

1. In a garage door construction, vertical guides at the opposite sides of the door, a single rigid section forming a movable door between said guides, and means for tilting and raising said door into an overhead open position, comprising vertical links having their upper and lower ends provided with means for engaging said guides, and door-supporting means pivoted on the lower end of each link.

2. A structure as specified in claim 1, the door-supporting means comprising arms having their

upper ends pivotally connected with other arms that in turn have their upper ends pivoted at stationary points adjacent the top of the doorway, and movable means on which the lower ends of said first mentioned arms are pivoted.

3. A structure as specified in claim 1, comprising pulling means, and flexible connections extending from said pulling means over sheaves and then down to the upper ends of said links.

4. A structure as specified in claim 1, comprising a lost motion slot and pin connection between said door and the said door-supporting means.

5. A structure as specified in claim 1, said door being pivotally mounted to tilt on the upper ends of said links.

6. In a garage door, a single rigid section forming a movable door, vertical tracks at the opposite sides of the doorway, means on the door for engaging said tracks, providing in effect a horizontal axis about which the door may tilt, pulling means, flexible members leading from said pulling means, and connecting means including a leverage system for connecting said flexible members to the door, operative to support the door horizontally in an overhead open position, said pulling means being operative to assist in the opening movement of the door, and to in effect cushion the downward or closing movement thereof, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system.

7. In a garage door, a single rigid section forming a movable door, vertical tracks at the opposite sides of the doorway, means on the door for engaging said tracks, providing in effect a horizontal axis about which the door may tilt, pulling means, flexible members leading from said pulling means, and connecting means including a leverage system for connecting said flexible members to the door, operative to support the door horizontally in an overhead open position, said pulling means being operative to assist in the opening movement of the door, and to in effect cushion the downward or closing movement thereof, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system, and the upper end of each arm being pivoted to the distal end of a lever arm also forming part of said system.

8. In a garage door, a single rigid section forming a movable door, vertical tracks at the opposite sides of the doorway, means on the door for engaging said tracks, providing in effect a horizontal axis about which the door may tilt, pulling means, flexible members leading from said pulling means, and connecting means including a leverage system for connecting said flexible members to the door, operative to support the door horizontally in an overhead open position, said pulling means being operative to assist in the opening movement of the door, and to in effect cushion the downward or closing movement thereof, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system, and the upper

end of each arm being pivoted to the distal end of a lever arm also forming part of said system, together with a lost motion slot and pin connection between each lever arm and the door.

9. In a garage door structure, a single rigid section forming a movable door, vertical tracks at the opposite sides of the doorway, extending practically to the top of the latter, means on the door for engaging said tracks, in both the open and closed position of the door, and during all movement of the latter, providing in effect a horizontal axis fixed on the door and about which the latter may tilt inwardly at its top, while said axis is rising, pulling means, flexible members leading from said pulling means, and connecting means including a leverage system for connecting said flexible members to the door, always engaging said tracks below said axis, in all positions of the door, operative to support the latter horizontally in an overhead open position, with the top of the door extending a distance inside the building, said pulling means being operative to assist in the opening movement of the door, and to in effect cushion the downward or closing movement thereof.

10. A structure as specified in claim 9, said door having a pivotal and sliding connection at its side edges with said leverage system.

11. A structure as specified in claim 9, said system comprising upper and lower links connected at their ends to in effect form a pair of toggles, with the door pivoted on the upper member of each toggle.

12. A structure as specified in claim 9, comprising vertical links connecting the said axis to the lower ends of said system.

13. A structure as specified in claim 9, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system, said structure having three horizontal axes of motion adjacent the plane of said tracks, one of said axes being fixed, and two being movable up and down.

14. A structure as specified in claim 9, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system, and the upper end of each arm being pivoted to the distal end of a lever arm also forming part of said system, said structure having three horizontal axes of motion adjacent the plane of said tracks, one of said axes being fixed, and two being movable up and down.

15. A structure as specified in claim 9, said connecting means comprising vertical links provided at their upper ends with said means for engaging the tracks, and provided at their lower ends with additional means for engaging the tracks, the lower end of each link having pivoted thereon an arm forming part of said system, and the upper end of each arm being pivoted to the distal end of a lever arm also forming part of said system, together with a lost motion slot and pin connection between each lever arm and the door, said structure having three horizontal axes of motion adjacent the plane of said tracks, one of said axes being fixed, and two being movable up and down.

WILLIAM D. FERRIS.
CECIL R. WOLF.