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AWNING DOOR

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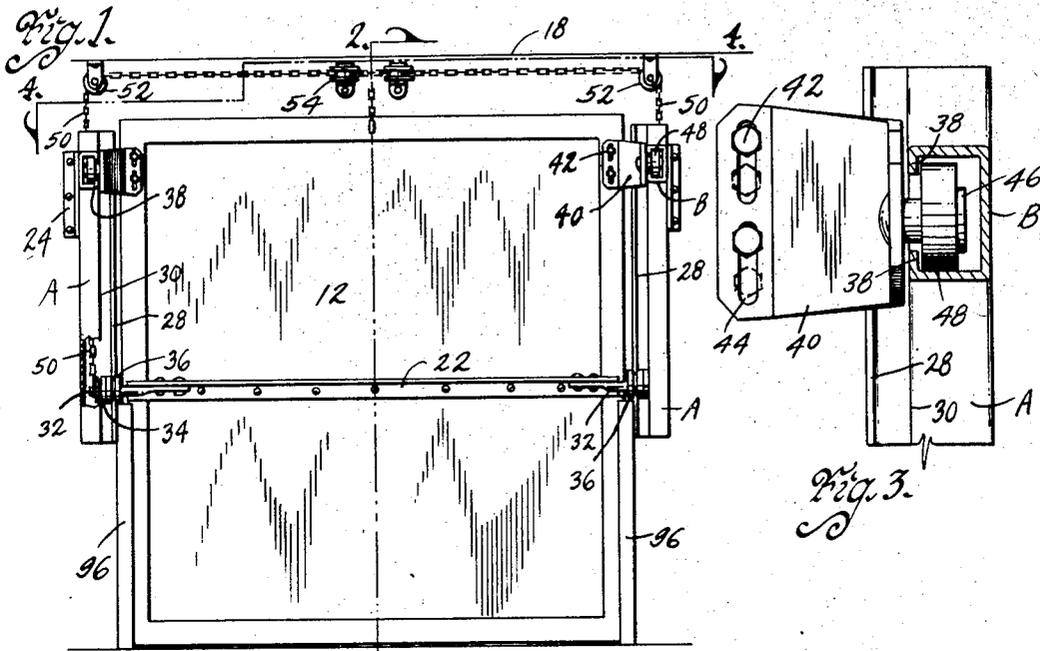
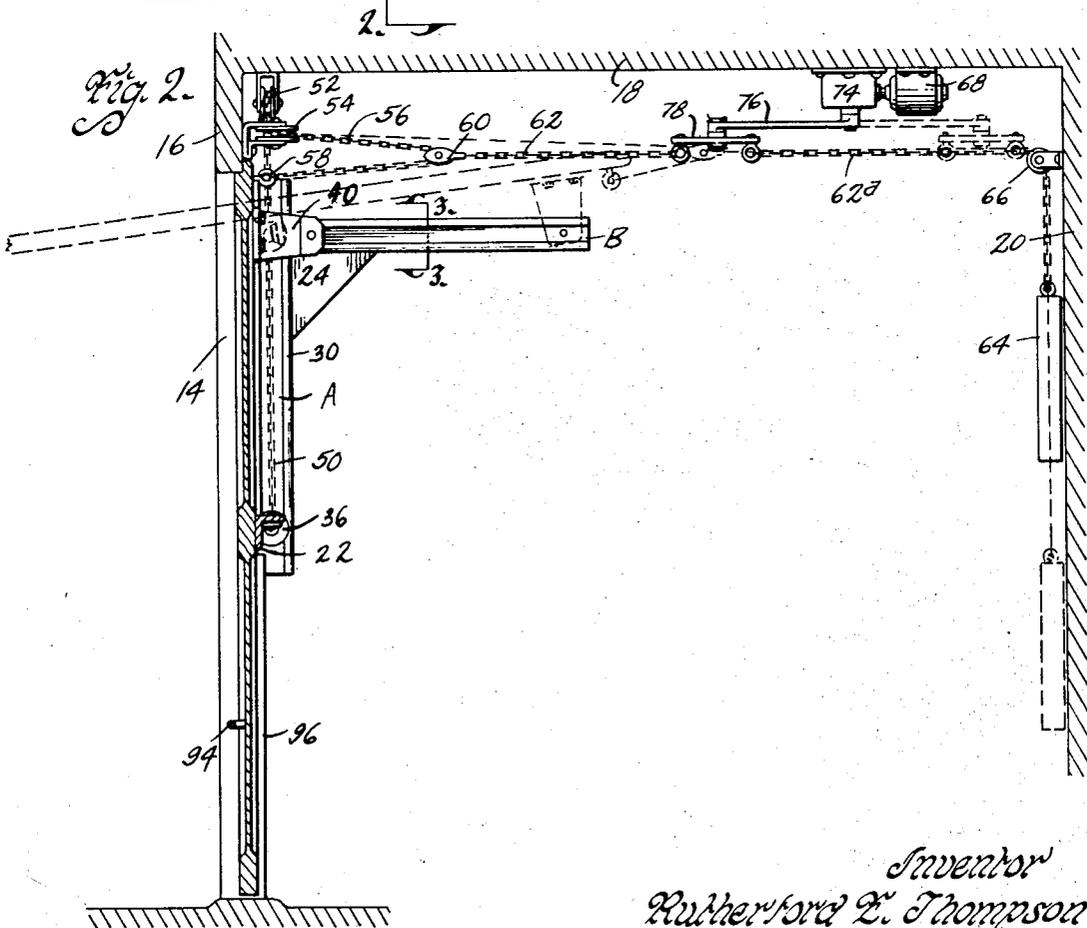


Fig. 3.



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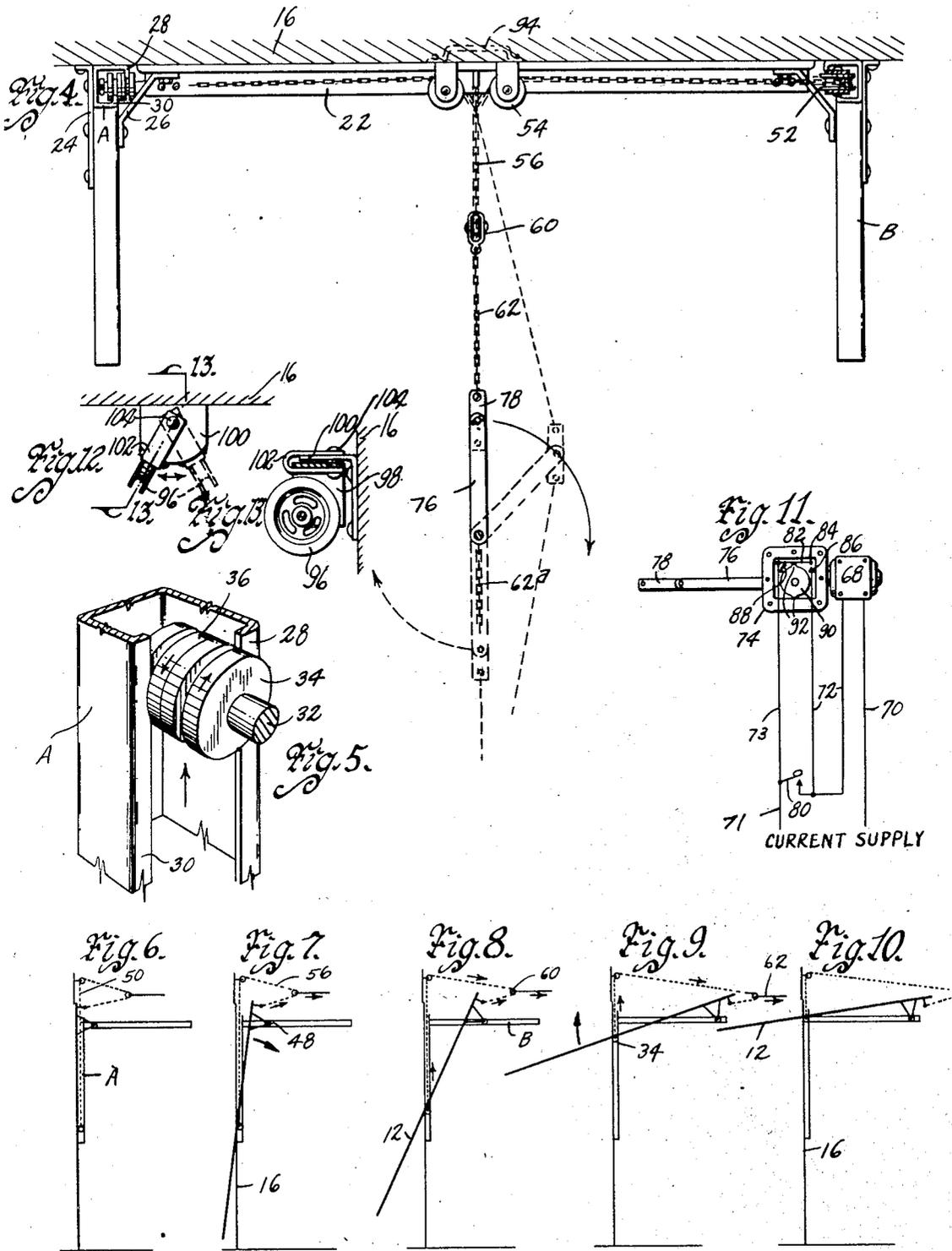
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# UNITED STATES PATENT OFFICE

1,980,303

## AWNING DOOR

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Application July 29, 1932, Serial No. 625,818

1 Claim. (Cl. 20—19)

The object of this invention is to provide an improved construction and method of mounting for a door for garages and the like, which door is movable from vertical closing position to a substantially horizontal position above the door opening, in which latter position it not only is entirely out of the way so far as obstructing space in and about the doorway is concerned, but it also serves as a protective canopy, a portion of the door projecting beyond and above the door opening.

A further object of the invention is to provide an improved door which moves upwardly and inwardly of the building to open position and which is suspended and counterbalanced in such manner that a minimum of force is needed for operation.

Still another object of the invention is to provide a door of the character set forth which embodies simplicity of construction and economy of cost and is also capable of being quickly and easily installed and is characterized by ease of operation and durability in use.

Another and further object of the invention is to provide a door of the kind set forth which is capable of being installed in locations where there is a minimum of space above the door opening as well as at the sides thereof.

A further object of the invention is to provide an upwardly moving door which is provided with novel and efficient guiding means.

Still another object is to provide an improved construction for a self-aligning pulley for the door chains.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:—

Figure 1 is an interior view showing my improved door in closed position.

Figure 2 is a vertical section on the line 2—2 of Figure 1, the dotted lines indicating the door in open position.

Figure 3 is a detail section on the line 3—3 of Figure 2, illustrating one of the horizontal guide tracks and also the means for adjusting a roller bracket to compensate for possible changes in the floor level of the door opening.

Figure 4 is a horizontal section on the line 4—4 of Figure 1 and illustrating various positions of a part of a mechanical door operating mechanism.

Figure 5 is a detail perspective of a portion of one of the vertical guide tracks and the rollers cooperating therewith.

Figures 6 to 10 inclusive are diagrammatic views illustrating various positions assumed by the door in traveling from closed to open position.

Figure 11 is a diagrammatic view illustrating the door operating mechanism, particularly with respect to the means for automatically stopping the motor at the end of each operation for moving the door either to or from open position.

Figures 12 and 13 are plan view and side elevation respectively of a self-aligning pulley which may be employed.

In the drawings I have employed the numeral 12 to designate the door proper and this door may be of any suitable dimensions and be employed for closing a door opening 14 in a wall 16 which may be part of a garage, factory, warehouse, barn or other building. For convenience in locating certain of the parts, the structure is also illustrated as having a ceiling 18 and a rear wall 20 opposed to the wall 16 in which the opening is formed.

A cross rail 22 is fixed to and extends transversely of the inner face of the door 12, approximately midway between its upper and lower margins, said cross rail extending entirely across the door and its length being governed by the width thereof.

At each side of the door opening 14 is fixed a vertical guide track A and a horizontal guide track B, the vertical tracks occupying positions extending throughout somewhat more than the upper one-half of the door opening and the horizontal tracks extending rearwardly or inwardly of the building from positions adjacent the upper ends of the vertical tracks. The vertical tracks A may be affixed vertically to the door jambs or frame members and the horizontal tracks B may be supported by means of brackets or braces 24 and 26.

Each of the vertical tracks A is of channel formation and has its opening directed inwardly toward the door opening 14. The side walls of the channel tracks A are of uneven width, that wall which is fixed to the door frame being of greater width than the other and terminating in a guide flange 28 while the narrower wall terminates in a guide flange 30. The flanges 28 and 30 are directed inwardly of the channeled track and occupy spaced parallel planes as shown particularly in Figure 5.

Fixed to each end of the cross rail 22 of the door is a spindle 32 on which a pair of grooved rollers

are mounted for rotation, these rollers being designated by the numerals 34 and 36. The groove of the innermost roller 34 engages and travels on the guide flange 28 of one of the tracks A while the groove of the outermost roller 36 engages and travels on the guide flange 30. As the door is moved up or down the rollers 34 and 36 of course rotate in opposite directions and in conjunction with the parts of the guide tracks A they serve to guide and steady the door in its movements and also to eliminate endwise movement of the spindles 32 and sidewise movement of the door.

The guide tracks B are also of channel formation as shown in Figure 3 and they likewise open inwardly toward the door opening. The inner margins of the channeled tracks B are defined by inwardly extending flanges 38 which serve to partially close the channel opening and to retain rollers as hereinafter set forth.

A bracket 40 is fixed to the inner face of the door 12 near each upper corner thereof, preferably by means of bolts or screws 42 extending adjustably through vertical slots 44 in the brackets. The brackets 40 project beyond the side margins of the door and are then turned rearwardly and carry studs or spindles 46 on which rollers 48 are rotatably mounted, said rollers being arranged for travel in the channeled tracks B and the spindles 46 extending through the open spaces defined by the flanges 38 of said tracks.

The purpose of the adjustable mounting of the brackets 40 by means of the slots 44 is to provide means for adjusting the door 12 vertically in case there should be need. This provides means for compensating for any changes which may occur in the floor level at the position of the door opening, such changes sometimes being occasioned by the influence of frost or similar natural phenomenon.

The door is supported and suspended by means of a pair of chains 50, one located at each side of the doorway and fixed at one end to a side margin of the door or, preferably, to one end of the central cross rail 22 or spindle 32 carried thereby. The chains 50, when the door is in closed position, extend upwardly through the vertical guide tracks A and thence over direction pulleys 52 suitably located above the door opening. The chains thence extend inwardly toward the center line of the door opening and engage other pulleys 52 near the median line of the door. The inner end portions of the two chains 50 are then joined to a common operating strand or a chain 56 which normally extends inwardly a limited distance within the room or building in a plane substantially perpendicular to the front wall 16 and then returns and is fixed at its opposite end to the upper central portion of the door 12, as by means of an eye bolt 58.

The bight of the operating chain 56 is movably engaged by a floating pulley 60 and to this pulley is attached a counterweight chain 62 which serves to support a counterweight 64. The counterweight 64 may be attached directly to the chain 62, particularly where the door is installed and arranged for manual actuation only. In the event a mechanical door operating mechanism is employed, as here shown, the counterweight is attached to an extension 62a of the counterweight chain and other parts are interposed between the chains 62 and 62a as will hereinafter be made clear.

The counterweight chain may extend over a pulley 66 carried by the rear wall 20 so that the counterweight 64 is arranged for vertical travel

against the face of said wall. However, it is to be understood that the various chains may be extended in any suitable direction and the counterweight may be placed in any desired location relative to the door opening.

The counterweight 64 substantially counterbalances the weight of the door 12 and the parts carried thereby so that very little effort is required for lifting and moving the door to open position and that when the initial impulse is given the door will travel slowly by gravity to closing position. This eliminates the greater part of the strain on all of the moving parts except the chains, and makes the door very easy to operate.

The door operating mechanism which is here shown and described includes a motor 68 which may be mounted on the ceiling 18 and which is supplied with current through conductors 70, 71, 72 and 73 connected with a suitable source of current supply as disclosed by the diagram in Figure 11.

The armature shaft of the motor 68 extends within a gear casing 74 within which is arranged suitable gearing, not shown, for imparting movement to a crank 76 arranged for movement in a horizontal plane beneath the ceiling 18. A cross head 78 has a central swivel connection to the free end of the crank arm 76 and to the respective ends of said cross head are attached the adjacent ends of the strands 62 and 62a of the counterweight chain.

It will be noted that as the crank arm 76 is turned from the full line position shown in Figure 4, wherein it points directly toward the front wall 16, to the dotted line position, or in other words moves through an arc of 180 degrees, it exerts a pull on the chain 62 and through it on the operating chain 56 and supporting chains 50, for moving the door to open position. An opposite movement of the crank arm will permit the door to move to closed position.

The circuit to the motor 68 is controlled by a manually operable spring switch 80 which is normally in open position and which is manually closed for starting the motor.

Means is provided for automatically breaking the circuit and stopping the motor whenever the crank arm has moved through one-half a revolution and reaches either of the positions shown in Figure 4. This automatic circuit breaking means includes a switch lever 82 which carries a contact member 84 adapted to engage a stationary contact member 86, said lever being constrained toward circuit closing position by a spring 88.

The operating mechanism connected with the motor includes a cam disc 90 which is rotated during movement of the operating mechanism and which is formed with two peripheral cam projections 92. The cam projections 92 are arranged on diametrically opposite sides of the disc 90 and are adapted to successively engage the switch lever 82 and move it to circuit breaking position as shown in Figure 11, thereby breaking the circuit and stopping the motor and the operating mechanism.

The operation of opening the door will now be described in detail, it being understood that the movement of the door and parts connected therewith is the same regardless of whether the operation is performed manually or by the operating mechanism heretofore described, or by other means. If the door is opened manually it may be accomplished by a pull exerted upon the counterweight chain 62 from some convenient

location or by lifting force applied directly to the door itself as through the instrumentality of a handle 94, in which instance the pull on the counterweight chain is effected by the counterweight itself.

it is desired to work on an automobile located within the room.

Because of the method of hanging the door and of moving it toward and from open position, very little space is required above the top of the door opening or at the sides thereof. In fact, it has been found that a clearance of three inches between the top of the door opening and the ceiling 18 is sufficient and that a clearance of two and one-half inches at either side is ample to provide space for the guide tracks.

Furthermore, it is possible for an automobile to stand very close to the door opening and yet not interfere with the operation of the door. In fact, an object such as an automobile may rest against the inner face of the door and not interfere with its operation because the first movement is an outward swinging movement of the door at its lower margin and a corresponding inward swinging movement at the top, which of course is located at sufficient elevation to be above the top of any vehicle which is capable of moving through the entrance opening. At no time during its movement does the door assume a position in which it would strike the rear or top of an automobile of usual construction particularly when equipped with rearwardly projecting bumpers.

As the door is suspended from its center and is nicely counterbalanced, it requires but a few pounds of pressure to operate either to or from open position and it will slide up or down practically of its own account with slight pressure. It can be operated just as easily from the interior as from the exterior of the building and when used in residential basement garages it is capable of being operated from the room above, through ropes or chains connected with the counterweight chain, or by operation of a switch in case the mechanical door operator is employed.

Both the vertical tracks A and horizontal tracks B are employed solely as guides for the operation of the door and they carry no weight, the entire weight of the door and its fittings being carried by the chains. Because of this method of suspension there are few parts which can get out of order or require replacement.

In Figures 12 and 13 I show a form of swivel or self-aligning pulley which may be employed for the chains of the door in lieu of any or all of the pulleys shown in the other parts of the drawings.

In these views the pulley itself is designated by the numeral 96 and it is journaled in a channeled carrier 98.

A right-angled bracket 100 is fixed to the wall 16 where the pulley is to be located, one portion of the bracket being placed in contact with and fixed to the wall while the other part of the bracket extends outwardly in a horizontal plane. The carrier 98 for the pulley is provided at its closed upper part with a recurved strap 102 which embraces the horizontal part of the bracket 100 and is pivoted thereto by a rivet or bolt 104, thus permitting the carrier and the pulley to swing on a vertical axis relative to the bracket as indicated in Figure 12. The forward margin of the horizontal part of the bracket preferably is curved on an arc having the pivot 104 at its center.

By using this type of pulley the chains for the door may be extended in any desired direction, and furthermore, the pulley is capable of limited swinging movement to compensate for changes

When the door 12 is closed it fits snugly within the door opening 14, its lower part engaging stops 96 arranged vertically on the opposite margins of the door opening and extending downwardly from points near the location of the center cross rail 22. It is obvious, therefore, that the force initially applied for causing the door to open must be in the nature of a rearward pull at the top of the door to cause it to turn on a horizontal pivot defined by the cross rail 22, spindles 32, and rollers 34 and 36. This initial force may be occasioned by a rearward or inward pull on the counterweight chain 62, or by a slight manual pull outwardly on the handle 94, if the operator stands outside the door, or by an outward push on the lower inner part of the door, such manual force in either instance being supplemented by action of the counterweight 64.

The initial or closed position of the door and the chains is illustrated diagrammatically in Figure 6, and the first movement which occurs in opening the door is illustrated in Figure 7. It will be remembered that the connection of the counterweight chain 62 to the operating chain 56 is a loose or movable connection, the operating chain being fixed to the door at two points, namely at one end at the point 58 near the top of the door, and then near the center of the side margins of the door by the two supporting chains 50. Draft rearwardly on the chain 62 will necessarily first be applied as an inward pull at the point 58 so that the top of the door is swung inwardly as illustrated in Figure 7. The pulley 60 is free to shift along the chain 56 toward the point 58 as such force is applied.

As the moving force is continued, principally by draft on the chain 62, the door 12 gradually turns from vertical position through an arc toward horizontal position, the pulleys 34 and 36 at each side of the door traveling in contact with the flanges 28 and 30 of the guide tracks A and the rollers 48 traveling in the horizontal guide tracks B. This continued movement of the door is illustrated in Figures 8 and 9, and it will be noted that there is a combination of forces acting upon the two different parts of the operating chain 56, as separated by the pulley 60, one force acting to pull the top portion of the door rearwardly and the other force acting to lift the central portion of the door upwardly. The pulley 60 may in such movement shift away from the point 58 along the chain 56, inasmuch as the greater force will then be required for bodily lifting the door through the chains 50.

The door finally comes to rest in substantially horizontal position as illustrated in Figure 10, and is supported in such position by the chains and counterweight until started by either a manual downward pull on the door or by a lifting pull on the chain which supports the counterweight.

When the door is in open position its bottom portion, comprising substantially the lower one-half thereof, projects outwardly in nearly horizontal position from the top of the door opening 14. It thus provides an awning or canopy which serves to protect the entrance opening and the forward part of the room or building from sun or rain. It provides shade or a dry spot and increases the available working space in the event

in the direction of the chain during movements occasioned by the operation of the door.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

Although the tracks B have been referred to as horizontal, yet it is to be understood that they need not be absolutely horizontal. It has been found that by arranging these track members in such manner that they slope somewhat toward the upper ends of the track members A an advantage is secured, particularly with respect to the closing of the door when the rollers 48 reach a position near the upper ends of the members A. This arrangement also makes it somewhat

easier to start the door on its upward movement.

I claim as my invention:—

In a door structure, a door frame, a vertical guide track attached at the side thereof, said guide track comprising an inwardly opening channel having one side wall of greater width than the other or opposed side wall and each side wall terminating in a vertical flange extending inwardly of the channel, thereby forming a pair of guide elements spaced apart in both horizontal directions, a door and a pair of grooved rollers attached at the side of said door and engaging the respective guide elements and adapted for travel thereon, said rollers engaging the respective vertical flanges of said guide element and being caused by such engagement to rotate oppositely to each other during upward or downward travel of the rollers.

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