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DOOR AND OPERATING MEANS THEREFOR

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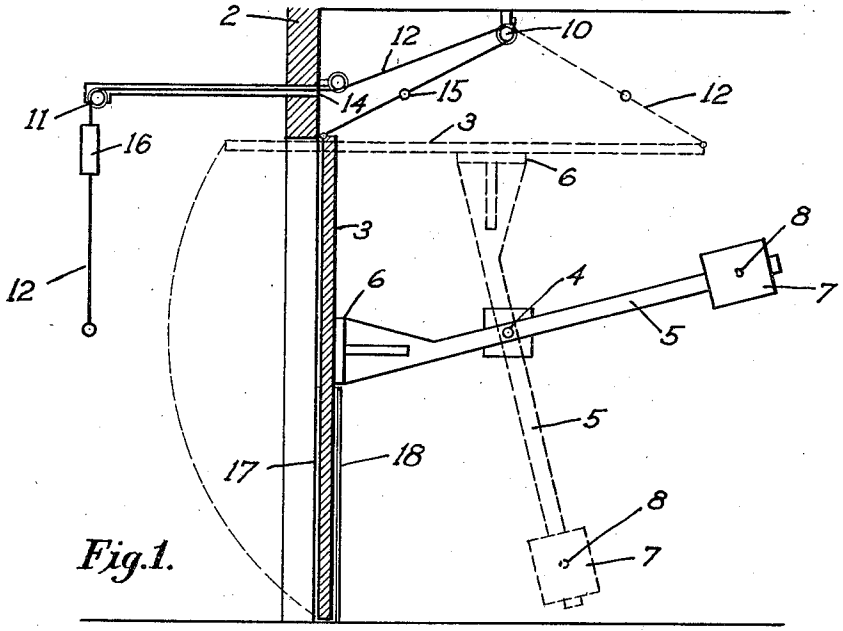


Fig.1.

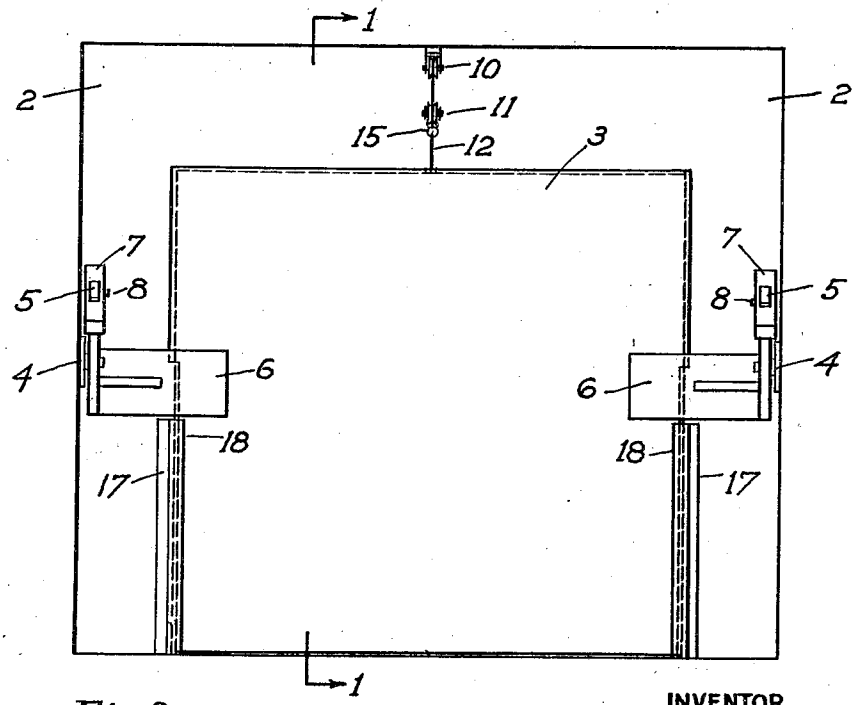


Fig.2.

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DOOR AND OPERATING MEANS THEREFOR

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2 Claims. (Cl. 268—30)

This invention relates to doors, and aims to provide an improved door and operating means therefor particularly adapted for use with garages.

When an automobile is driven out of or into a garage equipped with doors of the type now in common use, the driver is required to get out of the automobile to close or open the garage doors. Furthermore, such doors when open are so exposed to the wind that they may become blown shut or even torn from their hinges, and, where it is necessary to turn the automobile around in a limited area, they occupy a considerable amount of valuable space.

These disadvantages are eliminated by my invention which has, as a particular object, the provision of a door and operating means therefor, which may be constructed of a few inexpensive parts and attached to a garage of the usual type, whereby the door may be easily opened or closed from a point outside of the garage and accessible to an occupant of an automobile.

In accordance with my invention, the door is mounted for rotary movement from a substantially vertical closed position to a substantially horizontal open position. To permit the door to be swung easily about its axis and to hold the door in open position, a counterweight is attached to the door so that the center of gravity is shifted from a point between the door and its axis to a point on the other side of the axis as the door is opened.

In order that my invention may be clearly understood, I will describe in detail the specific embodiment of the invention, which is illustrated diagrammatically in the accompanying drawing, in which:

Fig. 1 is a section on the lines 1—1 of Fig. 2, showing the door in closed position in full lines, and in open position in broken lines; and

Fig. 2 is an elevation showing the door and operating means attached to a garage.

A garage 2 of ordinary construction is provided with a door 3 mounted for rotary movement from a substantially vertical closed position to a substantially horizontal open position, where it is out of the way of automobiles. Fixed to the sides of the garage are pivots 4. A rigid arm 5, having one end connected through plates 6 with the door, is mounted on each of the pivots 4. Adjustably mounted on each of the arms at its other end is a counterweight 7, having a set screw 8.

Each arm 5 is, in effect, a lever of the first class, and the corresponding pivot 4 provides the fulcrum therefor. The relationship between the weights of the door 3 and the counterweights 7, and the position of the pivots 4 with respect to the door and counterweights, is adjusted so that the force exerted by the counterweights 7 is not quite sufficient to balance the force exerted by the door 3 when the door is in closed position, while the force exerted by the door 3 is not quite sufficient to balance that exerted by the counterweights 7 when the door is in open position. Thus, little force is required to swing the door 3 about the axis formed by pivots 4.

The door 3 is normally held in closed position by virtue of the fact that the center of gravity is then between the door and the axis. As the door 3 is swung from closed position to open position, the center of gravity is shifted from a point between the door and the axis to a point on the other side of the axis. It is to be noted that the pivots 4 are spaced from the door 3, but at a distance less than the distance between the bottom of the door and the point where the arms 5 are attached to the door, so that when the door 3 is in open position, it is held against the upper edge of the doorway, which serves as a stop to prevent further movement of the door until it is swung back to closed position.

Means, which may be actuated from a point outside of the garage and accessible to an occupant of an automobile, are provided for swinging the door from open position to closed position and vice-versa.

The door 3 is mounted so that, when the center of gravity is located at a point directly above the axis and a condition of equilibrium has been reached, the upper end of the door is located at a point midway between the open and closed positions of the upper end of the door. Fixed to the ceiling of the garage, at a point directly above said middle position of the door 3, is a pulley 10. A second pulley 11 is fixed at a point outside of the garage and spaced from the doorway. A pull rope 12, having one end attached to the upper end of the door, passes over pulley 10 through an opening 14 in the front of the garage, and over pulley 11, and extends to a point outside of the garage where its other end is accessible to an occupant of an automobile.

To open or close the door, it is merely necessary to pull the free end of pull rope 12, thereby swinging the door to a point where the center of gravity is shifted to a point directly above the axis. The momentum of the door will then cause it to swing beyond that point, and the shift of the center of gravity from one side of the axis to the other will bring the door to rest in open or closed position. In order that the door

3 will be swung freely about pivots 4 without any sidewise pull, the pull rope 12 is attached to the upper end of the door at a point midway between its side edges, and pulley 10 is aligned therewith.

To insure that the momentum of the door 3 will carry it beyond the point where the center of gravity is shifted from one side of the axis to the other, a stop 15 is attached to the pull rope 12 between the end of the door and pulley 10 and is spaced a sufficient distance from the end of the door to check a further pull just before the point of equilibrium is reached.

The pull rope 12 has a counterweight 16 attached to its free end, which keeps it taut in order that it will not leave the pulleys. Counterweight 16, by exerting a force counter to that exerted by the door 3 and counterweights 7 after the point of equilibrium has been reached, also tends to prevent the door from slamming when it is opened or closed.

Provision is made whereby the doorway is effectively sealed when the door 3 is closed. The door 3 is tipped when it is swung from closed to open position, and it is necessary that the lower portion of the door be sufficiently narrow to project through the doorway. The upper portion of the door 3, which does not project through the doorway when the door is tipped, is wider than, and overlaps, the doorway. Fixed to each of the inner sides of the lower portion of the doorway are members 17 having flanges 18 adapted to overlap the narrow portion of the door 3. It will be observed that the main counterweight 7 has limited rotary movement about the same horizontal axis passing through the pivot 4 as the door 3; that in the closed position of the door said counterweight is located above the horizontal plane passing through said axis and behind the vertical plane passing through said axis; and that in the fully open position of the door the counterweight is also substantially behind said vertical plane.

While, as pointed out above, my invention is particularly adapted for use in connection with a garage, it is apparent that it may be applied with advantage to other structures. It is to be understood, therefore, that my door and operating means may be applied to structures other than garages without departing from my invention.

What I claim is:

1. The combination with a garage, of a door mounted for limited rotary movement about a horizontal axis; a main counterweight connected thereto and having limited rotary movement about the same horizontal axis, said counterweight in the closed position of the door being located above a horizontal plane passing through said axis and behind the vertical plane passing through said axis, and in the fully open position of the door being also substantially behind said vertical plane; and means for swinging the door from closed to open position and vice versa, said means comprising a pulley mounted at a point above said axis, a pull rope attached to said door and extending over said pulley to a point outside of the garage, and a secondary counterweight attached to said pull rope; both the main and secondary counterweights moving downward during the initial stage of opening movement of the door, the secondary counterweight opposing the pull of the main counterweight when said door is in fully open position.

2. The combination with a garage, of a one-piece door mounted for limited rotary movement about a horizontal axis; a main counterweight connected thereto and having limited rotary movement about the same horizontal axis, said counterweight in the closed position of the door being located above a horizontal plane passing through said axis and behind the vertical plane passing through said axis, and in the fully open position of the door being also substantially behind said vertical plane; and means for swinging the door from closed to open position and vice versa, said means comprising a pulley mounted at a point above said axis, a pull rope attached to the door and running over said pulley, a stop connected to the pull rope between its point of attachment to the door and said pulley, and a secondary counterweight attached to the pull rope at the opposite side of the pulley from said stop; both of said counterweights moving downward during the initial stage of opening movement of the door, the secondary counterweight opposing the main counterweight when said stop becomes effective to limit the door-opening operation.

LOUIS GRANDGENT.