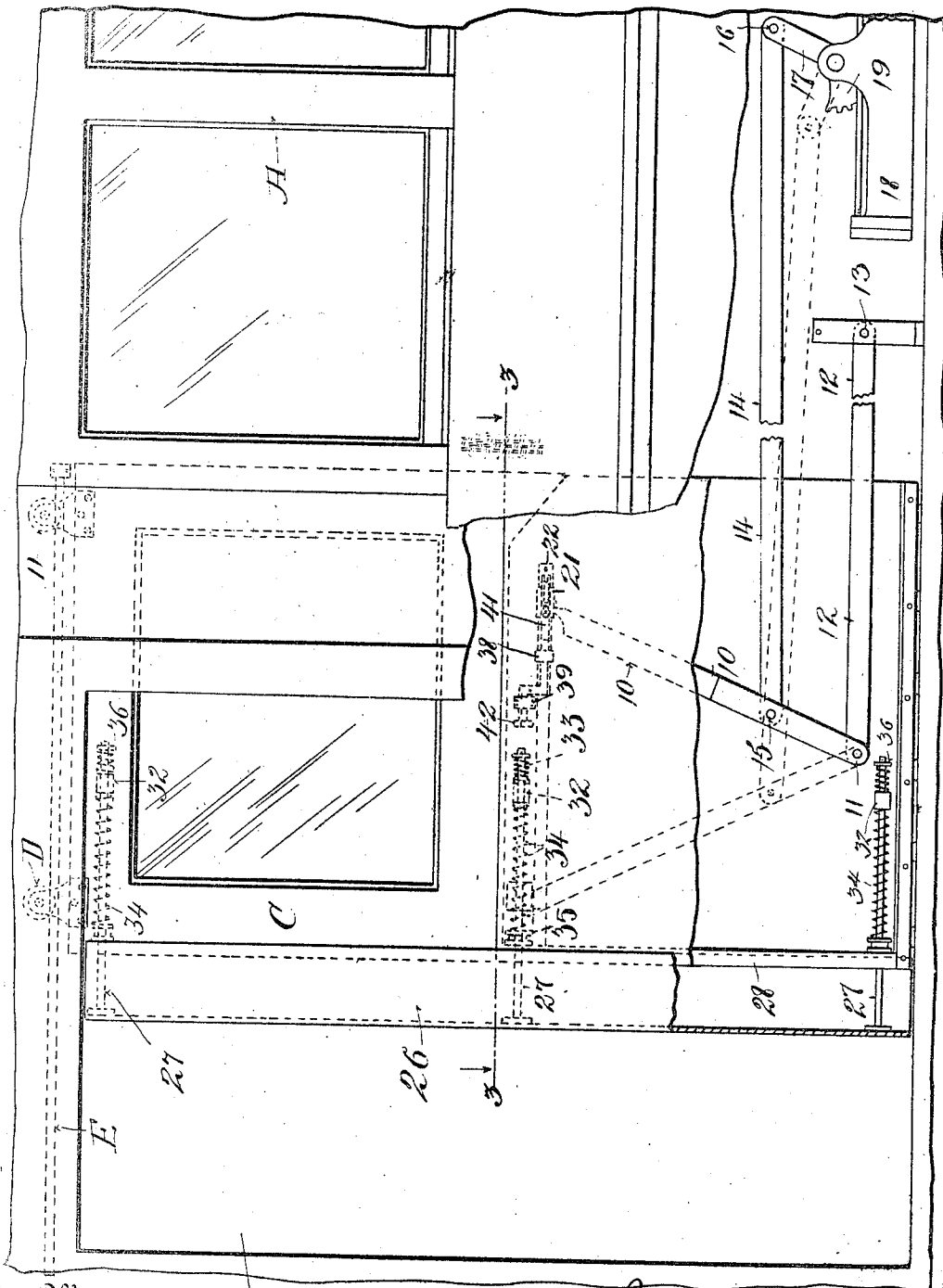


J. S. DOYLE.
SAFETY MECHANISM FOR POWER OPERATED DOORS.
APPLICATION FILED SEPT. 16, 1909.

1,004,754.

Patented Oct. 3, 1911.

2 SHEETS-SHEET 1.



Witnesses:
C. H. Thompson
J. C. Klein

fig. 1.

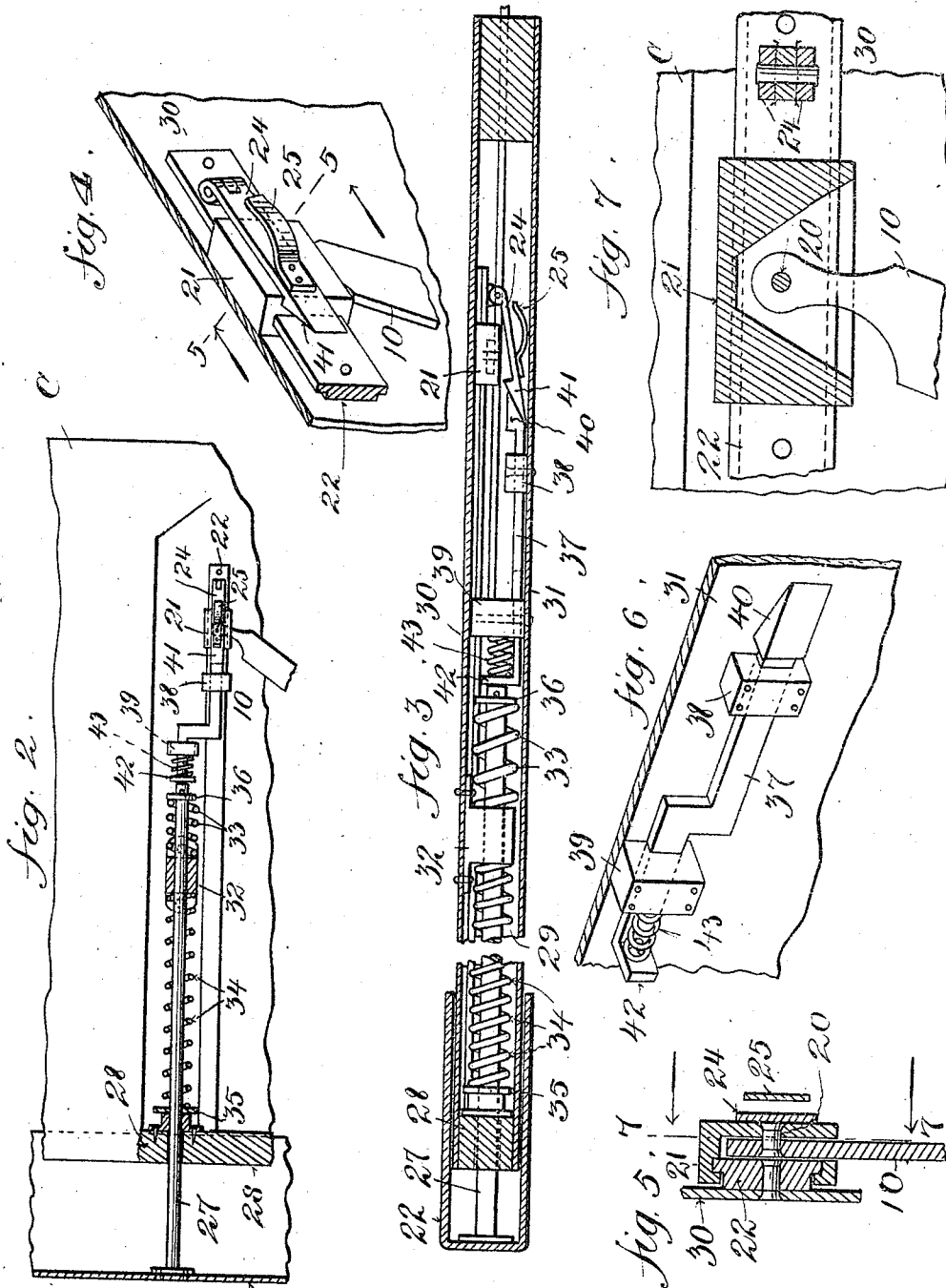
James S. Doyle Inventor
By Attorney
Samuel C. Kirby

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JAMES S. DOYLE, OF NEW YORK, N. Y., ASSIGNOR TO BURDETT-ROWNTREE MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SAFETY MECHANISM FOR POWER-OPERATED DOORS.

1,004,754.

Specification of Letters Patent.

Patented Oct. 3, 1911.

Application filed September 16, 1909. Serial No. 517,966.

To all whom it may concern:

Be it known that I, JAMES S. DOYLE, a citizen of the United States, residing in the city, county, and State of New York, have made a certain new and useful Invention in Safety Mechanism for Power-Operated Doors, of which the following is a specification.

The invention relates to safety appliances for power operated doors or other closures, and the object is to provide means which are simple and effective for automatically releasing a door or other closure from operative connection with respect to its power actuating devices, in case an obstruction is encountered by the door or other closure, in closing.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference signs appearing thereon,—Figure 1 is a view in side elevation of a door and its frame work, showing safety devices embodying the principles of my invention applied, portions of the frame work and door being broken out. Fig. 2 is a detail view of the latch mechanism shown in Fig. 1, the front plate of the door being removed and the shoe, spring and mounting being in part section. Fig. 3 is an enlarged view in horizontal section on the line 3, 3, Fig. 1, looking in the direction of the arrows, showing the shoe in telescoped position. Fig. 4 is a broken view in perspective, showing the detachable latch for coupling the power actuated arm or lever to the door. Fig. 5 is a broken view in section, on the line 5, 5, Fig. 4, looking in the direction of the arrows. Fig. 6 is a view similar to Fig. 4, showing the detaching lug, for disconnecting the door and its power actuated lever. Fig. 7 is a broken detail view in section, on the line 7, 7, Fig. 5, looking in the direction of the arrows.

The same part is designated by the same reference sign wherever it occurs through the several views.

In the operation of power actuated doors or other closures and similar devices, it very frequently happens that in closing, the door or other device encounters an obstruction, which causes the closing movement of the door to be arrested or restrained, or else the power applied to the door to close it endeavors to overcome the obstruction with the result, that in case the obstruction is the arm, shoulder or other part of the body of a person, of causing serious and sometimes fatal injury. Where the obstruction encountered is sufficient to arrest the action of the power devices in moving the door or other closure toward its closed position, the application of the power employed to effect the closing movement of the door, continuing after the obstruction is encountered, tends to cause a continued squeeze of the obstruction between the advancing edge of the door and the door jamb, and sometimes with an increasing force depending upon the character of the door moving devices, and in any event, the withdrawal or removal of the obstruction results in causing the door to move too rapidly toward its final closed position, thereby causing an objectionable slam.

The objections above noted are particularly serious in the case of the operation through power actuated devices of doors, gates or other closures, of street, subway, elevated, passenger elevator and other cars, and the like, and especially where it is necessary for large crowds of people to use or pass through the doorways or entrances of such cars. The dangers and objections above noted are increased where the doors are operated by pressure medium such, for instance, as compressed air, since the pressure applied to close the door when once placed in commission, continues to build up when an obstruction is encountered and hence an increasing force is applied, tending to move the door to its closed position during the time the obstruction remains in the front of the advancing edge of the door.

It is among the special purposes of my present invention to provide means whereby the power actuating devices for the door are automatically disconnected from the door, in case the front or advancing edge of the door, in closing, encounters in its path of

movement an obstruction tending to arrest the further advancing movement of the door, and renders the same inert and harmless.

In the drawings, I have shown one form of an embodiment of the present invention, as applied to the operation of a sliding door, such as is ordinarily employed in street, subway and elevated cars. It is to be understood however, that my invention, as defined in the claims, is not to be limited or restricted in respect to this application or use of my invention.

In the drawing, A, designates the side of a car, B, a doorway therefor, and C, the door. In the particular arrangement shown, the door is of the sliding type, suspended by hangers or rollers D, from a track E, in the usual or well known manner and is provided with chambers or recesses for the reception of the shoe supporting plungers and springs, hereinafter to be described.

Reference sign 10, designates the door operating lever, through the operation of which the door is moved. This lever may be power actuated in any suitable or convenient manner and from any suitable or convenient source of power. In the particular form shown, to which however, my invention, as defined in the claims, is not to be limited or restricted, the operating lever 10, is pivotally connected at one end, as at 11, to the end of the link 12, which is pivotally connected as at 13, to a fixed part of the car frame. A link 14, is pivotally connected at one end, as at 15, to the operating lever 10, and at its other end, as at 16, to an arm 17, the latter being operated by a piston operating in the power cylinder 18, through an intermediate segment rack 19, in a well known and well understood manner.

It is obvious that many other suitable or convenient forms of power mechanism may be employed for the purposes of my invention.

The free end of the door operating lever 10, is pivotally connected as at 20, see Figs. 5 and 7, with a slide block 21, mounted to slide upon a bar 22, rigidly connected to the door to move therewith. The slide block 21 is free to move along the bar 22, except when restrained by a latch 24, which is pivotally connected at one end to the door and provided with a hook 41 at its other end to engage over the front edge of the block 21. A spring 25, serves to retain the hooked end of latch 24 in engaging relation with respect to the front edge of the slide block, and normally presses said latch toward such engaging relation.

At its front edge, the door C is provided with a shoe 26, mounted in yielding relation with respect to the door, and, in effect, constituting an extension of the front or advancing edge of the door. In the particular embodiment of my invention, shown in the

drawings, but to which my invention is not to be limited or restricted, this shoe extends the entire length of the door, and is of U shape, arranged to telescope over the front edge of the door, as most clearly shown in section, in Fig. 3. The shoe is supported upon rods 27, extending through the front edge portion 28, of the door proper, these rods being mounted to slide longitudinally through openings formed in said portion 28, and their inner ends are received in a chamber 29, formed between the side plates 30, 31, of the door, being guided by blocks 32, fastened on the inner surface of one of said side plates. Springs 33, 34, are arranged to act upon the rods 27, so as to normally but yieldingly maintain the shoe 26 offset from the edge of the door. In the particular arrangement shown, the springs 34, bear at one end against the guide blocks 32, and at their other end against collars 35, carried by the rods 27, the tension of said springs 34, being normally exerted upon said rods 27 in a direction to press the shoe away from the front edge portion of the door. The springs 33, bear at one end against the opposite side or end of the guide blocks 32, and at their other ends against collars 36, carried by the ends of the rods 27, the tension of these springs 33 being normally exerted in the direction to move the rods 27, longitudinally into the chamber 29.

The tensions of the springs 33, 34, oppose each other, and hence enable comparatively light pressure exerted on the front edge of the shoe to move the same telescopically on to the front edge of the door, and I propose to so relatively proportion the tensions of these springs as to secure these results. A slide bar 37, is provided and is mounted to slide through guide blocks 38, 39 mounted on the inner surface of one of the door side plates 31. This slide bar 37 is provided with a cam head 40, having an inclined surface designed to coöperate with a similar inclined surface on the hooked end 41, of the locking latch 24, to disengage the latter from the slide block 21. The slide bar 37, is provided at its opposite end with the flange 42, arranged in the path of longitudinal movement of one of the shoe supporting rods 27. A spring 43, interposed between the guide blocks 39, and flange 42, normally exerts its pressure upon the slide bar 37 to move the latter longitudinally in the direction to withdraw the inclined surface of cam head 40, from engaging relation with the end of latch 24. When however, the rod 27 is projected endwise into the chamber 29, as for instance, when in closing, the front or advancing edge of the door, in this instance the front or advancing edge of the shoe 26, encounters an obstruction such as a passenger getting on or off the car, the door being impelled toward its closing po-

sition by the power actuated devices, the springs 34 yield against the pressure exerted by the shoe against the obstruction, thereby moving the rod 27 into the chamber 29, and hence causing the end of the rod 27, to engage the flange 42, on the slide bar 37, and project the latter endwise against the pressure of spring 43, and hence carrying the inclined surface of cam head 40, into engagement with the cooperating surface on the hooked end 41, of latch 24, thereby detaching the latter from engaging relation with respect to the slide block 21, and hence permitting said slide block to slide freely under the impelling force of the power devices along the bar 22, without causing any movement of the door. In other words, by the action referred to, the power actuated devices are automatically disconnected from the door. These two functions are accomplished by the cushion arrangement on the front edge of the door. When an obstruction is encountered by the front edge of the door, in closing, even when moving rapidly under the influence of the motor which moves the door toward its closed position, it is first cushioned by the collapsing or telescopic movement of the shoe 26, and thereafter the power mechanism or motor is automatically detached from operative connection with the door, and consequently the danger of injury to passengers getting on or off the car is obviated, while permitting the power mechanism to complete its full forward stroke, leaving the door free to be moved by hand. After the obstruction has been removed from in front of the door, the springs 34, restore the shoe to its distended position, thereby removing the pressure from spring 43, and enabling the latter to restore slide bar 37 to its normally retracted position with its cam head 40 withdrawn from engaging relation with respect to the locking latch 24. Now, by reversing the motor to open the door, the slide block 21, moves freely along the slide 22, and eventually the spring 25, causes the latch 24 to snap into engaging relation with respect to the front edge of the block 21, thereby again coupling up the door with the motor or power mechanism.

Many variations and changes in the details of construction and arrangement might readily occur to persons skilled in the art, and still fall within the spirit and scope of my invention, as defined in the claims. I do not desire therefore, to be limited or restricted to the exact details shown and described. But

Having now set forth the object and nature of my invention, and a construction embodying the principles thereof, what I claim as new and useful, and of my own invention, and desire to secure by Letters Patent is:

1. The combination with a door, of power operated devices for operating the door, and means operated by the door striking an obstruction, in closing, for disconnecting the door and its operating devices.

2. The combination with a door, and power actuated devices for moving the same, of means operated by the door striking an obstruction in its path, in closing, for automatically disconnecting the power operated devices from the door.

3. The combination with a door, and power operated mechanism therefor detachably connected thereto, of means carried by the door and operated by encountering an obstruction, in closing, for detaching said power actuated mechanism from the door.

4. The combination with a door, and power operated devices for moving the door, of yielding means carried by the door and operating when encountering an obstruction in the path of the closing movement of the door to detach the power operated devices from operative connection with the door.

5. The combination with a door, and power operated mechanism therefor, of means controlled by an encountered obstruction to the closing movement of the door, for detaching the power operated mechanism from the door, without arresting the operation of said power operated mechanism.

6. The combination with a door, a motor, and detachable connections between the door and motor for moving the door, of means for controlling said connections, said means operating when an obstruction is encountered in the closing movement of the door to disconnect said connections and door.

7. The combination with a sliding door, an operating motor therefor, and detachable connections between the door and motor, of a yielding member carried by the door at its front edge, and means operated by the yielding movement of said member for detaching the connections between the door and its operating motor.

8. The combination with a door and a motor, an arm operated by the motor, a latch connected to the door, and arranged to engage said arm to engage the same to the door, and means operated by the door encountering an obstruction in closing, for releasing said latch.

9. The combination with a door, of a motor, an arm arranged to be moved by the motor, a latch carried by the door and arranged to engage said arm to couple the same to the door, and means carried by the door at its front edge and operated by encountering an obstruction in the closing movement of the door, for detaching said latch from engaging relation with the arm.

10. The combination with a door having a bar mounted thereon, a block mounted to slide on said bar, an arm connected to said

block, a motor for operating said arm, a latch connected to the door to engage said block, and means carried by the front edge of the door, and operated by encountering an obstruction in the closing movement of said door for detaching the latch from said block.

11. The combination with a door, and a motor, having detachable connections therewith for moving the same, a member carried by the door at its front edge, and mounted for movement relative to the door, and means operated by the yielding movement of said member for detaching the connections between the door and its operating motor.

12. The combination with a door, of a motor for operating the same, a yieldingly mounted cushion carried by the front edge of the door, and means operated by the yielding movement of the cushion, when encountering an obstruction in the closing movement of the door for detaching the connections of the motor and door.

13. The combination with a door, of a motor, and connections between the door and motor for operating the former, a shoe arranged at the front edge of the door, and yieldingly mounted for movement relatively to the door, a slide bar arranged to be engaged and moved when the shoe is moved relatively to the door, and means operated by the movement of the slide for detaching the connections of the door and motor.

14. The combination with a door, of a motor, operating connections between the door and motor, a shoe arranged at the front edge of the door, a rod carried by the door and connected to the shoe, a spring acting on said rod to yieldingly press the shoe away from the door, and means operated by the yielding movement of the shoe toward the edge of the

door for detaching the motor connections with the door.

15. The combination with a door, of a motor, connections between the motor and door for operating the latter, slide rods carried by the door and extending through the front edge thereof, a shoe carried by the slide rods and telescoping over the front edge of the door, springs acting on said rods, whereby said shoe forms a yielding cushion for the front edge of the door, and means operated by the yielding movement of the shoe for detaching the motor connections from the door.

16. The combination with a door, of a motor, an arm operated by the motor, a latch carried by the door to engage said arm to couple the same to the door, a slide bar mounted on the door and arranged, when projected, to engage said latch and detach the same from engaging relation with the arm, means for yieldingly maintaining said slide bar retracted from engaging relation with respect to said latch, a yielding cushion for the front edge of said door, and connections operated by the yielding movement of the cushion to project said slide bar.

17. The combination with a door, of a motor, detachable connections between the motor and door, a cushion device carried by the front edge of the door, and mechanism operated by the yielding movement of the cushion for detaching said connections.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 9th day of September A. D., 1909.

JAMES S. DOYLE.

Witnesses:

J. E. KLEIN,

CLARENCE HUNICKE.