April 22, 1952 D. BAILEY 2,593,403

DOOR WITH CLOSING AND PROTECTING ASSEMBLY

Filed April 21, 1950

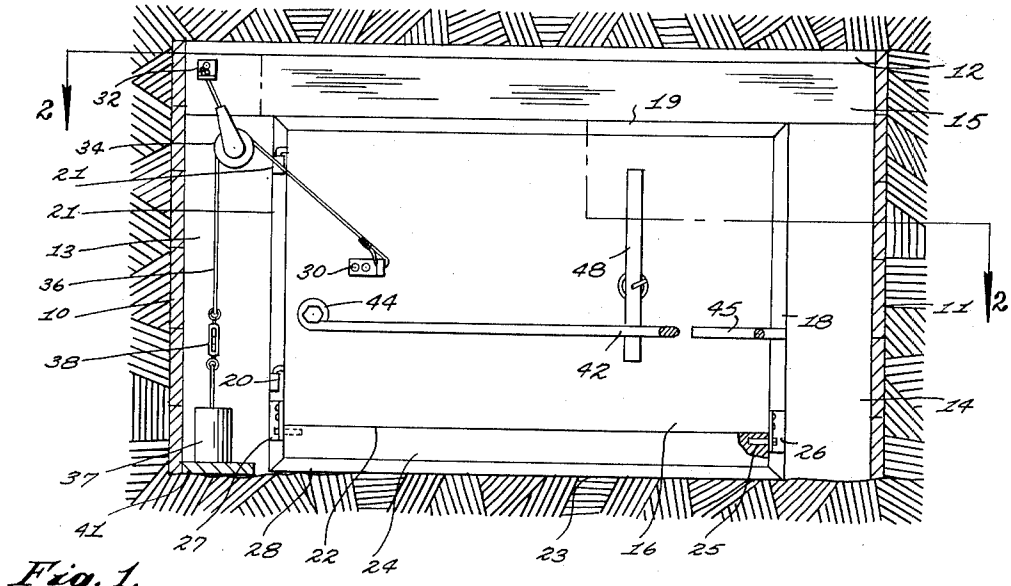


Fig. 1.

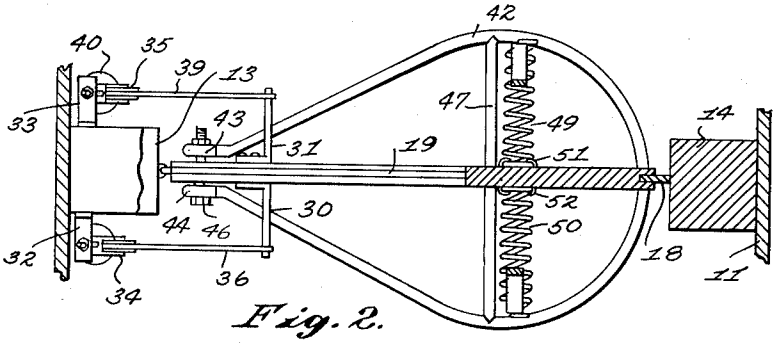


Fig. 2.

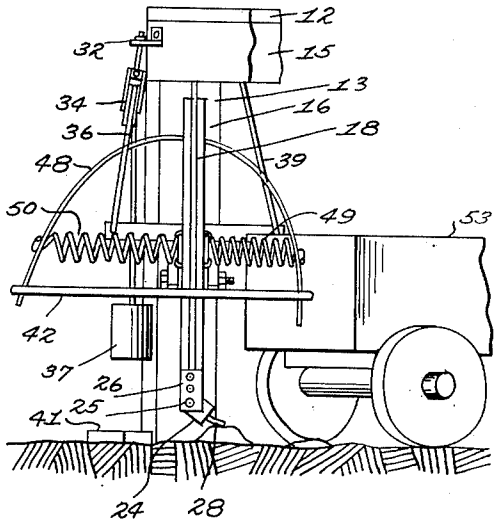


Fig. 3.

INVENTOR.
DONALD BAILEY
BY

McMorrow, Berman & Davidson
ATTORNEYS

Patented Apr. 22, 1952

2,593,403

UNITED STATES PATENT OFFICE

2,593,403

DOOR WITH CLOSING AND PROTECTING ASSEMBLY

Donald Bailey, Puritan Mines, W. Va.

Application April 21, 1950, Serial No. 157,341

3 Claims. (Cl. 20—16)

1

This invention relates to doors and automatic closing and protecting assemblies therefor and more particularly to an automatically closing door assembly for use in mines.

It is among the objects of the invention to provide a self or automatically closing door assembly in which the door may swing open in either direction and will automatically return to its closed position when released, which assembly includes door protecting means so that the door can be forcibly pushed open or bumped to open position by a moving vehicle, such as a mine car or locomotive, without damage to the door and also includes a swingable vane or panel to enable the door to pass over obstructions in its opening and closing movements, which provides definite and positive centering of the door in closed position and a distribution of opening forces applied to the door in a manner to avoid excessive stresses on the door, which provides shock absorbing means so that the door will not be damaged even when the assembly is violently bumped, and which is simple and durable in construction, economical to manufacture, easy to install and positive and effective in operation.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing wherein:

Figure 1 is a transverse cross sectional view of a mine tunnel showing a door assembly illustrative of the invention operatively mounted in the tunnel;

Figure 2 is a cross sectional view on the line 2—2 of Figure 1; and

Figure 3 is a somewhat diagrammatic perspective view of the door assembly and a vehicle fragment showing the manner in which the door is pushed or bumped open by a moving vehicle.

With continued reference to the drawing, the mine tunnel is a substantially rectangular, more or less horizontal passage having timber or plank side walls 10 and 11 and a ceiling structure 12 to prevent the material, such as earth, rock, coal or ore through which the tunnel extends from falling into the tunnel. The tunnel is timbered in the usual manner, not illustrated, to protect it from falling material and this timbering includes doorways located at spaced apart intervals along the tunnel, one such doorway and a door assembly therefor being shown in elevation in Figure 1.

The doorway includes a door frame having two vertical posts or jambs 13 and 14 disposed at respectively opposite sides of the tunnel with the post 13 bearing against the side wall 10 and the

2

post 14 bearing against the side wall 11, and a lintel or beam 15 extending across the tunnel against the top or ceiling structure 12 and bearing at its respectively opposite ends on the upper ends of the posts 13 and 14. The posts 13 and 14 and the lintel 15 frame a rectangular door opening and a rectangular door 16 is disposed in this opening. The door is made slightly smaller than the opening and has along its end and top edges seals or flappers 17, 18 and 19 formed of strips of resilient material, such as rubber, which engage the inner surfaces of the door posts and lintel to provide a seal between the door and the door frame when the door is closed. Suitable hinges, as indicated at 20 and 21, each having one part secured to the door post 13 and its complementary part secured to the adjacent end of the door 16 pivotally support the door on the post 13 for swinging movements in either direction from its closed position.

The horizontally disposed bottom edge 22 of the door is disposed above the floor surface 23 of the tunnel and a swinging panel 24 is disposed in the space between the bottom edge of the door and the floor of the tunnel. The panel 24 is pivotally connected at its opposite ends to the door by suitable means, such as the pins 25 secured in and projecting each from one end of the panel near the upper edge of the latter and the brackets 26 and 27 secured to the door and pivotally receiving the projecting portions of the pins 25. A seal or flapper 28 extends along the bottom edge of the panel 24 to provide a seal between the bottom edge of the door and the tunnel.

Two angle brackets 30 and 31 are secured to the door intermediate the height of the latter and adjacent the hinged edge of the door and project laterally from the respectively opposite sides of the door in substantial alignment with each other. Supports 32 and 33 are secured to the lintel 15 at respectively opposite sides of the latter and near the end of the lintel resting on the hinge post 13 and a cable sheave 34 is suspended from the support 32 while a similar cable sheave 35 is suspended from the support 33. A cable or rope 36 is secured at one end to the outer end of the bracket 30 and is trained over the sheave 34 to depend at the adjacent side of the post 13. A weight 37 is secured to the other end of the cable 36, preferably through an adjustable turnbuckle 38 and acts to return the door to closed position if the door is swung to an open position at the side of the post 13 opposite that at which the cable 36 is disposed.

A cable 39 is secured at one end to the outer

end of the bracket 31 and is trained over the sheave 35 to depend at the corresponding side of the post 13 and a weight 40 is secured to the other end of this cable 39, preferably through the intermediacy of an adjustable turnbuckle such as the turnbuckle 38. The weight 40 acts to return the door to closed position when the door is opened in the opposite direction to that described above.

The lengths of the two cables 36 and 39 are such that when the door is properly centered in closed position both weights rest lightly on horizontal supports 41 and any opening movement of the door involves the raising of one weight without any movement of the other. The assumption of both of the weights of their position of rest on the corresponding supports 41 is effective to properly center the door in its closed position.

Suitable means for protecting the door from damage when bumped open by moving vehicles is provided and comprises a guard rail 42 bent to a somewhat elliptical shape in plan and provided at its ends with apertured eyes 43 and 44 respectively. The end of the door opposite the hinged end thereof is provided with an inwardly extending slot or recess 45 and the intermediate portion of the guard rail 42 is slidably disposed in this recess, the longitudinal center line of the guard rail being disposed substantially in a plane perpendicular to the door and to the hinge axis of the door. The recess 45 is positioned at a height above the tunnel floor to position the guard rail for effective contact by moving mine vehicles and the eyes 43 and 44 of the guard rail are positioned at substantially the same height above the mine floor as the slot 45 and near the hinged end of the door. A bolt 46 extends through the eyes 43 and 44 and through an aperture in the door to firmly secure the corresponding end of the guard rail to the door.

A stiffening bar 47 extends transversely across the guard rail 42 at or adjacent the widest location of the guard rail and is secured at its respectively opposite ends to the sides of the guard rail. This bar extends slidably through an aperture provided in the door so that the end of the guard rail adjacent the free end of the door can move laterally of the door in either of the two opposite directions.

A U-shaped strap 48, serving as a force equalizing or distributing element, is extended through an aperture provided in the door above the bar 47 and at the side of the bar adjacent the free end of the door. The strap 48 is engaged in the door substantially at the mid-length location of the strap and the two ends or legs of the strap extend downwardly and outwardly at the respectively opposite sides of the door to locations somewhat below the corresponding sides of the guard rail 42, as is clearly illustrated in Figure 1. The legs of the strap or equalizer 48 are secured to the corresponding sides of the guard rail and the strap serves to hold the guard rail against tilting relative to the door as well as to assist in distributing forces applied to the guard rail to separated locations on the door. Two coiled compression springs 49 and 50 extend laterally outwardly from respectively opposite sides of the door and are interposed between the corresponding sides of the door and the legs of the strap 48 disposed at the same sides of the door. The inner ends of these springs are engaged in spring seats 51 and 52 respectively, secured to the door while the outer ends are extended through apertures provided in the opposite end portions or

legs of the strap 48. These springs serve as shock absorbing elements to protect the door from damage even when the guard rail 42 is violently impacted by a moving vehicle.

The numeral 53 designates a vehicle, such as a mine car, shown in impacting relationship with the guard rail 42 in Figure 3.

With this arrangement, the door will be pushed or bumped open when the guard rail is contacted by a moving vehicle and will open in either direction depending upon the side of the door at which the vehicle approaches and will be automatically returned to its closed position when the vehicle passes. When closed, the door will be centered in closed position and will provide an effective seal in the doorway or opening to facilitate proper ventilation of the mine and to effectively shut off the corresponding part of the mine from gas in the event this should become necessary.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. In a mine door assembly including a door hinged at one end to a support for swinging movement about a substantially vertical axis and support-carried means connected to the door for returning the door to its closed position from positions at either side of the closed position, resilient bumper means carried by the door for protecting the latter when bumped open by a moving vehicle comprising a guard rail of generally elliptical shape having its ends secured to the door at respectively opposite sides of and adjacent said one end thereof and its intermediate portion slidably supported by said door at the other end of the latter, said guard rail being disposed substantially perpendicular to said door and said vertical axis and having its sides spaced from the respectively opposite sides of the door, compression springs operatively interposed between the sides of said guard rails and the corresponding sides of said door resiliently resisting movement of said guard rail relative to said door, and a reinforcing bar extending slidably through said door adjacent said springs and transversely of said guard rail, said reinforcing bar having its ends connected one to each side of said guard rail to maintain the latter in said generally elliptical shape.

2. A mine door assembly including a door hinged at one end to a support for swinging movement about a substantially vertical axis and support-carried means connected to the door for returning the door to its closed position from positions at either side of the closed position, resilient bumper means carried by the door for protecting the latter when bumped open by a moving vehicle comprising a guard rail of generally elliptical shape having its ends secured to the door at respectively opposite sides of and adjacent said one end thereof and its intermediate portion slidably supported by said door at the other end of the latter, said guard rail being disposed substantially perpendicular to said door and said vertical axis and having its sides spaced from respectively opposite sides of

the door, compression springs operatively interposed between the sides of said guard rail and the corresponding sides of said door resiliently resisting movement of said guard rail relative to said door, and a U-shaped strap extending through said door above said guard rail and providing legs extending downwardly and outwardly at respectively opposite sides of the door and connected near their ends to the corresponding sides of said guard rail to support said guard rail against tilting relative to the door.

3. In a mine door assembly including a door hinged at one end to a support for swinging movement about a substantially vertical axis and support-carried means connected to the door for returning the door to its closed position from positions at either side of the closed position, resilient bumper means carried by the door for protecting the latter when bumped open by a moving vehicle comprising a guard rail of generally elliptical shape having its ends secured to the door at respectively opposite sides of and adjacent said one end thereof and its intermediate portion slidably supported by said door at the other end of the latter, said guard rail being disposed substantially perpendicular to said door and said vertical axis and having its sides spaced from the respectively opposite sides of the door,

compression springs operatively interposed between the sides of said guard rail and the corresponding sides of said door resiliently resisting movement of said guard rail relative to said door, a reinforcing bar extending slidably through said door adjacent said springs and transversely of said guard rail, said bar having its ends connected one to each side of said guard rail to maintain the latter in said generally elliptical shape, and a U-shaped strap extending through said door above said guard rail and providing legs extending downwardly and outwardly at respectively opposite sides of the door and connected near their ends to the corresponding sides of said guard rail to support said guard rail against tilting relative to the door.

DONALD BAILEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,090,562	Orr et al.	Mar. 17, 1914
1,194,897	Still	Aug. 15, 1916
1,455,967	Pals	May 22, 1923
1,620,669	Littlejohn	Mar. 15, 1927