Sept. 8, 1953

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2,651,387

AUTOMATIC SAFETY BRAKE

Filed Jan. 10, 1951

Fig. 1.

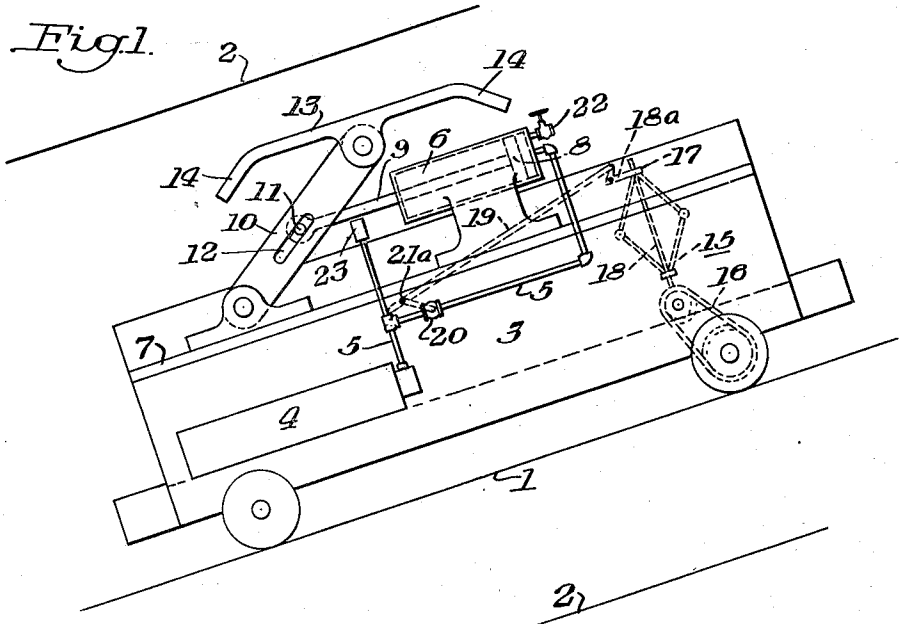


Fig. 2.

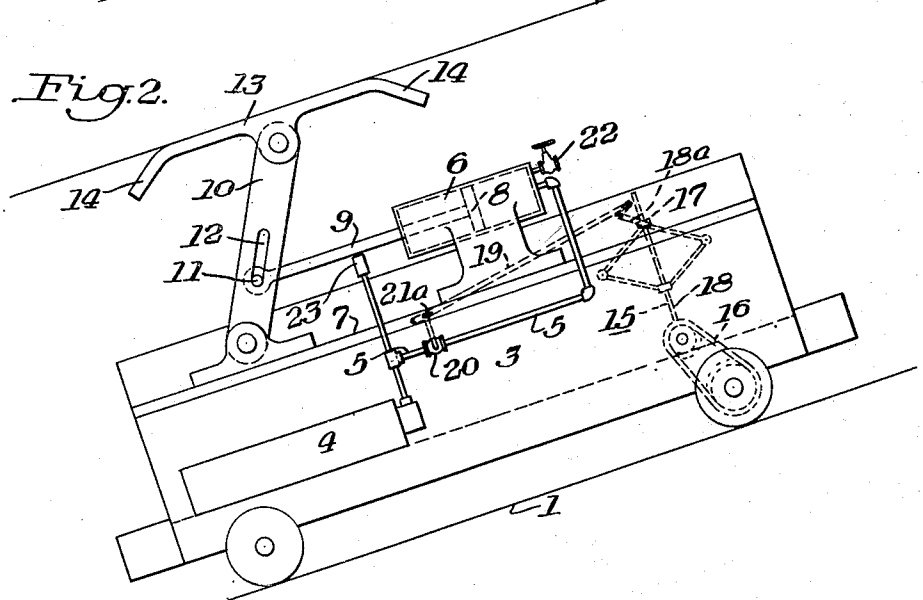
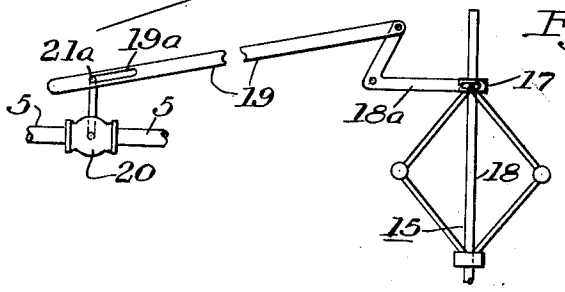


Fig. 3.



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Patented Sept. 8, 1953

2,651,387

UNITED STATES PATENT OFFICE

2,651,387

AUTOMATIC SAFETY BRAKE

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Application January 10, 1951, Serial No. 205,410

2 Claims. (Cl. 188—181)

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My invention relates to an automatic safety brake which is to be applied to a car or train of cars which are drawn up or lowered on an inclined track, such, for instance, as the entry slope of a mine or other inclined roofed passageway. Where a car or train of cars is being moved along, either up or down, such an inclined track, in case the draft cable breaks or other traction means fails, the cars are free to descend the track at great speed, often resulting in the death or serious injury to persons riding on the cars and the derailment and wreakage of the cars and loss of their contents. Many such serious accidents have occurred, especially in slope tunnel mines.

My invention comprises a contact shoe mounted in one of the cars, preferably a specially equipped car which may be coupled to a train of cars, and which shoe is arranged to be elevated into frictional contact with the roof of the passageway, in case traction power is accidentally released from the train and a run away occurs. A centrifugal governor controlled by the speed of the latter is mounted in the car which is provided with the shoe, and causes the elevation of the shoe into contact with the roof of the slope and brings the train of cars to a complete stop.

In the preferred embodiment of my invention the shoe is pivotally mounted on a horizontal axis on the upper end of a lever, the lower end of which lever is pivotally attached to a portion of the car interior, so that when the lever is swung towards its vertical position the shoe will come into and be held in contact with the roof. To elevate the lever towards the vertical and thus bring the shoe into frictional contact with the passage roof, I prefer to provide a single acting pressure cylinder and piston device, mounted in the car, and having its piston rod pivotally connected to the lever intermediate of the length of the latter. A compressed air tank is mounted in the car and is connected by a pipe or duct with the rear end of the cylinder and a valve is fitted in the pipe. A centrifugal governor is mounted within the car and is actuated by sprocket and chain connection with an axle or wheel of the car, and the governor is so adjusted that when the car attains a predetermined run away speed the governor opens the valve, thereby admitting pressure to the rear of the cylinder, thus elevating the shoe into frictional contact with the slope roof and bringing the car to a stop.

Preferably a hand valve is provided in the pipe connecting the pressure tank to the cylinder, to prevent the release of pressure from the cylinder from accidentally releasing the shoe until the traction means are repaired.

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In the accompanying drawings, which illustrate a practical embodiment of the principles of my invention,

Fig. 1 is a longitudinal vertical section showing a car provided with my automatic safety brake device, showing the brake shoe retracted out of its operative position, and

Fig. 2 is a similar view showing the shoe raised into contact with the slope roof to halt the run away car and the train in which it may be coupled, and

Fig. 3 is a detail on enlarged scale showing the means for attaching the end of the connecting rod to the valve connecting the pressure tank to the single-acting cylinder.

Referring to the drawings, 1 indicates the inclined track of the tunnel or roofed passage along which the train of cars is being raised or lowered, as in the entry of a slope nine, and 2 indicates the roof of the tunnel or slope which is substantially parallel with the track. The reference numeral 3 indicates a car carrying the safety brake mechanism. This is preferably a special car coupled to a burden bearing car or a train of such cars loaded with coal or other substances and to be drawn up or lowered down the inclined track 1 which may be on a twenty percent incline to the horizontal, or it may be a passenger car loaded with miners.

A tank 4 containing compressed air is located within the car 3. This may be a replaceable tank, so that when the pressure in a tank falls below the necessary amount to operate the safety roof brake, a fresh tank may be substituted, or, if desired, the tank may be permanently mounted in the car 3, and means, such as an air compressor, not shown, driven by the movement of the car may be used to maintain the necessary pressure in the tank.

The tank 4 is connected by a pressure pipe 5 to the rear end of the cylinder 6 mounted within the car as on the deck or platform 7. The cylinder 6 is provided with a single-acting piston 8. The piston 8 is provided with a piston rod 9 which extends through the front end of the cylinder and is connected to an intermediate portion of a lever 10. The lower end of said lever is pivotally mounted within the car 3, as for instance on platform 7. A gudgeon 11 is mounted on the outer end of the piston rod and engages a longitudinal slot 12 in the lever 10 to slide along said slot when the lever 10 is being swung.

On the upper end of lever 10 is the frictional brake shoe 13 pivoted to said lever on a horizontal axis. The brake shoe is provided with a central extended flat surface to increase the contact area engaging the roof 2 when the lever is moved counterclockwise from its position illustrated in Fig. 1 into its position illustrated in Fig. 2 engaging the roof 2 of the slope. At its front and rear, as shown in the drawing the shoe is provided with downwardly curved wings 14—14 which enable the shoe to slide into flat contact with the roof rather than to dig into the latter as the shoe moves into contact with the roof, to halt the car.

A gravity centrifugal governor is shown at 15 connected as by sprockets and chain 16 to the axle or wheel of the car 3. The sliding collar 17 on the spindle 18 of the governor is connected to one arm of a bell crank lever 18a pivoted at its apex to a portion of the car 3 while the second arm of the lever is operatively connected to the stem of a valve 20, in the pipe 5, by the link 19.

The end portion of the link 19 adjacent the valve 20 is provided with a longitudinal slot 19a which is slidably engaged by a pin 21a extending laterally from the lever of valve 20. Thus lost motion of the link 19 is provided for preventing the governor from opening the valve 20 to admit pressure into the rear of cylinder 6 and thus force the brake shoe against the mine roof, unless the car attains a predetermined runaway speed. This governor is arranged so that when the speed of travel of the car 3 exceeds the safety maximum, as when the traction cable drawing the train of cars up the slope or lowering them thereon breaks, the governor will open the valve 20, admitting pressure to the cylinder 6 and causing the lever 10 to be swung counterclockwise, bringing the shoe 13 into contact with the roof 2 of the slope and halting the travel of the train of cars. As the movement of the run away car lessens and the collar 17 rises on the spindle 18 of the governor, the link 19 will not close the valve 20 because of the leeway afforded by the slot 19a. After the wheels of the car are blocked to prevent resumption of movement, and the valve 20 is manually closed, the valve 22 may be opened to permit the escape of pressure from the cylinder so that the shoe 13 may be retracted from contact with the roof 2.

The numeral 23 indicates a pressure gauge on tank 4 to indicate the available pressure in said tank, and whether a fresh tank should be substituted.

In the prior art numerous means and methods to prevent a runaway of a traveling vehicle have been proposed. Thus means for adding to the pressure between the wheels and the track rails have been suggested, but have not gone into use in slope mines because the momentum of a runaway train of cars on a slope of at least twenty degrees would be so great that the cars would promptly jump the track and result in a serious accident to men and equipment. In some cases it has been proposed to provide shoes or contact members which, when a runaway occurs, engage

stationary members at either side of the track, but this is impractical where the passageway is relatively wide, and at best the upsetting of the cars is the result. Again, it has been proposed to provide a brake arm with a serrated contact surface which, in the case of a runaway, is forced down against the surface of the track, but the effect would be to elevate the car and capsize the car or train of cars. The like result would follow if the car be provided with a trailing drag bar which is intended to dig into the track if the movement of the cars in a runaway is downwardly.

In the present invention the pressure is not applied merely in a downwardly direction, but the car is held by pressure applied against the roof and also against the track, and the braking action does not tend to lift the car from the track, but acts by wedging the car against the track and also against the roof of the tunnel.

Therefore a positive braking effect is automatically produced which will safely halt the movement of the car or train or cars, without injury to the men who may be aboard the train, or to the valuable equipment, thus preventing injury without tearing up the track or spilling the contents of the cars.

I claim:

1. A vehicle roof brake comprising, a mine car, a brake shoe having a top surface to frictionally engage and slide along the roof of a mine, lever means pivoted to the car and the under side of the brake shoe to raise the latter into engagement with the roof of a mine when extended, a fluid actuated servomotor mounted on the car and having piston means connected to said lever means, and control means actuated by the movement of the car to supply fluid under pressure to said servomotor to actuate said piston means and extend the lever means to force the shoe upwardly into frictional engagement with the roof of a mine to retard the movement of the car, the force applied through the brake shoe on the mine roof reacting through the mine car and its wheels to retard the same.

2. The structure of claim 1 characterized in that said control means includes a governor operated by a wheel of the mine car in accordance with the speed of the mine car.

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