Oct. 16, 1934. H. C. CARTER 1,977,228

LOW COAL LIMIT SWITCH

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FIG. 1

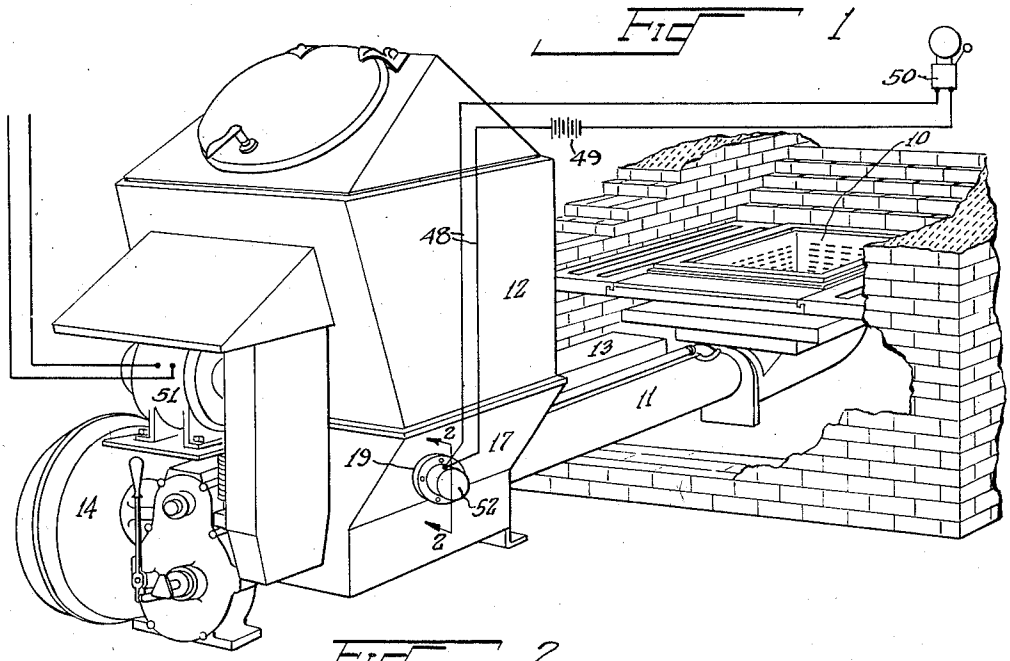


FIG. 2

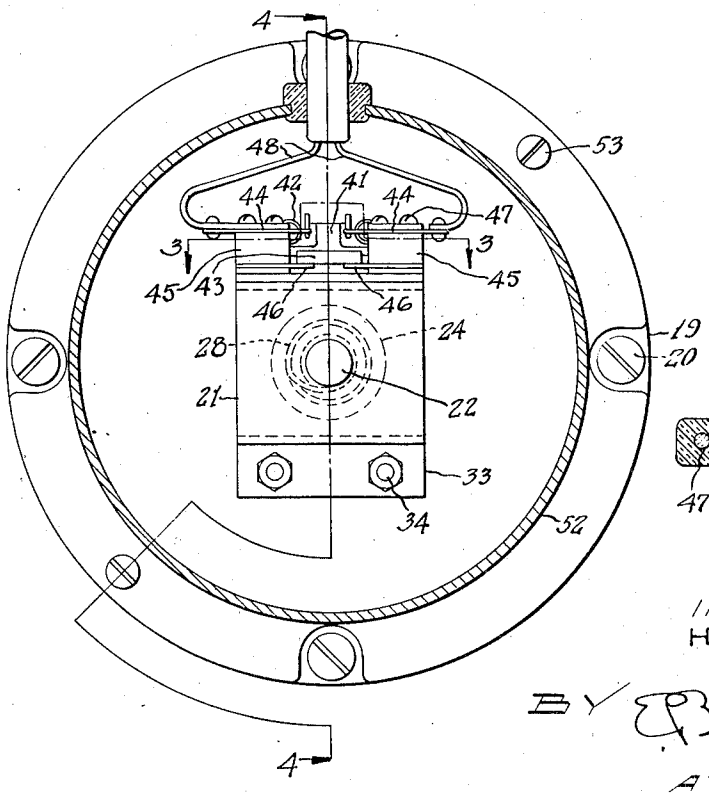
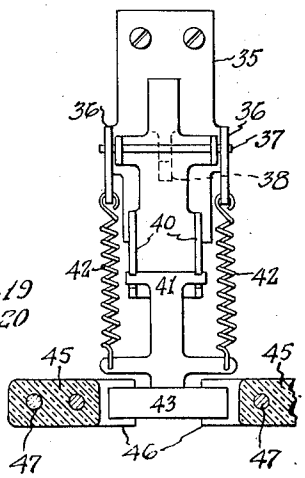


FIG. 3



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FIG. 4

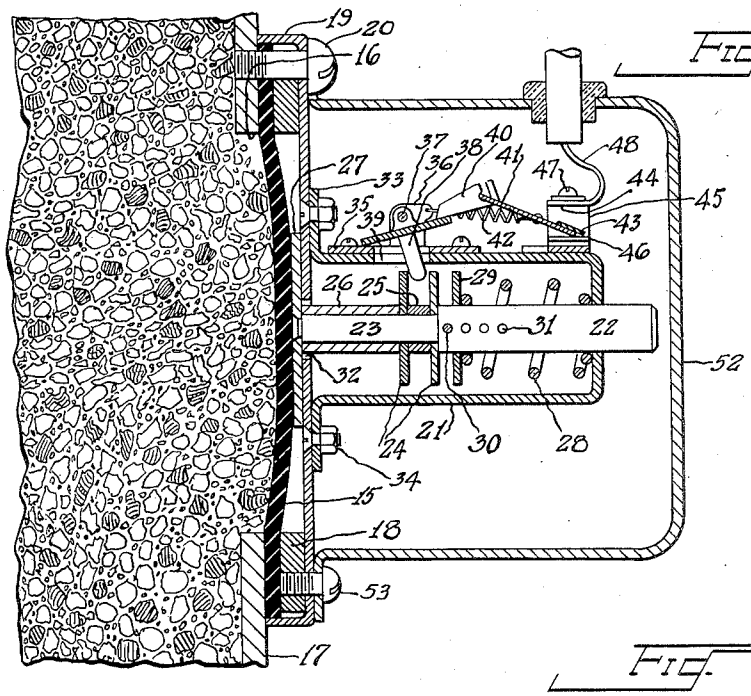
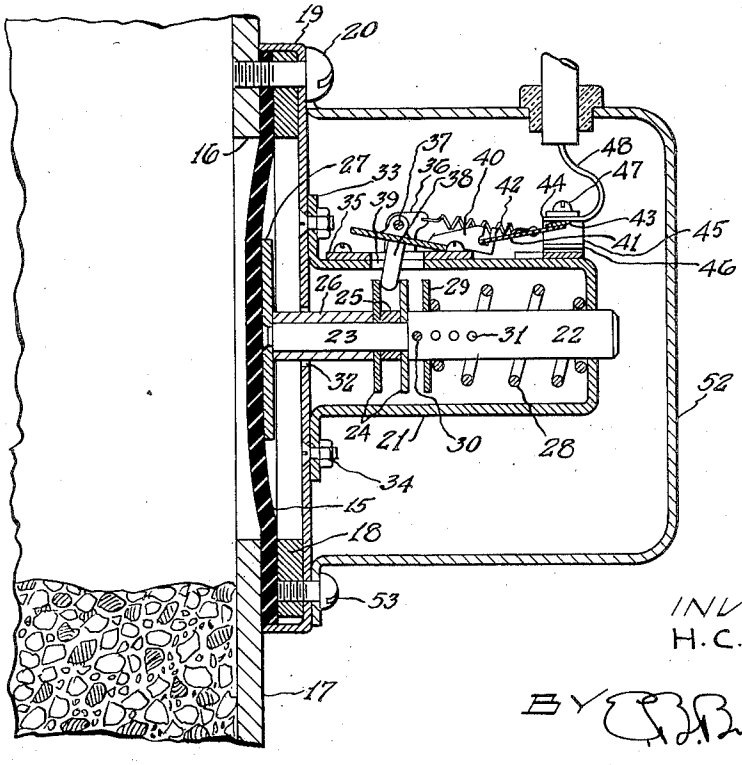


FIG. 5



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UNITED STATES PATENT OFFICE

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LOW COAL LIMIT SWITCH

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Application January 23, 1932, Serial No. 588,482

1 Claim. (Cl. 200—52)

This invention relates generally to stokers, and particularly to devices for indicating a lack of fuel in the hopper of the stoker.

The main object of this invention is to make it possible to prevent the operation of a stoker when the supply of fuel is exhausted by notifying the attendant that the fuel supply needs replenishing.

The second object is to prevent a premature burning out of the tuyère elements which would occur if the stoker was operated without fuel for a period of time which would permit the coal bed to be burned down low into the retort.

The third object is to provide a low coal limit switch whose operating parts cannot be rendered inoperative by dust or particles of fuel from within the hopper.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of a stoker installation showing the location of the switch.

Fig. 2 is a section taken along the line 2—2 in Fig. 1.

Fig. 3 is a section taken along the line 3—3 in Fig. 2.

Fig. 4 is a section taken along the line 4—4 in Fig. 2 showing the position of the parts when an ample supply of fuel is in the hopper.

Fig. 5 is a section similar to Fig. 4 but showing the position of the parts when the fuel supply is running low.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, there is shown the tuyère 10 of a coal burning stoker past which tuyère is fed fuel through the fuel duct 11 from a magazine or hopper 12. Air is supplied to the tuyère 10 through an air duct 13 by means of a fan within the casing 14.

Referring more particularly to my invention the same will be seen to consist of a flexible diaphragm 15 which is placed across an opening 16 in the side 17 of the hopper 12. Against the diaphragm 15 is placed a washer 18. Outside of the washer 18 is secured a hollow base 19 by means of the screws 20. On the outside of the base 19 is secured a frame 21 within which is mounted a plunger 22 having a reduced end 23 on which are placed the washers 24 which are separated by a spacer 25. A second spacer 26 is placed between the end washer 24 and a head 27 which is riveted on the end of the reduced portion 23. The head 27 bears against the diaphragm 15.

On the plunger 22 is placed a spring 28 whose compression may be adjusted by means of the washer 29 which is held in position with relation to the plunger 22 by means of the pin 30 which may occupy any of the holes 31 formed in the plunger 22. The spacer 26 passes freely through the opening 32 in the base 19.

The frame 21 is provided with flanges 33 which is secured to the base 19 by means of the bolts 34. To one side of the frame 21 is secured a plate 35 from which project the standards 36 which carry the transverse shaft 37 on which is rockably mounted the operating arm 38 of a toggle switch. The arm 38 has its end between the washers 24 and is capable of moving freely in the slots 39 formed in the plate 35 and frame 21. The arm 38 has formed thereon a pair of outwardly projecting ends 40 which support the outer end 41 of the toggle switch. The end 41 is joined to the standards 36 by means of the springs 42.

Across the end 41 is secured a transverse bar 43 adapted to bridge across the contact arms 44. The arms 44 are supported on the insulation blocks 45 which rest upon the stops 46 which, in turn, together with the arm 44 and the blocks 45, are secured to the frame 21 by the screws 47. From the contact arms 44 the lead wires 48 extend to a source of power 49 and a bell 50. The bell 50 may, of course, be replaced by or supplemented with lights or an electrically operated switch adapted to stop the stoker motor 51 should this be desired.

The frame 21 and the toggle switch just described are enclosed by a casing 52 which is secured to the base 19 by means of the screws 53.

Obviously, the details of construction of this device may be varied greatly without departing from the spirit of the invention.

While this device has been described and illustrated as a low coal limit switch, it is also employed for a totally different purpose, namely for the control of a conveyor for supplying coal to the hopper 12 from a storage bin. When so used instead of being mounted at the bottom of the hopper (as shown) it is used near the high coal level point in the hopper. Obviously, one of these devices could be placed at either or both of the positions illustrated and referred to, to accomplish both of the functions should this be desired.

When employing this switch for the purpose

of controlling the feeding of coal into the hopper the device may be readily converted from double pole single throw type of switch to a double pole double throw type by merely converting the stops 46 into contact arms, similar to the arms 44, employing the additional arms to control whatever other equipment it is deemed necessary. In other words, if using a hopper-filling mechanism the entire switch will be mounted in the upper portion of the hopper and the set of contact arms 44 may be used to sound the signal 50 or start the hopper-loading conveyor, and the set of contact arms corresponding with the stops 46 will be employed to stop the conveyor.

Obviously, the switch can be used in a great variety of manners without departing from the spirit of the invention.

I claim:

A low coal limit switch for comminuted fuels confined within a hopper comprising a flexible diaphragm adapted to be secured over an opening in the under side of the hopper of an underfeed stoker, a plunger mounted at the center of the outer side of said diaphragm and normal thereto, a frame for guiding said plunger, a spring for urging said plunger against said diaphragm, a pair of spaced washers mounted on said plunger in planes normal to the axis thereof, a toggle switch secured to said frame having an operating arm extending between said washers, and a shell forming a cover for said switch and also forming a means for securing said diaphragm to said hopper.

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