

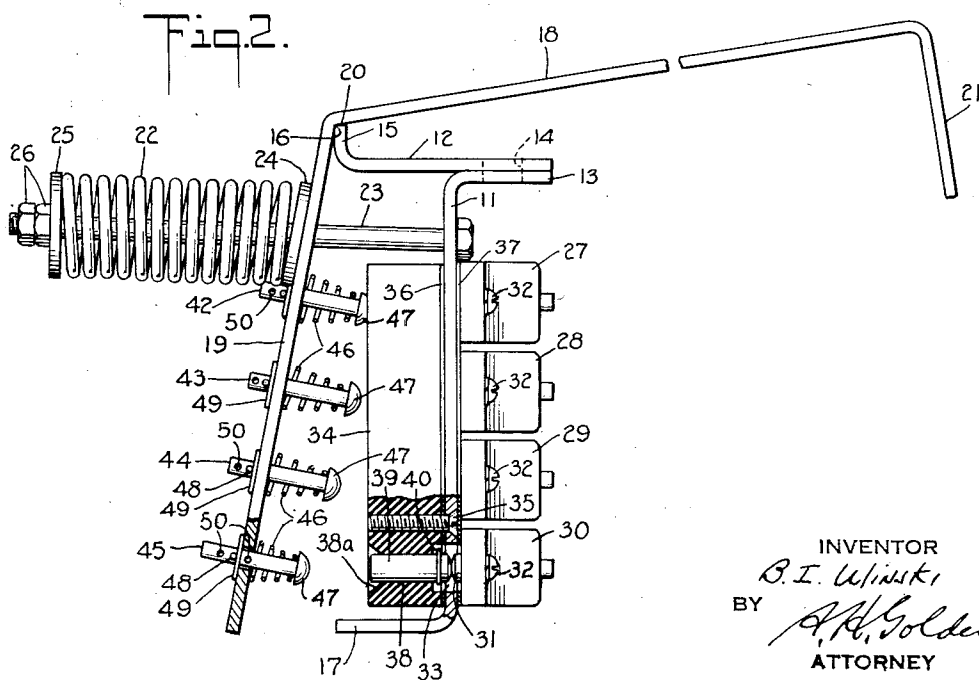
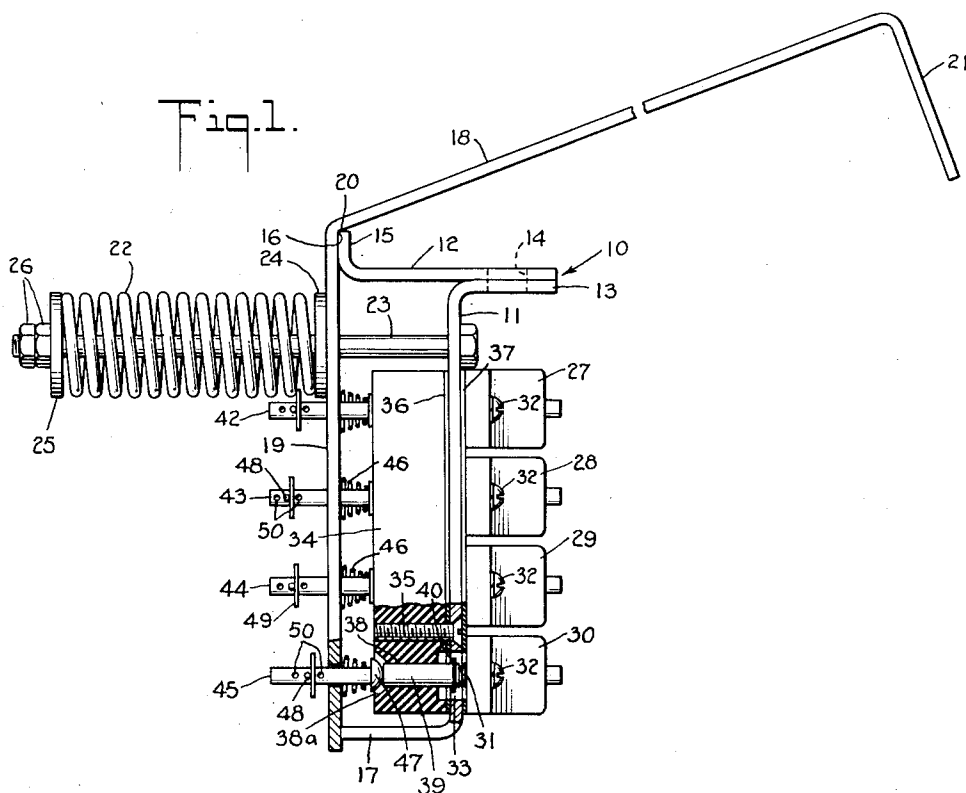
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SPARK-PROOF ACCELERATOR ASSEMBLY

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SPARK-PROOF ACCELERATOR ASSEMBLY

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9 Claims. (Cl. 200—18)

This invention relates to a foot-operated accelerator for electric industrial trucks. More particularly, my invention relates to an extremely novel accelerator assembly having pedal-actuated means for closing in proper sequence a number of motor control circuits in a truck of this type. My novel construction can be very readily adjusted for closing the motor circuits in any predetermined order but, nevertheless, is exceedingly simple and utilizes a relatively small number of parts. These parts are so constructed and arranged as to enable the accelerator to operate without sparks that are exposed to the atmosphere so that the accelerator can be safely utilized in an environment where there is danger of fire or explosion.

As one feature of my novel accelerator assembly, I utilize as two principal parts a pedal and a support frame that are formed from sheet metal. The frame supports a series of switches for the control circuits, and is formed at one edge to provide a fulcrum for the pedal. The sheet metal pedal is bent angularly to form a seat to coact with the fulcrum, and has at one side of the seat an arm through which the switches are actuated. The portion of the pedal at the opposed side of the seat forms a tread for the foot of the driver. The support frame carries a spring that holds the pedal seated on the fulcrum to pivot on the support frame, this spring acting further to rotate the pedal to a normal position.

As a further feature, I equip the pedal arm with spring-pressed plungers to move the switches. These plungers are retained relatively to the pedal arm through means that enable the accelerator to be very readily adjusted for moving the switches in any predetermined order. Each plunger yields upon actuating its particular switch so that the pedal arm does not apply excessive pressure to the switch, regardless of the particular adjustment of the plungers.

As a still further feature, my novel construction uses pre-assembled snap-action switches of a standard commercial type. These switches have enclosed contacts with operating buttons for moving the contacts, and are available with a pair of contacts that are normally open, or normally closed, or with other standard contact arrangements. Switches having different arrangements of contacts are readily substituted on the support frame of my novel accelerator, and I can select those switches that are suited for a particular motor control circuit. This feature, together with the adjustable action of the plungers on the pedal arm, makes my novel accelerator very versatile and easily adapted to control different types of circuits.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate

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that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawing:

Fig. 1 is a side view of my novel control assembly, partly in section.

Fig. 2 shows the accelerator with the pedal in depressed position.

Referring now more particularly to the drawings, the numeral 10 indicates generally the sheet metal support frame of my novel accelerator assembly. This support frame 10 has a vertical bracket portion 11, and a horizontal upper arm 12 that is attached to a flange 13 on the bracket portion 11. I prefer to form an opening 14 through the arm 12 and flange 13 to receive a bolt, not shown, for mounting the support frame upon the truck. The left hand portion of the bracket arm 12, as viewed in the drawing, is bent upwardly to form a flange 15 having a transverse fulcrum edge 16. The lower end 17 of the vertical portion 11 of the support frame is bent into parallel relation with the horizontal arm 12, thereby forming a stop for the pedal, as will be described in due course.

To form the pedal, I bend a section of sheet metal angularly to form a tread portion 18 and a downwardly extending arm 19, with the angular relation of the portion 18 and arm 19 providing a seat 20 on the pedal. Preferably, also, the forward end of the tread portion 18 is bent downwardly to form a stop 21 that is adapted to engage a part of the truck when the pedal is depressed. The lower end of the pedal arm 19 is so positioned as to engage the stop 17 on the support frame 10 to limit movement of the pedal in the opposed direction.

I utilize a coil spring 22 to hold the pedal seated on the fulcrum 16. I particularly mount the spring 22 on a rod 23 carried by the vertical portion 11 of the support frame and extending rearwardly past the pedal arm 19. The spring 22 is engaged between a seat 24 positioned against the rear face of the pedal arm 19 and a washer 25 that is retained on the rear end of the rod 23 by nuts 26. It is important to observe here that the coil spring 22 acts at a point that is a short distance below the fulcrum 16 to press the pedal arm 19 toward the stop 17 on the support frame. The spring 22 thereby acts to hold the pedal seated upon the fulcrum 16 while simultaneously pressing the pedal to a normal position in which the tread 18 of the pedal is raised, as shown in Fig. 1. When the tread 18 is depressed, as in Fig. 2, the pedal arm 19 moves away from the stop 17 in the axis of the fulcrum 16, with the coil spring 22 still acting to hold the pedal seated upon the fulcrum.

I show at 27, 28, 29, 30 a series of switches of the type having operating buttons 31. These switches 27 to 30 are attached in a vertical row to the front surface of the vertical frame portion 11 by screws 32, with the operating buttons 31 positioned in relatively large openings 33 in the frame portion 11. Upon the rear surface of the vertical frame portion 11, I mount a block 34 of insulating material through screws 35. I utilize a gasket 36 between the support frame and the block 34, and also a gasket 37 between the frame and the switches, whereby the switch operating buttons 31 are completely enclosed. I form a bore 38 through the block 34 in aligned relation to each switch operating button 31, and I mount pins 39 to slide in these bores 38 to depress buttons 31. The block 34 has inclined cam surfaces 38a at the outer ends of the bores 38, for reasons that will

appear. A retaining ring 40 on each pin 39 prevents the pin from sliding rearwardly out of its bore 38.

The arm 19 of the pedal carries a series of plungers 42, 43, 44, 45 in aligned relation to the switch operating pins 39. These plungers are mounted to slide in openings in the pedal arm 19, and a coil spring 46 is engaged between arm 19 and a head 47 on one end of each plunger to press the plunger toward the corresponding switch operating pin 39. The opposed end of each plunger 42, 43, 44, 45 has a series of transverse openings 50, and a cross pin 48 in one of these openings in each plunger engages a washer 49 at the rear surface of the pedal arm 19 to limit the movement of the plunger relatively to arm 19. Thereby the springs 46 and cross pins 48 coact to determine a particular position of each plunger 42 to 45 relatively to the pedal arm 19. This enables the arm 19 to actuate each switch operating pin 39 at a particular point in its rotating movement on the fulcrum 16 whereby to move the switches 27-30 in a predetermined order. The cam surfaces 38a on the block 34 will guide the heads 47 on the plungers into contact with the pins 39, in the event that the plungers are not perfectly aligned with the pins. Because the pedal arm 19 acts on the plungers 42 to 45 through the springs 46, the arm 19 cannot apply excessive pressure to the switches. The order in which the pedal arm 19 moves the switches can very readily be changed merely by inserting the cross pin 48 of each plunger into a different one of the openings 50 of the plunger.

When the coil spring 22 holds the pedal arm 19 in its normal position against the stop 17 on the support frame 10, the arm 19 acts on the plungers 42 to 45 through springs 46 to hold the switch operating pins 39 depressed, these pins in turn holding the switch buttons 31 depressed. If we consider now that the truck driver depresses the tread portion 18 of the pedal to move the arm 19 away from the switches, the plungers 42 to 45 will move away from the switch operating pins 39, thereby effecting movement of the switches. Assuming for purposes of description that the switch 30 is to move first, the cross pin 48 on plunger 45 will have been so adjusted, as in Figs. 1 and 2, that this plunger moves away from the corresponding switch operating pin 39 before movement of the other plungers away from their switch operating pins. As the pedal arm 19 continues to move away from the switches, the arm will move the plungers 44, 43, and 42 away from their corresponding switch operating pins, with the particular order in which these plungers act determined by the adjustment of their cross pins 48.

If we assume that the motor control circuits are such that they are to be closed when the accelerator pedal is depressed, the switches 27 to 30 that are utilized are of the type having contacts that close when their operating buttons 31 are released. Thus, when the pedal spring 22 holds the arm 19 against the stop 17, as in Fig. 1, the pedal will act through plungers and operating pins to hold the switch buttons 31 depressed and the motor control circuits will be open. As the driver depresses the tread 18 of the accelerator, the pedal arm 19 moves the plungers 42 to 45 away from the operating pins 39 to relieve pressure on the switch buttons 31, thereby causing the switches 27 to 30 to close the motor control circuits in predetermined order.

I believe that those skilled in the art will now understand that I have contributed an exceedingly novel accelerator assembly having very considerable advantages. Notwithstanding its extreme simplicity, my novel assembly is very versatile and enables me to utilize standard commercial switches suitable for controlling different types of motor circuits, while also enabling me to change very readily the order in which the circuits are closed. In addition, my novel construction enables the accelerator to operate without causing hazardous sparks.

I believe, therefore, that my invention will now be fully appreciated.

I now claim:

1. In a combination of the class described, a series of switches, a support frame for said switches adapted to be mounted on an industrial truck, a block on said support frame at one side of said series of switches, an operating pin for each switch mounted to slide in the block, an edge portion on said support frame forming a fulcrum positioned in an axis at one end of the block, a sheet metal pedal bent angularly to form a seat to coact with said fulcrum, a spring holding the sheet metal pedal seated on the fulcrum whereby to pivot relatively to the support frame with an integral part of the pedal moving toward and away from the switch operating pins, a stop on the frame for the movement of the said part of the pedal toward the pins, said spring pressing said part against its stop, a series of plungers carried by said part of the pedal in aligned relation to the switch operating pins, springs through which the pedal acts when against its stop to press the plungers relatively to the switch operating pins to hold each switch in a particular position, and means acting when the pedal moves away from the stop to hold each plunger against the pressure of its spring whereby to enable the switches to move to an opposed position in predetermined order.

2. In a combination of the class described, a series of switches having operating pins or the like, a support frame for said switches adapted to be mounted on an industrial truck, a means mounting said switches in spaced relation on said support frame, a fulcrum on said frame for a pedal, a sheet metal pedal bent angularly to form a seat to coact with said fulcrum, a spring holding the sheet metal pedal seated on the fulcrum whereby to pivot relatively to the support frame with an arm of the pedal moving toward and away from the operating pins of said switches, a series of plungers carried by said arm of the pedal in alignment with said switch operating pins, springs pressing the plungers relatively to the arm against said switch operating pins, and means whereby the pedal moves said plungers away from said switch operating pins in predetermined order when said pedal is rotated on its fulcrum.

3. In a combination of the class described, a series of switches having operating pins or the like, a support frame for said switches adapted to be mounted on an industrial truck, a means mounting said switches in spaced relation on said support frame, a fulcrum on said frame for a pedal, a sheet metal pedal bent angularly to form a seat to coact with said fulcrum, a spring holding the sheet metal pedal seated on the fulcrum whereby to pivot relatively to the support frame with an arm of the pedal moving toward and away from the operating pins of said switches, a series of plungers carried by said arm of the pedal, springs pressing the plungers relatively to the arm against said switch operating pins, cam means guiding said plungers into alignment with said switch operating pins, and means whereby the pedal moves said plungers away from said switch operating pins in predetermined order when said pedal is rotated on its fulcrum.

4. In a combination of the class described, a support frame adapted to be mounted on an industrial truck, switch means on said support frame, an edge surface on said support frame forming a fulcrum, a sheet metal strap bent angularly intermediate its length to form a seat at the internal side of the bend therein, said seat lying against said fulcrum whereby to pivot on the fulcrum relatively to the support frame, a spring coacting with said strap for holding said strap in one position against said fulcrum, that portion of the strap at one side of said bend and fulcrum forming a foot containing portion of a pedal, and an integral part of said sheet metal strap coacting with said switch means when pivoting on the fulcrum to actuate said switch means.

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5. In a combination of the class described, a support frame adapted to be mounted on an industrial truck, switch means on said support frame, an edge surface on said support frame forming a fulcrum, a member bent angularly intermediate its length to form a seat at the internal side of the bend therein, said seat lying against said fulcrum whereby to pivot on the fulcrum relatively to the support frame, a spring coacting with said member at one side of said bend and fulcrum for holding said member against said fulcrum, said spring by its coaction rotating the member in one direction on the fulcrum, a portion of said member at one side of the bend forming a foot contacting portion of a pedal, and an integral part of said member coacting with said switch means when pivoting on the fulcrum to actuate said switch means.

6. In a combination of the class described, a series of switches, an actuating part in each switch, a support frame for said switches, an operating member mounted for pivoting on said support frame, a series of plungers mounted on said operating member with each plunger movable with said member to apply the plunger to one of the actuating parts of each of said switches, a spring engaged between each plunger and the operating member to press the plunger in one direction relatively to said operating member and toward its switch, means limiting the movement of each plunger by its spring, each spring yielding upon movement of its plunger against its switch actuating part, and each spring being of sufficient strength to effect operation of its plunger and switch part prior to yielding.

7. In a combination of the class described, a series of switches, an actuating part in each switch, a support frame for said switches, an operating member mounted for pivoting on said support frame, a stop on said frame for the pivotal movement of the operating member, a series of plungers mounted on said operating member with each plunger movable with said member to apply the plunger to one of the actuating parts of each of said switches as the member moves toward its stop, a spring engaged between each plunger and the operating member to press the plunger toward its switch, means limiting the movement of each plunger by its spring, each spring yielding upon movement of its plunger against its switch actuating part, and each spring being of sufficient strength to effect operation of its plunger and switch part prior to yielding.

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8. In a combination of the class described, a series of switches, a support frame for said switches, a block mounted on said support frame at one side of said series of switches, an actuating pin mounted to slide in the block for moving each switch, an operating member mounted for pivoting on said support frame, a series of plungers mounted on said operating member with each plunger movable with said member to apply the plunger to one of the actuating pins of each of said switches, a spring engaged between each plunger and the operating member to press the plunger in one direction relatively to said operating member and toward its switch actuating pin, means limiting the movement of each plunger by its spring, each spring yielding upon movement of its plunger against its switch actuating pin, and each spring being of sufficient strength to effect operation of its plunger and switch prior to yielding.

9. In a combination of the class described, a series of switches, an actuating part in each switch, a support frame for said switches, an operating member mounted for pivoting on said support frame, a stop for the movement of the operating member, a plunger for each switch, means mounting the plungers in spaced relation on said operating member with each plunger movable with said member whereby to apply the plungers in predetermined order to the actuating parts of said switches, a spring engaged between each plunger and the operating member to press the plunger in one direction relatively to said operating member and toward its switch, means limiting the movement of each plunger by its spring, each spring yielding upon movement of its plunger against its switch actuating part as the operating member moves against its stop, and each spring being of sufficient strength to effect operation of its plunger and switch part prior to yielding.

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