March 11, 1952 I. F. SCHRECK 2,588,664

DRIVE CONTROL FOR MOTORIZED HAND LIFT TRUCKS

Filed Sept. 27, 1946 2 SHEETS—SHEET 1

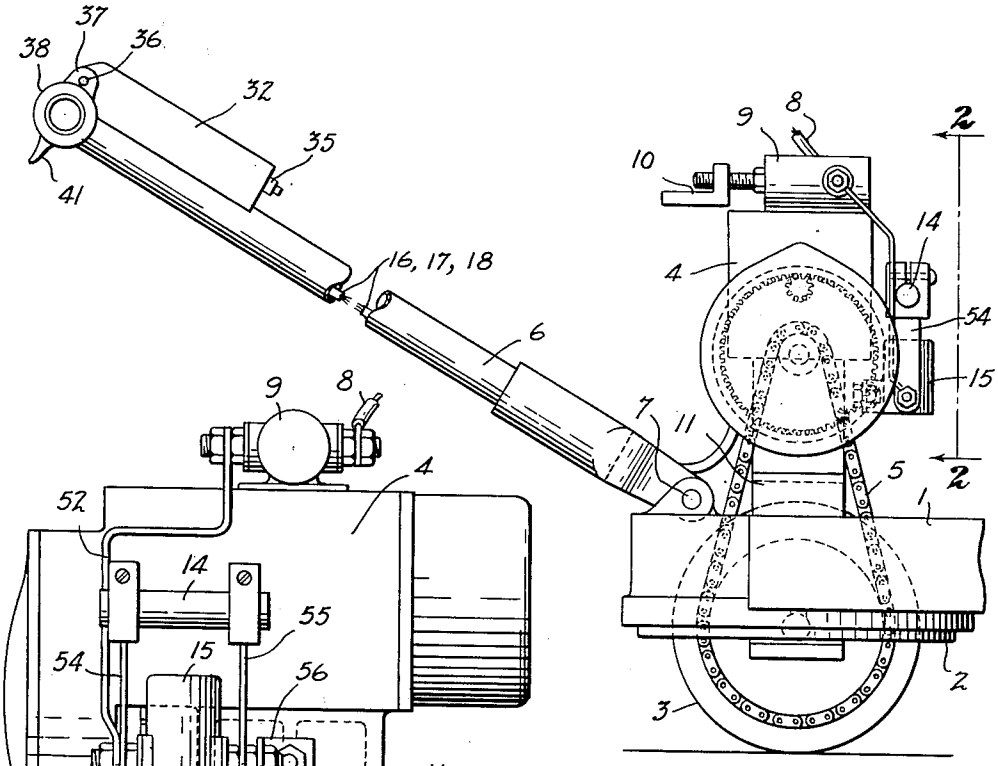


Fig. 1

Fig. 2

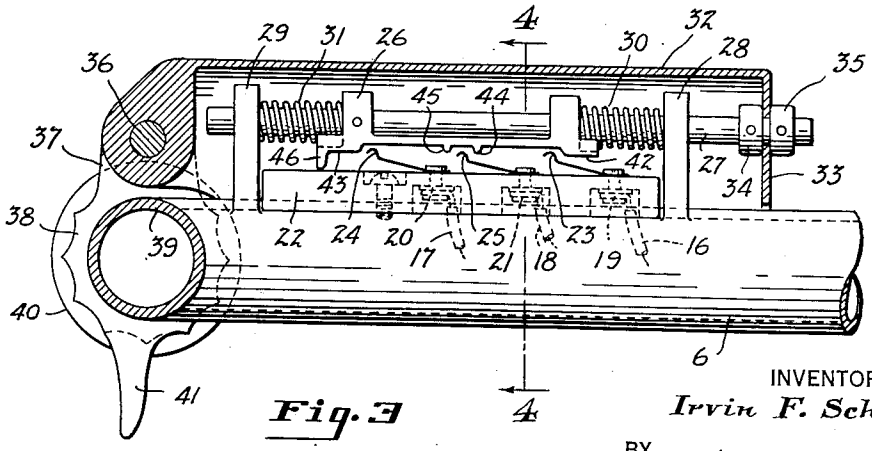


Fig. 3

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DRIVE CONTROL FOR MOTORIZED HAND LIFT TRUCKS

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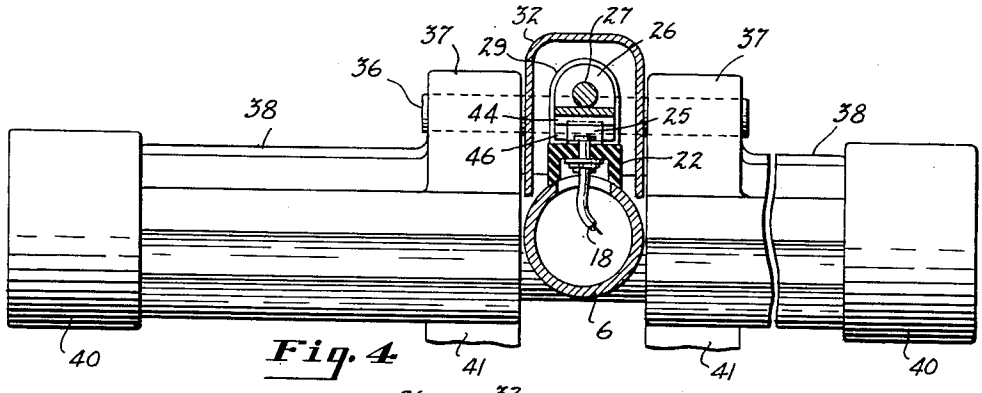


Fig. 4

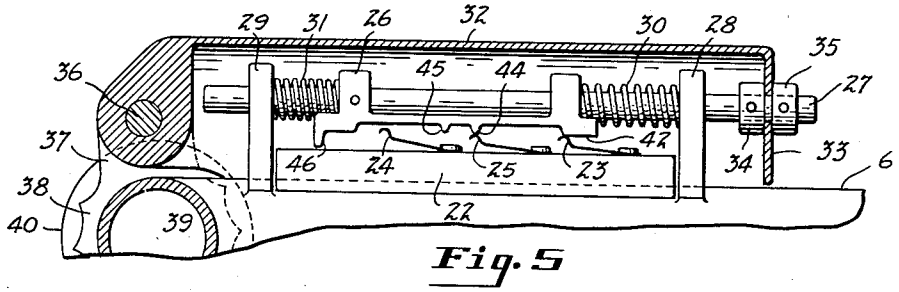


Fig. 5

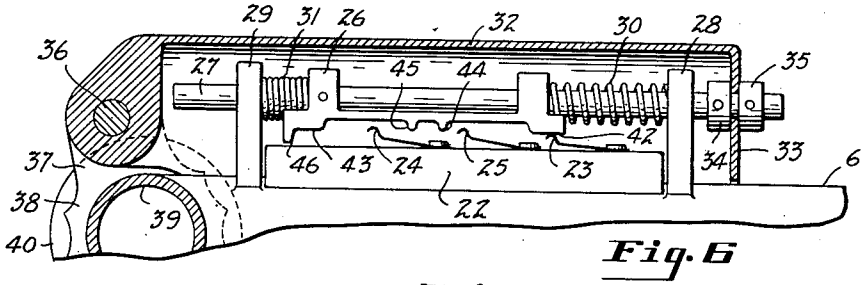


Fig. 6

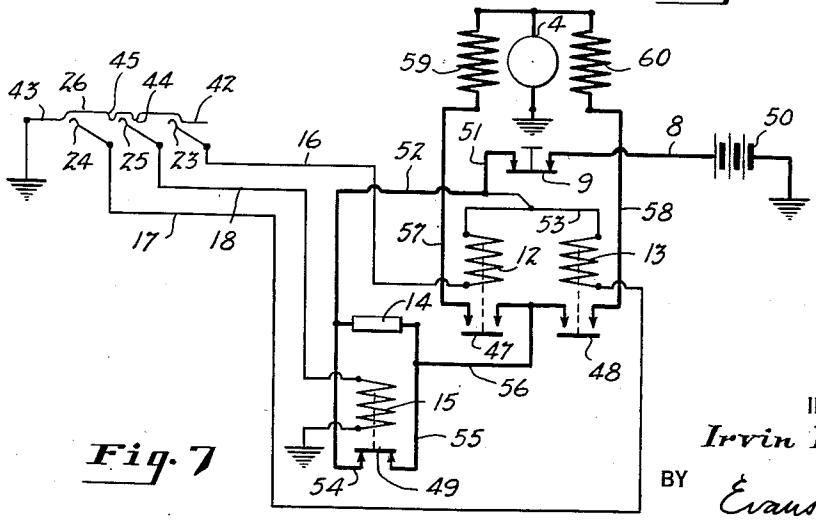


Fig. 7

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UNITED STATES PATENT OFFICE

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DRIVE CONTROL FOR MOTORIZED HAND LIFT TRUCKS

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Application September 27, 1946, Serial No. 699,691

3 Claims. (Cl. 318—386)

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This invention relates to a drive control for trucks of the type shown in my Patent No. 2,209,356, granted July 30, 1940 and known as motorized hand lift trucks, these trucks being provided with a vertically swinging draft tongue that is connected to a swiveled steering wheel frame located at the front end of the truck and carrying a front supporting wheel and a propelling motor that is controlled by manually operable control elements on the draft tongue and by movements of the draft tongue which stops the motor and applies a brake when swung to vertical position.

The invention has for one of its principal objects to provide a control device on the tongue which is manually operable to start, stop and vary the speed of the motor in any of the angular positions of the tongue so as to provide for convenient manipulation of the truck in restricted spaces.

An additional object is to provide a simple speed varying device for an electric propelling motor that can be readily applied to single speed motors in use on such trucks.

A further object of the invention is to provide a control that is operated by turning the tongue hand grip about its axis in one direction or the other from a neutral position and which is operable to start the motor in low speed in either direction and to increase or decrease the speed at will during operation.

With the above and other objects in view, the invention may be said to comprise the control mechanism illustrated in the accompanying drawings, hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification in which:

Figure 1 is a fragmentary side elevation of a front end of a truck to which the invention is applied;

Fig. 2 is a rear elevation of the propelling motor;

Fig. 3 is a longitudinal section through the motor control mounted on the draft tongue;

Fig. 4 is a transverse section taken on the line indicated at 4—4 in Fig. 3;

Figs. 5 and 6 are sectional views similar to Fig. 3, Fig. 5 showing the control in one of its slow speed positions and Fig. 6 showing the control in one of its high speed positions; and

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Fig. 7 is a wiring diagram showing the motor control circuits.

The accompanying drawings show the front end only of an industrial truck, the truck frame being indicated by the numeral 1 and having a swiveled frame 2 mounted at the front end thereof to turn about a vertical axis. The frame 2 has a front supporting wheel 3 mounted therein and carries a propelling motor 4 which drives the wheel 3 through a sprocket chain 5. A draft tongue 6 is connected to the swiveled frame 2 by means of a horizontal pivot 7 and can be used either to steer the truck while it is being propelled, or for pushing or pulling the truck manually.

The motor 4 is preferably an electric motor provided with suitable control switches and supplied with current from a suitable source such as a battery mounted on an adjacent portion of the truck, current being supplied to the motor by a conductor cable 8 through a safety switch 9 which is normally closed but which carries an abutment 10 in the path of movement of the tongue 6 by means of which the switch is opened by the tongue when the tongue is moved to vertical position. The safety switch is shown in more detail in my copending application Serial No. 547,930, filed August 3, 1944, now Patent 2,478,327 issued August 9, 1949. The switch 9 is closed whenever the tongue 6 is moved out of engagement with the abutment 10, so that the motor 4 is operable in any of the inclined positions of the tongue under the control of manually operable means carried by the tongue. The motor 4 is mounted upon a housing 11 that encloses solenoids 12 and 13 which control the forward and reverse actuation of the motor.

The present invention provides a change speed device in the form of a unit which may be attached externally to the motor casing. The change speed unit comprises a carbon rod resistance 14 adapted to be interposed in the circuit of either the forward or reverse winding of the motor 4, whichever is energized, and a solenoid 15 by means of which the resistance is controlled. Wires 16, 17 and 18 extend from one terminal of each of the three solenoids 12, 13 and 15 through the tongue 6, which may be of tubular form, to terminals 19, 20 and 21 carried by an elongated cylindrical block 22 attached to the tongue 6 adjacent its outer end. Energizing contacts 23 and 24 are connected to the terminals 19 and 20 for controlling the solenoids 12 and 13 and an energizing contact 25 is connected to the terminal 21 for controlling

the solenoid 15. A grounding element 26 is positioned above the contacts 23, 24 and 25 and is movable endwise to energize the solenoids 12, 13 and 15 in the proper sequence. The element 26 is preferably in the form of a metal member attached to a shaft 27 that is positioned parallel to the tongue 6 and slidably mounted in lugs 28 and 29 that are suitably secured to the top of the tongue 6. The grounding member 26 is normally held in the neutral position by means of coil springs 30 and 31 which are interposed between opposite ends of the member 26 and the lugs 28 and 29. The switch elements above referred to are enclosed within a housing 32 which also serves as an actuating member, the housing 32 having an inner end wall 33 through which the inner end of the shaft 27 extends and to which the shaft 27 is anchored by means of collars 34 and 35 attached to the shaft 27 inside and outside the wall 33. The outer end of the housing member 32 is connected by a horizontal pivot 36 to lugs 37 carried by hand grip sleeves 38. The lugs 37 are positioned upon opposite sides of the outer end of the member 32, and the sleeves 38 are rotatably mounted on tubular handle members 39 welded or otherwise rigidly secured to the outer end of the tongue 6 and disposed at right angles to the tongue. The hand grip sleeves 38 are mounted between the tongue 6 and retaining collars 40 attached to the outer ends of the members 39. Each of the hand grip sleeves may be provided with a thumb lug 41 to assist in turning it.

The grounding member 26 is provided with end contact portions 42 and 43 which are spaced apart longitudinally a greater distance than the space between the contacts 23 and 24 so that the grounding member may be held in its neutral position out of contact with both contacts 23 and 24, the contact portion 42 being engageable with the contact 23 when the member 26 is moved outwardly and the contact portion 43 being engageable with the contact member 24 when the member 26 is moved inwardly. The contact portions 42 and 43 are of a length such that each remains in engagement with its energizing contact throughout the extent of endwise movement of the grounding member. The engagement of the contact member 42 with the contact member 23 energizes the solenoid 12 to propel the motor forwardly, and engagement of the contact portion 42 with the contact 24 energizes the solenoid 13 to propel the truck rearwardly.

Intermediate the contact portions 42 and 43 the member 26 has short engaging lugs 44 and 45 that are engageable with the intermediate contact 25. In the neutral position of the member 26 shown in Fig. 3, the lugs 44 and 45 are on opposite sides of the contact 25 and out of engagement therewith. Engagement of either the lug 44 or 45 with the contact 25 serves to place the resistance 14 in series with the energized winding of the motor to reduce the speed of the motor in either direction, and the lugs 44 and 45 are spaced from the contact 25 substantially the same distance as the contact portions 42 and 43 from the contacts 23 and 24 when the member 26 is in neutral position, so that one of the lugs 44 or 45 engages the contact 25 simultaneously with the engagement of the contact 23 or 24 with the contact portions 42 or 43, so that the motor is started in either direction at a low speed. Continued movement of the member 26 in either direction causes the lug 44 or 45, in engagement with the contact 25, to move out of engagement with the contact 25, whereupon the motor operates at its high speed.

During operation of the truck, the speed of the motor can be changed at any time by shifting the member 26 to bring the lug 44 or 45 into or out of engagement with the contact 25. The grounding member 26 is preferably provided with a flange 46 that closely overlies the flat top face of the insulating block 22 so as to insure proper positioning of the contact portions of the member 26 with the energizing contacts.

Referring to Fig. 7 of the drawings, the solenoids 12 and 13 control normally open switches 47 and 48 and the speed control solenoid 15 operates a normally closed switch 49 which normally short circuits the resistance 14 but which when opened connects the resistance in the motor circuit to slow down the motor. Current is supplied to the motor from a battery 50 through the conductor cable 8 and safety switch 9. The switch 9 is connected to the control solenoids 12 and 13 by means of wires 51, 52 and 53, the wire 52 being also connected to the resistance 14. The terminals of the switch 49 are connected to opposite terminals of the resistance 14 by means of wires 54 and 55 and a wire 56 connects the resistance 14 to one terminal of each of the switches 47 and 48, the opposite terminals of the switches 47 and 48 being connected by wires 57 and 58 to forward and reverse windings 59 and 60 of the motor 4. When the grounding member 26 is moved outwardly to engage the portion 42 thereof with the contact 23, the current passes through wires 51, 52 and 53, solenoid 12 and wire 16 to ground to energize the solenoid 12 to close the switch 47. Upon closing of the switch 47 current can flow through the wires 51, 52, resistance 14, wire 56, switch 47, wire 57 and winding 59 to ground. The resistance 14 is normally short circuited by wires 54, switch 49 and wires 55 and 56, but since the lug 44 engages the contact 25 at the same time that the contact portion 42 engages the contact 23, the motor is started at slow speed with the resistance 14 in series with the winding 59. Upon further outward movement of the grounding member 26, the lug 44 is moved out of engagement with contact 25 to deenergize the solenoid 15 and permit the switch 49 to close, short circuiting the resistance 14 so that the motor will operate at a higher speed. When the grounding member 26 is moved inwardly the contact portions 43 and the lug 45 simultaneously engage the contacts 24 and 25, energizing the solenoids 13 and 15 to connect the winding 60 in series with the resistance 14 to start the motor in reverse direction at low speed.

In operating the motor to propel the truck either forwardly or rearwardly, the operator can change the speed at will during operation, but the motor is always started at slow speed and is always slowed down before it is stopped. By combining the change speed control with the motor starting and stopping devices on the draft tongue, the operator may control the speed of the motor with the draft tongue 6 in any of its inclined positions.

Trucks of the type herein disclosed have been found to be very useful for handling material in restricted spaces in warehouses, factories and the like and in such spaces it is often necessary to hold the draft tongue in nearly vertical position in making short turns. It is advantageous, therefore, to provide a control for the motor which will permit operation at the desired speed in substantially all angular positions of the draft tongue.

It is to be understood that variations and modifications of the specific device herein shown and described for purposes of illustration may be made without departing from the spirit of the invention.

What I claim is:

1. In a truck of the character described, an electric truck propelling motor having forward and reverse windings, a resistance in series with said windings, means including a normally closed switch for short circuiting said resistance, a manually operable control member mounted for movement away from and back to a neutral position, spring means biasing said member toward neutral position, means controlled by said member when moved in one direction from neutral position to energize one of said windings and when moved in the opposite direction to energize the other of said windings, and means controlled by said member when moved in either direction from neutral position to first open said switch to connect said resistance in the circuit of the energized motor winding to operate the motor at slow speed and then to close said switch to short circuit said resistance to increase the speed of the motor, said switch being reopened to reinsert said resistance in the circuit of the energizing winding during the return movement of said member to reduce the speed of the motor prior to stopping.

2. In a truck of the character described, a truck propelling motor having forward and reverse windings, a resistance in series with said windings, means including a normally closed switch for short circuiting said resistance, a controller including a hand grip member movable in opposite directions from a neutral position to energize the forward and reverse windings of the motor, and means controlled by said manually operable means upon movement in either direction from its neutral position to first open said switch to connect said resistance in the circuit of the energized motor winding to start the motor at slow speed and for then closing said switch to short circuit said resistance to increase the speed of the motor and upon return movement in either direction to open said switch to reconnect said resistance to the energized winding to reduce speed prior to deenergization of the motor.

3. In a truck of the character described, a reversible electric truck propelling motor, two starting solenoids, one controlling forward actuation and the other rearward actuation of the motor, a third solenoid controlling the speed of said motor, circuits for said solenoids including a contact for energizing each solenoid, and a manually operable controller engageable with said contacts, said controller operating upon movement in either direction from a neutral position to energize one or the other of the starting solenoids and to energize and then deenergize the speed control solenoid.

IRVIN F. SCHRECK.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,432,831	Blood	Oct. 24, 1922
1,942,587	Whitman	Jan. 9, 1934
2,108,607	Nelson	Feb. 15, 1938
2,193,268	Catron et al.	Mar. 12, 1940
2,209,356	Schreck	July 30, 1940
2,327,583	Framhein	Aug. 24, 1943
2,399,605	Schroeder	Apr. 30, 1946
2,401,113	Schroeder	May 28, 1946