July 29, 1952 G. V. SADLER 2,605,313

ELECTRIC CRANE AND THE LIKE

Filed Oct. 25, 1947 3 Sheets-Sheet 1

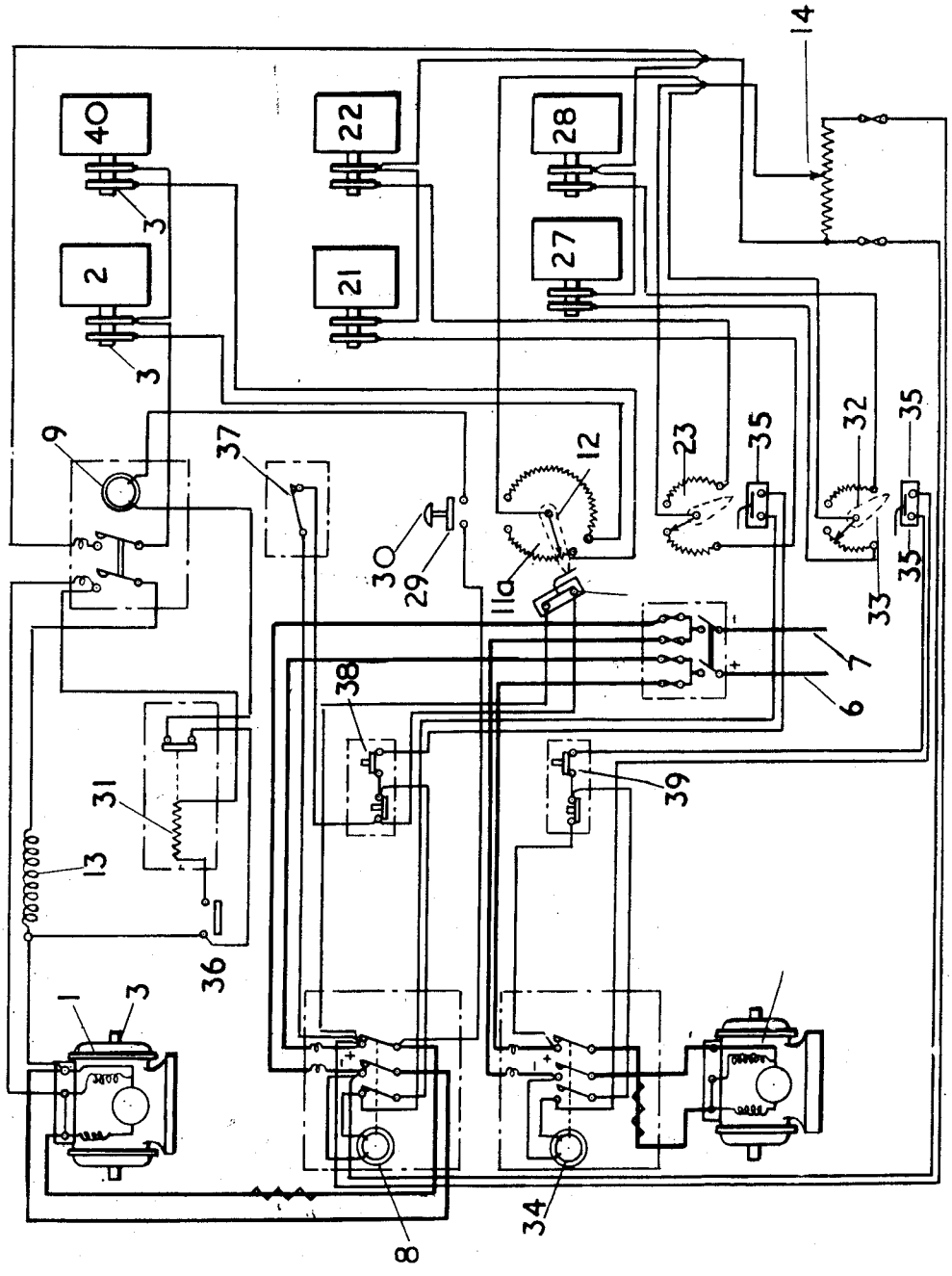


FIG. 1

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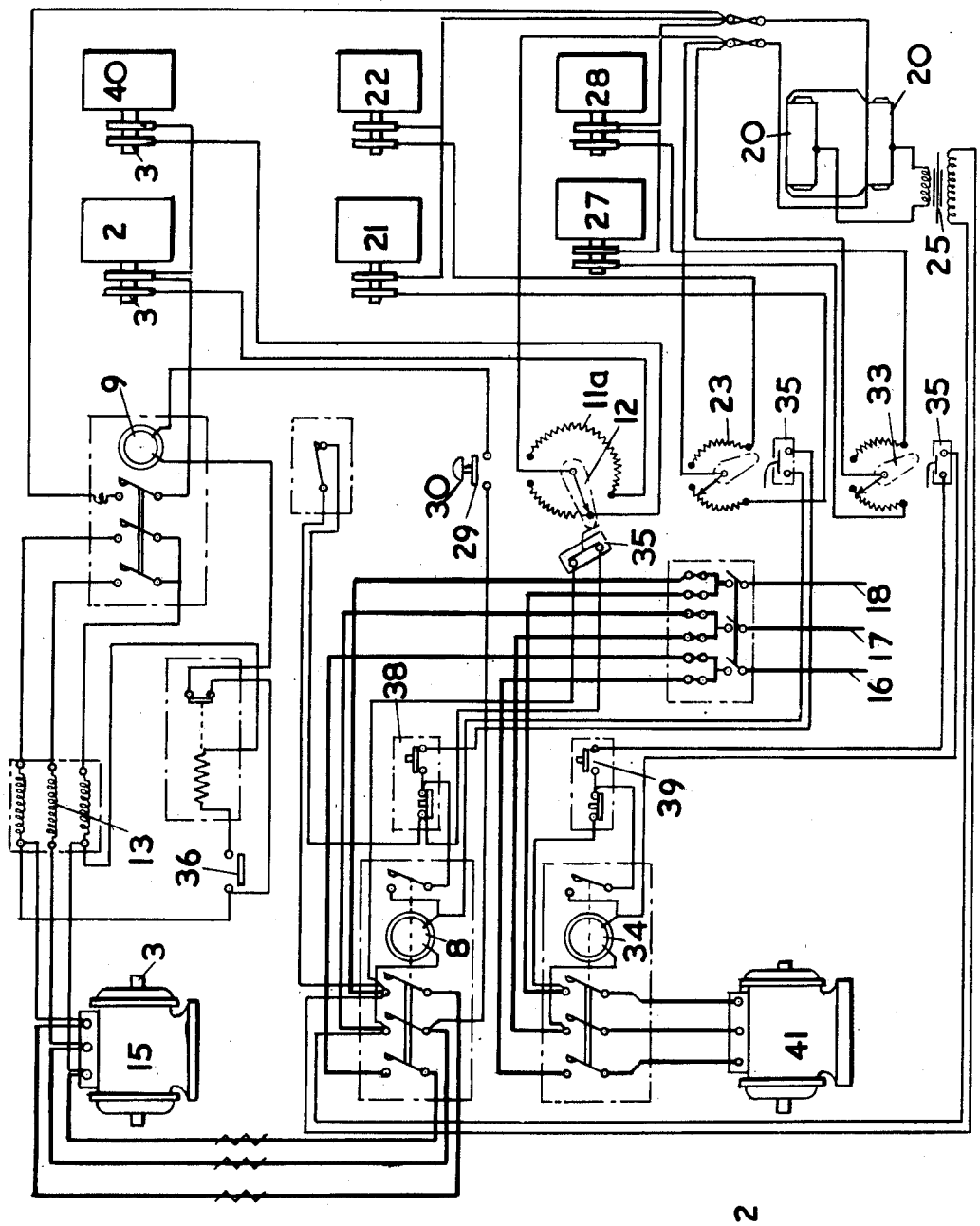


FIG. 2

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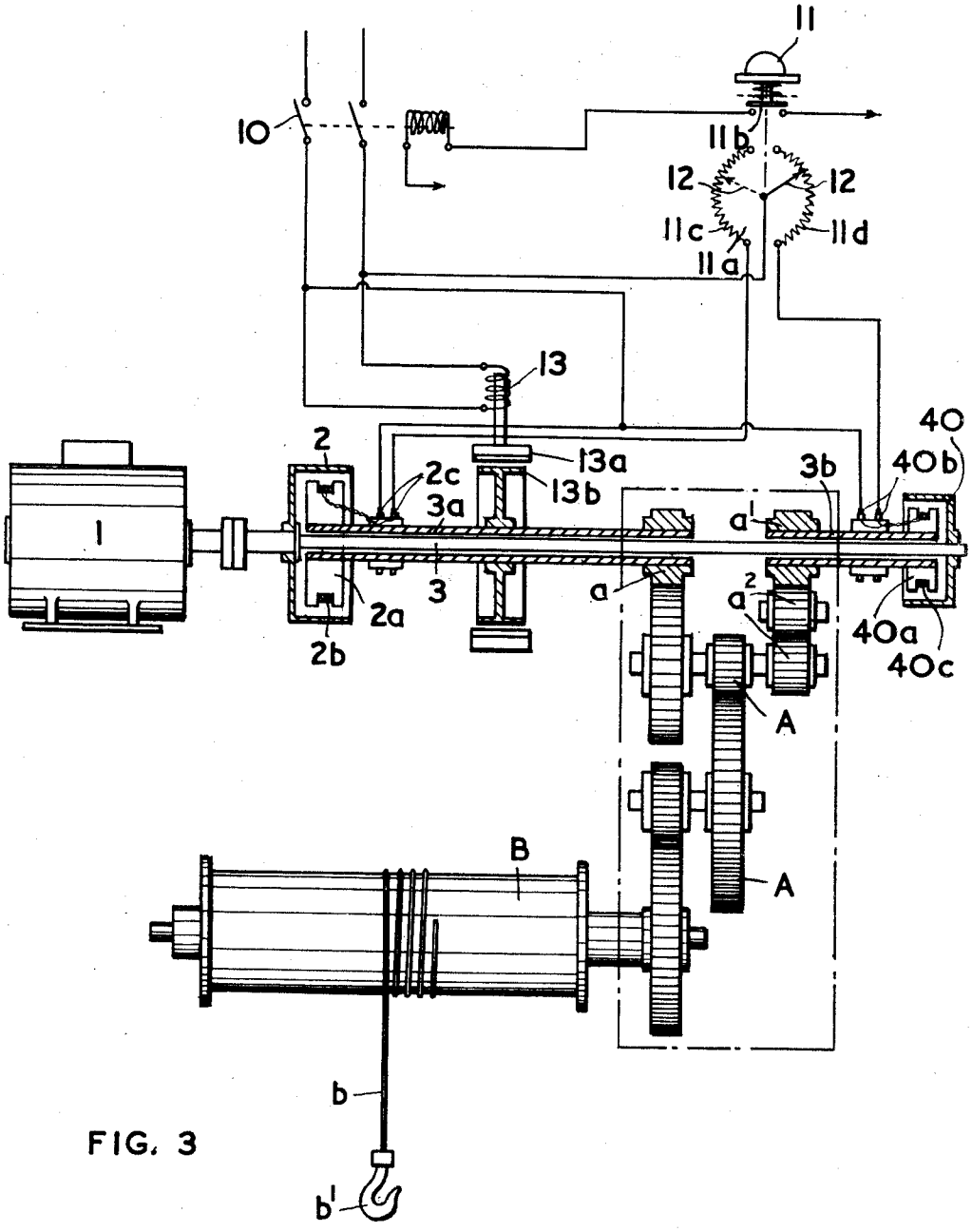


FIG. 3

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UNITED STATES PATENT OFFICE

2,605,313

ELECTRIC CRANE AND THE LIKE

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Application October 25, 1947, Serial No. 782,073
In Great Britain March 9, 1946

Section 1, Public Law 690, August 8, 1946
Patent expires March 9, 1966

3 Claims. (Cl. 172—284)

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This invention relates to improvements in control gear for electric cranes, and pulley blocks, telphers, lifts, hoists and the like.

The object of the present invention is to provide a control for a crane or the like driven by either a D. C. or A. C. motor running continuously at a constant speed during the operation of the crane or the like.

The invention comprises an electric motor connected to a hoisting drum through an eddy current magnetic coupling the degree of excitation of the coupling being controlled by a stepless controller operated by a handwheel in which is incorporated an electric switch the contacts of which are closed by a press knob in any position of the controller.

The invention will be described with reference to the accompanying drawings:

Fig. 1 is a circuit diagram for a hoist according to the invention operated by two D. C. motors;

Fig. 2 is a similar diagram for a hoist or the like operated by two A. C. motors from a three phase supply;

Fig. 3 is a diagram showing a practical embodiment of the invention partly in section.

The simplest form of the invention is shown in Figs. 1 and 2 as applied to a D. C. and A. C. motor respectively operating a hoist. In the arrangement shown in Fig. 1 employing a D. C. motor 1 an eddy current coupling 2 is mounted on the shaft 3 of the driving motor 1 having an armature 4 and a series-shunt field 5 supplied from D. C. mains 6 and 7 to provide a series motor with a speed limiting winding. The inner member 2^a (Fig. 3) of the eddy current coupling 2 carrying the exciting winding 2^b is mounted on the shaft 3^a in the form of a sleeve surrounding shaft 3 of the gearing A for driving the winding or hoisting drum B around which the hoisting cable *b* carrying a load hook b^1 is wound. A pinion *a* is keyed on the shaft 3^a driving the gearing A and the winding drum B. Current is supplied to the coil 2^b through slip rings 2^c. The motor is operated by a motor contactor 8 and the excitation applied to the coupling 2 by an energising contactor 9 the contactor 8 being placed in circuit by the operation of a switch 10 and the coupling 2 being excited by a press button 11 closing contacts 11^b.

The degree of excitation of the coupling 2 is controlled by a stepless controller 11^a operated by a hand wheel 12 moving over a resistor 11^c. A shunt brake 13^a having a coil 13 and engaging a brake drum 13^b on the shaft 3^a is incorporated in the circuit of the coupling 2 to come into operation in the usual manner when the push button switch 11 is released and a potentiometer 14 may also be incorporated by which the excitation voltage for the coupling may be initially adjusted.

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A similar arrangement is shown in Fig. 2 for operation of an A. C. motor 15 from a three phase supply 16, 17, 18 in which the coupling 2 is excited with rectified A. C. from a secondary coil 19 of the brake coil 13 through rectifiers 20.

For hoisting the load the motor 1 or 15 is started and runs at a constant speed and after attaining full speed the eddy current coupling 2 is energised to give a variable hoisting torque, the hoisting speed of the load depending on the slip, i. e. on the excitation of the coupling.

For lowering loads the handwheel 12 is moved in the direction of the arrow Fig. 1 to reduce the excitation of the coupling 2 until the desired lowering speed has been reached.

For lowering an empty hook, where the weight is insufficient for falling under the action of gravity, a further eddy current coupling 40 mounted on the motor shaft 3 is introduced to provide a positive lowering torque to drive down the empty hook b^1 or very light loads. The inner member 40^a of the coupling is mounted on a shaft 3^b surrounding the motor shaft 3. A pinion a^1 is mounted on the shaft 3^b driving pinions a^2 to give a reverse drive through the gearing A to the winding drum B. The coupling 40 is controlled by the hand wheel 12 operating over the second resistor 11^d of the stepless controller 11^a so that both couplings 2 and 40 cannot be energized simultaneously; slip rings 40^b supply D. C. or rectified A. C. to the coil 40^c.

The degree of excitation of the coupling 2 is controlled by the stepless controller 11^a as abive described and operated by the hand wheel 12 in which is incorporated the electrical push button switch whose contacts 11^b are closed by downward pressure of the hand on a knob 11 in any position of the hand wheel 12 to energize the couplings 2 or 40 and the shunt brake coil 13 which holds the brake off.

As has been described the speed of lowering all but the lightest loads is governed by the hoist coupling excitation, the value of the excitation determining the degree of torque available from the motor which is counterbalanced by the pull of the suspended load due to gravity whereby the speed of descent may be controlled.

At any position of the controller 11^a the load may be instantly arrested, whether moving up or down, by the release of the push button 11 which energizes the clutches and brake coil.

The above described speed control enables slow and creeping speeds to be obtained with crane loads, moving in the upward or downward direction in a convenient and simple manner without interfering in any way with lifting or lowering loads at normal crane speeds.

I claim:

1. A hoisting apparatus having an electric motor driving a drum actuating a hook, comprising in combination, a first eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum so as to exert a hoisting torque on the drum; a second eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum for exerting a torque on the drum lowering the hook in the absence of any load thereon; a controller for controlling the excitations of said couplings; manually actuated means for operating said controller; a push button switch arranged for supplying a current to said controller and the excitations of said couplings; and a push button for closing said push button switch in any position of said controller, said push button being arranged on said manually operated means for operating said controller.

2. A hoisting apparatus having an electric motor driving a drum actuating a hook, comprising in combination, a first eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum so as to exert a hoisting torque on the drum; a second eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum for exerting a torque on the drum lowering the hook in the absence of any load thereon; a controller having two resistors for controlling the excitations of said couplings, respectively; manually actuated means for operating said controller; a push button arranged for supplying a current to said controller and the excitations of said couplings, respectively; and a push button for closing said push button switch in any position of said controller, said push button being arranged on said manually operated means for operating said controller.

3. A hoisting apparatus having an electric motor driving a drum actuating a hook, comprising in combination, a first eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum so as to exert a hoisting torque on the drum; a second eddy current magnetic coupling having a variable excitation and being interposed between the motor and the drum for exerting a torque on the drum lowering the hook in the absence of any load thereon; a controller having two resistors for controlling the excitations of said couplings, respectively; manually actuated means for operating said controller; a brake winding connected in shunt to said controller and the excitations of said couplings; a push button switch arranged for supplying a current to said controller and the excitations of said couplings, respectively, and said shunt brake winding; and a push button switch for closing said push button switch in any position of said controller, said push button being arranged on said manually operated means for operating said controller.

GILBERT VAUGHAN SADLER.

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