Nov. 12, 1940. F. WARE 2,221,365

ELECTRICAL CONTROL FOR STEAM MOORING WINCHES

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Fig. 1.

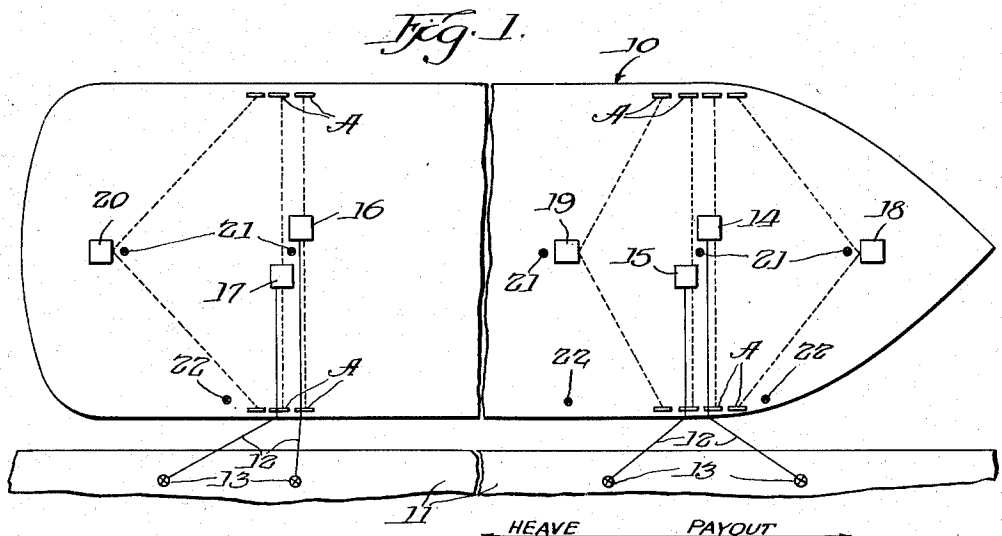
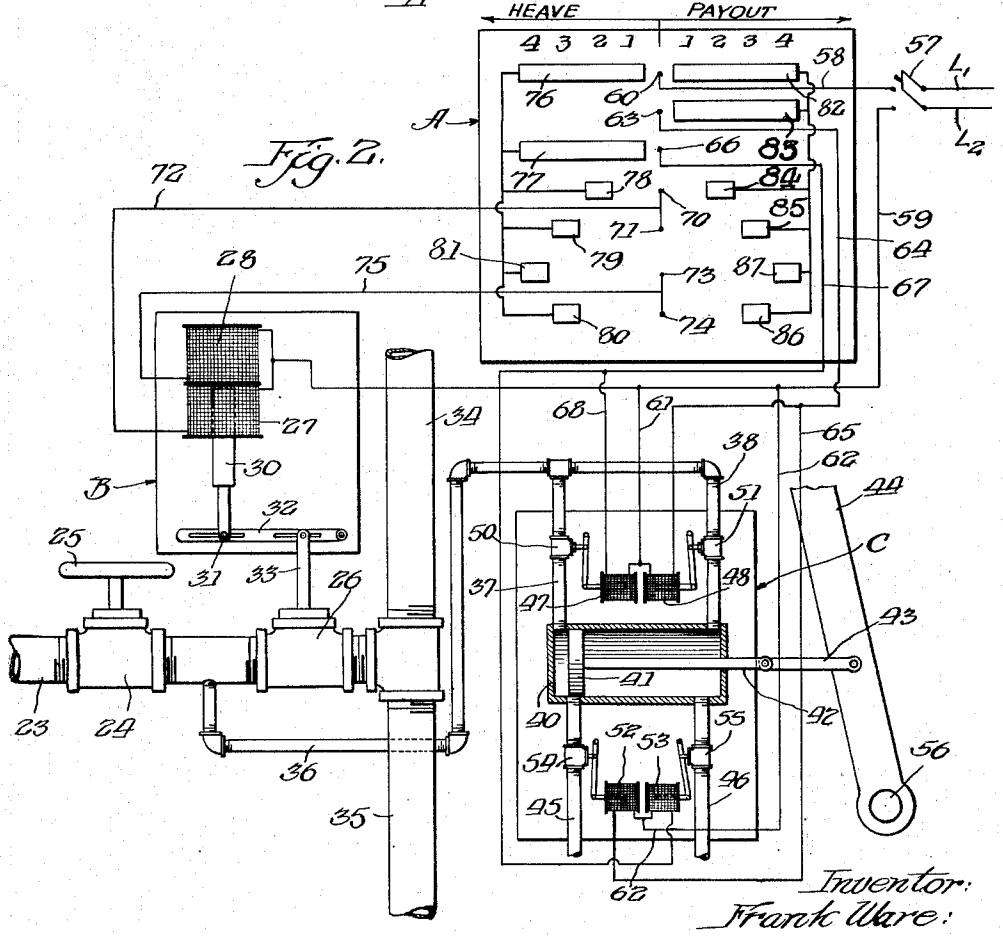


Fig. 2.



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ELECTRICAL CONTROL FOR STEAM MOORING WINCHES

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3 Claims. (Cl. 121—143)

The invention relates to improvements in the control of steam mooring winches and has more particular reference to electrical control for automatically operating the winch engines at a distance, preferably from a location adjacent one side of the boat.

Almost all ships on the Great Lakes are equipped with steam mooring winches. They are of the utmost importance in the handling of the vessel while docking, loading of cargo and while discharging cargo. Heretofore the method of operation of these winches has been inefficient and frequently unsafe due to the fact that the winches were handled manually from a position amidship, which made it impossible for the operator to see what was taking place on the docks. Usually the operation of two or more winches was directed by an official of the ship located at a satisfactory point of vision. Since changes have to be made in the position of the cables relative to the ship quite rapidly, this method of direction often resulted in confusion.

An object of the present invention resides in the provision of remote control for said steam mooring winches by which two or more of the winch engines may be operated by an individual at a satisfactory position along one side of the boat remote from the winches.

A more particular object resides in the provision of electrical control for steam mooring winches by which the winch engines may be operated from a point remote therefrom with the utmost safety and precision.

Another object is to provide electrical control for the purposes described which will be so constructed and installed as not to adversely affect the manual control of the winch, thereby making it possible to return to this manual method of control at least temporarily.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawing and claims appended hereto.

In the drawing which illustrates an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is a plan view of a boat showing the manner of directing the same by the use of winches and mooring cables and illustrating the location of the electrical control of the invention; and

Figure 2 is a diagrammatic view, parts being shown in section, illustrating the mechanical equipment and electrical control therefor comprising the invention.

Referring to the drawing, particularly Figure 1, the boat indicated by numeral 10 is being moored to the dock 11 by means of mooring cables 12 secured to posts 13 on dock 11 and which have connection at their other end with the mooring winches 14, 15, 16 and 17, respectively. It will be noted that these winches are located amidship with additional winches 18, 19 and 20 being located forwardly and rearwardly of the boat and which are likewise used for handling the vessel while docking, loading of cargo, or while discharging cargo. Heretofore winch engines have been manually operated, the operator being located at a position along side the winch as at point 21. It was therefore impossible for the operator to see the operations on the dock and all information relative to control of the mooring winches was conveyed to him by a mate located at or near points 22 which are at that side of the boat adjacent the dock. Rapid changes have to be made in the position of the cables relative to the ship, especially during docking of the ship and also while discharging cargo. Accordingly, this method of direction caused considerable confusion.

The electrical control of the invention by which steam mooring winches can be operated with the utmost safety and precision from a remote point, preferably from a location at the side of the ship, is shown in Figure 2. The upper right-hand part of the diagrammatic view of Figure 2 comprises a diagrammatic plan of a drum type of electrical control unit A, the rotatable part of which is movable in both directions. The electrical control unit A enables the operator to actuate unit B which controls the steam pressure to the winch engine and also unit C by which the proper direction of rotation of the winch engine may be secured. The direction of rotation of the winch engine of course depends on whether the operator desires to heave or pay-out on the mooring cables. The steam pressure for operating the winch engines is supplied by the steam line 23 equipped with the manually actuated valve 24 and a solenoid actuated valve 26. Handle 25 actuates valve 24, whereas, the means for actuating the valve 26 comprises unit B which consists of two solenoids 27 and 28. The plunger 30 associated therewith is operatively connected at 31 with the lever 32 which also has connection through member 33 with the valve 26. The branch lines 34 and 35 leading from the main steam line 23 conduct the steam to the

winch engines such as 14 and 15 and from the foregoing it will be observed that the speed of said winch engines is controlled through actuation of the valve 26.

The auxiliary line 36 conducts steam from the supply line 23 to unit C, the said auxiliary line connecting with the inlets 37 and 38 for the steam cylinder 40 equipped with piston 41 having piston rod 42 which is suitably connected by link 43 with the manual reversing lever 44. The inlets 37 and 38 join with the cylinder 40 at the respective ends thereof and therefore operate to admit steam on either side of the piston as may be desired. The exhaust pipes 45 and 46 likewise have connection with the respective ends of the cylinder and function to exhaust steam from said cylinder. The solenoids 47 and 48 actuate valves 50 and 51, respectively, the valve 50 being located in inlet 37 and valve 51 being located in inlet 38. In a like manner the solenoids 52 and 53 actuate their respective valves 54 and 55, located in the exhaust pipes 45 and 46, respectively.

From the foregoing it will be understood that piston 41 will be moved in one direction or the other, depending upon whether steam is admitted by inlet 37 or by inlet 38 to in turn actuate the reversing lever 44 having connection with shaft 56. By means of the electrical unit A the movement of reversing lever 44 can be controlled so that the winch engines can be caused to "heave" or "payout" on the mooring cables. The unit A will also automatically control the throttle valve 26 through energization of the solenoids 27 and 28. This structure will now be described.

The power lines indicated L_1 and L_2 are electrically connected by means of the switch 57 with conductors 58 and 59, the former ending in terminal 60, whereas, conductor 59 is directly connected to the solenoids 27 and 28 and through the tap 61 is connected with the solenoids 47 and 48 and through tap 62 with solenoids 52 and 53. Terminal 63 is connected through conductor 64 with solenoid 48 and by means of the tap 65 with solenoid 52. Terminal 66 is connected to conductor 67 electrically connecting with solenoid 53 and by means of tap 68 with solenoid 47. The terminals 70 and 71 are jointly connected by conductor 72 with the solenoid 27 and in a like manner the terminals 73 and 74 are jointly connected by means of conductor 75 with solenoid 28.

In operation of the electrical conductor unit above described it will be assumed that the operator's first act is to close switch 57 which will immediately join one side of the power line, namely, L_2, with the solenoids 27 and 28, with solenoids 47 and 48 and with solenoids 52 and 53. As before stated, the drum type of electrical control unit A, which has been developed into a diagrammatic plan, comprises a rotatable part which is adapted for movement in both directions. This rotatable part carries a series of contacts 76, 77, 78, 79, 80 and 81, and another and separate series of contacts 82, 83, 84, 85, 86 and 87, the first-named series being adapted for operation when the rotatable part of the drum type controller is moved in the direction designated "Heave," and the last-named series being adapted for operation when the rotatable part of the controller is moved in the direction designated "Payout." The terminals 60, 63, 66, 70, 71, 73 and 74, which are shown as disposed intermediate the series of contacts referred to hereinbefore are stationarily carried. When the rotatable part of the electrical control unit A is moved into No. 1 position "Heave" the contacts 76 and 77 will be engaged and through conductor 67 solenoids 47 and 53 will be energized, thereby admitting steam to the left hand side of the piston 41 through inlet 37 and making it possible to exhaust steam from the right hand side of said piston. Admitting steam to the left end of piston 41 will force the piston to the right which will actuate the reversing lever 44 to cause the winch engines to rotate in that direction to wind up the mooring cables. When the rotatable part of the electrical control unit A is moved to No. 2 position "Heave" an additional contact, namely, 78, is engaged, which through terminal 70 and conductor 72 will cause energization of solenoid 27. The plunger 30 will thereupon be centered with respect to solenoid 27 and this will open the throttle valve 26 a limited amount. In No. 3 position "Heave" two additional contacts, namely, 79 and 80, will be engaged and through conductors 72 and 75 solenoids 27 and 28 will be energized, whereupon the plunger will be centered with respect to the combined solenoids, which will open the throttle valve a greater amount. In No. 4 position "Heave" contact 81 will be engaged and by means of conductor 75 only solenoid 28 will be energized. Since the plunger will thereupon be centered with respect to solenoid 28 the throttle valve will be opened its maximum amount. Movement of the rotatable part of the electrical control unit A from No. 4 "Heave" position to neutral position will close the throttle valve since both solenoids 27 and 28 will be deenergized. Solenoids 47 and 53 will also be deenergized so that the valves actuated thereby will be closed in the inlet and exhaust, respectively. The closing of the throttle valve will result in stopping rotation of the winch engines. However, it will be noted that reversing lever 44 will be left in "Heave" position.

To cause the winch engines to rotate in that direction to "Payout" on the mooring cables the rotatable part of the electrical control unit A is moved to No. 1 "Payout" position, whereby contacts 82 and 83 will be engaged and through conductor 64 solenoids 48 and 52 will be energized. This will admit steam to the right side of piston 41 and will permit steam to exhaust from the left side. As a result the piston is actuated in a direction toward the left and the reversing lever 44 is actuated to "Payout" position. As the rotatable part of the electrical control unit A is moved to No. 2, No. 3 or No. 4 positions "Payout," contacts 84, 85, 86 and 87 will be successively engaged to produce results similar to those previously described in connection with the movement of the rotatable part of the electrical control unit A to identical positions "Heave," except of course that the winch engines are rotating in the opposite direction.

Referring to Figure 1, it will be noted that the control unit A is located adjacent the respective sides of the boat and as shown in said figure, winches 14, 15, 16, 17, 18 and 19 are each provided with their individual control units. As a result of the remote electrical control of the steam mooring winches in accordance with the present invention, the operator has a clear view of the dock and he is therefore able to control the mooring winches with much greater safety and precision than was heretofore possible. Also the necessity of having an officer of the ship available for signalling is eliminated. The present equipment and electrical control may be

readily applied to installations now in use, and its addition greatly improves the operation of said installations from the standpoint of efficiency and safety. However, it is possible with the present invention to resort to manual control of the winch without adversely affecting the electrical equipment.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawing, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In apparatus of the character described, the combination with steam mooring winches for boats and the like having a throttle valve and a reversing lever, electrically operated means for actuating the throttle valve, and electrically controlled means for operating the reversing lever; of a single remotely disposed manually operable electrical controller for controlling both of said means whereby the operator may be located at a distance from said throttle valve and said reversing lever; said controller comprising contact means arranged to energize the electrically controlled reversing lever operating means and at the same time maintain deenergized the electrically operated throttle valve actuating means when the said controller is in one position, and contact means arranged to maintain energized the electrically operated reversing lever operating means and to energize the electrically operated throttle valve actuating means when the said controller is in a second position.

2. In apparatus of the character described, the combination with steam mooring winches for boats and the like having a throttle valve and a reversing lever, electrically operated means for actuating the throttle valve and electrically controlled means for operating the reversing lever; of a single remotely disposed manually operable electrical controller for controlling both of said means whereby the operator may be located at a distance from said throttle valve and said reversing lever; said controller comprising contact means arranged to energize the electrically controlled reversing lever operating means and at the same time maintain deenergized the electrically operated throttle valve actuating means when the said controller is in one position, contact means arranged to energize the electrically operated throttle valve actuating means when the said controller is in a second position, and contact means arranged to actuate the electrically operated throttle valve actuating means to increase the opening of said throttle valve when said controller is in a third position, said second-named contact means and said third-named contact means being arranged to maintain energized the electrically operated reversing lever operating means.

3. In apparatus of the character described, the combination with steam mooring winches for boats and the like having a throttle valve and a reversing lever, electrically operated means for actuating the throttle valve, and electrically controlled means for operating the reversing lever; of a single remotely disposed manually operable electrical controller for controlling both of said means whereby the operator may be located at a distance from said throttle valve and said reversing lever; said controller comprising contact means arranged to energize the electrically controlled reversing lever operating means and at the same time maintain deenergized the electrically operated throttle valve actuating means when the said controller is in one position, contact means arranged to energize the electrically operated throttle valve actuating means when the said controller is in a second position, contact means arranged to actuate the electrically operated throttle valve actuating means to increase the opening of said throttle valve when said controller is in a third position, and contact means arranged to deenergize the electrically operated throttle valve actuating means when the said controller is in a fourth position, all but said first-named contact means being arranged to maintain energized the electrically operated reversing lever operating means.

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