

No. 741,995.

PATENTED OCT. 20, 1903.

W. D. BALDWIN & A. SUNDH.
ELECTRIC CAPSTAN.
APPLICATION FILED JAN. 20, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

FIG2.

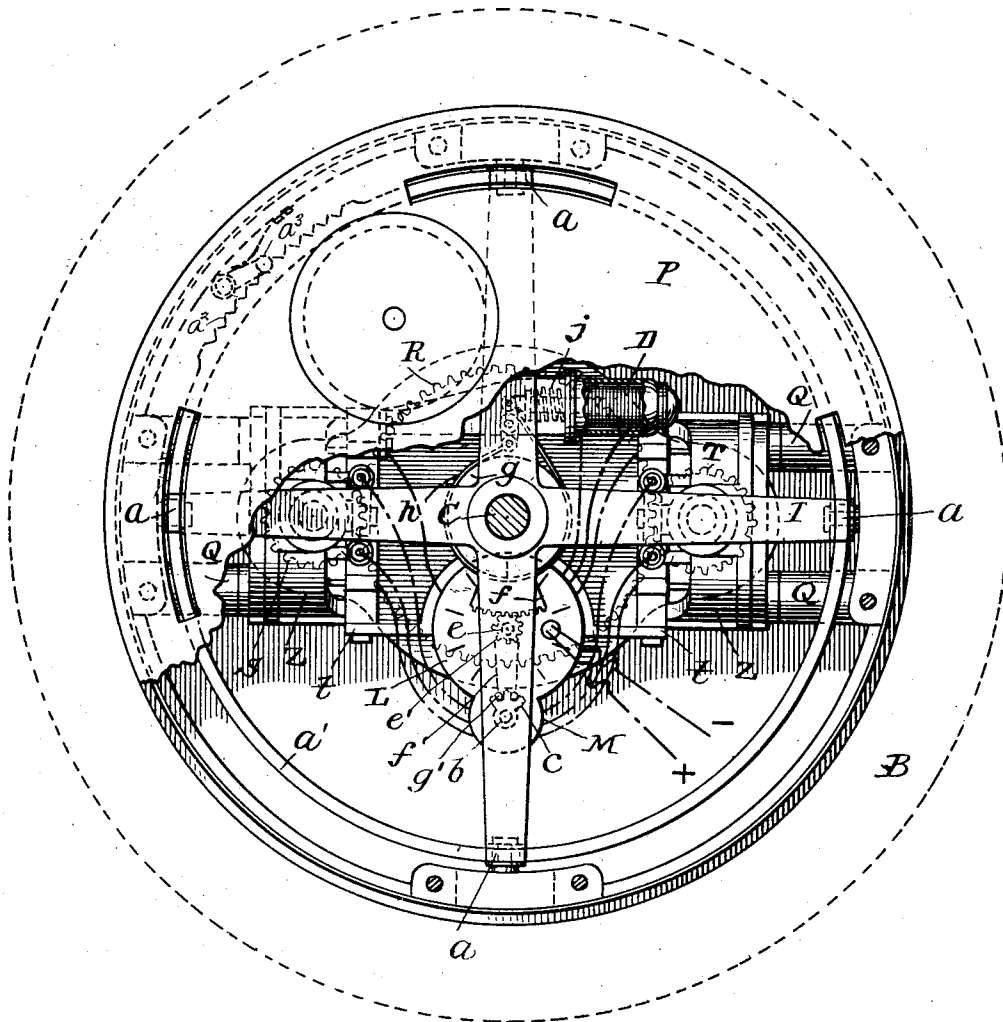
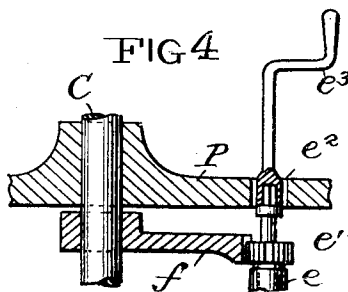


FIG 4



WITNESSES:

J. J. McCarthy
Samuel Gillman, Jr.

INVENTORS

William D Baldwin
August Sundt

Bv

BY
John Freeman

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM D. BALDWIN, OF NEW YORK, AND AUGUST SUNDH, OF YONKERS,
NEW YORK, ASSIGNORS TO OTIS ELEVATOR COMPANY, OF EAST ORANGE,
NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELECTRIC CAPSTAN.

SPECIFICATION forming part of Letters Patent No. 741,995, dated October 20, 1903.

Application filed January 20, 1902. Serial No. 90,541. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM D. BALDWIN, residing at New York, in the county of New York, and AUGUST SUNDH, residing at Yonkers, in the county of Westchester, State of New York, both citizens of the United States, have invented certain new and useful Improvements in Electric Capstans, of which the following is a specification.

Our invention relates to the operation of capstans by electricity; and its object is to provide a simple and efficient capstan designed more particularly for use in those instances where it may be necessary to haul loads horizontally, as on the waterside and in connection with yards and docks, although our invention may be used in whatever connection it is applicable.

Our invention consists, primarily, in a capstan driven by means of electric motors, with means for controlling the operation of such motors to start, stop, and reverse them simultaneously with each other.

To this end our invention further consists in the novel construction of apparatus and combinations of parts hereinafter more fully described and shown in its many details of construction in the accompanying specification and drawings, in which—

Figure 1 is an elevation, partly in section, of a capstan embodying our invention. Fig. 2 is a plan view of the same with part of the top broken away and partly in section. Fig. 3 is a diagram of circuits, showing the series-parallel control of the motors with reversing-switch; and Fig. 4 is a modified construction of apparatus for operating the controller and reversing-switch.

Referring to the drawings, A represents a suitable foundation or base, with sides B, which may be of any desired construction, shown in this instance as masonry, the foundation or base A being at such distance below the level of the yard, dock, or flooring upon which it is desired to operate that the capstan O will be supported above the dock or flooring, as shown, upon a vertical shaft C extending downwardly therefrom. The shaft C is provided with a suitable bearing

for its lower end in the bottom plate W of the apparatus, which is suitably secured to the base A, as shown, by bolts *w*. The casing V, in this instance of cylindrical form, is supported upon the base-plate W and carries a top plate P, which affords a bearing for the upper portion of the vertical shaft C, and the capstan O, as shown, is arranged above the top plate P.

Electric motors J K are arranged to drive the capstan, and they may be in any desired position relative to the capstan, either within or without the casing; but the preferable arrangement is within the casing, and any desired number of motors may be provided. In the drawings the motors are provided with vertical shafts, as this is a convenient arrangement of apparatus readily controlled and efficient in operation. Bearings F and E are provided for the lower ends of the shafts G H, the bearings of the upper ends of the shafts being in sockets X Y on the yoke-pieces Z, which yokes are additionally supported from the casing V by supports Q. Suitable gearing is provided between the motor-shafts and the central shaft C for driving the capstan, as shown the shaft C being provided with one large gear-wheel R, and the motor-shafts G H being provided with smaller gear-wheels S T, thus forming a convenient arrangement, although other arrangements of gear-wheels, of course, may be utilized. The gear-wheel R has a ball-bearing on the under surface of its hub *r*, as the balls *q* operating in grooves *p* in the block *p'*, while the whole gear is arranged in a suitable gear box or casing formed by projections *q'* on the plate W and a cover *r'*. The gear-casing may be filled with lubricant, as shown, if desired. From the arrangement shown it is evident that if both motors rotate in the same direction they will drive the gear R in the same direction, and by simply reversing the direction of rotation of each motor the gear R will be reversed and the capstan O will also be reversed.

Any suitable electric motors may be used with our invention and any form of yokes and pole-pieces and construction of armature,

commutator, and brushes; but as illustrative of a suitable form of motor we have shown series-wound motors, of which, as stated, Z are the yokes, the outsides only being shown, and brushes d' , with posts u , for the connection of the circuit-wires.

Suitable means must be provided for controlling the motors and determining their direction of rotation, and, as shown, we provide a series-parallel control for the motors and a reversing-switch for determining their direction of rotation, the series-parallel controller and reversing-switch being preferably operated simultaneously. As a further means of controlling the motors a suitable brake is provided, shown in this instance as a band-brake h operating upon a sheave g , and electromagnetic means in the shape of an electromagnet D are provided for withdrawing the brake upon starting the motors, a spring j operating to apply the brake when the current is turned off to stop the motors. We have simply shown this brake as an illustration of our invention and are not to be understood as limiting ourselves to its particular form. The series-parallel controller is of any usual or suitable construction, there being preferably a series of stationary brushes B' and a rotatable cylinder carrying contacts, the brushes and cylinder being arranged within a suitable casing L. The cylinder itself is not shown; but a development thereof is illustrated in Fig. 3 which is a simple way of tracing the circuits, it being understood that the contacts shown in Fig. 3 are arranged on the outside of the insulating-cylinder, as shown.

Any suitable reversing-switch may be provided, as shown it being arranged within a casing M, and it may consist of a series of stationary brushes C' , with movable contacts also on the cylinder, the development of this cylinder being shown in Fig. 3.

The series-parallel controller and reversing-switch are operated, respectively, from vertical shafts b and e , and suitable means are provided for simultaneously rotating said shafts about their vertical axes. A convenient means and one which we have found particularly suitable to this class of apparatus is that illustrated, in which horizontal arms I are provided radiating from the center and rotatably supported upon the shaft C, as shown, they being connected to the hub r^2 . The arms I are arranged just beneath the top plate P, and the outer ends of the same are connected by a ring a' , which is guided in rollers K, as shown, connected to the casing V. The ring a' may be provided with ratchet-teeth a^2 on its side, engaging a suitable pawl a^3 , mounted on the casing, as indicated in Fig. 2. From this ring a' foot or hand pieces a project upward through slots in the top plate P, so that by pushing or pulling on said foot or hand pieces a (they being shown as foot-pieces) the arms I may be rotated in one direction or another, and if connections are

provided between said arms and the shafts b and e it will be seen that ready means are at hand for operating the controller and reversing-switch from the outside of the apparatus. In this instance the segment f is connected to the hub r^2 and meshes with a pinion e' on the shaft e , while any suitable connection, shown as an arm f' having teeth g' engages teeth on a segment c , connected to the shaft b . The oscillation then of segment f rotates the pinion e' , which in turn oscillates the arm f' , and segment c is thereby oscillated, partially rotating the shaft b and simultaneously reversing the controller and reversing-switch.

In Fig. 4 a modified form of apparatus is shown in detail for operating the controller and reversing-switch. Instead of the arms I the shaft e is extended upwardly through the aperture e^2 in the cover or top plate P, and means are provided for connecting a crank e^3 or other operating-handle to said shaft e through the aperture. As before, the arm f' is connected to the shaft e , (not shown in Fig. 4,) so that by turning the crank e^3 both shafts e and b will be rotated and the controller and reversing-switch operated.

As stated, we prefer to operate the motors with series-parallel control, and any suitable connections may be provided for so controlling the motors; but a simple construction of apparatus is diagrammatically shown in Fig. 3, in which a series of brushes B' , as stated, is shown, these brushes being represented individually by the numerals 6 7 8 9 10 11 12 13 14 15, on each side of which series of brushes are represented contacts in parallel rows, there being such a number of said contacts that when the controller is operated the brushes may take five different positions relative to the contacts. (Indicated in dotted lines by 1 2 3 4 5 and 1' 2' 3' 4' 5'.) The contacts are shown of various shapes and sizes, and their arrangement is such, as will hereinafter be described, that the armatures of the motors are thrown first in series with each other with resistances 40 and 41 in circuit for each armature. At position 2 one of the resistances is cut out of circuit, and at position 3 the other is cut out of circuit. At position 4 the armatures are thrown into parallel relation to each other with resistance in the circuit of each, while in position 5 the armatures are thrown into parallel relation directly across the line with no resistance in circuit. As stated, the motors are preferably series wound; but they may be of any desired winding, as shown S' S^2 being the series fields and A' A^2 the armatures. The reversing-switch also consists, as stated, of a series of brushes C' (individually indicated by the numerals 18 19 20 21 22 23 24 25,) with contacts on each side thereof so arranged and connected that when the contacts on either side are moved into contact with the brushes circuits will be made through the armatures A' A^2 in different directions. Those contacts

to the right of the reversing-switch are numbered 30 31 32 33 34 35 36 37, and they are connected to each other in pairs in the manner shown.

5 D represents the brake-magnet, connected directly across the mains, (represented by + and -,) and assuming that the controller and reversing-switch are simultaneously turned to start the motors and bring them up to speed
10 the circuits may be traced as follows: Let the brushes B' first rest upon the contacts marked 1 of the controller, while the contacts to the right of the series of brushes C' of the reversing-switch may be assumed to be in contact
15 with the brushes. Circuit will then be completed from the positive main at +, by wire 26, to brush 15, from thence by wire 27 to the brake-magnet D and to the negative lead. The brake-magnet will thus be energized and
20 will lift the brake. Another circuit will be completed from the positive lead through the series field-winding S² to brush 18 on the reversing-switch, from thence to contact 30, to contact 32, to brush 20, to and through the armature A² of the motor, and back to the brush
25 19, from thence through contacts 31 and 33 to brush 21, from thence to brush 10 on the series-parallel controller, and brushes 10 and 11 being upon one of the contacts in the position marked 1 the circuit will be completed
30 from brush 10 to brush 11, through resistance 40 to brush 12, and the brushes 12 and 13 being upon one of the contacts of the position marked 1 current will pass from brush 12 to
35 brush 13, from thence to and through the series field-winding S', from thence to brush 22 of the reversing-switch, to contact 34, to contact 36, to brush 24, from thence to and through armature A' to brush 23, to contact 35, to contact
40 37, to brush 25, from thence to brush 9 on the controller, and the circuit being completed to brush 8, from thence to and through resistance 41 to brush 7, and from brush 6 to the negative main. The circuit will thus have
45 been completed through the armatures A' A² in series with each other, with a resistance 40 in series with the armature A² and a resistance 41 in series with the armature A'. When contacts of the position marked 2 come opposite the brushes B' of the controller, the circuits will be the same as those just described,
50 except that resistance 41 will be cut out of the armature-circuit, and when the contacts of position marked 3 come opposite and in contact with the brushes B' the resistance 40 will also be cut out of circuit, and the armatures will be left running in series with each other connected directly across the line. When the contacts of the position marked 4
60 come opposite and in contact with the brushes B', circuit will be completed as follows: from the positive lead through the field S² to brush 18, to contact 30, to contact 32, to brush 20, through the armature A² to brush 19, to contact 31, to contact 33, to brush 21, to brush 10
65 on the controller, to brush 11, through resist-

ance 40 to brush 12, and from thence to the negative main by wire 42. A circuit will also be completed by wire 26 to brush 14 on the controller, to a contact of the position marked
70 5 on the controller, to brush 13, from thence to and through the series field-winding S', to brush 22 of the reverser, to contact 34, to contact 36, to brush 24, to and through armature A' to brush 23, contact 35, contact 37, brush 25,
75 brush 9 on the controller, to brush 8, through resistance 41 to brush 7, to brush 6, and to the negative main. In this position of the controller the motors are thrown in parallel across the line with resistance in series with
80 each, and when the controller is in such position that the contacts of the position marked 5 come opposite and in contact with the brushes B' the motors will be thrown in parallel with each other across the line, but without
85 resistance in the circuit of either, and they will then be running at normal speed. Should the controller be turned in a reverse direction, bringing those contacts marked 1' 2' 3' 4' 5' successively into contact with
90 brushes B' and bringing the contacts on the left of the series of brushes C' of the reversing-switch into contact with brushes C', the motors would be thrown first into series and then into parallel with each other, as before,
95 and the direction of rotation would be reversed.

In Fig. 2 the + and - signs represent the leading-in wires for the motors, these wires entering the casing of the controller and reversing-switch and emerging therefrom to
100 pass to the motors and brake-magnet in a manner to connect the motors and brake-magnet, as diagrammatically illustrated in Fig. 3. The casing containing the controller and reversing-switch may be arranged in any suitable
105 manner with relation to the motors; but a convenient arrangement is to support it from the yokes of the motors by suitable arms *t*.

Without limiting ourselves to the precise construction and arrangement of parts shown and described, we claim as our invention—

1. The combination with a platform, and a capstan thereon, of a shaft extending downwardly therefrom, two electric motors geared
115 to drive said shaft, a series-parallel controller and reversing-switch, and means arranged in the platform for operating the controller and reversing-switch, substantially as described.

2. The combination with a capstan, and a shaft extending downwardly therefrom, of two electric motors geared to drive the shaft,
120 a series-parallel controller and reversing-switch for the motors, and arms rotatably supported upon the capstan-shaft connected to operate the controller and reversing-switch, substantially as described.

3. The combination with a capstan, and a shaft extending downwardly therefrom, of
125 two electric motors geared to drive said shaft, a controller for said motors, and arms rota-

ably supported on said shaft and connected to operate the controller, substantially as described.

4. The combination with a capstan, of an
5 inclosed casing, at least two electric motors within the casing connected to drive the capstan, a series-parallel controller and reversing-switch also arranged within the casing, and means without the casing for operating
10 said controller and reversing-switch, substantially as described.

5. The combination with an inclosed casing, of a capstan, at least two motors within the casing connected to drive the capstan, a

series-parallel controller, reversing-switch, 15
brake, and brake-magnet all arranged within the casing, and means without the casing for controlling the operation of said controller, reversing-switch and brake-magnet, substantially as described. 20

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM D. BALDWIN.
AUGUST SUNDIL.

Witnesses:

HUGO A. HENKEL,
W. H. BRADY.