(No Model.)

B. A. FISKE.

ELECTRIC MOTOR.

No. 387,714. Patented Aug. 14, 1888.

Fig. 1.

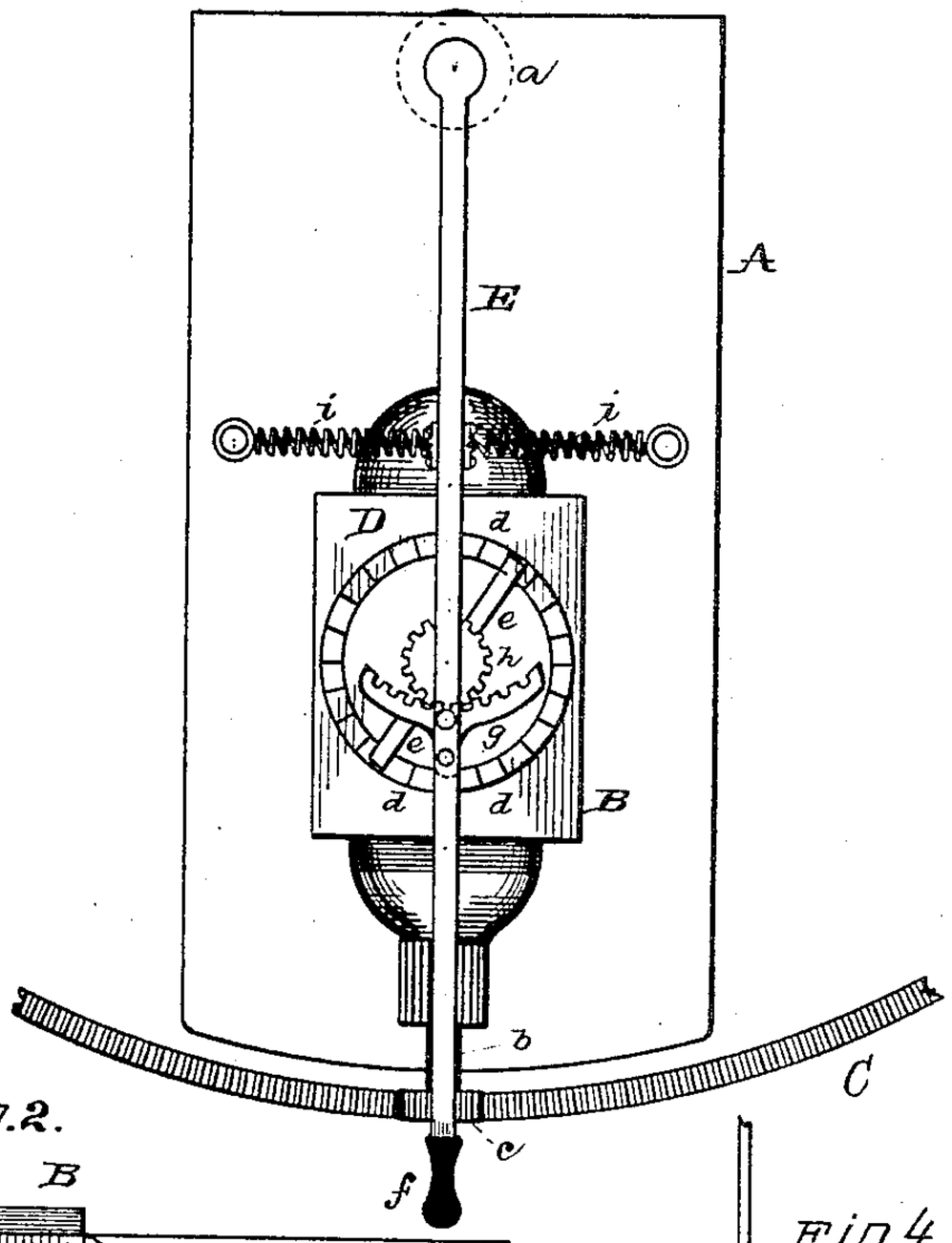

Fig. 2.

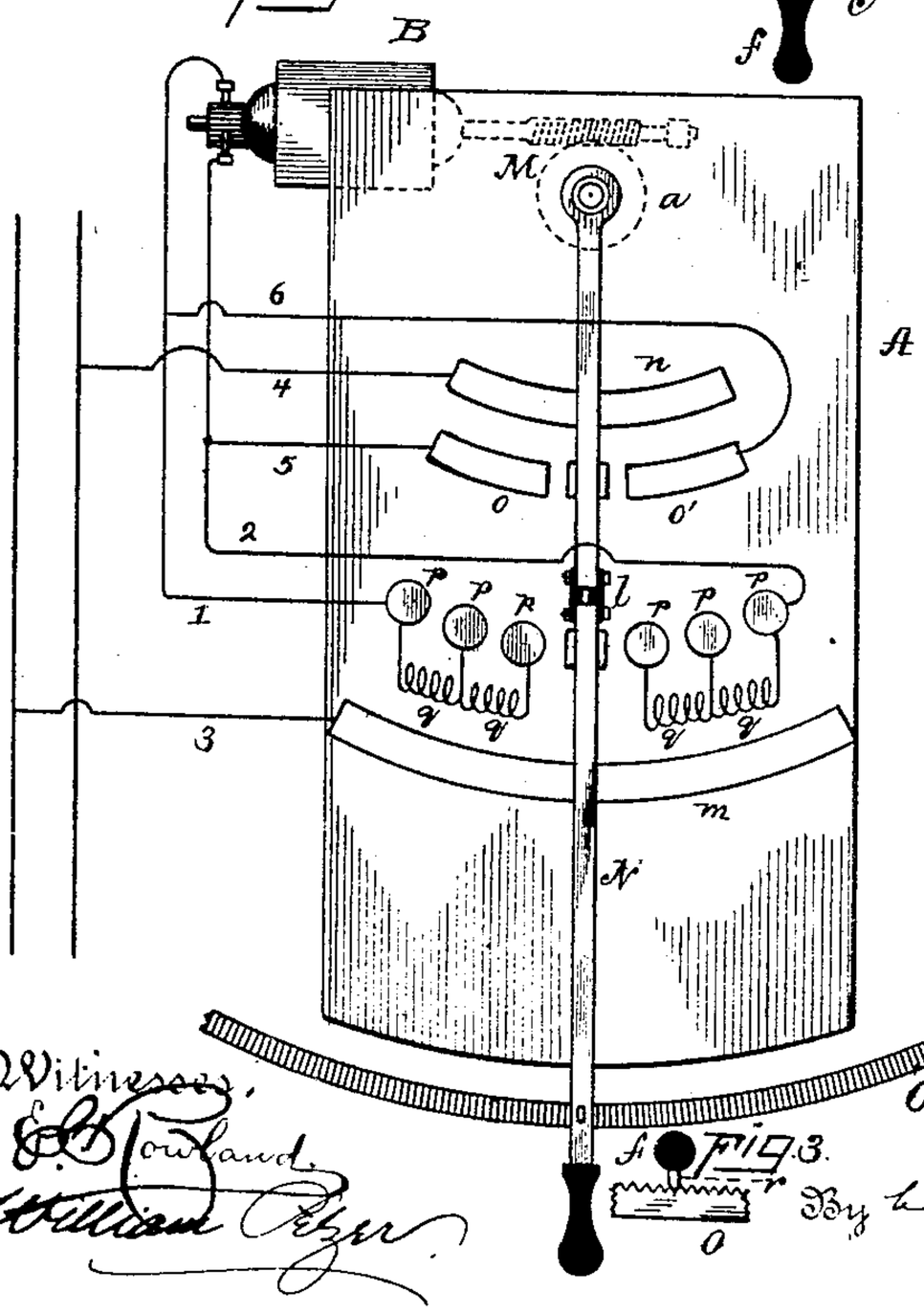

Fig. 3.

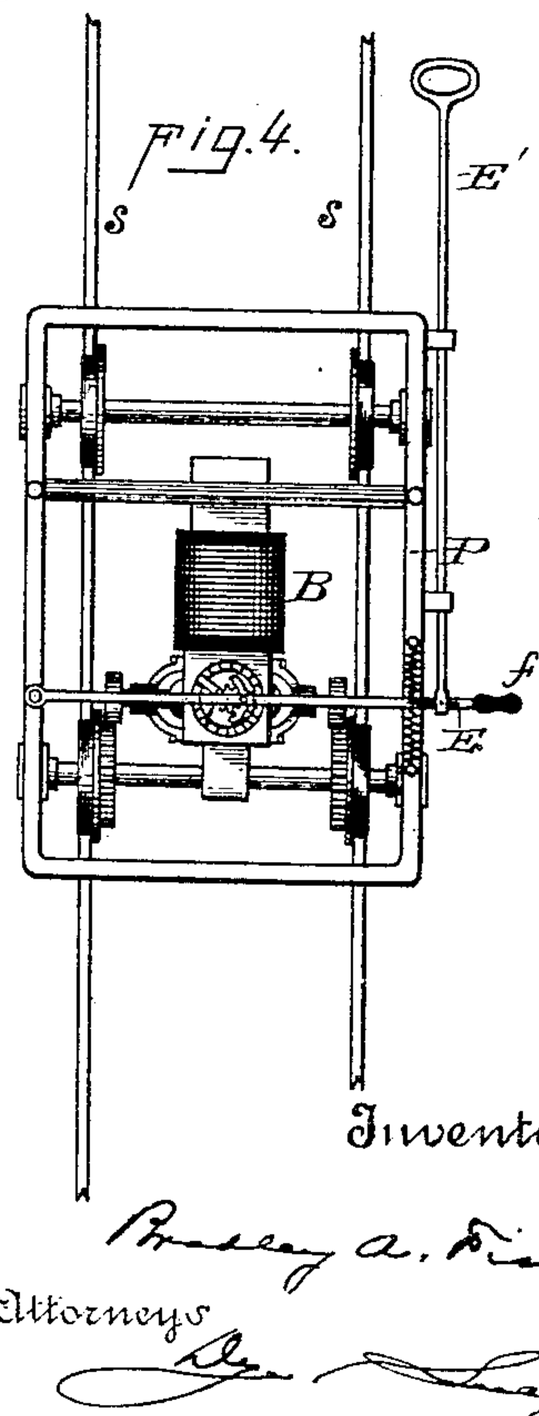

Fig. 4.

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UNITED STATES PATENT OFFICE.

BRADLEY A. FISKE, OF THE UNITED STATES NAVY.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 387,714, dated August 14, 1888.

Application filed January 17, 1888. Serial No. 261,016. (No model.)

To all whom it may concern:

Be it known that I, BRADLEY A. FISKE, of the United States Navy, have invented a certain new and useful Improvement in Electric Motors, of which the following is a specification.

In my application filed June 27, 1887, I have set forth a method of regulating electric motors by producing variations in the speed or direction of rotation of their armatures correspondingly to variations in the speed and direction of mechanism continuously revolved by the hand of an operator, the idea being that it may seem to the operator that he himself is rotating the motor, so that to control it he must do only that which is natural—that is, to turn faster or slower when he wants the motor to run faster or slower, or to stop turning when he wants the motor to stop.

My present invention is a further extension of the same idea. It relates to the employment of electric motors for moving bodies which are required to move in one direction or the other with a limited movement—such as gun-carriages, railway turn-tables, cars or trucks running short distances, planing-machines, &c.; and its object is mainly to enable the operator to control the movements of such body by manual movements such as he desires to give to the body itself. In accomplishing this I employ an arm movable independently of the body to be moved, the movements of which arm affect a circuit-controlling or regulating switch carried by such movable body and so connected with the motor that when such arm is moved in either direction the body is moved in the same direction so long as the movement of the arm is continued. It will thus be to the operator as though the movement imparted to the arm itself moved the body, and he has to act simply as though this were really the case, without stopping to consider the effect of his action on the motor. The motor may be mounted directly upon the moving body, or may be detached therefrom and geared to it, so as to move it. The switch-controlling arm is preferably a lever pivoted upon the movable body.

In the accompanying drawings, Figure 1 is a plan view of an arrangement embodying my invention, in which the motor is placed upon the body which it propels; Fig. 2, a view of another form, in which the motor is detached from the propelled body, the electrical connections being shown diagrammatically; Fig. 3, an end view of the hand-lever of Fig. 2, and Fig. 4 illustrates a car or truck propelled by an electric motor and provided with my invention.

Referring first to Fig. 1, A represents a body, such as a gun-carriage, turn-table, &c., which is pivoted at *a*, so as to be capable of movement in one direction or the other, it being moved by the electric motor B, placed upon it, whose armature-shaft *b* has a pinion, *c*, engaging with a stationary curved rack, C, whereby the turning of the shaft in one direction or the other swings the body A on its pivot in one direction or the other.

The switch D is preferably placed, as shown, upon the field-magnet of the motor, and consists of contact-blocks *d d*, separated by insulation, and on which travel two contact-arms, *e e*, such connections being made to the contact blocks and arms from the field-magnet coils and armature-circuit of the motor, as will be readily understood, that when the said arms are in the position shown the circuit to the motor will be broken and the motor will not run; but if the arms are moved in one direction on the switch, circuit will be closed to the motor with a strong field, so that it will start slowly in a certain direction, and as the movement is continued the field will be weakened and the motor will run faster. Moving the arms to the other side of the zero position reverses the motor, so that it runs the other way in the same manner. Switches of this character are well known in the art. The arms *e e* are moved by a lever, E, having a handle, *f*, pivoted at *a* or elsewhere on the body A and carrying a rack, *g*, which engages with a pinion, *h*, on the shaft of the switch-arms. I may provide centering-springs *i i*, which tend to hold the lever E at its central position and the arms *e e* at the zero position. Now, it will be seen that if the lever E is moved to the right the motor will start slowly in such a direction as to turn the pinion *c* on the rack C and move the body A to the right. So long as the operator continues to move the lever E, the body A will continue to turn slowly to the right,

following the lever. If it is desired to move it faster, the lever is moved faster, so that the switch-arms *e e*, moving faster than the body A, will reach the next pair of contacts and the speed will be increased. To stop the motor, the operator ceases to move the lever and holds it in the position in which it is, whereupon the motor continues to move for a moment until the body A overtakes the lever, and the arms bear on the zero-points again, so that the motor stops where it is and remains there so long as the operator holds the lever at that point. Thus it will be seen that the movements of the body A correspond entirely with those of the lever. When the lever is moved one way or the other, the body A moves in the same direction. The speed of movement of the body A corresponds with the speed of the lever, and the body A can be maintained at any point by holding the lever in the corresponding position. The centering-springs *i i* are not essential, but are provided to guard against the possibility of the operator neglecting to maintain control of the lever—that is, if he should move the lever to one side and then leave it there, the springs will bring the switch-arms back to zero and stop the motor, since they will prevent the lever from moving with the body by friction.

In the form shown in Figs. 2 and 3 the motor B is mounted apart from the body A to be moved by it, and connected with it by worm-gearing M or other speed-reducing gearing. The switch placed upon said body consists of a metal lever, N, having an insulating-section, *l*. One part of the lever rests on the metal contact-plate *m*, which is insulated from the body A, if the latter is of metal. The other part of the lever rests on the contact-plate *n*, and may make contact with one or the other of the two plates *o* and *o'*. The lower half of the lever is also adapted to come into contact with plates *p p*, which are joined through resistance-coils *q q*, and are connected with the armature-circuit 1 2 of the motor. A wire, 3, from the supplying-circuit goes to the plate *m*, and a wire, 4, from the other side of said circuit to the plate *n*. A wire, 5, from one side of the armature-circuit goes to plate *o*, and wire 6 from the other side to plate *o'*. The outer end of the lever having the handle *f* works across a curved rack, O, and has a tooth, *r*, which will stop the lever by dropping into the rack.

It will be seen that if the lever N is moved to the right onto plates *o'* and *p* the circuit of the motor will be closed as follows: wire 4, plate *n*, lever N, plate *o'*, wire 6, wire 1, motor B, wire 2, resistance-coils *q*, lever N, plate *m*, and wire 3. This closes the motor-circuit through resistance-coils in such direction that the motor slowly turns the body A to the right. The operation is then the same as already explained. The movement of the switch to the left of the central position closes the motor-circuit in the opposite direction, so that the motor runs the other way.

If the operator loses or leaves the control of the lever, the tooth *r*, dropping into the rack O, stops the lever at that point until the motor overtakes it and the circuit is broken.

In practice it is preferred to bring the switch-connections up through the pivot at *a*, which is made hollow for the purpose.

In the arrangement shown in Fig. 4 is shown a car or truck, P, propelled by a motor, B, on track *s s*, and receiving current in any suitable manner. The motor is provided with a switch like that of Fig. 1, controlled by a lever, E, from which a rod, E', or a cord or other handle extends to the end of the car. It will be seen that by pulling forward on the lever the car will be made to move forward fast or slow, according to the speed of movement of the lever, or by moving the lever the other way the car will run the other way. The operator may walk with the car, maintaining the movement of the lever, as though he were thereby himself pushing or pulling the car along. This arrangement is adapted for cars or trucks running short distances—as in shops or warehouses—or for machines, such as planers or the carriages of saw-mills.

It is evident that my invention may be readily applied to hoisting apparatus, in which case the operator will pull a cord connected with a switch on the car or body to be raised or lowered according to the direction in which he wishes to move it.

What I claim is—

1. The combination of a movable body, a rotary electric motor, gearing whereby the rotation of said motor moves said body, an arm movable independent of said body and adapted to be moved by hand, a circuit-controlling switch carried by said body and operated by said arm, and electrical connections between said switch and said motor, such that when said arm is moved said movable body is moved so long as the movement of the arm is continued, substantially as set forth.

2. The combination of a movable body, a rotary electric motor, gearing whereby the rotation of said motor moves said body, an arm movable independent of said body and adapted to be moved by hand, contacts on said body and contacts controlled by said arm, and electrical connections to the motor, whereby variations in the relative position of said contacts due to movements of said arm relative to the movable body affect the motor so as to cause said movable body to follow the movements of said arm, substantially as set forth.

3. The combination of a movable body, an electric motor for moving the same, a switch carried by said movable body, an arm movable independent of said movable body for controlling said switch, connections to said motor, such that when said arm is moved in either direction the body is moved in the same direction, and means for returning said arm and the switch to their original position when said arm is released by the hand, substantially as set forth.

4. The combination of an electric motor, a body connected therewith so as to be moved thereby, an arm movable independently of said movable body, a switch for the motor-circuit controlled by said arm, having a central position at which the circuit is open, and closing the circuit in one direction or the other as said arm is moved in one or the other direction, whereby said body is caused to follow the movement of said arm, and means whereby said arm is returned to its central position when it is released by the hand, substantially as set forth.

5. The combination of a movable body, a rotary electric motor, gearing whereby the rotation of said motor moves said body, an arm movable independently of said movable body and adapted to be moved by hand, switch-contacts carried by said movable body, and switch-contacts controlled by said arm, and electrical connections from said switch to the motor, such that at the central position of the arm the motor-circuit is broken, and on its movement in either direction circuit is closed to the motor, so that it moves said body in the same direction, following the movements of the arm, and on a more rapid movement of the arm the speed of the motor is increased, substantially as set forth.

This specification signed and witnessed this 16th day of January, 1888.

BRADLEY A. FISKE.

Witnesses:
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A. W. KIDDLE.