W. HESS, JR.

REWINDING MECHANISM.

APPLICATION FILED FEB. 16, 1911.

994,840.

Patented June 13, 1911.

3 SHEETS—SHEET 1.

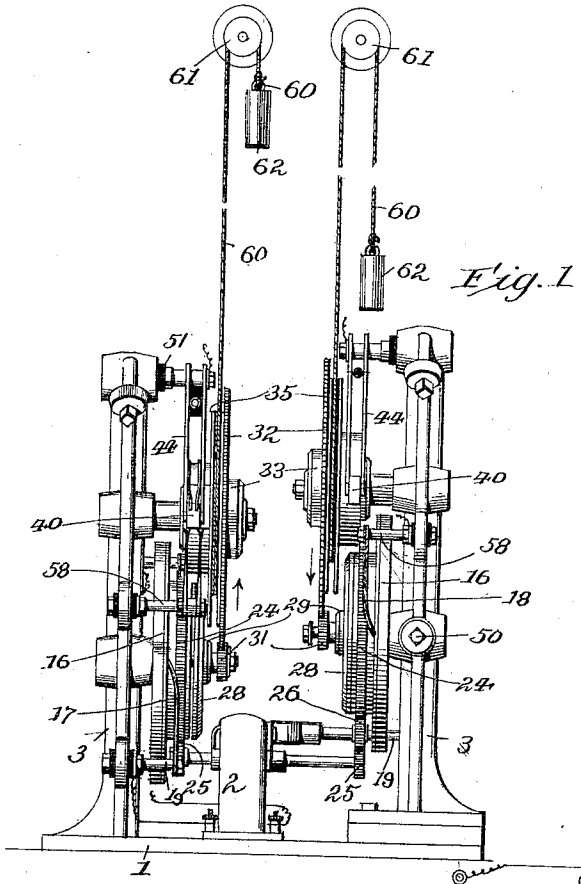

Fig. 1

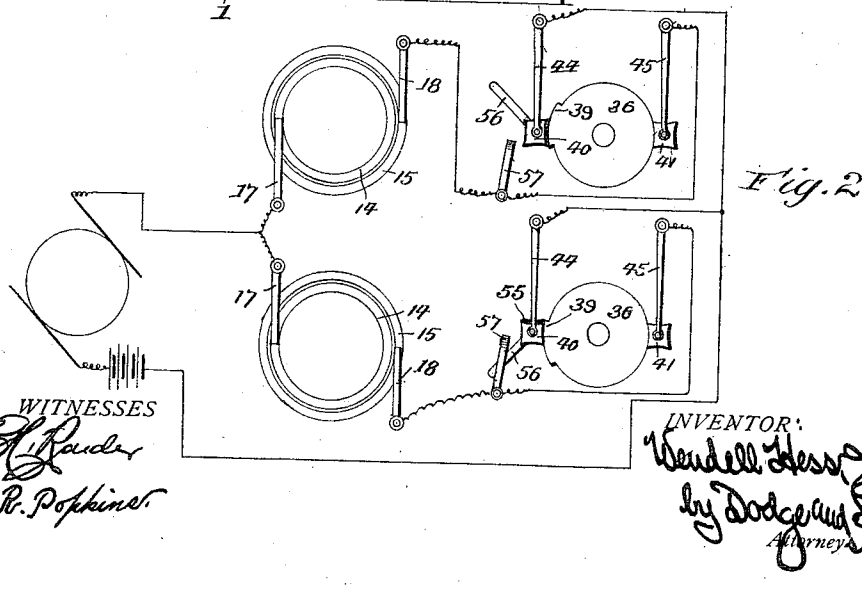

Fig. 2

WITNESSES

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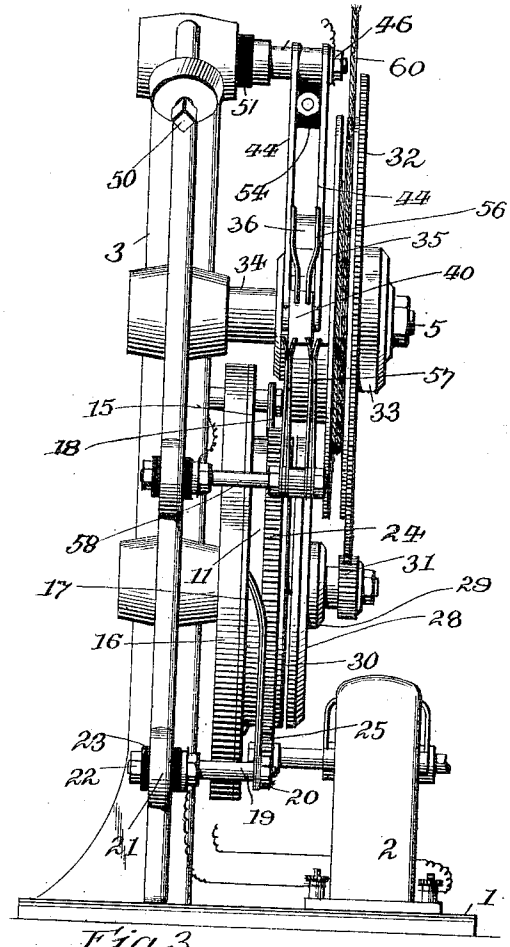

Fig. 3.

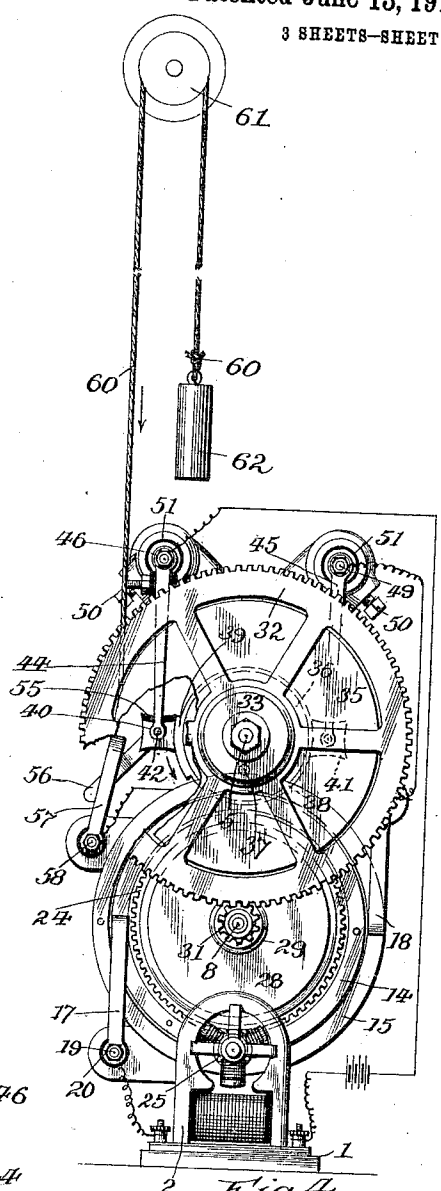

Fig. 4.

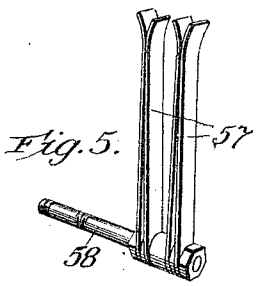

Fig. 5.

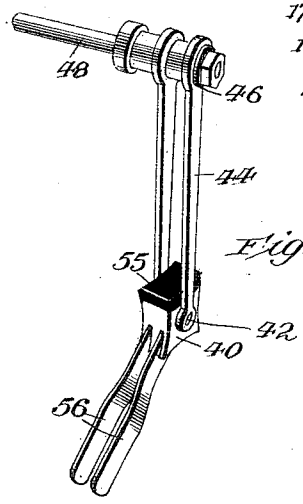

Fig. 6.

WITNESSES

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3 SHEETS—SHEET 3.

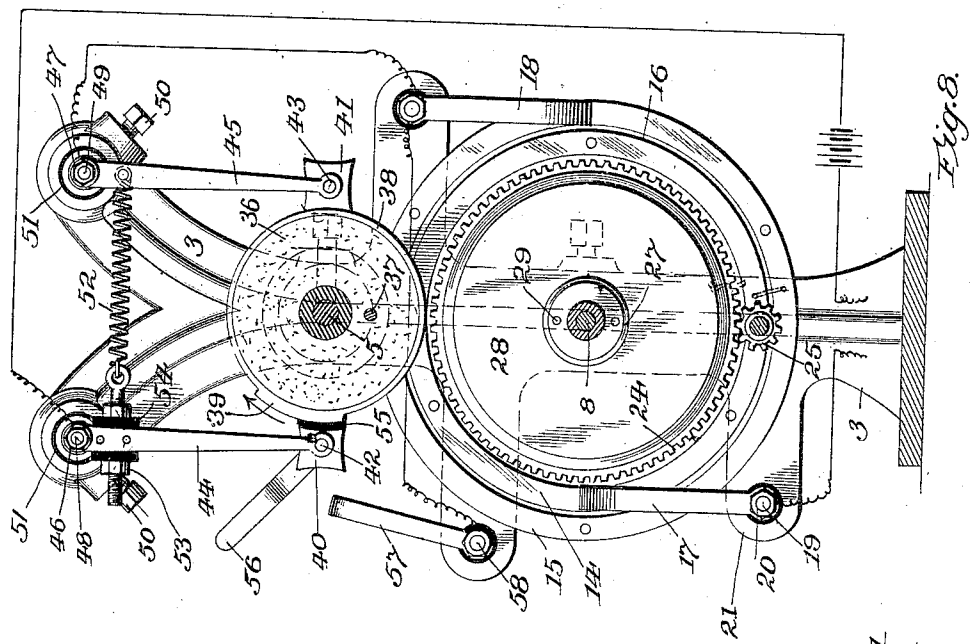

Fig. 8.

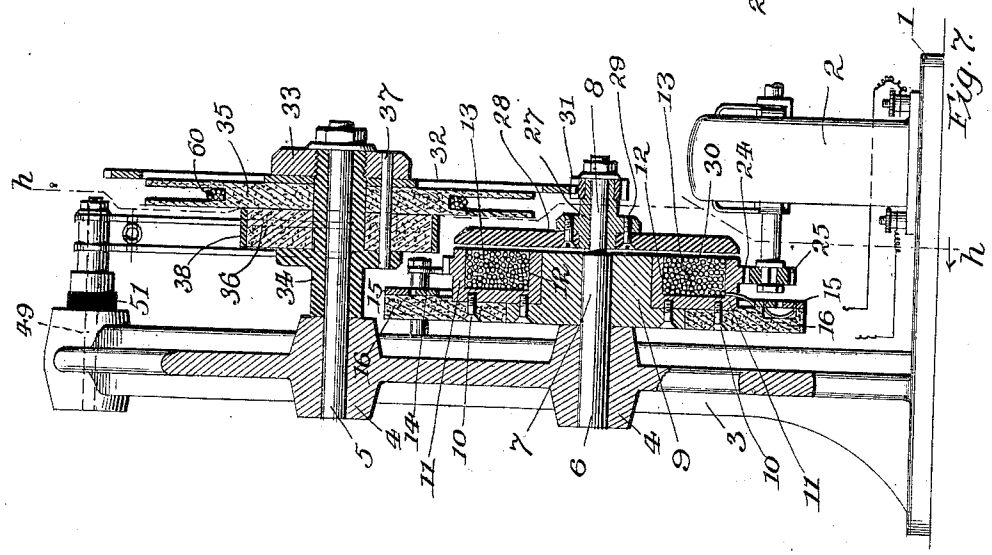

Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

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REWINDING MECHANISM.

994,840. Specification of Letters Patent. Patented June 13, 1911.

Application filed February 16, 1911. Serial No. 608,942.

To all whom it may concern:

Be it known that I, WENDELL HESS, Jr., a citizen of the United States, residing at Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Rewinding Mechanism, of which the following is a specification.

This invention relates to rewinding mechanisms and particularly to an electrically actuated rewinding mechanism specially adapted to use in weight clocks but capable of use in various other connections where a mechanism of this type is required.

The invention resides in a special form of circuit closer actuated when the propelling mechanism of the clock passes certain limiting positions, and in a special form of magnetic clutch interposed in the motor circuit and functioning to release the major part of the rewinding mechanism from the clock propelling mechanism except during the rewinding operation.

A further object of the invention is to enable a single motor to be used to rewind a plurality of weights either individually or simultaneously. This is effected by providing a separate circuit closer and magnetic clutch for each weight, the circuit closer functioning to start the motor, and clutch the rewinding drum corresponding to the desired weight to the motor. Thus the actuation of one or more circuit closers starts the motor and the actuation of each circuit closer controls the corresponding clutch to secure the requisite rewinding for each weight.

The preferred embodiment of the invention I shall describe in connection with the accompanying drawings, in which:—

Figure 1 is an elevation of a device embodying the various features of the invention showing it arranged to rewind two weights; Fig. 2 is the wiring diagram of the same; Fig. 3 is a side elevation similar to Fig. 1, but on a larger scale, the rewinding mechanism for one weight being omitted; Fig. 4 is a view of the mechanism illustrated in Fig. 3 looking from the right with reference to that figure, a portion of the gear 32 being broken away to show the circuit controller; Fig. 5 is a perspective view of a contact forming part of the circuit closer; Fig. 6 is a perspective view of a rocking contact shoe forming part of the circuit closer; Fig. 7 is a central vertical section of the mechanism shown in Fig. 3; and Fig. 8 is a section on the line *h*—*h* of Fig. 7.

In the drawings, 1 represents the base upon which is mounted the entire apparatus. An electric motor 2 which furnishes the power for the rewinding is attached to the base near its center, and at either side rise standards or supporting frames 3 of any suitable form, but here shown as each cast in one piece with bosses 4 into which are forced shafts 5 and 6 for a purpose later to be described. The two standards 3 and the entire mechanism carried thereby are identical, and hence only one such mechanism will be described.

Referring now particularly to Figs. 3 to 8, it will be noted that the shaft 6 has an inner portion 7 and a reduced outer portion 8. On the portion 7 turns one member of the magnetic clutch. This member consists of a central hub 9 of bronze or the like to which is attached by screws 10 or the equivalent, a soft iron shell 11 having an annular groove 12 on its outer face. In this groove are wound the inductive windings 13 usually of insulated copper wire. They are tied into the groove 12 in the usual manner and the ends of the coil are respectively connected to slip rings 14 and 15 insulated from each other by being individually mounted on the fiber or other insulating ring 16 which in turn is held by screws to the shell 11. Current is led to and from the windings of the magnetic clutch through brushes 17 and 18 contacting with the slip rings. These brushes are held on stems 19 by nuts 20 and the stems 19 are supported by the frame 3 as at 21, the stems being held to the frame by nuts 22 with insulators 23 interposed between the stems and the frame to prevent short circuiting. The shell 11 is formed with gear teeth 24 around its circumference and is driven by a gear 25 carried on the shaft of the motor 2 either directly as shown in the left hand mechanism of Fig. 1, or through an idler gear 26 as shown in the right hand mechanism of the same figure. The purpose in using the idle gear in one case and not in the other is to cause the two rewinding mechanisms to have the same relative directions of rotation, thus avoid-

ing the necessity of making a right and a left hand mechanism; which otherwise would be required.

Mounted on the reduced portion 8 of the shaft 6 is a sleeve 27 to which a soft iron disk armature 28 is attached as by screws 29. A thin paper washer 30 may be inserted between the armature and the magnet and causes the clutch to release more quickly. When the current is passed through the windings of the magnet the armature is attracted thereto very strongly, because the shell 11 and armature 28 form a complete path for the magnetic flux, with no appreciable air gap. When the magnet is deënergized the brushes 17 and 18 force it away from the armature which is held by the shoulder between the two portions 7 and 8 of the shaft 6, thus causing instant release of the connection.

The sleeve 27 carries a small gear 31 which meshes with a large gear 32 held by a nut 33 on a hub 34. The hub 34 turns on the shaft 5, and in addition to the gear 32 carries a grooved drum 35, preferably of insulating material and a fiber, or other non-conducting drum 36. The parts numbered 32 to 36 inclusive are further tied together by a pin 37 (see Fig. 7).

The drum 36 carries a slip ring 38 provided with a boss or lug 39 on its face and against this slip ring bear shoes 40 and 41. These shoes are pivoted to turn at 42 and 43 in the ends of arms 44 and 45 respectively. These arms 44 and 45 are pivoted at 46 and 47 on rods 48 and 49, which in turn are supported in the frame 3. They are held in the frame by set screws 50 and are insulated therefrom by insulators 51. A tension spring 52 adjustable by nuts 53 draws the arms together so as to hold their connected shoes against the slip ring 38 and this spring is insulated at 54 so as not to short circuit the arms 44 and 45.

The shoes 40 and 41 are both in the path of the boss 39 as the slip ring rotates alternately in opposite directions and will be struck by the boss and turned to bring different faces of the shoes into contact with the slip ring. All four faces of the shoe 41 are conducting, so that the only function performed by turning it over is the distribution of wear over more than one face. The shoe 40 has, however, one insulated face 55 and the turning of this shoe by the boss 39 alternately to bring a conducting and this insulated face 55 into contact with the slip ring 38 is the means used to control the operation of the rewinding mechanism. A supplemental circuit is simultaneously made or broken through the switch blades 56 carried by the shoe 40 which blades coact with the spring contacts 57 (see Figs. 5 and 6) to effect this purpose. The contacts 57 are supported on a pin 58 held in the frame 3 but insulated therefrom in the manner described with reference to the pins 19. This double provision for controlling the circuit is made to secure certainty of operation for long periods without inspection, and has been found desirable in certain classes of mechanism. Either circuit may however be used alone with successful results.

The path of the current is from the battery through the motor; thence through brush 17 and slip ring 14 through the magnetic coil 13 by way of the slip ring 15 to brush 18. From the brush 18 two paths are open, the first through the arm 45 through shoe 41, slip ring 38 to shoe 40 and the other to contact 57 through the knives 56 to shoe 40, the making and breaking of both connections being dependent on the position of shoe 40. From shoe 40 the current passes through arm 44 and back to the battery. The various wire connections are illustrated in diagram on the various figures.

In the groove on the drum 35 is wound one end of the weight cord 60 which then passes upward and makes several turns around the usual clock weight drum 61, to which it is connected. The other end of the cord 60 carries the usual weight 62, whose descent furnishes power to the clock. It is of course understood that the weight drum is connected to its arbor by a ratchet as is common in weight clocks and that the weight is rewound by drawing down on the end of the cord 60.

From the mechanism already described it is apparent that if we assume a shoe 40 to be in circuit closing position, current will pass through that shoe and by means of the connections shown, through the corresponding clutch and the motor. The motor drives the shell 11 which by the magnetic clutch action turns armature 28 and its connected gear 31, and this drives gear 32 and the connected drum 35 upon which the weight cord 60 is wound, thus rewinding the clock. At the beginning of the rewinding the parts are in the position shown in Fig. 4. As the motor runs, the boss 39 turns in a counter-clockwise direction, as viewed in Fig. 8, until it collides with shoe 40, turning it to the position shown in Figs. 3 and 8. There the knives 56 are away from contact 57 and insulated face 55 is in contact with slip ring 38. The clutch is thus released and current is turned off from the motor, which comes to rest independently of the remainder of the mechanism. The rewinding action lasts two seconds or less. The weight now continues to drive the clock and draws the rewinding mechanism (which turns free of the motor and magnet) in a reverse direction to that previously imparted by the motor. The boss 39 thus rotates clockwise until it collides with the other face of shoe 40 and turns it back to conducting position (Fig. 4)

whereupon the weight is rewound as previously described. The use of the clutch obviates the need of a heavy weight necessary to turn the motor backward, and the arrangement of the clutch is such that the friction of the brushes 17 and 18 does not retard the descent of the weight.

By connecting in parallel a plurality of units each consisting of a circuit controller and clutch, and then connecting them, as in Fig. 2, to control a single motor which is adapted to supply power through the respective clutches I secure a device which will rewind several weights at appropriate times, whether the periods of rewinding for the several weights be separate, coincident or overlapping. In the last named case the clutch prevents overwinding of the first weight though the motor continues to run in winding the second. The arrangement of the wiring, batteries and the like may be varied in many obvious ways, the essential feature being that each circuit controller and corresponding clutch be grouped as a unit controlling the motor's action.

The form of the mechanical elements of the mechanism are also subject to considerable variation but I prefer the embodiment shown, because of its simplicity and durability. The clutch engages and releases instantly, and requires only a small current. The brushes assist the disengagement of the clutch and insure free turning of the clutch armature during the descent of the weight.

Having thus described my invention, what I claim is:—

1. The combination of a plurality of propelling weight mechanisms; a plurality of devices each adapted to rewind a corresponding weight mechanism; an electric motor; a plurality of electromagnetic clutches each adapted to clutch the motor to a corresponding rewinding device; a plurality of circuit controllers each adapted to be actuated by the movements of a corresponding weight mechanism; and connections whereby each circuit controller controls the passage of current through the corresponding clutch and the motor.

2. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding device therefor, a magnetic clutch adapted to establish driving relation between the motor and the rewinding device, and a circuit controller adapted to be actuated by the movements of the weight mechanism; and connections whereby each circuit controller controls the passage of current through its corresponding clutch and the motor.

3. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding mechanism therefor moving with the weight mechanism, a magnetic clutch adapted to establish driving relation between the motor and the rewinding device, and a circuit controller adapted to be actuated by the movements of the rewinding device as it moves with the weight mechanism; and connections whereby each circuit controller controls the passage of current through its corresponding clutch and the motor.

4. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding device therefor, an electrically actuated clutch adapted to establish driving relation between the motor and the rewinding device, and a circuit controller adapted to be actuated by the movements of the weight mechanism; and connections whereby each circuit controller controls the passage of current through its corresponding clutch and the motor.

5. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding device therefor, an armature connected to the rewinding device, a magnet adapted to be rotated by the motor and when energized to cause frictional engagement with the armature to establish driving relation between the motor and the rewinding device, and a circuit controller adapted to be actuated by the movement of the weight mechanism; and connections whereby each circuit controller controls the passage of current through the corresponding magnet and the motor.

6. The combination of an electric motor; a plurality of units each consisting of a propelling weight mechanism, a rewinding device therefor, an armature connected to the rewinding device, an electro-magnet adapted to be rotated by the motor, and when energized to cause frictional engagement with the armature to establish driving relation between the motor and the rewinding device, brushes adapted to conduct current to and from the magnet and to urge the magnet and armature apart, and a circuit controller adapted to be actuated by the movements of the weight mechanism; and connections whereby each circuit controller controls the passage of current through its corresponding magnet and the motor.

7. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding device therefor, a magnetic clutch adapted to establish driving relation between the motor and the rewinding device, a slip ring turning with the weight mechanism and provided with a lug, and a shoe having a conducting and a non-conducting face and held in contact with the ring in the path of the lug, whereby the shoe is turned by the lug alternately to present one or another face to the ring; and connections whereby the establishment and destruction of conducting rela-

tions between each shoe and its ring control the passage of current through the corresponding clutch and the motor.

8. The combination of an electric motor; a plurality of units, each consisting of a propelling weight mechanism, a rewinding device therefor, a magnetic clutch adapted to establish driving relation between the motor and the rewinding device, a member turning with the weight mechanism and provided with a lug, and an electric switch mounted in the path of the lug and adapted to be moved thereby alternately between circuit making and circuit breaking positions; and connections whereby each switch controls the passage of current through the corresponding clutch and the motor.

9. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and rewinding of the weight; a slip ring moving with the rewinding mechanism and provided with a lug; a shoe having a conducting and an insulated face mounted in the path of the lug so as to be shifted thereby alternately to bring the insulated and the conducting face into contact with the slip ring; a motor connected to drive the rewinding device; and connections whereby the shifting of the shoe controls the flow of current through the motor.

10. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and rewinding of the weight; a slip ring moving with the rewinding mechanism and provided with a lug; a shoe having a conducting and an insulated face mounted in the path of the lug so as to be shifted thereby alternately to bring the insulated and the conducting face into contact with the slip ring; a fixed contact member; a switch knife carried by the shoe and adapted to contact with the fixed contact when the conducting face of the shoe is in contact with the slip ring; a motor connected to drive the rewinding device; and connections whereby the establishment and destruction of conducting relations between the slip ring and the shoe and between the knife and the fixed contact control the flow of current through the motor.

11. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and rewinding of the weight; a drum moving with the rewinding mechanism and provided with a lug; a switch adapted to be positively moved by the lug alternately between circuit making and circuit breaking positions; a motor connected to drive the rewinding device; and connections whereby the switch controls the flow of current through the motor.

12. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and the rewinding of the weight; a slip ring moving with the rewinding mechanism and provided with a lug; a shoe having a conducting and an insulated face mounted in the path of the lug so as to be shifted thereby alternately to bring the insulated and the conducting face into contact with the slip ring; an electric motor; a magnetic clutch adapted to connect the motor to the rewinding device; and connections whereby the shifting of the shoe controls the flow of current through the motor and clutch.

13. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and the rewinding of the weight; a slip ring moving with the rewinding mechanism and provided with a lug; a shoe having a conducting and an insulated face mounted in the path of the lug so as to be shifted thereby alternately to bring the insulated and the conducting face into contact with the slip ring; a fixed contact member; a switch knife carried by the shoe and adapted to contact with the fixed contact when the conducting face of the shoe is in contact with the slip ring; an electric motor; a magnetic clutch adapted to connect the motor to the rewinding device; and connections whereby the establishment and destruction of conducting relation between the slip ring and the shoe and between the knife and the fixed contact control the flow of current through the motor and clutch.

14. The combination of a propelling weight mechanism; a rewinding device therefor operatively connected to the weight mechanism and adapted to rotate alternately in opposite directions during the descent and rewinding of the weight; a drum moving with the rewinding mechanism and provided with a lug; a switch adapted to be positively moved by the lug alternately between circuit making and circuit breaking positions; an electric motor; a magnetic clutch adapted to connect the motor to the rewinding device; and connections whereby the switch controls the flow of current through the motor and clutch.

15. The combination of a propelling weight mechanism; a rewinding device therefor; an electric motor; an electromagnet adapted to be rotated by the motor; an ar-

mature connected to the rewinding device and adapted to enter into frictional engagement with the magnet when the latter is energized; a slip ring provided with a lug and adapted to be rotated in opposite directions as the propelling weight mechanism moves during the descent of the weight and the rewinding thereof; a shoe having a conducting and an insulated face mounted to contact with the slip ring in the path of the lug; whereby it is shifted alternately by the lug to bring the conducting and insulated face into contact with the slip ring; and connections whereby such shifting of the shoe controls the flow of current through the motor and the electromagnet.

16. The combination of a propelling weight mechanism; a rewinding device therefor; an electric motor; an electro-magnet adapted to be rotated by the motor; an armature connected to the rewinding device and adapted to enter into frictional engagement with the magnet when the latter is energized; a slip ring provided with a lug and adapted to be rotated in opposite directions as the propelling weight mechanism moves during the descent of the weight and the rewinding thereof; a shoe having a conducting and an insulated face mounted to contact with the slip ring in the path of the lug, whereby it is shifted alternately by the lug to bring the conducting and insulated face into contact with the slip ring; a fixed contact member; a contact member mounted on the shoe, adapted to contact with the fixed contact member when the conducting face of the shoe is in contact with the slip ring; and connections whereby the establishment and destruction of conducting relation between the ring and the shoe and between the fixed contact and the contact member carried by the shoe control the flow of current through the motor and the electromagnet.

17. The combination of a propelling weight mechanism; a rewinding device therefor; a circuit controller adapted to be actuated by the movements of the propelling weight mechanism; an electric motor; an electro-magnet adapted to be rotated by the motor and consisting of an annular coil; an armature operatively connected to the rewinding mechanism the armature and the magnet being adapted to be drawn into frictional engagement by the energizing of the magnet, so as to establish driving relation between the motor and the rewinding device; and connections whereby the circuit controller controls the flow of current through the motor and magnet.

18. The combination of a propelling weight mechanism; a rewinding device therefor; a circuit controller adapted to be actuated by the movement of the weight mechanism; an armature operatively connected to the rewinding device; an electric motor; an electro-magnet adapted to be rotated by the motor and when energized to cause frictional engagement with the armature to establish driving relations between the motor and the rewinding device; contact rings electrically connected to the electro-magnet; brushes adapted to conduct current to the contact rings and to urge the magnet and the armature apart; and connections whereby the circuit controller controls the flow of current to the motor and magnet.

19. The combination of a propelling weight mechanism; a rewinding device therefor; a circuit controller adapted to be actuated by the movement of the weight mechanism; an armature operatively connected to the rewinding device; an electric motor; an electro-magnet adapted to be rotated by the motor and when energized to cause frictional engagement with the armature to establish driving relations between the motor and the rewinding device; contact rings electrically connected to the electro-magnet; brushes adapted to conduct current to the contact rings and to urge the magnet and the armature apart; a thin sheet of non-magnetic material interposed between the magnet and the armature; and connections whereby the circuit controller controls the flow of current to the motor and magnet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WENDELL HESS, JR.

Witnesses:
GORDON S. HOPKINS,
J. WATSON HAYDEN.