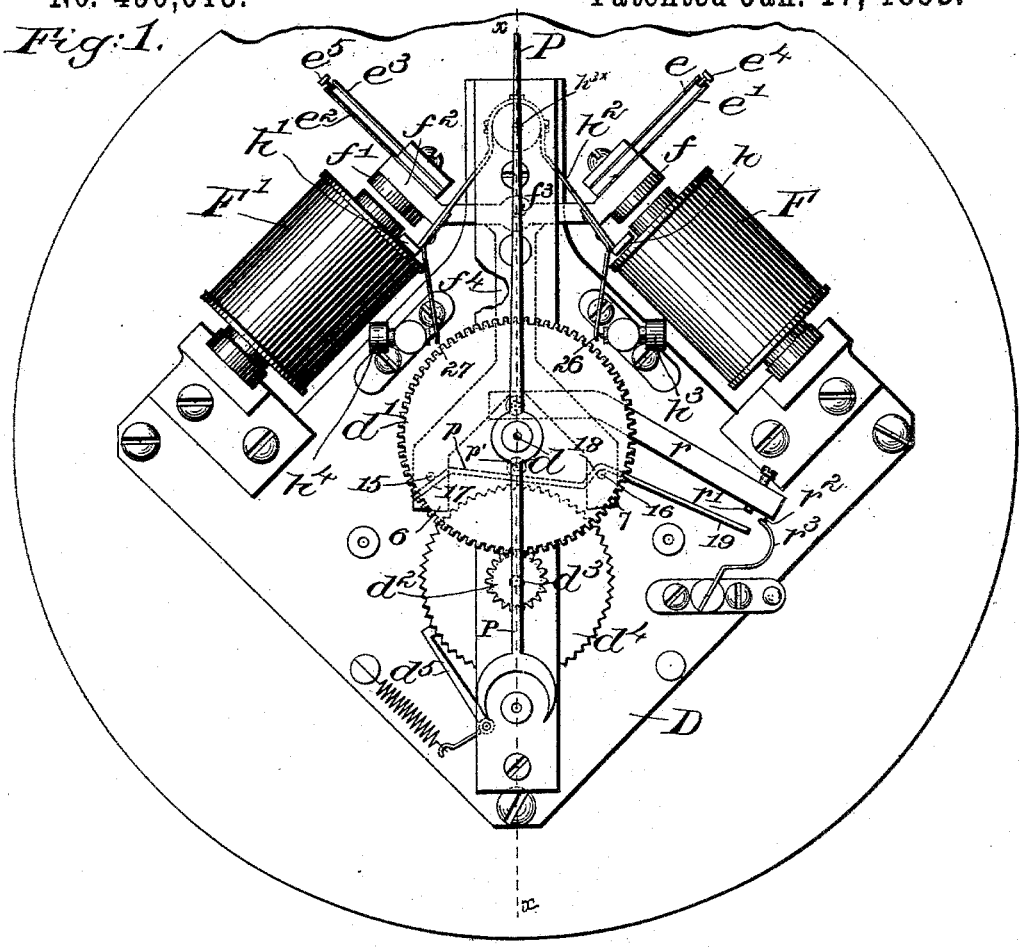
(No Model.) 3 Sheets—Sheet 1.

F. J. DIBBLE.

ELECTRIC TELEMETER TRANSMITTER.

No. 490,013. Patented Jan. 17, 1893.

Fig: 1.



Witnesses.
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Edward F. Allen

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(No Model.) 3 Sheets—Sheet 2.

F. J. DIBBLE.

ELECTRIC TELEMETER TRANSMITTER.

No. 490,013. Patented Jan. 17, 1893.

Fig: 3.

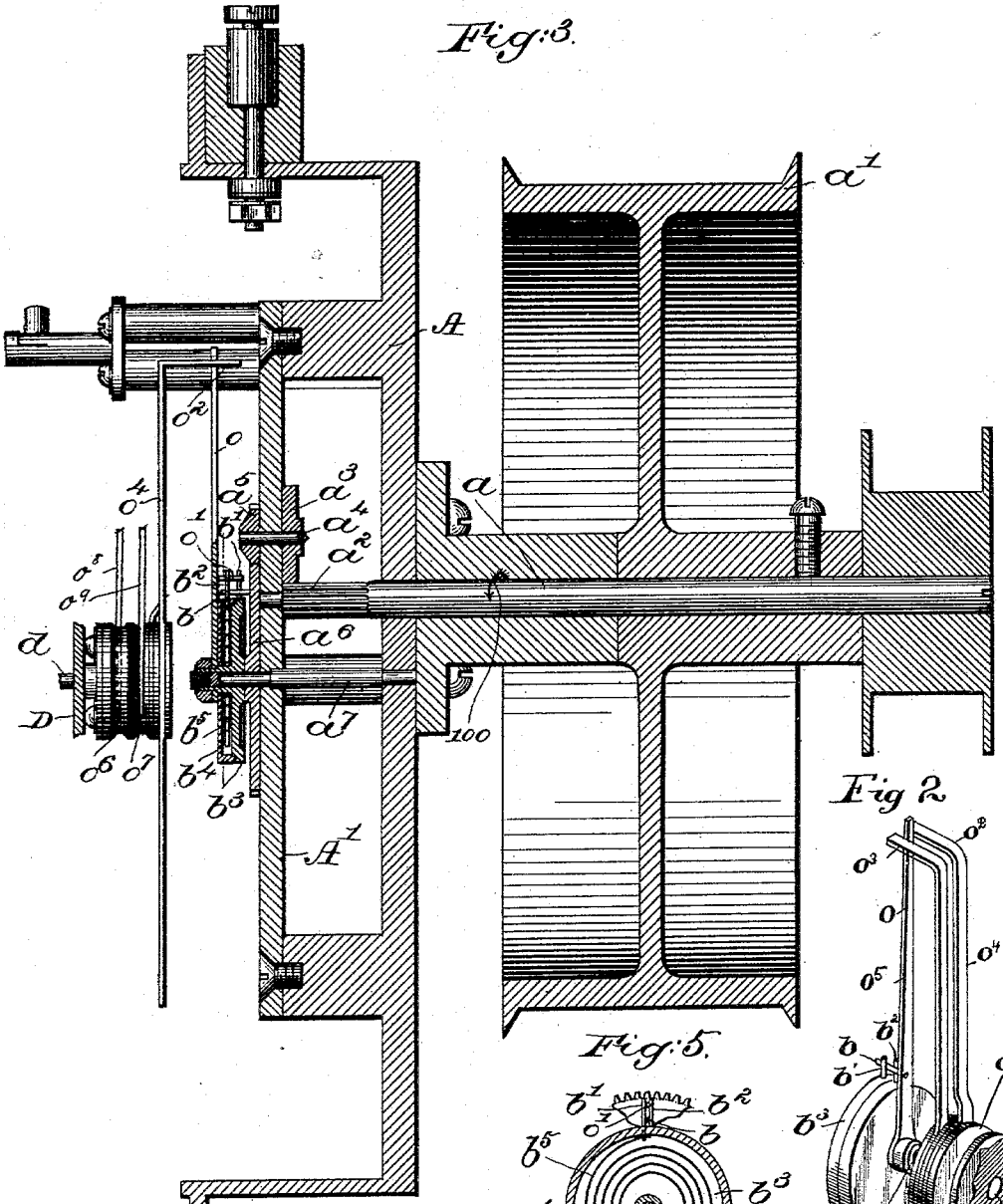

Fig: 5.

Fig 2.

Witnesses.
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(No Model.) 3 Sheets—Sheet 3.

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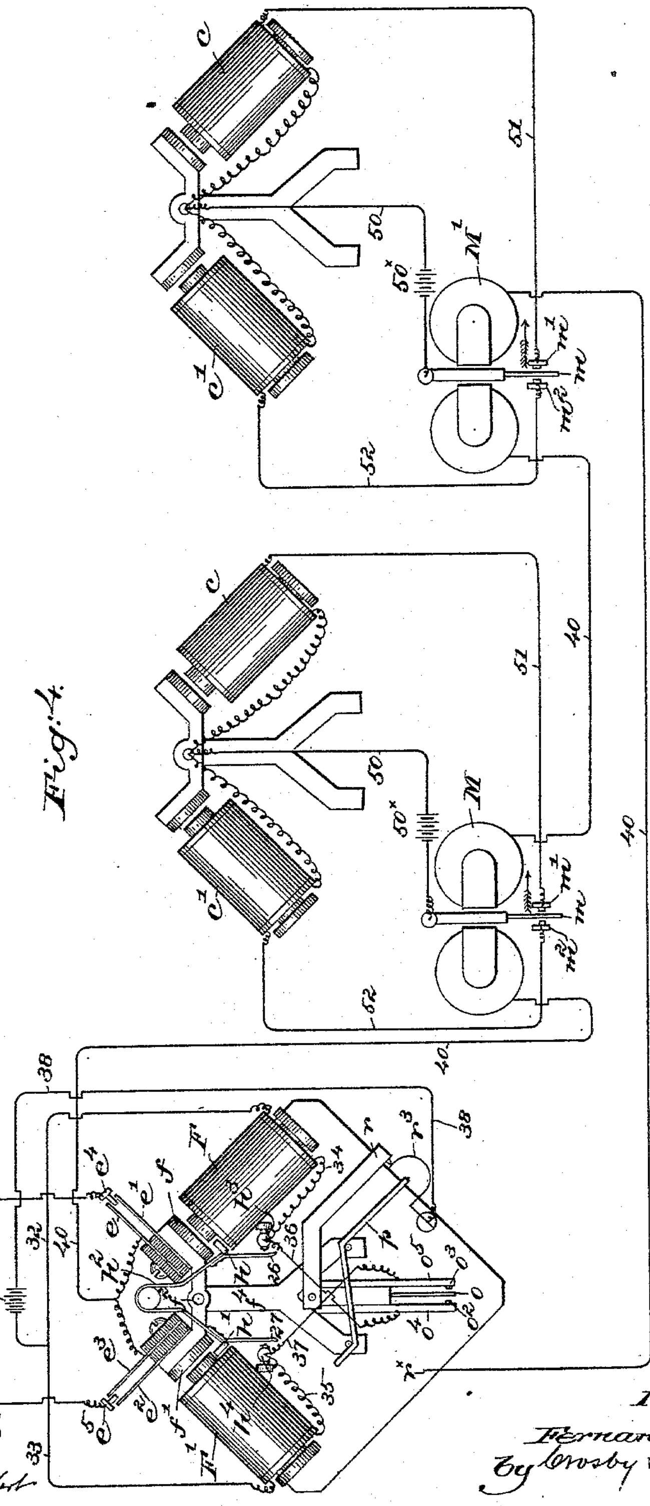

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

FERNANDO J. DIBBLE, OF PEABODY, MASSACHUSETTS.

ELECTRIC TELEMETER-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 490,013, dated January 17, 1893.

Application filed November 21, 1891. Serial No. 412,671. (No model.)

To all whom it may concern:

Be it known that I, FERNANDO J. DIBBLE, of Peabody, county of Essex, State of Massachusetts, have invented an Improvement in Telemeter Systems, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to telemeter systems, and has for its prime object the production of a system which may be operated over a single-line circuit employing a single-line battery or generator.

Other features of this invention will be hereinafter described and pointed out in the claims.

Figure 1 is a face view of a transmitting device to be used in connection with my improved telemeter system; Fig. 2 a perspective detail showing the contact arm and co-operating movable contacts; Fig. 3, a section of Fig. 1 on dotted lines x—x the plate D and parts carried thereby being removed; Fig. 4, a diagram view, showing the arrangement of circuits to be described; and Fig. 5, a detail to be referred to.

The invention is herein represented as embodied in a device particularly adapted for use in indicating and recording the variations in the level of water contained in a reservoir, stand-pipe, &c., said device consisting of a suitable frame or casing A, having bearings for the shaft a, fast upon which at one end is a pulley a', which may be belted or connected to any usual float in the water contained in the reservoir or stand-pipe, and which it is unnecessary to describe in detail, rise and fall of the float rotating the pulley a' and shaft a in one or the other direction. The shaft a, at its end opposite the pulley a', has a series of teeth a^2 cut in its periphery, which teeth mesh with the teeth of a pinion a^3 on an arbor a^4, journaled in the back-plate A', said arbor at the opposite side of said plate having fast upon it a pinion a^5, in mesh with a toothed wheel a^6, fast on a shaft a^7, journaled in the said back-plate and casing, see Fig. 3. The toothed wheel a^6 which constitutes a rotatable actuator carries a laterally-extended pin b, which normally lies between the two pins b', b^2 projecting radially from the peripheries of the disks or plates b^3, b^4, loose on the shaft a^7 and connected with each other by a coiled spring b^5, see Fig. 5, one end of which is attached to the hub of the disk b^3, while the other end is attached to the periphery of the disk b^4. A contact arm o, loosely journaled on the hub of the disk b^3 about the shaft a^7, also has a projecting pin o', lying between the pins b', b^2, see Fig. 3, the outer end of said contact arm lying between the contacts o^3, o^3 on the arms o^4, o^5, on the inner end of the staff d, journaled in the frame plates D, Fig. 1 the said contacts being connected respectively with the conducting disks or surfaces o^6, o^7 on and insulated from the staff d and also insulated from each other, a contact spring o^8 bearing upon the disk o^6, and a contact spring o^9 upon the disk o^7, by which the said contacts, while movable, are placed in electrical connection with wires leading from said spring contacts.

The staff d at its front end carries the toothed wheel d', Fig. 1 driven by the pinion d^2 on the shaft d^3, also carrying the toothed driving wheel d^4, the teeth of which are adapted to be engaged by one or the other of the ends 6, 7 of the pallet f^4, pivoted at f^3, the said wheel d^4 also being acted upon by a spring-controlled dog d^5, which assists in the proper rotation of the wheel and to retain the same in position.

The pallet f^4 at its pivotal end has formed as a part of it the armature-carrier f^2, to opposite ends of which are attached the armatures f, f' of the electro-magnets F, F', see Fig. 1. The electro-magnets F, F' are also provided with auxiliary armatures h, h', carried by the U-shaped carrier h^2, pivoted at $h^{3\times}$, the arms 26, 27 of said carrier normally lying between and out of engagement with the fixed contacts h^3, h^4. The armature-carrier f^2 carries at each end two contact springs e, e', e^2, e^3, insulated from each other, the springs e, e' normally lying at opposite sides of a fixed contact e^4, while the springs e^2, e^3 normally lie at opposite sides of the fixed contact e^5. The pallet f^4 has two laterally-extended pins 15, 16, shown by dotted lines Fig. 1 which lie at opposite sides of the inclined faces 17, 18 of the bar p, pivoted at p', the outer end 19 of which lies directly beneath

the screw r' on the pivoted circuit-breaking lever r, a contact r^2 on the outer end of which normally rests upon a contact spring r^3, see Fig. 1.

In Fig. 4, the movable contacts o^4, o^5 are shown as partially rotated into their lowermost position for the sake of clearness, they being in the positions which they will occupy when the circuit has been closed a succession of times, and referring to said figure the fixed contacts e^4, e^5 are connected by wires 30, 31 with the opposite poles of the main line battery B. One pole of the local battery B′ is connected by the wires 32, 33 with the electro-magnets F, F′, the latter being also connected by wires 34, 35 with the fixed contacts h^3, h^4, they in turn being connected by wires 36, 37 with the contacts o^2, o^3. The other pole of the local battery B′ is connected by wire 38 with the fixed contact r^3. One end of the line wire 40 is connected with the pivotal end of the circuit-breaking lever r through the base of the instrument at the point r x Fig. 4, while the other end of the line is connected with the contact springs e, e^3, which are insulated therefrom, the other springs e', e^2 being connected in circuit with the base of the instrument through the armature carrier f^2.

M, M′ represent polarized relays included in the main line 40, one of which is located at each receiving instrument, which may be placed at any desired point however distant from each other, being herein represented as substantially like those shown and described in my patent No. 474,771, dated May 14, 1892, to which reference may be made, a portion only of each instrument being herein shown for the sake of clearness, the armature m of each of the said polarized relays being connected by wire 50, through a local battery $50^{\times}$, with the receiving magnets c, c', said magnets being also connected by wires 51, 52 respectively with the contacts m', m^2 at opposite sides of the armature m.

The operation of the system is as follows,—Assuming the shaft a of the transmitting device to be rotated in the direction of arrow 100, Fig. 3, by a fall of water in the reservoir or stand-pipe with which it is connected, and rotated in the opposite direction by a rise of water in the said reservoir or stand-pipe, if the water falls the shaft will be rotated in the direction designated, and through the pinions a^3, a^5 will rotate the wheel a^6, causing its pin b to move the pin b^2 to the right, Fig. 2, and the pin b', being connected therewith by the spring b^5 will tend to follow the said pin b^2, and will move the contact arm o before it, causing it to follow or move in unison with the pin b^2, the outer end of the said contact arm engaging the contact o^2, which, referring to Fig. 4, closes the circuit from the local battery B′ through the wire 32, magnet F, wire 34, contact h^3, wire 36, contact o^2, contact arm o, through the base of the instrument to the circuit-breaking lever r, through the contact spring r^3 and wire 38, back to the other pole of the battery, such closure energizing the magnet F and causing it to attract its auxiliary armature h to bring the end 26 of the carrier h^2 into engagement with the fixed contact h^3, to thereby shunt out the contact arm o and contact o^2 and permit the current from the magnet F to pass through the wire 34, contact h^3, and carrier h^2, directly to the base of the instrument, and thence through the circuit-breaking lever r back to the battery, without passing through the contact arm and its contact. The passage of the current through the magnet F will cause it to attract its main armature f, and bring the spring e into engagement with the fixed contact e^4 and the spring e^2 into engagement with the fixed contact e^5, completing the circuit of the main line battery B the circuit being traced as follows,—from the main line battery B through the wire 30, fixed contact e^4, spring e, out over the main line 40 through the magnets of the polarized relays M, M′, &c., at the various receiving stations, back through to the base of the instrument at the point $r^{\times}$, through the armature carrier f^2 spring e^2, fixed contact e^5, wire 31, to the other pole of the main line battery. A current of one polarity being thus sent over the main line 40, the several polarized relays M included in the circuit will be energized, causing their armatures to be moved in one direction, as for instance that indicated by the arrows, to close the circuit from the local battery $50^{\times}$ through the armature m, contact m', wire 51, receiving magnet c, through the base of the instrument and wire 50 to the other pole of the battery, energizing the said receiving magnet c, and operating through its armature in the manner described in the patent No. 474,771 previously referred to, to indicate or record the change in movement of the shaft a of the transmitter to indicate that the water in the reservoir or stand-pipe is lower. As the magnet F of the transmitter attracts its armature f, the pallet f^4 will act as described to rotate the staff d of the transmitter to move the pointer P thereon to indicate the lowering of the water, the rotation of the staff d moving the conducting disks or hubs o^6, o^7, and their contacts o^2, o^3 in the same direction that the contact arm o has been moved, to thus move the contact o^2 away from or out of engagement with said contact arms to break the circuit and permit the armatures and parts to resume their normal positions. But should the water in the reservoir continue to fall rapidly, and thus cause the contact arm o to follow the contact o^2 as the latter is moved away from it, the circuit will still be broken by the bar p which, actuated by the vibratory movement of the pallet f^4 acts upon and lifts the circuit-breaking lever r, off from the contact spring r^3; but if the contact arm follows and continues in engagement with the contact arm o^2, the circuit will be again established as soon as broken

and the pointers and recording members of the transmitting and receiving devices will be moved forward another point to indicate a further lowering of the water in the reservoir. This movement of the pointers is continued by successive closures and interruptions of the circuit, until the contact arm has reached the limit of its movement, indicating the lowest level of water, when the next succeeding impulse will carry the contact o^3 beyond it to break the circuit at that point. Should the water rise in the reservoir, the shaft a of the transmitter will be rotated in the direction opposite to that indicated by the arrow 100, causing the pin b on the wheel a^6 to move in the opposite direction and strike against the pin b' on the disk b^3, moving the latter back or away from the pin o' on the contact arm o, which it had followed, and permitting the coiled spring b^5, acting through the other pin b^2, to move the said contact arm back to cause the said arm to engage the contact o^3 and close the circuit from the local battery B', through the wire 33, magnet F', wire 35, fixed contact h^4, wire 37, contact o^3, contact arm o, through the base of the instrument to the circuit-breaking lever r, contact r^3 and wire 38, to the other pole of the local battery, thus energizing the said magnet F' slightly to attract its auxiliary armature h', and to bring the arm 27 of the carrier h^2 against the fixed contact h^4 to thus shunt out the said contact arm o and contact o^3, and permit the current to pass from the magnet F' directly to the base of the instrument.

The shunting out of the contact arm o and contact o^3, permits the magnet F' to be fully energized to attract its main armature f', and to bring the spring e^3 against the fixed contact e^5 and the spring e' against the fixed contact e^4, to thus establish a circuit from the battery B through the main line, which circuit may be traced as follows,—from the main line battery B, wire 31, contact e^5, spring e^3, line wire 40, through the various polarized relays placed in the line, back to the base of the transmitting instrument at $r^\times$, thence through the armature carrier f^2, spring e', fixed contact e^4, wire 30, to the other pole of the main line battery, thus passing a current over the main line in the opposite direction from that sent over the line by the energizing of the magnet F, and causing the armatures m of the polarized relays at the receivers to be moved in the opposite direction, or opposite to that indicated by the arrows, to close the local circuit at each receiver from the battery, through the armature m, contact m^2, wire 52, receiving magnet c' to the base of the receiving instrument and wire 50, back to the local battery, causing the said receiving magnets to attract their armatures and, as fully set forth in the patent No. 474,771 previously referred to, to move their indicating pointers and recording arms in the direction opposite to that in which they were moved by attraction of the armatures of the receiving magnets c, to thus indicate a rise in level of the water in the reservoir. The circuit is, in this instance, broken at the transmitting instrument by the circuit-breaking lever r, as described, after each impulse, the impulses being repeated as long as the contact arm o remains in engagement with the contact o^3, the successive impulses causing the indicating pointers and recording arms to be moved back to indicate the rise in the level of the water, until the latter has reached its highest level.

It will be seen from the foregoing that a single main line battery only, is necessary for the operation of the system, the usual local batteries being provided at the various stations.

The contact arm o is held in a central normal position by the pins b', b^2 acting from opposite sides against the pin o', and as soon as either one of the pins b', b^2 is moved to the left or the right by the pin b on the wheel a^6, the coiled spring b^5, acting through the other pin, will cause the said arm to immediately follow the movement of the pin thus moved.

Should the water in the reservoir fall rapidly, and cause the shaft a and the wheel a^6 to be rotated faster than the contact arm o by successive impulses is permitted to follow, the pin b^2, which is moved away from the said contact arm by the faster rotation of the wheel a^6, will simply act to tighten or wind the coiled spring b^5, while the other pin, behind the contact arm and also acted upon by the coiled spring, pushes the contact arm o along after the pin b^2 as fast as the successive electric impulses will permit it, until the said contact arm shall have caught up and shall have been stopped from further rotation by the pin which was moved away from it.

If, from any cause, the battery or any of the electric circuits should fail, the shaft a and the wheel a^6 may be moved by the rise or fall in level of the water without danger of breaking or otherwise injuring the mechanism of the instruments; for, if the electricity fail to operate properly, the contact arm o cannot be moved forward, in which case the wheel a^6 will simply push one or the other of the pins b', b^2 through a complete revolution without the contact arm following and without doing any damage. After the said pin has been moved one whole or part of a revolution without the contact arm following, if the electricity be suddenly restored, the contact arm will immediately, by the successive impulses sent over the line as described, click along after the said pin until it has caught up to it.

By having the coiled spring act at opposite sides of the contact arm, the latter is acted upon by two opposing forces, which hold the same firmly in a central normal position so that it will not be easily moved except by the wheel a^6.

The contacts e^4, e^5 the spring pins e, e', e^2, e^3, constitute a pole changer for the main line circuit body.

I claim—

1. In a telemeter system, a movable contact arm, two co-operating contacts between which said contact arm moves, two transmitting magnets arranged in local circuit respectively with said contacts, a battery for said local circuit, and armatures for said magnets, combined with a main line circuit, a battery therefor, polarized relays therein, and receiving devices controlled thereby, and a circuit-closer and pole-changer also in said main line and operated by movement of the armatures of said transmitting magnets, substantially as described.

2. In a telemeter system, a movable contact arm, two co-operating movable contacts between which said contact arm moves, two transmitting magnets arranged in local circuit respectively with said contacts and having their armatures connected to move said contacts, combined with a pole-changer operated by said armatures, a main line circuit controlled thereby, polarized relays in said main line, and receiving devices controlled thereby, substantially as described.

3. In a telemeter system, a movable contact arm, two co-operating contacts between which said contact arm moves, two transmitting magnets arranged in circuit respectively with said contacts, a battery for said circuit, armatures for said magnets, two pairs of contact springs moved by said armatures, one pair being connected with one end of the main line circuit and the other pair being connected with the other end of the said circuit, and co-operating contacts for said two pairs of contact springs connected respectively with the opposite poles of a main line battery, to operate substantially as described.

4. A rotatable actuator, an actuating mechanism therefor, combined with a contact arm pivoted to rotate about the axis of said actuator, and a spring connected with said actuator and acting against said contact arm at each side, substantially as described.

5. A rotatable actuator and actuating mechanism therefor, combined with a contact arm pivoted to rotate about the axis of the said actuator, a spring connected with said actuator and acting against said contact arm at each side, and a device actuated by said shaft to relieve the said contact arm from the action of the spring at either side to permit the spring at the opposite side to move the arm, substantially as described.

6. A rotatable shaft, an actuator, and a wheel on said shaft carrying a laterally-extended pin, combined with two disks loosely journaled on said shaft and connected by a spring, two pins on the peripheries of said disks arranged respectively upon opposite sides of said laterally-extended pin, and a pivoted contact arm also provided with a pin extended between the pins on the peripheries of said disks, substantially as described.

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

FERNANDO J. DIBBLE.

Witnesses:
FREDERICK L. EMERY,
GEORGE F. RANDLETT.