No. 815,778. PATENTED MAR. 20, 1906.

R. ANDERSON.

ELECTRICAL SPEED INDICATOR.

APPLICATION FILED FEB. 16, 1905.

2 SHEETS—SHEET 1.

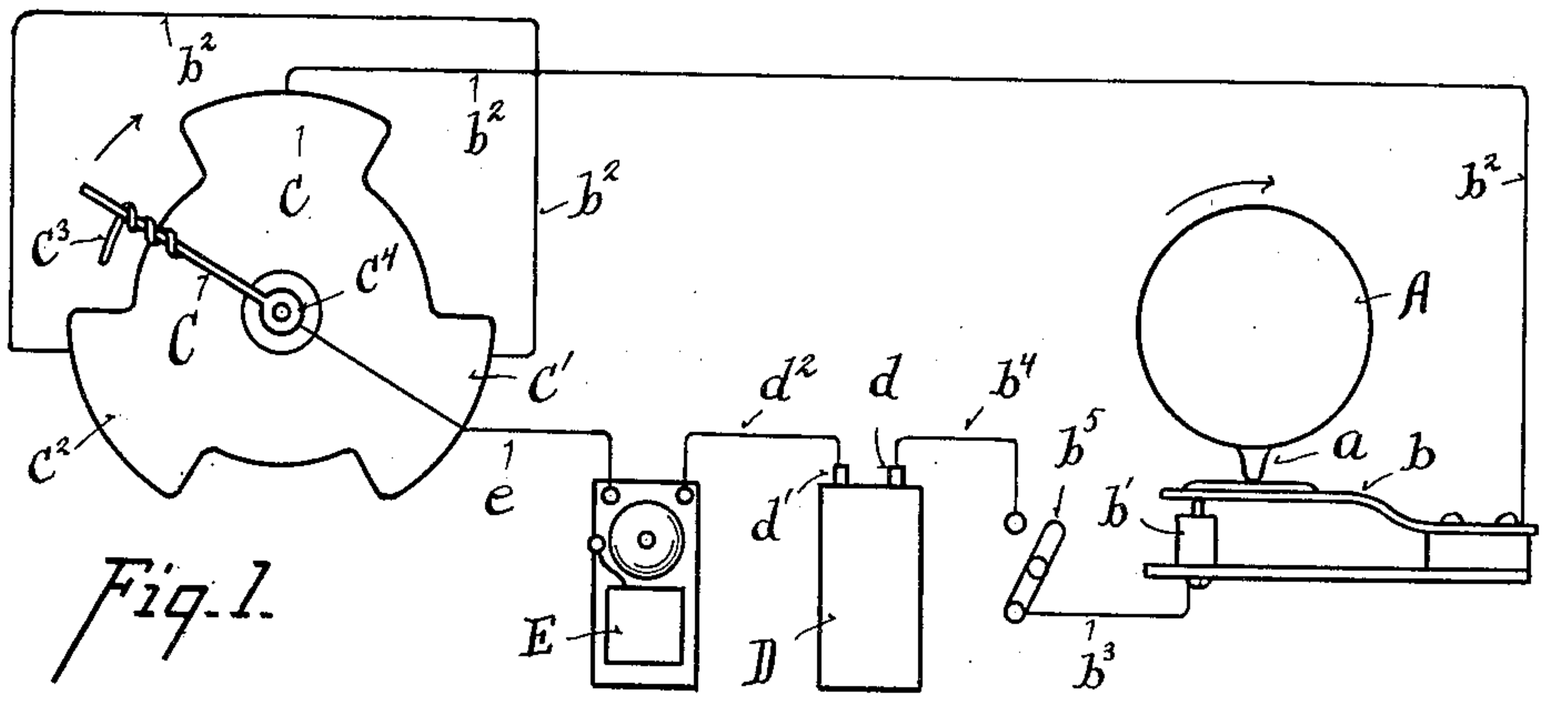


Fig. 1.

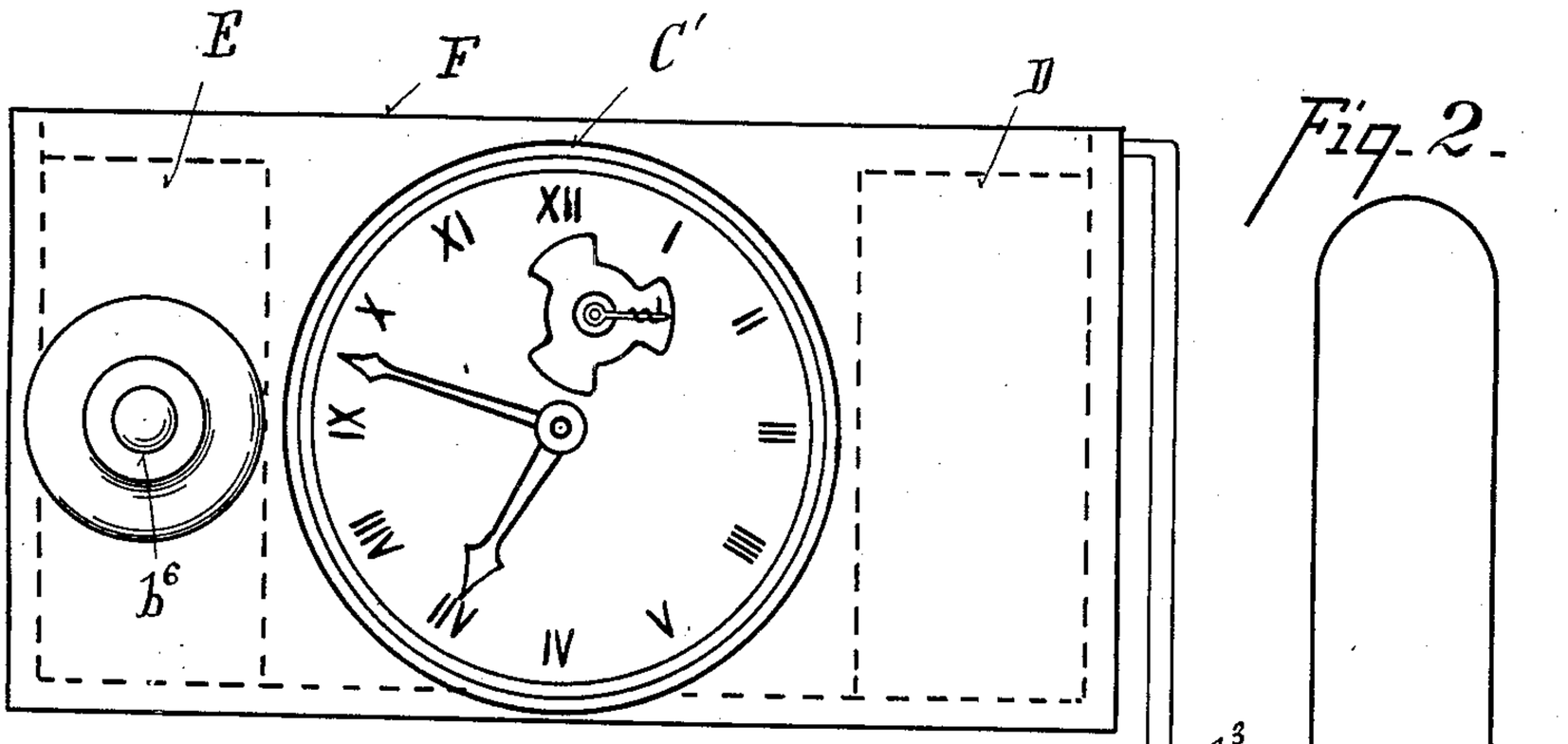


Fig. 2.

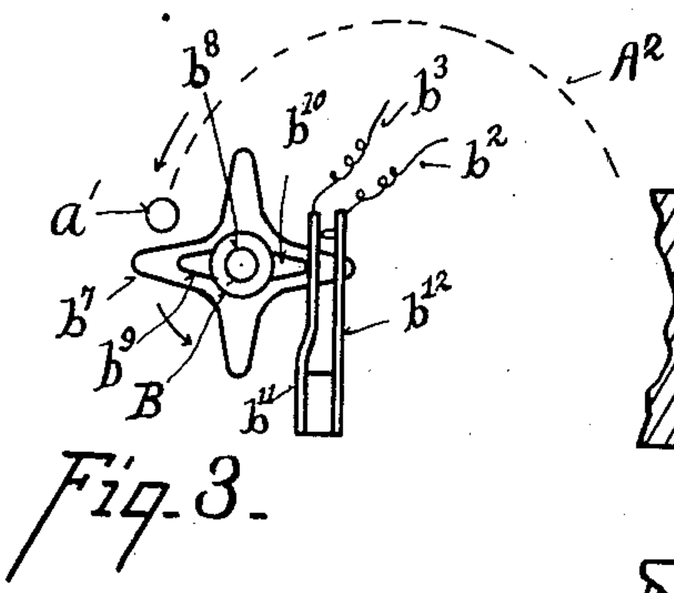
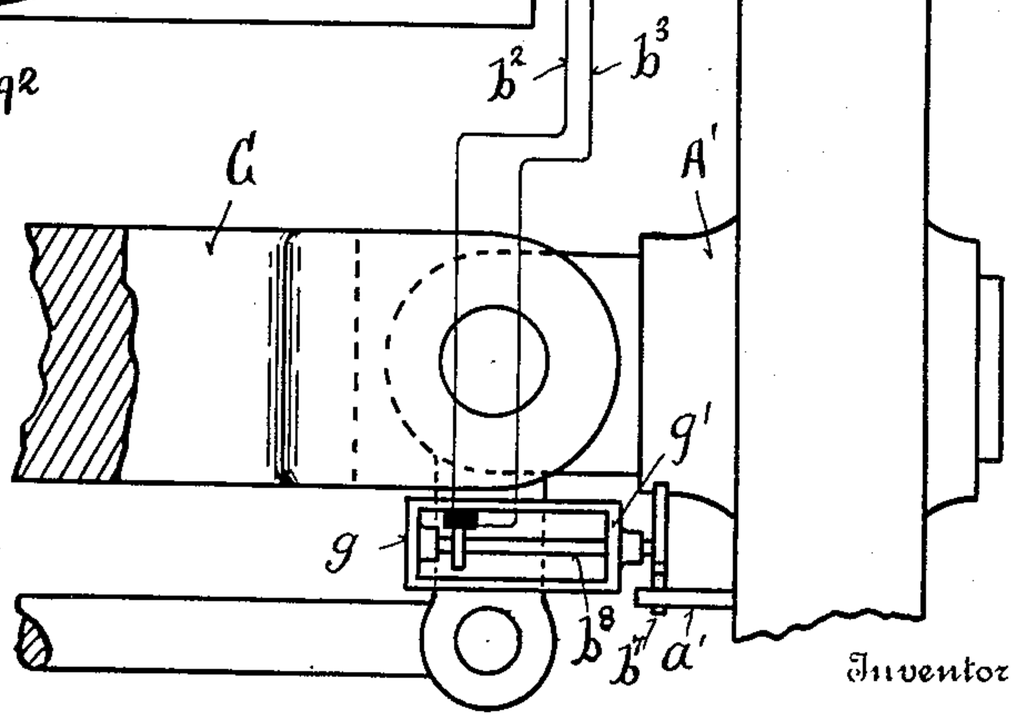


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 5.

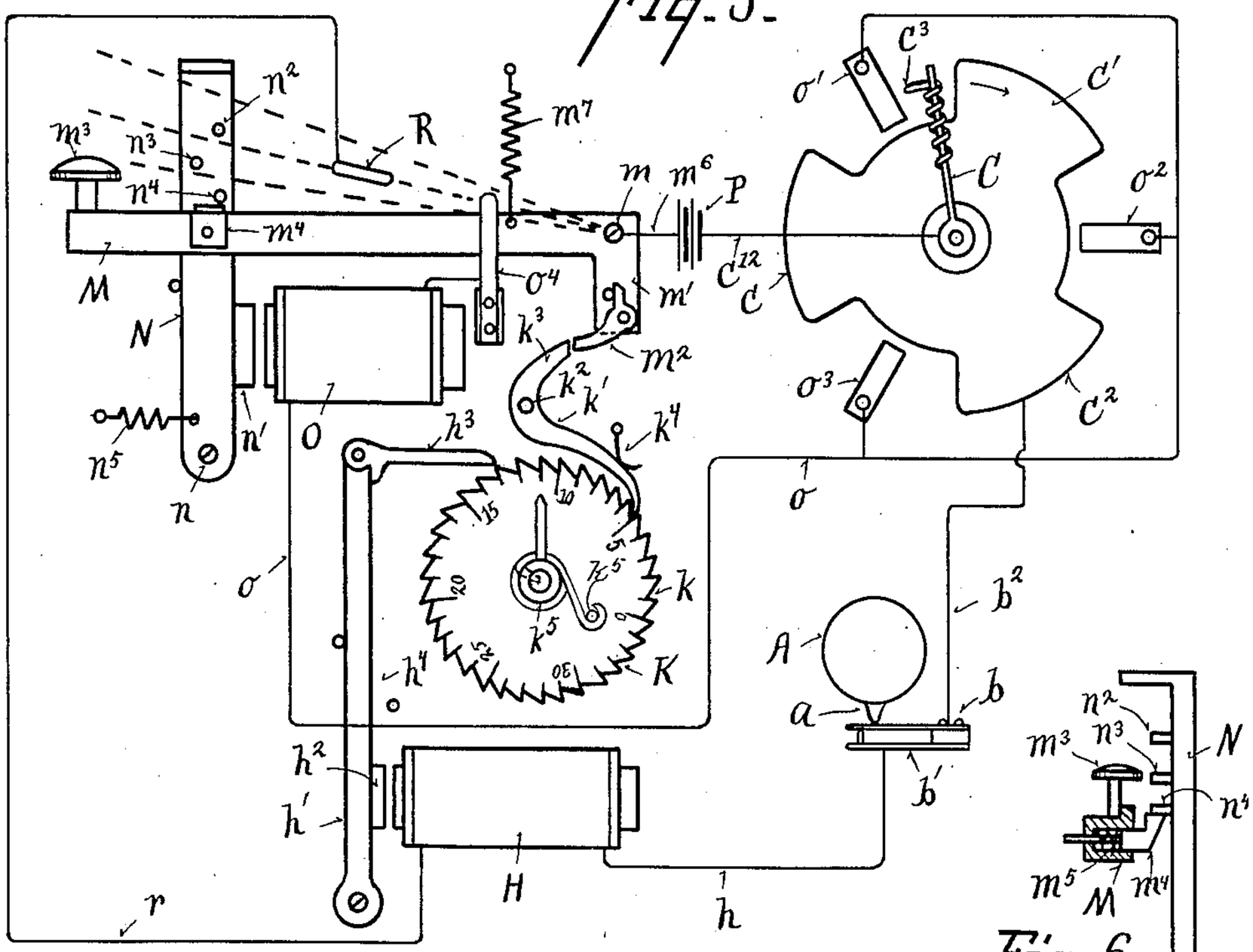
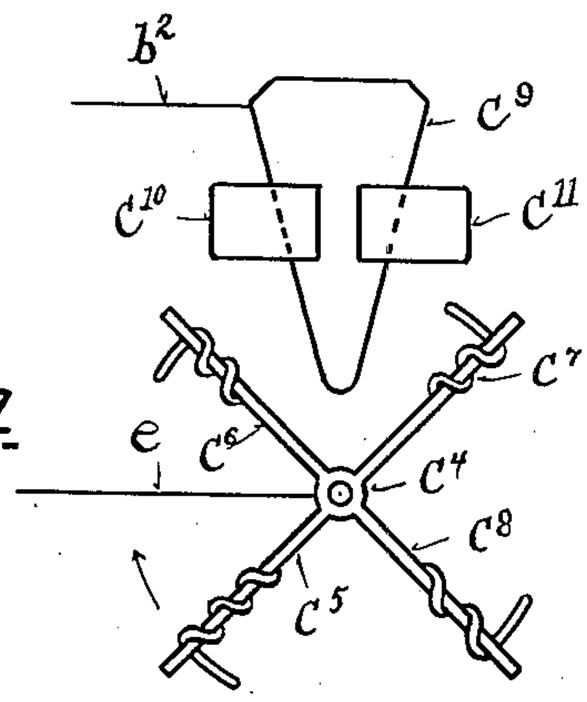


Fig. 6.

Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT ANDERSON, OF CINCINNATI, OHIO.

ELECTRICAL SPEED-INDICATOR.

No. 815,778. Specification of Letters Patent. Patented March 20, 1906.

Application filed February 16, 1905. Serial No. 245,836.

To all whom it may concern:

Be it known that I, ROBERT ANDERSON, a citizen of the United States of America, and a resident of Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Electrical Speed-Indicators, of which the following is a specification.

The object of my invention is a speed-indicator which will indicate either to the sight or to the hearing the rate of revolution of a shaft at any time, which is simple and economical in construction, and which may be readily thrown in or out of operation at any moment. This object is attained by the means illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatical view of a speed-indicator embodying my invention, which indicates by sound the rate of revolution. Fig. 2 is a detail view showing the invention in a form applied to automobiles. Fig. 3 is a detail view of the device shown in Fig. 2. Fig. 4 is a modified form of construction for the shaft of the seconds-hand of the clock. Fig. 5 is a diagrammatical view of my speed-indicator in the form which indicates the rate of speed to the sight. Fig. 6 is a detail view of the lever carrying the push-button and the lever carrying the contact-pins.

Referring to Fig. 1, adjacent shaft A, the speed of whose rotation is to be ascertained, is located a metal spring b, which is to be contacted by a stud a, projecting from the side of the shaft to bring the spring into contact with the post b'. Spring b is electrically connected by a wire b^2 with three contact-plates $c\,c'\,c^2$, located upon the face of a clock adjacent the seconds-hand C. The contact-pieces are all of the same size and are equidistant from each other. In the present instance each is sixty degrees in length. Seconds-hand C carries a wire whose outer end c^3 travels over the contact-plates $c\ c'\ c^2$ as the hand revolves. Post b' is electrically connected by wires $b^3\ b^4$ with one of the poles d of the battery D. The communication between wires $b^3\ b^4$ is regulated by means of a switch b^5. The other pole d' is connected, by means of a wire d^2, with an electrical button or buzzer E, from the opposite side of which a wire e is connected with a spindle c^4 of the seconds-hand C.

In operation when spring b is held in contact with the post b' by the stud a and the wires $b^3\ b^4$ are connected by the switch b^5 and the end c^3 of the wire upon the seconds-hand contacts one of the plates c, c', or c^2 it is seen that the circuit from the battery D is complete and that the bell or buzzer E will ring. When the stud a releases the spring b, it will break the circuit and the buzzer will cease to sound. The switch b^5 remaining in a position to contact wires $b^3\ b^4$, as long as wire c^3 is contacting one of the plates c, c', or c^2 the buzzer will sound every time the spring b is contacted by the stud a—that is, at every revolution of the shaft. As soon as the spring c^3 ceases to contact the contact-plates c, c', or c^2 the circuit is broken there and the buzzer will not sound when the stud a contacts the spring b. The seconds-hand taking a predetermined time—say ten seconds—to pass over one of the contact-plates c, c', or c^2, the number of times the buzzer sounds indicates the number of revolutions made by the shaft A during that period, thus indicating by sound the rate of revolution of the shaft. Any time the operator desires, therefore, to ascertain the rate at which the shaft A is revolving he has only to throw the switch b^5 into contact with wires $b^3\ b^4$, and after he has ascertained the fact to place the indicator out of use he has simply to throw the switch out again.

In Fig. 2 I have illustrated a form of indicator for use with automobiles. The battery D, clock C′, and bell E are mounted in a case F, which may be secured to the dashboard of the vehicle. In place of the switch b^5 to connect the wires $b^3\ b^4$ a push-button b^6 may be used. Upon the hub A′ is a pin a', in the path of which a pinion b^7 is mounted upon the shaft b^8, mounted between lugs $g\ g'$, secured upon the axle G. Upon the shaft b^8 is located a disk B, having arms $b^9\ b^{10}$ at diametrically opposite sides. Located upon the axle G are contact-pieces $b^{11}\ b^{12}$, corresponding to the spring b and the post b' in Fig. 1. The arms $b^9\ b^{10}$ when they contact the spring b^{11} complete the circuit and cause the buzzer to be sounded at every other revolution of the wheel. By changing the number of teeth upon the disk B the circuit may be made at every third or fourth revolution of the wheel. For instance, if the disk B had only one tooth b^9 then the contact would be made and the buzzer would sound every fourth revolution. The change in the number of teeth of the disk B would be made for the purpose of simplifying the calculation of the speed of the automobile.

In the modification shown in Fig. 4 I have

mounted four arms c^5, c^6, c^7, and c^8 upon the spindle c^4 of the seconds-hand, and in place of the fixed contact-plate c c' c^2 I have placed a movable tapered contact-piece c^9, which is mounted in ways c^{10} c^{11}. This contact-piece is connected to the wire b^2. The length of time it takes for the contact-wires carried by the arms c^5, c^6, c^7, and c^8 to pass over the strip c^9 may be regulated by the position of the strip—for instance, by raising it in its ways the length of time may be diminished, and vice versa, so that the number of revolutions of the shaft per five seconds may be obtained, or per ten seconds, &c.

In Figs. 5 and 6 I have illustrated a recorder for indicating the speed to the eye. The contact-plates c c' c^2 are connected by the wire b^2 to the spring b. The hub A has a tooth a to carry spring b against the contact-piece b', and the seconds-hand C has a wire c^3 to contact the plates c, c', and c^2, the same as described for Fig. 1. Contact-piece b' is connected by a wire h with an electromagnet H, adjacent to which is mounted a lever h', carrying an armature h^2, the upper end h^3 of the lever standing adjacent to the periphery of a record-disk K, having notches k. Every time the tooth a carries spring b into contact with piece b' the current passes through and magnetizes the magnet H, attracts the armature h^2, and carries the disk K forward one step. When the tooth a releases spring b, the magnetism in the magnet H dying out, the lever h' is carried back by the spring h^4 to carry the arm h^3 out of contact with the disk K and in position to engage the next notch of the disk when the magnet H is again energized, the disk K being held in place by a spring-pawl k', fulcrumed at k^2, having an upwardly-projecting arm k^3 and being held against the disk by a spring k^4. Thus the disk K will be carried forward as many notches as there are contacts made between the tooth a and the spring b during the passage of the seconds-hand C over any one of the plates c, c', or c^2.

I will now describe the means whereby the recording-disk K is carried back to its zero position and the indicator is placed in circuit for taking the speed by the actuation of the hand-lever M. Lever M is pivoted at m and has a short arm m', carrying a pawl m^2. At its opposite end lever M has a button m^3. Upon the side of the lever M a pawl m^4 is mounted and is pressed outwardly by a coiled spring m^5. Adjacent to lever M is an arm N, fulcrumed at n and bearing an armature n'. Arm N has three pins n^2, n^3, and n^4 at different heights, the pin n^3 being out of vertical alinement with pins n^2 and n^4. Mounted adjacent to arm N is an electromagnet O, which is connected by a wire o with narrow contact-plates o', o^2, and o^3, located upon the face of the clock adjacent to the contact-plates c, c', and c^2. Communicating with the magnet O is a contact-spring o^4, which stands adjacent to the path of the hand-lever M. Pivot m is connected by a wire m^6 with a battery P, the other pole thereof being connected by wire c^{12} with the spindle of the seconds-hand C. Adjacent to the path of the hand-lever M is a contact-piece R, which is connected by wire r with the electromagnet H. When the pawl m^4 engages the pin n^2, lever M is in communication with contact-piece R, and the electromagnet H is then in circuit with the battery P.

I will now describe the operation of my indicator. When he desires to ascertain the speed at which the hub A is rotating, the operator pushes the hand-lever M down to the position shown in Fig. 5. As soon as the seconds-hand C of the clock reaches one of the narrow contact-strips o', o^2, or o^3 the electromagnet O will be placed in circuit through the wire c^{12}, wire o, contact-piece o^4, and wire m^6. This will energize the magnet, attract the armature, carry the pin n^4 out of contact with the pawl m^4, and the spring m^7 will then carry the hand-lever up against the pin n^3. In this position of the hand-lever the pawl m^2 will contact the pawl k', raising it out of contact with the disk K, whose spring k^5 will then carry it around to its zero position. Spring k^5 is coiled about the shaft upon which disk K is journaled and engages a pin k^6 upon said disk. As soon as the seconds-hand leaves the narrow contact-piece—say, for instance, o^2—which has just been contacting the electromagnet O is deënergized, and spring n^5 will carry the arm N back to its normal position, thereby releasing pawl m^4 from pin n^3, and the spring m^7 will then carry lever M up until the pawl m^4 engages pin n^2. The lever M then contacting the piece R, the magnet H will be brought into circuit as soon as the seconds-hand C reaches the next contact-plate—as, for instance, c^2—and the tooth a of the hub closes the switch b b'. Thus every time the tooth a closes the switch the magnet H becomes energized, attracts the lever h', and moves the dial K through one step. The number of revolutions of the shaft A thus taking place while the seconds-hand is moved over one of the contact-plates c c', or c^2 is recorded on the dial. I have been assuming that the seconds-hand has just been traveling over the contact-plate c^2. As soon as it reaches the narrow contact-piece o^3 magnet O is thrown into circuit, the armature m' is attracted, the pin n^2 is carried out of contact with the pawl m^4, and the hand-lever M is carried upward out of contact with the contact-pieces o^4 and R, as indicated in dotted line, the indicator being then out of use.

What I claim is—

1. In a speed-indicator for rotating shafts the combination of an electrical circuit, a switch adapted to be actuated by the rotation of the shaft to make and break the cir-

cuit by the revolution thereof, an indicator in the circuit to register each time it is completed, a chronometer with a moving hand interposed in the circuit, one end of the circuit broken by the chronometer being connected to the hand thereof and a contact-piece in the path of the hand and connected to the other broken end of the circuit.

2. In a speed-indicator for rotating shafts the combination of an electrical circuit, a switch adapted to be actuated by the rotation of the shaft to make and break the circuit by the revolution thereof, an indicator in the circuit to register each time the circuit is completed, a chronometer with a moving hand interposed in the circuit, one end of the circuit broken by the chronometer being connected to the hand thereof, a contact-piece in the path of the hand connected to the other broken end of the circuit, and a switch for making and breaking the circuit adapted to be actuated by the operator.

3. In a speed-indicator for rotating shafts the combination of an electrical circuit, a switch adapted to be actuated by the rotation of the shaft to make and break the circuit by each revolution thereof, an indicator and a chronometer with a moving hand interposed in the circuit, one end of the circuit being broken by the chronometer being connected to the hand thereof and a series of contact-pieces regularly placed in the path of the hand and connected to the other broken end of the circuit.

4. In a speed-indicator for rotating shafts the combination of an electrical circuit, a switch adapted to be opened and closed by the revolution of the shaft, a bell interposed in the circuit, a chronometer with a moving hand interposed in the circuit, one of the broken ends of the circuit being coupled to the hand of the chronometer and a contact-piece in the path of the hand and connected to the other broken end of the circuit and a switch to be operated by the operator to make and break the circuit.

5. In a speed-indicator for a revolving shaft the combination of an electrical circuit, a switch consisting of a post and a spring standing normally out of contact with the post interposed in the circuit, a tooth upon the shaft for carrying the spring into contact with the post, a chronometer with a moving hand interposed in the circuit, one end of the broken circuit being connected to the hand of the chronometer, a contact-piece in the path of the hand connected to the other broken end of the circuit, and an indicator for indicating each time the circuit is completed.

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