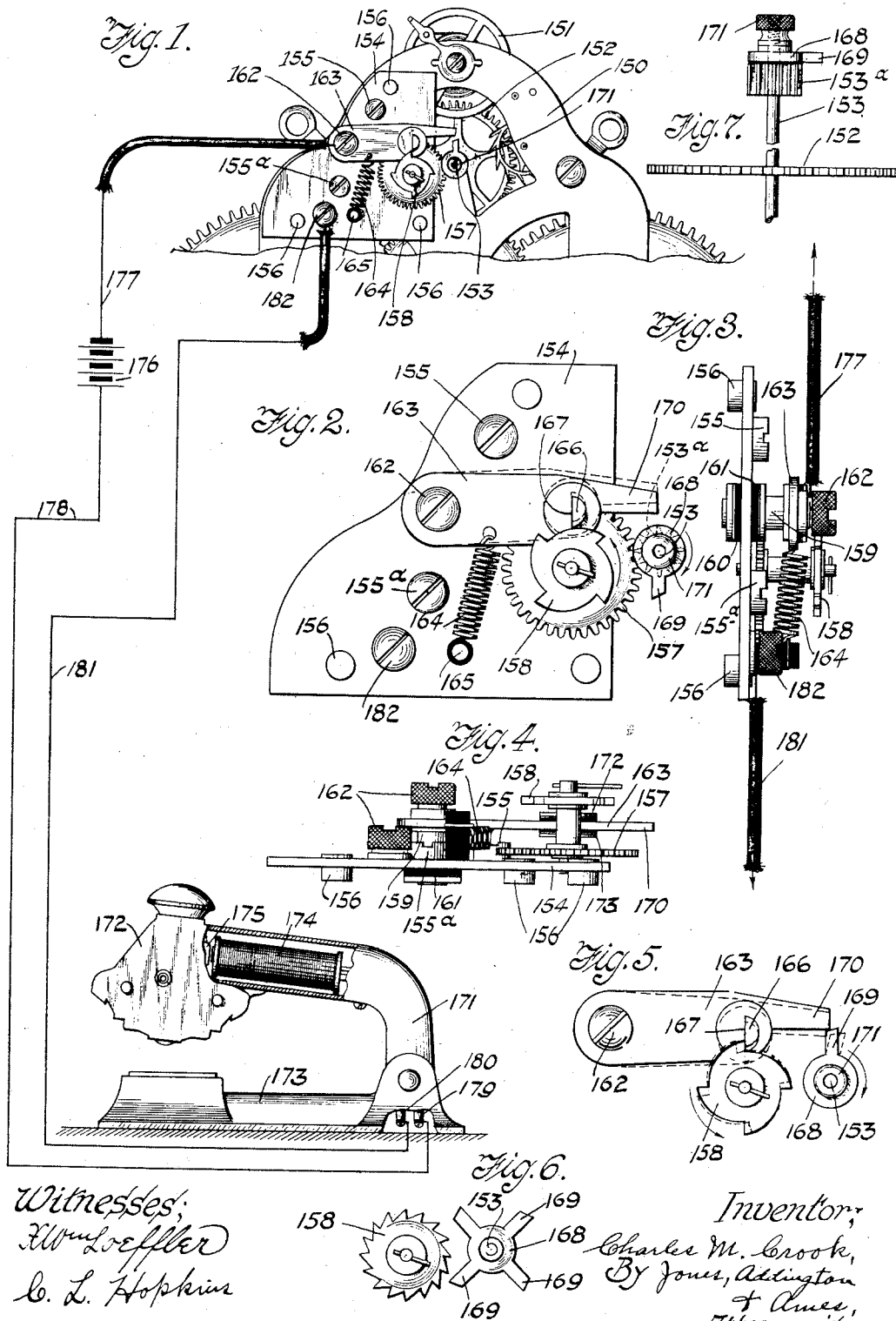


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TIME CONTROLLED ELECTRIC SWITCH.
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UNITED STATES PATENT OFFICE.

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TIME-CONTROLLED ELECTRIC SWITCH.

1,022,532.

Specification of Letters Patent.

Patented Apr. 9, 1912.

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To all whom it may concern:

Be it known that I, CHARLES M. CROOK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Time-Controlled Electric Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in time-controlled electric switches such as are employed in combination with electric time stamps and other devices operated by or requiring intermittent electrical impulses.

The object of my invention is to provide a device for periodically making and breaking an electric circuit, which is adapted to be applied to and operated by a clock or the like, and which is so constructed and applied that the running of the clock will not be materially interfered with by reason of the extra work thus imposed thereupon.

In the accompanying drawings I have shown my invention as applied to a clock and connected in circuit with a battery and a time stamp operated by electrical impulses occurring at intervals of one minute.

In these drawings, Figure 1 shows in elevation a portion of a clock movement having the devices of my invention applied thereto and connected in circuit with the battery and time stamp; Fig. 2 is a plan view of the switch mechanism removed from the clock; Fig. 3 is a side edge elevational view of the same; Fig. 4 is a bottom edge elevational view of the same; Fig. 5 shows parts of the contact device in different positions from those shown in Figs. 1 and 2; Fig. 6 shows in elevation certain of the parts modified to cause the contact to be made and broken at more frequent intervals than is provided for by the construction shown in the other views; and Fig. 7 shows in detail the method of adjustably securing the rotary contact piece in position.

In the several figures of the drawings, 150 is the frame of the clock, 151 being the balance wheel and 152 being the gear which revolves once per minute and ordinarily carries the "seconds" hand, on its shaft 153. Secured to this shaft is a pinion 153^a. A removable plate 154, secured to the frame of the clock by suitable screws 155 and 155^a

and spaced away from the frame by the legs 156, carries a gear 157 adapted to mesh with the pinion 153^a. This gear has four times the number of teeth as the pinion 153^a, and therefore revolves once during each four revolutions of the pinion, or once in each four minutes. Revolving with this gear 157 is a cam plate 158 having four cam surfaces. Secured to the plate 154 is a stud 159, insulated from the plate 154 by suitable washers 160 and 161 on opposite sides of the plate 154. This stud is provided with a binding screw 162 and has pivoted thereto a contact arm 163 moved toward the cam plate 158 by a spring 164, the spring 164 being secured at one of its ends to the arm 163 and at its opposite end to a pin 165 surrounded by suitable insulation to prevent passage of current through the spring from the plate 154 to the contact arm. The contact arm 163 is provided with a cam-engaging part formed by a stud 166 having one of its sides flattened at 167. This stud, by riding over the cam surfaces of the cam plate 158 causes the arm 163 to be moved toward and away from the cam plate. Mounted upon the end of the shaft 153 which carries the pinion 153^a is a rotary contact-piece 168 provided with a lug or tongue 169 which engages the end 170 of the contact-arm 163 once during each revolution of the shaft. This contact piece is made adjustable around the shaft so as to time the contact of the same with the arm, and is secured in place on the shaft after adjustment by means of a thumb-nut 171. To prevent the passage of current from the arm 163 to the plate 154 by way of the cam-plate the cam-engaging stud 166 is insulated from the arm by means of suitable insulating washers 172 and 173.

It will be observed that there is no electrical connection between the arm 163 and any other part except while the contact tongue 169 is in engagement with the end of this arm. As the arm is raised very slowly, the clock is not called upon to exert much power in moving said arm against the force of the spring 164, even though this spring be made of sufficient strength to insure perfect electrical contact between the circuit making and breaking parts of the device. To overcome the drag of the arm 163 upon the end of the tongue 169 and consequent retardation of the clock and interference with the

time-keeping qualities thereof, the end of the tongue is made inclined to the direction of movement of the arm, as clearly shown in the drawings, so that when the arm is dropped upon the end of the tongue the same will, in effect, slide down an inclined plane on a receding part.

In Fig. 5 the arm is shown in contact with the end of the tongue, the direction of movement of the same and of the lifting cam-plate being indicated by arrows. It will be seen that the plane of the surface with which the end of the arm engages is inclined to the direction of movement of this arm when moving under the influence of the spring 164. This results in the clock being assisted rather than retarded during the interval that the circuit is kept closed, the resultant effect being that a portion of the power stored in the spring 164 when the arm 163 is being lifted by the cam is returned to assist the clock when the arm is permitted to return. If the action of the clock movement is slowed down during the interval in which the arm is being raised, it is hastened during a portion of the return of said arm to partly compensate therefor.

As devices of this kind have heretofore been commonly made, it has required such a great amount of power to operate the circuit make-and-break device that the time-keeping qualities of the clock have been seriously impaired and it is one of the features of my invention that this interference is reduced to a minimum.

The action of the device may be briefly stated as follows: Rotation is transmitted from the shaft 153 by back-gearing to the cam-plate 158. The cams are so formed, and the rotary contact piece 168 is so adjusted on the shaft 153 that the tongue 169 will pass under the end 170 of the arm 163 when the latter is raised to its highest position, and therefore these parts will not engage each other at this time. When the cam-plate has rotated to such a position that the stud 166 passes beyond the highest point of the cam and the arm drops, the tongue will be in the position shown in Fig. 5. The end of the arm thus falls upon the inclined end of the tongue 169 and remains in engagement therewith until the shaft 153 has revolved to such a position as to draw the tongue from under the end 170 and break the circuit. In this manner the electrical circuit is kept closed for a sufficient interval to permit the electrically operated mechanism in the time-stamp or other device connected in circuit with the clock to operate. By adjusting the rotary contact piece 168 around on the shaft the length of the period during which the current flows may be readily gaged. By the use of the devices of my invention herein disclosed the advantages of a sliding contact are secured without

such retardation of the clock as to interfere with its proper operation, because of the fact that the contact-arm is very gradually raised to permit the rotating contact-piece to pass thereunder and is then suddenly dropped upon this part, and when so dropped engages the same in such a manner as to assist for a time the clock rather than to retard the same.

In Fig. 1, in which I have shown a clock movement connected in circuit with a battery and an electric time stamp, the stamp 171 has a pivoted head 172 movable toward and away from the base 173 and carrying an electromagnet 174 arranged to change, by its action upon the armature 175, the reading of this stamp at intervals of one minute. The circuit illustrated is merely typical, the battery 176 being shown with one of its poles connected by the conductor 177 with the binding-screw 162, and its other pole connected, through the conductor 178, with one of the binding-screws 179 of the time stamp, the other binding-screw 180 of the stamp being connected through the conductor 181 with the second binding-screw 182 of the contact device. The circuit is completed once per minute as hereinbefore explained and is kept closed for a sufficient period to permit the electrically-actuated parts of the stamp to operate.

While I have shown the device forming the subject of the present invention employed in combination with an electrically-operated time stamp, I contemplate the use of the same in other relations, this particular use of the same being shown merely for the purpose of making clear the operation of the device.

It may in some cases be desirable to so construct the device that the circuit will be made at more frequent intervals than once per minute. This may be readily accomplished by increasing the number of cam surfaces on the plate 158 and correspondingly increasing the number of tongues 169 on the plate 168. In Fig. 6 I have shown such parts as would be modified in construction, in such an event, these parts being adapted for a device in which impulses are given at intervals of one fourth minute. In this case the plate 168 has four contact tongues 169 and the cam plate 158 is provided with sixteen cam surfaces.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a clock, of a contact-piece rotated thereby, a cooperating movable contact-member, means for intermittently moving said contact-member out of the path of said contact-piece, and resilient means for returning said contact-member, the co-engaging surfaces of said contact-piece and contact-member being so

formed that said returning means tends to accelerate said clock while said co-engaging surfaces are in contact.

2. The combination with a clock, of a contact-piece revolved thereby, a contact-member arranged to be movable into and out of the path of said contact-piece, positively-acting means for moving said contact-member out of the path of said contact-piece, and a spring for returning said contact-member, the co-engaging surfaces of said contact-piece and contact-member being so formed that said spring tends to accelerate said clock while said co-engaging surfaces are in contact.

3. The combination with a clock, of a contact-piece carried by a shaft of said clock and revolving therewith, a pivoted contact-member, a spring for moving said contact-member into the path of said revolving contact-piece, a cam back-gearred from said shaft for moving said contact-member out of the path of said revolving contact-piece against the tendency of said spring, and adapted to release said contact-member when said contact-piece is adjacent thereto.

4. The combination with a clock, of a contact-piece revolved by said clock and having a tongue thereon, a contact-arm disposed to engage said tongue, a cam arranged to move said contact-arm out of the path of said tongue, and means for returning said contact arm, the contacting surface of said tongue being inclined to the direction of movement of the contacting portion of said arm.

5. The combination with a clock, of a contact-piece revolving with one of the shafts thereof, a cam back-gearred from said

shaft, a contact-member arranged to be moved out of the path of said contact-piece by said cam, means for returning said member, said cam being adapted to suddenly release said member and permit the same to strike said contact-piece, said contact-piece having a surface for engagement with said contact-member inclined to the direction of movement of said member under the influence of said returning means.

6. The combination with a clock, of a contact-piece rotated thereby, a cooperating contact-member movable into and out of the path of said contact-piece, a spring for moving said contact-member into the path of said contact-piece, and a cam for moving said contact-member out of the path of said contact-piece and adapted to release said contact-member and permit the same to strike said contact piece under the influence of said spring, the coengaging surfaces of said contact-piece and contact-member being so formed as to prevent retardation of the clock while the circuit is closed.

7. The combination with a clock or the like, of a rotary contact piece having an inclined contact surface, and a contact member movable into and out of the path of said contact piece and arranged to strike the inclined surface of said contact piece, said inclined surface being so disposed that the contact member while in contact therewith tends to rotate the contact piece.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

CHARLES M. CROOK.

Witnesses:

WM. M. SAENEL,
C. L. HOPKINS.