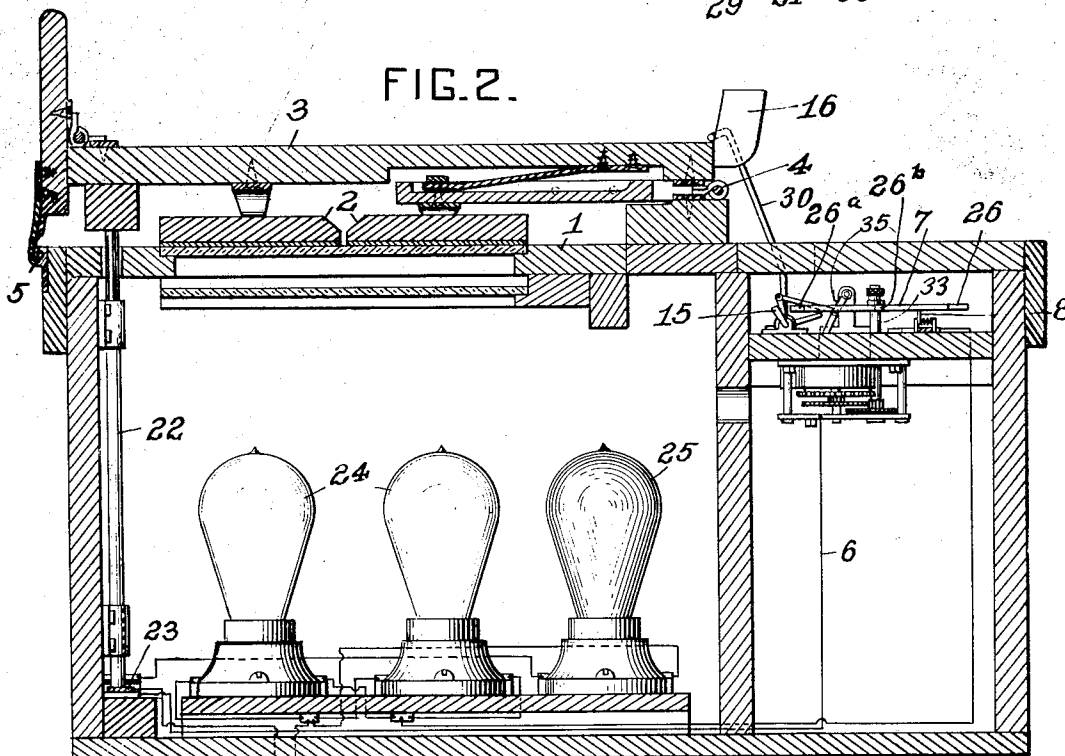
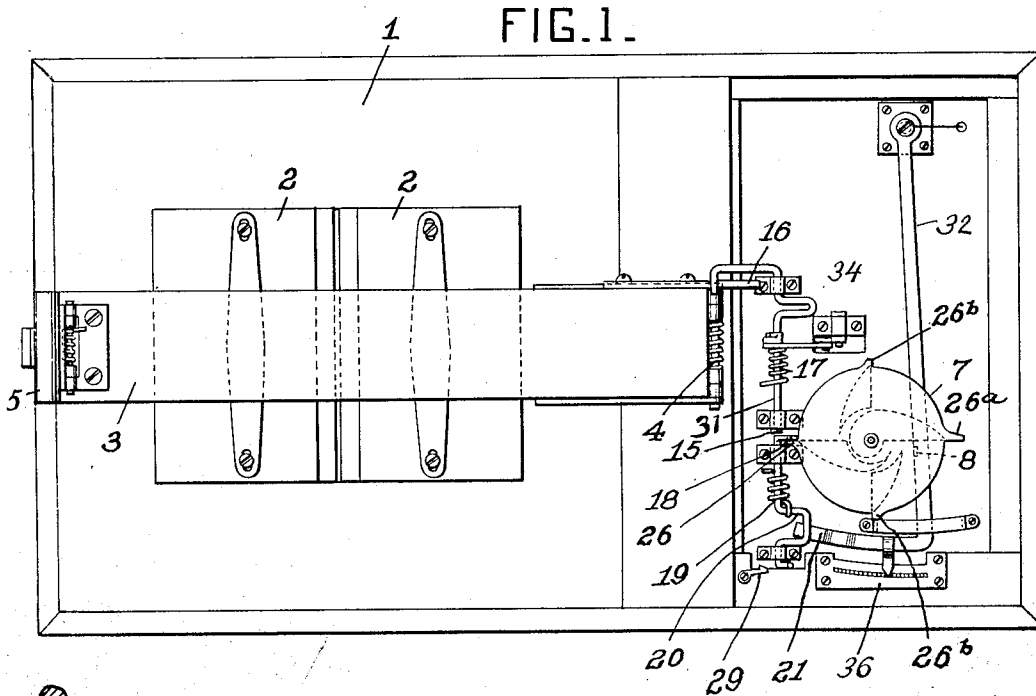


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 MAKE AND BREAK MECHANISM FOR ELECTRICAL CIRCUITS.  
 APPLICATION FILED FEB. 19, 1910.

1,002,886.

Patented Sept. 12, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

FIG. 3.

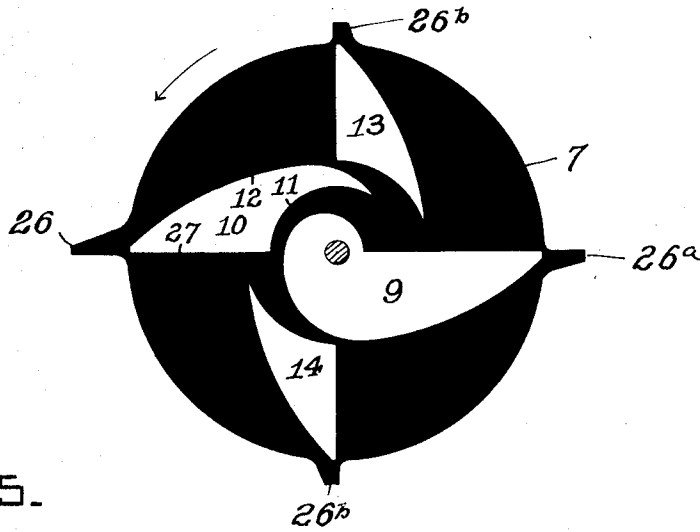


FIG. 5.

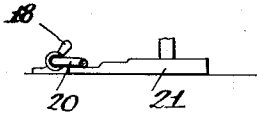
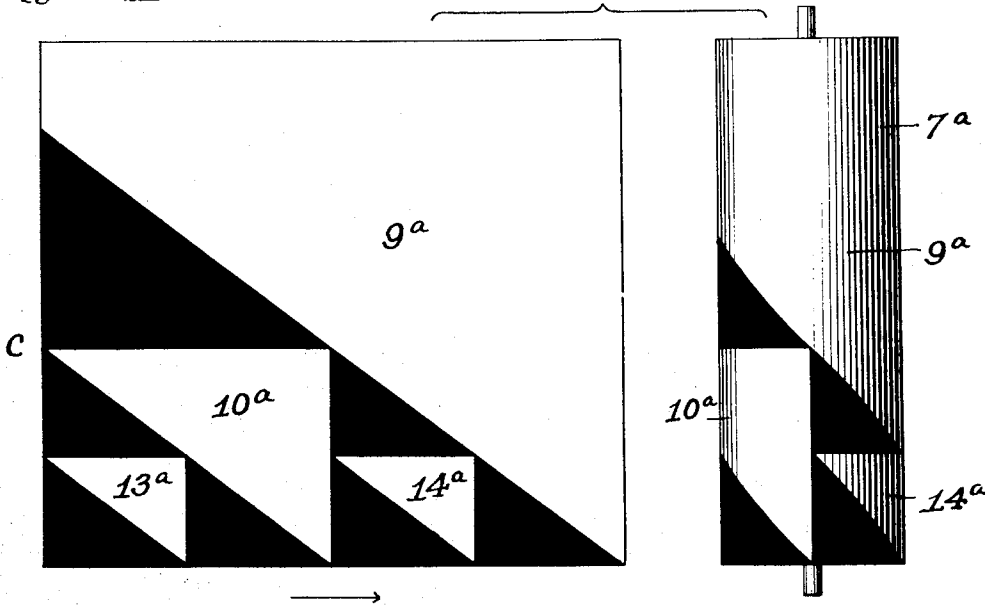


FIG. 4.



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# UNITED STATES PATENT OFFICE.

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## MAKE-AND-BREAK MECHANISM FOR ELECTRICAL CIRCUITS.

1,002,886.

Specification of Letters Patent. Patented Sept. 12, 1911.

Application filed February 19, 1910. Serial No. 544,924.

*To all whom it may concern:*

Be it known that I, JACOB WALTER, residing at Natrona, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Make-and-Break Mechanism for Electrical Circuits, of which improvements the following is a specification.

My invention relates to improvements in make-and-break devices for electrical circuits, and the object is to provide a make-and-break device in which the length of period of contact may be absolutely controlled and varied as desired, and in which successive periods of contact may follow upon one another at close intervals.

Specifically, my invention finds its use in a printing machine for making photographic prints.

The accompanying drawings which form a part of this specification illustrate my invention and the machine in which it is embodied.

Figure 1 is a plan view of my machine; Fig. 2 is a longitudinal vertical section; Fig. 3 is a detached detail of my preferred form of rotating contact; Fig. 4 is a side elevation of a cylinder, which is an alternate form of rotating contact, and with this elevation I show a projection in a plane of the surface of the cylinder; Fig. 5 is a view in elevation of a detail of the mechanism.

The parts which illustrate the same parts in the several figures bear the same reference numerals in each case.

The specific photographic printing machine shown herein consists of a box-like frame 1, provided with a movable back 2, which back is suitably secured to a bar 3, spring hinged at 4, to the end that the said back-carrying bar when not held in closed position by the catch 5 will normally be held in an upright position. The frame 1 is provided with suitable printing lamps 24, the lighting of which, while the machine is in operation, is controlled, through the wire 6, by my make-and-break mechanism, hereinafter described. The frame 1 may be further provided with a red lamp 25 and a switch 23, so arranged that, when the back is held in closed position, the circuit will be through the red lamp, the arm 22 being the medium of control.

In its preferred form, my make-and-break

mechanism consists of a rotatable disk 7 of conducting material, having inlays of non-conducting material, and a radially adjustable arm 32, electrically connected to the circuit 6 and having a contact piece 8, which piece is held yieldingly against the compound surface of the disk to the end that, as the disk rotates, a circuit may be made and broken. The conducting surface of the disk is so disposed and arranged that, when the contact piece 8 is properly shifted, the contact may be maintained for any desired portion of the period of revolution of the disk, and further, that contact may be repeatedly made more than once with each revolution, the number of individual contacts increasing as the period of each individual contact diminishes.

In Fig. 3, which shows the preferred detail construction of my preferred form of make-and-break mechanism, the conducting surfaces 9, 10, 13, and 14 are shown in white and the insulation surfaces are shaded. The conducting surface 9 surrounds the center of the disk in circular form and has a prolonged arm extending outwardly in a general radial direction, bounded by a spiral, which springs from the central circle, and by a radius. It will be understood that, so long as the contact piece 8 is maintained in contact with the disk 7 at some point within the central circular field, the circuit 6 will be complete as the disk revolves, and that, when the point of engagement is made beyond the central field, the circuit will be broken during a portion of the revolution, the period of interruption being proportional to the distance of the contact piece from the center. The circuit may thus be maintained for any desired fraction of a period of revolution. It will be observed further from Fig. 3 that, in addition to this conducting portion 9 of the surface of the disk, there is a second conducting portion 10, with which the contact piece 8 engages when shifted outward from the center of rotation. This surface 10 is formed by an arc of a circle 11, struck from the center of rotation, a spiral 12, and a radius 27. The inner edge of this second surface 10, that is, the edge which is formed by the arc 11, is so disposed that the contact piece 8 engages it when it has been shifted so far from the center of rotation that it engages the surface 9 for not more than half of the entire period of rotation. It will be

thus understood that the surface 10 supplements the surface 9, and affords a second period of electric continuity for each rotation of the disk, and that the length of this second period of contact diminishes as the contact piece 8 is moved outward, radially upon the disk. In like manner, further supplemental surfaces of conducting material 13 and 14 may be provided, which shall afford two more periods of electric continuity, when each single period is not greater than one fourth of the entire period of rotation, these supplemental periods also diminishing as the contact piece 8 is shifted outwardly. As I have illustrated this disk in Fig. 3 and described it, it will be seen that the arrangement is such that when the period of electric continuity falls below half of the entire period of rotation, two contact surfaces are provided; and, when the contact period falls below one fourth of the complete period of rotation, four surfaces of contact are provided. These particular fractions are arbitrarily selected; and it will be understood that, instead of thus dividing the period first into halves, and then into fourths by this disposition of conducting surfaces, I might in similar manner divide the period first into thirds, and so have three portions of contact effective when each separate period fell below one third of the entire period of revolution; and so, I might begin with any fraction, and multiply the number of individual contacts at any desired rate.

It will further be understood that, while I have shown in Fig. 3 and described a disk, the surface of which is partly conducting and partly insulating, as a matter of fact the insulating portion of the surface may be removed entirely, and the shaded portions of the drawing represent unfilled space, the remaining portions of the disk being properly supported to move in unison, and instead of having the contact piece 8 bear against an insulating surface, it may simply extend into the air, and become effective when it engages one of the conducting surfaces 9, 10, 13, or 14, as these parts rotate in unison about their center of rotation. And it will accordingly be understood that, where in the claims I have used the term disk, I mean to include not merely a continuous disk, strictly so-called, but such a broken or incomplete disk as I here particularly refer to, wherein the inactive insulating portions are eliminated, the rest of the disk remaining.

In place of the rotating disk of Fig. 3 which I have particularly described, I may use such a contact device as I have shown in Fig. 4, namely a cylinder 7<sup>a</sup>, against the surface of which the contact piece 8 may bear, and upon the surface of which this contact piece 8 may be adjustable from end

to end. As is particularly shown in the diagrammatic projection of Fig. 4, the surface of this cylinder is divided up into conducting and non-conducting portions, so disposed as to accomplish the precise result which I have described in connection with the disk of Fig. 3. There is first the conducting surface 9<sup>a</sup>, which at one end is continuous around the cylinder and which is interrupted by a wedge-shaped surface of insulation; which wedge gradually widening diminishes the circumferential extent of the conducting surface to zero. And at the point C, where this wedge of insulation extends half way around the cylinder, a second conducting surface 10<sup>a</sup> becomes effective, to make electrical contact through the contact piece 8, the extent of this conducting surface gradually diminishing toward the end of the cylinder, in like manner as the surface 9<sup>a</sup> diminishes; and, at the point where the two contacts afforded by surfaces 9<sup>a</sup> and 10<sup>a</sup> are each of them less than one fourth of the extent of the entire circumference of the cylinder, two more conducting surfaces 13<sup>a</sup> and 14<sup>a</sup> come into play.

Referring to Figs. 1 and 2 it will be observed that the disk 7 may be suitably mounted upon a stem 33, which is suitably rotated by a clock-work mechanism, and furthermore the circuit 6 may be completed through the said stem and clock-work.

In order to interrelate the period of rotation of the disk with the position of the contact piece, to the end that the disk may be stopped after any desired period of rotation, I provide shoulders 26, 26<sup>a</sup> and 26<sup>b</sup>, preferably upon the periphery of the disk, the shoulder 26 being the longest, 26<sup>b</sup> the shortest, and 26<sup>a</sup> an intermediate length. And to the same end I secure a stepped-surface block 21 (see Fig. 5) to the arm 32, the stepped surface being such that, as the steps are adjusted beneath a lever 20, held yieldingly upon the said block, as by a spring 19, a stop 18, suitably secured to the said lever, will be shifted from one to another of three operative positions to engage the different length shoulders 26, 26<sup>a</sup> and 26<sup>b</sup>. With the contact piece in the position where it is making contact four times in the course of each revolution, the stop 18 takes a position to engage in turn each of the four projections 26, 26<sup>a</sup>, 26<sup>b</sup>. It will be understood that, with the shifting of the block 8 inward to a position where it engages the conducting part of the disk but twice in each revolution, the lever 20 will be shifted, and the stop 18 will move radially outward, so that it will escape engagement with the stops 26<sup>b</sup>, but will engage the stop 26 and the stop 26<sup>a</sup>. And, further, that, as the block 8 is carried still farther inward, so as to make but one contact with each revolution, the stop 18 will be shifted

still farther from the center of rotation, and will engage but one arm, namely, the arm 26, as the disk rotates. By this arrangement the operator, swinging the arm 18 into the operative position automatically determined by the position of the contact piece 8, may leave his machine for an indefinite time, knowing that when the printing shall have continued for the predetermined interval, the light will go out, and the disk will stop and remain stopped and the light will continue extinguished until he shall return. It will be understood that the operator may, if he desires, swing the arm 18 entirely out of action. A catch 29 may be provided, to hold this arm in inactive position.

A second stop 15 may be employed to the end that any one of the several disk shoulders 20, 26<sup>a</sup> or 26<sup>b</sup> may be engaged thereby, when the back 2 is raised and the printing frame is inoperative. Such a stop 15 may be held from engagement with the said shoulder by being suitably secured to a rotatable rod 31, which rotatable rod may, in turn, be secured to an arm 30, suitably formed to engage the stop 16 of the bar 3. The arm 30 may be held yieldingly in engagement with the said stop 16 by a spring 17 and the backward movement of the said arm 30 may be properly limited by a stop 34, suitably secured to or formed in the rotatable rod 31. It will be understood of this construction that, when the back 2 is raised, the arm 30 will move backward, and its movement will be limited by the stop 34, to the end that the said arm will not pass out of the range of engagement of the stop 16, and furthermore that, when the arm 30 moves backward, the stop 15 will move into a position of engagement with one of the said shoulders.

A suitable trip lever 35 may be connected to the rod 31, as by a link and arm, to the end that, as the back 2 moves to closed position and the stop 15 releases the disk, the escapement of the clock work will be put in motion. Also the block 21 may have an indicator arm secured thereto, which arm, in the adjustment of the contact piece 8 may move along a suitably graduated plate 36, to the end that the period of exposure for each position of the contact piece may be determined.

In the operation of my make-and-brake mechanism, the indicator may be set for the desired exposure and, simultaneously with the setting thereof, the stop 18 will be adjusted to a position in which the disk will be stopped when the desired period of exposure has elapsed. The raising of the back 2 to remove the print will cause the stop 15 to be brought to a position in which it will engage the shoulder, already engaged by the stop 18, after the engagement of the

last named stop has been released, as by hand or otherwise. When the frame has been suitably provided with unexposed paper, the returning of the back to closed position will be effective to simultaneously release the stop 15 and start the clockwork.

I claim as my invention:

1. In a make-and-break mechanism for an electric circuit, the combination of a rotary member having an extended surface of conducting material, means for rotating said member, a contact piece engaging the extended surface of said member, and means for adjusting said contact piece, the surface of said rotating member being so disposed that the said contact piece may within the range of its adjustment make engagement therewith throughout the entire rotation of said rotary member or any desired fraction thereof, the said surface being further so disposed that, by the adjustment of the said contact piece, the number of separate contacts during each revolution may be multiplied, substantially as described.

2. In a make-and-break mechanism for an electrical circuit, the combination of a rotary disk, means for rotating said disk, a contact piece engaging the surface of said disk, means for radially adjusting said contact piece upon the surface of said disk, the surface of said disk formed in part of conducting material, the conducting portions of the said disk surface being so disposed that at one extreme of its radial adjustment the said contact piece may engage conducting material throughout the entire rotation of said disk and within its range of adjustment the said contact piece may engage conducting material throughout any desired fraction of the period of rotation of the said disk, the said surface being further so disposed that by the adjustment of the said contact piece the number of separate contacts during each revolution may be multiplied, substantially as described.

3. In a make-and-break mechanism for electric circuit, the combination of a rotary plate, means for rotating said plate, a contact piece engaging the surface of said plate, means for radially adjusting said contact piece upon said plate, said plate carrying an exposed surface of conducting material, said surface consisting of a circular field disposed about the center of rotation of said disk and an arm-like extension from said circular field bounded by a radius of said disk and by a spiral, said surface further consisting of an arrow-like field bounded by an arc struck from the center of rotation of said disk, a spiral and a radius, substantially as described.

4. In a make-and-break mechanism for an electric circuit, the combination of a rotary member with an extended surface of conducting material, means for rotating said

member, a contact piece engaging the extended surface of said rotary member, means for adjusting said contact in its engagement with said rotary member, the conducting surface of said rotary member being so disposed that said contact piece may within the range of its adjustment make engagement therewith throughout the entire rotation of said rotary member or any desired fraction thereof, said conducting surface being further arranged that the number of separate contacts during each rotation may be multiplied by the adjustment of said contact piece, said rotating member being provided with a series of shoulders corresponding in number with the largest number of separate

contacts per revolution for which the conducting surface of the rotating member is constructed and graded in position, and a stop adjacent to said rotating member and movable into the path of rotation of one or more of the aforesaid shoulders and means for shifting said stop in coordination with the adjustment of the aforesaid contact piece, substantially as described.

In testimony whereof I have hereunto set my hand.

JACOB WALTER.

Witnesses:

ALICE A. TRILL,  
J. HERBERT BRADLEY.