

C. I. HALL.
CONTACT MAKING MECHANISM.
APPLICATION FILED DEC. 30, 1912.

1,101,540.

Patented June 30, 1914.

2 SHEETS—SHEET 1.

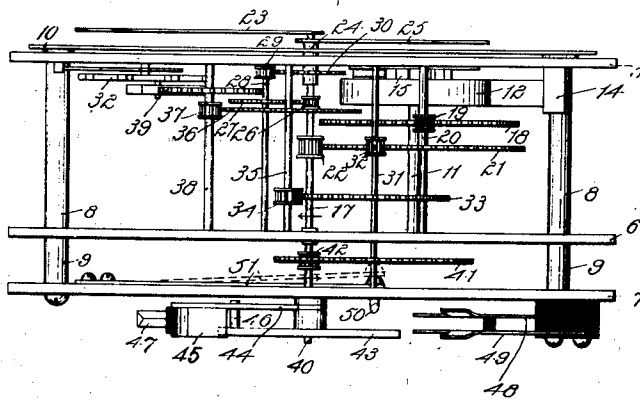
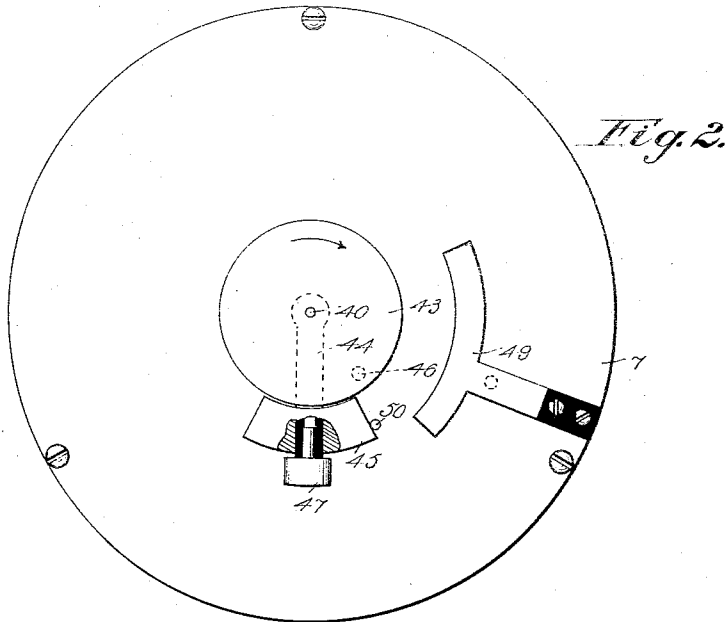


Fig. 1.

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2 SHEETS-SHEET 2.

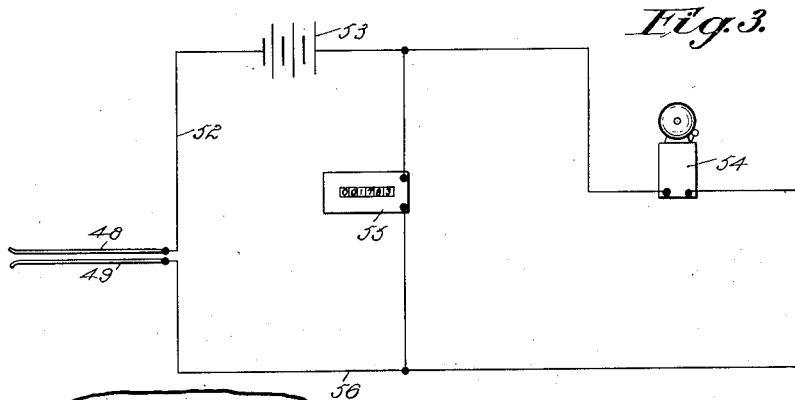


Fig. 3.

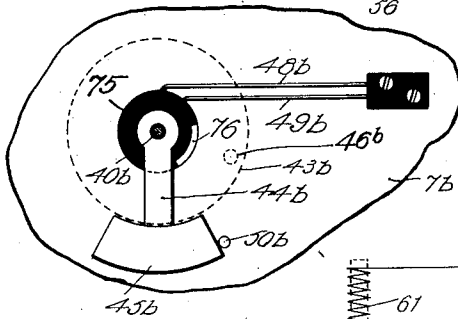


Fig. 5.

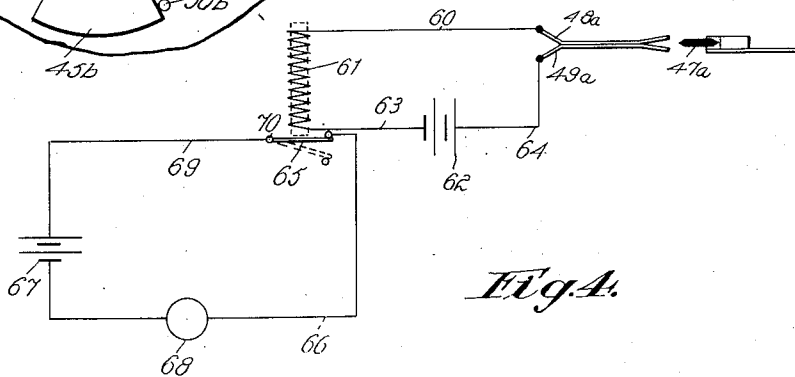


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CONTACT-MAKING MECHANISM.

1,101,540.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHESTER I. HALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Contact-Making Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improved form of contact making mechanism in which specially conformed clock driven mechanism controls an electric circuit so that it is momentarily closed or completed at recurring intervals.

By my invention I also provide mechanism by which a maximum amount of work may be done in closing the terminals of an electric circuit without at the same time exerting any undue stress at any one time, upon the gear trains constituting the mechanism of the clock, suitable devices being employed to store outside of said gear trains, the power developed by the clock mechanism during the intervals between the closure of the circuit, which stored power is subsequently expended in closing the circuit.

I also provide means for preventing the closure of the circuit more than once at the end of each interval or period.

The several drawings illustrating my invention are as follows:

Figure 1 shows in top view the clock mechanism, as well as the contacts terminating the electric circuits to be controlled by the mechanism. Fig. 2 shows in side elevation the parts indicated in Fig. 1. Fig. 3 shows diagrammatically a circuit which may be controlled by the contacts forming a part of the mechanism shown in Figs. 1 and 2. Fig. 4 shows a modified circuit arrangement for use in accordance with my invention; and Fig. 5 illustrates a modified form of contact making mechanism.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 1 and 2, the framework of the mechanism comprises three plates, 5, 6 and 7, said plates being disposed in parallel planes; a plurality of posts 8 connect the plates 5 and 6, and a similar set of posts 9 connect the plates 6 and 7. Retained upon the outside face of the plate 5, is a dial, illustrated at 10, in Fig. 1. Wound around

the shaft 11, bearing in the plates 5 and 6, is a spring 12, having driving relation with said shaft 11. One end of this spring is secured to the frame-work at 14. The inner end of the spring 12 has driving engagement with suitable ratchet mechanism, illustrated at 15, which ratchet mechanism in turn drives the shaft 11. The ratchet mechanism is provided for the purpose of winding the spring 12, as is well known to those skilled in the art. Power delivered to the shaft 11 from the spring 12, is transmitted to the clock spindle 17, through a gear train, comprising the gear 18, mounted upon the shaft 11, which gear meshes with a pinion 19, rigidly mounted upon the shaft 20, bearing in the plates 5 and 6, as shown. Mounted upon the shaft 20, is a gear 21, meshing with the pinion 22, mounted upon the clock spindle 17. The spindle 17 carries the minute hand 23, as shown. Secured upon a sleeve 24, disposed around the spindle 17 is the hour hand 25, which is driven from the spindle 17, through a reduction train comprising a pinion 26, mounted upon said spindle. Said pinion 26, meshes with a gear 27, mounted upon a shaft 28, bearing in the plates 5 and 6, as shown; said shaft 28 also having rigidly mounted thereon a pinion 29, meshing with a gear 30, rigidly mounted on the sleeve 24.

Having one end thereof bearing in the plate 5, extending through plate 6 and having the other end thereof bearing in plate 7, is a shaft 31, provided with a pinion 32, meshing with the gear 21 of the spring driven shaft 11. The shaft 31 is operatively connected with suitable escapement mechanism illustrated at 32, said connection being through a gear train comprising a gear 33, rigidly mounted upon the shaft 31, as shown. This gear 33 meshes with a pinion 34, said pinion 34 being mounted upon a shaft 35, having its bearings in the plates 5 and 6; said shaft 35 being also provided with a gear 36, rigidly mounted thereon. This gear 36 meshes with a pinion 37, which pinion is mounted upon a shaft 38, bearing in plates 5 and 6, as shown; said last mentioned shaft being also provided with a gear 39, directly associated with the escapement mechanism.

Bearing in the plates 6 and 7, and extending through the plate 7, is a shaft 40, which is driven from shaft 31 in the direction indicated by the arrow, through a gear 41,

rigidly mounted upon said shaft 31, said gear 41 meshing with a pinion 42, with which the shaft 40 is provided. The shaft 40 has secured to it outside of the plate 7, a disk 43, as shown. Between the disk 43 and the plate 7, there is loosely mounted upon the shaft 40 an arm 44, carrying at its outer extremity a weight 45. A pin 46, extends inward from the disk 43 so that it engages the arm 44, as the disk 43 is rotated. The weight 45 has rigidly supported by it, but insulated therefrom, a contact making member 47, which engages the contact springs 48 and 49, supported by, but insulated from the plate 7 and also insulated from each other, as indicated in Figs. 1 and 2. The springs 48 and 49 are so conformed that they are in the path of the contact making member 47, as the latter is swung around upon the shaft 40, and these contacts are at such a distance apart that each is positively engaged by the contact making member as it passes between them. A catch 50 extends through the plate 7 to be engaged by the arm 44 as it swings around upon the shaft 40, said catch being mounted within the plate 7 upon a spring 51 and conformed at its outer end so as to permit motion of the arm past it in a clockwise direction, as seen in Fig. 2, but to prevent back rotation of said arm.

The operation of the mechanism thus far described is as follows: The clock mechanism above described rotates shaft 40 and disk 43 in the direction indicated by the arrows, the pin 46 engages the arm 44, and moves it and the weight carried thereby around in a clockwise direction, as seen in Fig. 2, as a result of which the arm and weight are carried to their uppermost position and, immediately after passing the vertical position, the weight of the parts causes them to revolve ahead of the shaft 40 and to move rapidly downward bringing the contact making member 47 into engagement with the contact springs 48 and 49, the inertia of the weight 45 serving to move the contact making member between the springs and downward out of engagement with them. In this manner, the springs 48 and 49 may be given considerable tension, so that the friction between them and the contact making member 47 will insure a positive closure of the circuit without unduly taxing the clock mechanism, since the energy represented by the weight 45, moving rapidly downward from its uppermost position, is gradually stored as the weight is moved slowly from its lowermost position to its upper position. The catch 50 serves to positively prevent a second engagement of the contact springs with the contact making member 47, as a result of a back swing of the same after it has passed from engagement with the contact springs.

In Fig. 3, there is shown diagrammatically a circuit which may be controlled by the engagement of the contact making member 47 with the contact springs 48 and 49. As shown in this figure, the spring 48 is connected by wire 52 with a battery 53, the other terminal of which is connected with the electric bell 54 and an electro-magnetic counter 55. The other terminals of the bell 54 and the counter 55 are connected together and, by wire 56, with the contact spring 49. As a result of the connections described, whenever contact is made between the springs 48 and 49, by the member 47, the bell 54 and counter 55 are actuated. It is apparent that any other mechanism which is desired to actuate periodically and momentarily may be connected between the battery 53 and the wire 56 instead of the bell 54 and the counter 55 and, furthermore, that any source of current desired may be employed instead of the battery 53. It is also apparent that the contact springs 48 and 49 need not directly control by their closure the operation of the device which it is desired to actuate, but that such actuation may result indirectly by the employment of suitable relay devices, the operation of same being controlled by the engagement of the contact springs by the contact member 47, the operation of such relay mechanism in turn serving to actuate the device to be operated, as indicated in Fig. 4. As shown in this figure, the contact springs 48^a and 49^a are normally in contact and the actuating member 47^a is of insulating material and adapted by its operation to separate the contact springs. The spring 48^a is connected by wire 60 with one terminal of a relay winding 61, the other terminal of which is connected with one terminal of the battery 62 by wire 63. The other terminal of the battery 62 is connected by a wire 64 with the contact spring 49^a. The armature 65 of the relay is connected by wire 66 with one terminal of a battery 67, the other terminal of which is connected with the device 68, which it is designed to actuate, the other terminal of said device being connected by wire 69 with the normally closed contact 70 of the armature 65.

For the modification shown in Fig. 4, the device 68 actuated by the current flow from the battery 67 is assumed to be a mechanism or instrumentality which is actuated by the cessation of current flow rather than by the continuance of said flow, as a result of which, either by the break in the circuit or by the pulsation of current through the circuit due to the closure of the armature 65 with the contact 70, the device 68 is actuated. As a result of the circuit connections shown, when the contact springs 48^a and 49^a are separated by the operation of the member 47^a, the relay is de-

energized and the armature 65 drops back from its contact 70, thus opening the circuit through the device 68, which, as above described, may actuate said device or, if preferred, a subsequent closure of the circuit may effect such actuation.

It will readily be understood that the system shown in Figs. 3 and 4 may be combined in any desired way, so that any combination of normally closed and normally open circuit arrangements may be used to actuate desired mechanism either directly or indirectly.

In the modified form of circuit closing mechanism shown in Fig. 5, a constant speed rotating shaft is illustrated at 40^b. Loosely mounted upon said shaft is an arm 44^b which is provided at its free end with a weight 45^b. Disposed concentric to the shaft 40^b and rigidly connected to the arm 44^b is a commutator comprising a disk 75, of insulating material provided with a strip 76 of conducting material. I have shown in dotted lines a disk 43^b which is rigidly secured to shaft 40^b. This disk is provided with a pin 46^b adapted to engage the arm 44^b as the disk is rotated. Bearing upon the commutator is a pair of brush contacts 48^b and 49^b which are insulated from each other and are supported by a block of insulating material, as illustrated. As the shaft 40^b and disk 43^b are rotated in a clockwise direction, the arm 44^b and the commutator are correspondingly rotated. After the arm 44^b has passed a vertical position, the arm and commutator revolve ahead of the disk 43^b due to the weight of the parts. As the arm moves rapidly from its vertical position, the contacts 48^b and 49^b are momentarily electrically connected. A pin 50 prevents rotation of the arm in a counter clockwise direction.

It will be understood that, while I have shown my invention in the particular embodiments herein described, I do not, however, limit myself to the exact constructions shown, as I may employ other equiva-

lent mechanisms without departing from the spirit of my invention.

What I claim is:

1. In a contact making mechanism, the combination of a framework, a constantly rotating shaft, a pair of spring contacts mounted upon the framework and insulated therefrom and from each other, a disk secured to the shaft, a pin projecting from the disk, an arm loosely mounted upon the shaft in the path of the pin, a weight carried by the end of the arm, a contact making member carried by but insulated from the weight and adapted to engage and electrically connect the contacts as it passes between them, and a spring catch mounted upon the framework for preventing backward motion of the arm and parts carried thereby.

2. In a contact making mechanism, the combination of electric contacts, a constant speed rotating member, a weighted member arranged to operate said contacts, said weighted member movable independently of the first member in one direction, means for preventing said weighted member from moving independently of the first member in the opposite direction, said weighted member arranged to be driven through part of its cycle by said first member and during the other part of its cycle to move rapidly ahead of said first member to operate said contacts, together with a device arranged to permit said weighted member to pass only when said weighted member is moving in the direction in which said first member rotates, to prevent said weighted member from operating said contacts more than once for each cycle of said weighted member.

In witness whereof, I hereunto subscribe my name this 24th day of December, A. D., 1912.

CHESTER I. HALL.

Witnesses:

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