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ELECTRIC CIRCUIT CONTROLLER FOR INTERNAL COMBUSTION ENGINES.
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910,913.

Patented Jan. 26, 1909.

Fig. 1.

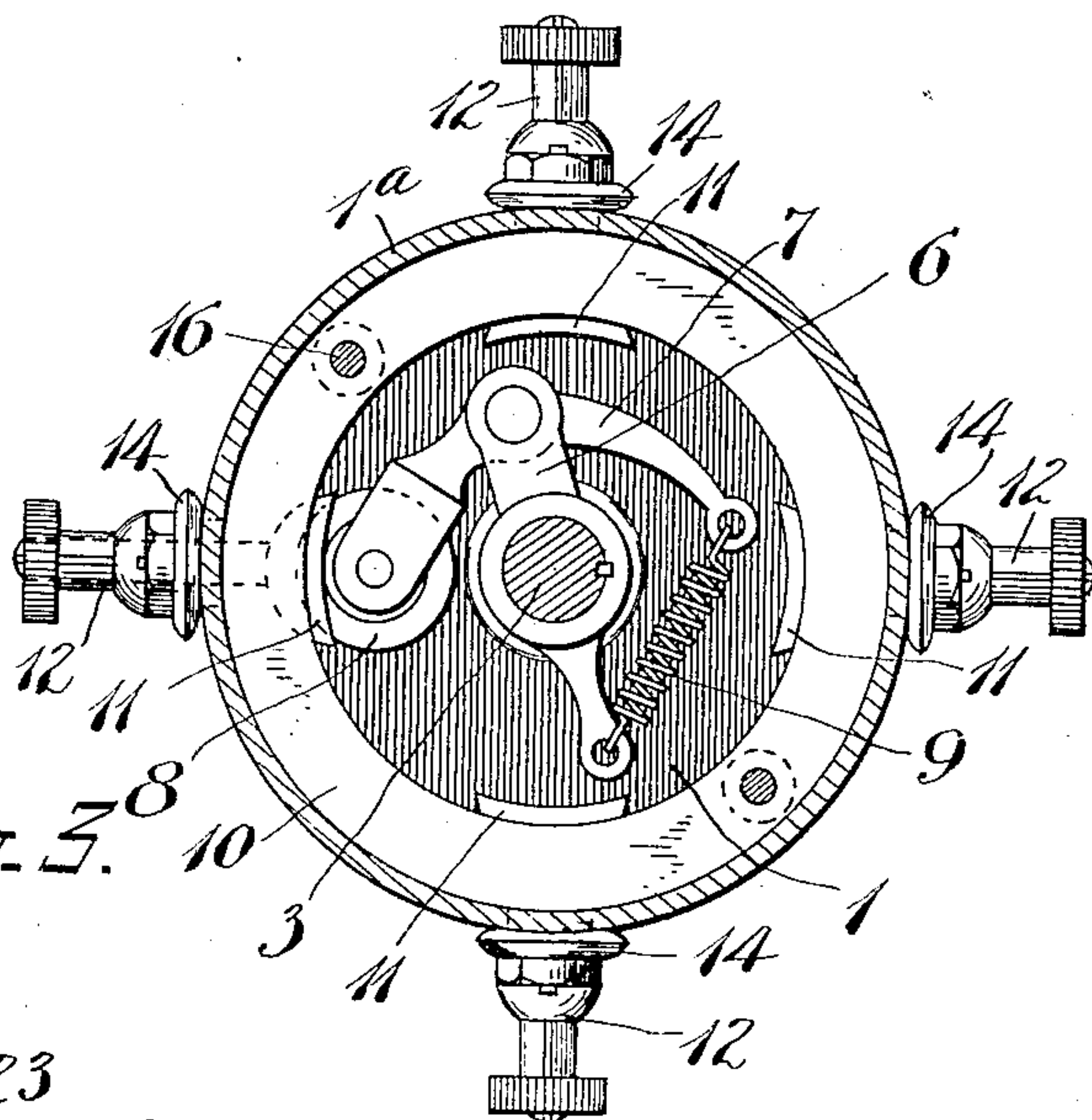


Fig. 3.

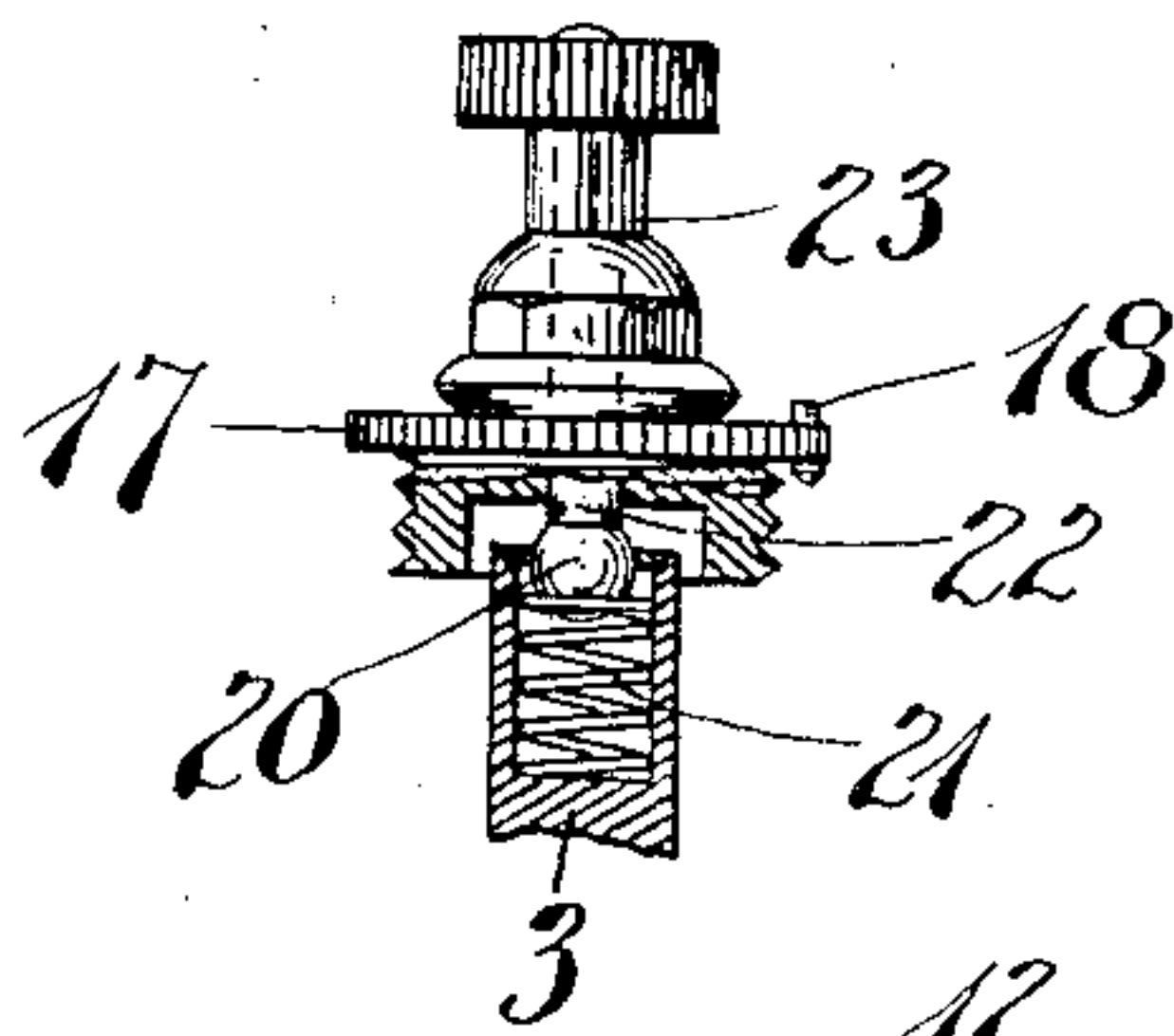


Fig. 2.

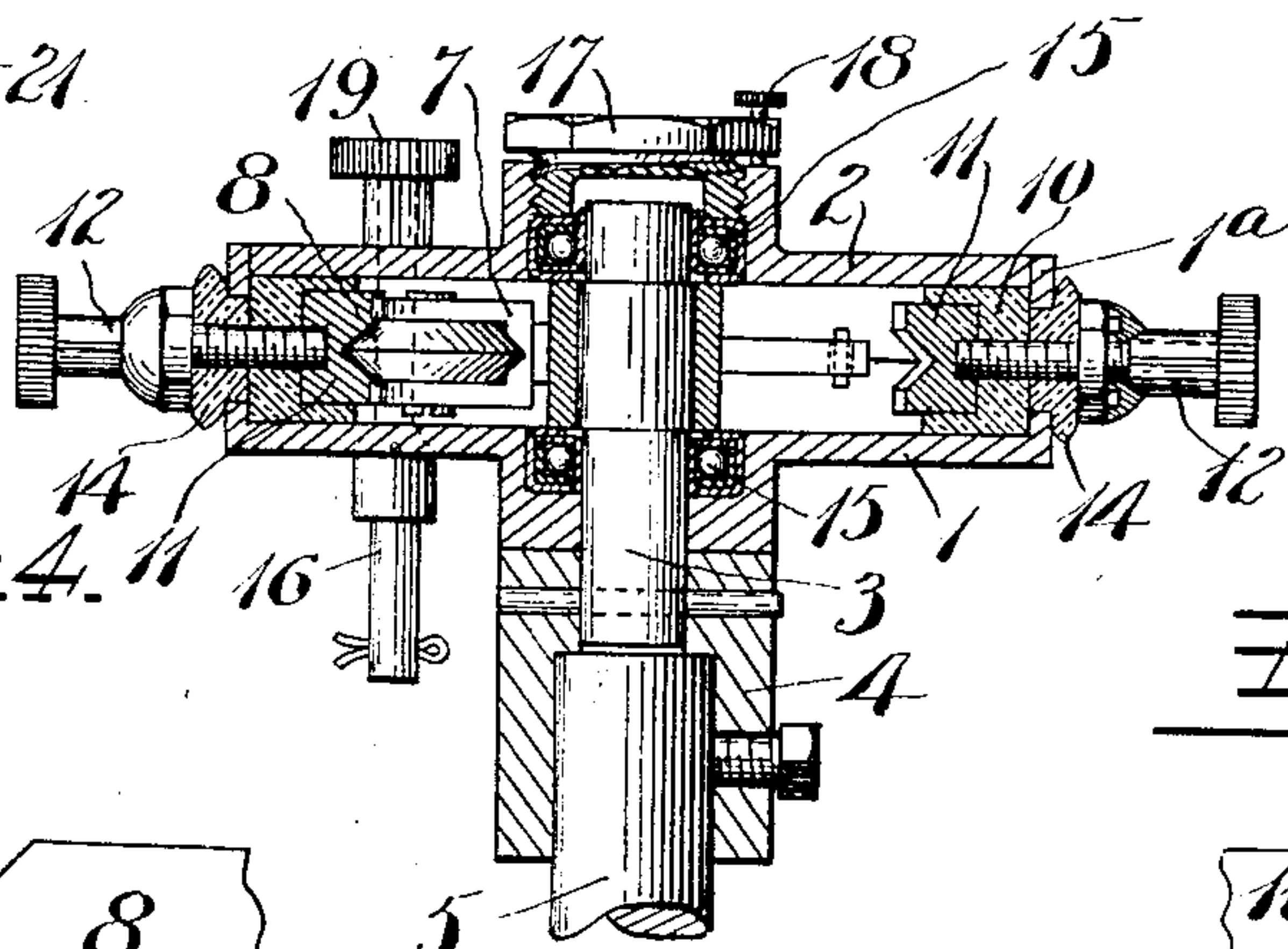


Fig. 4.

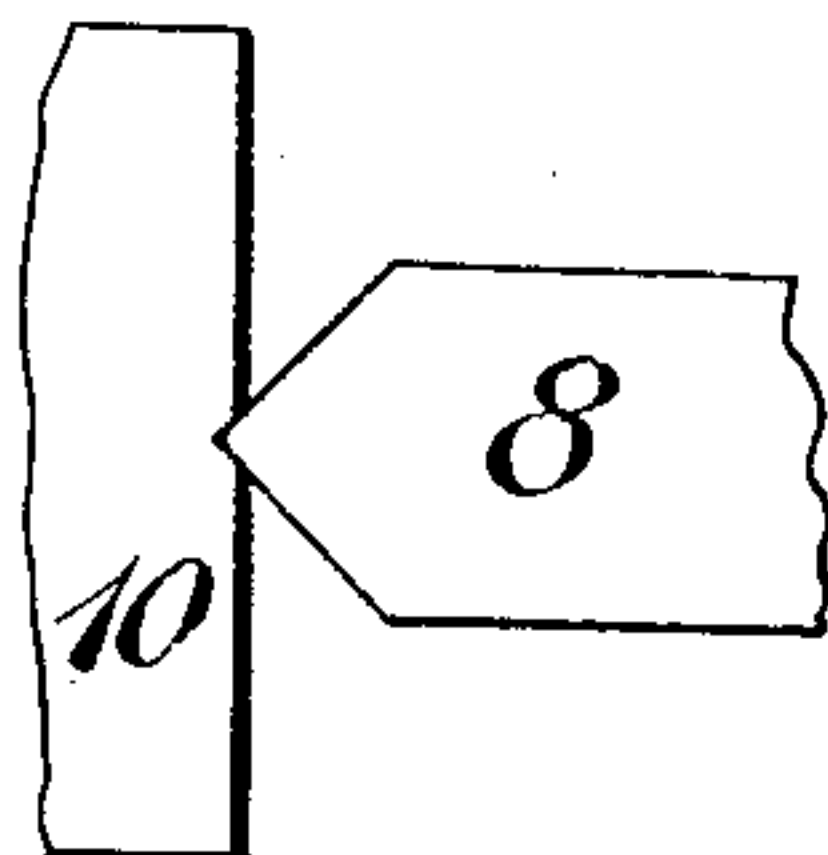
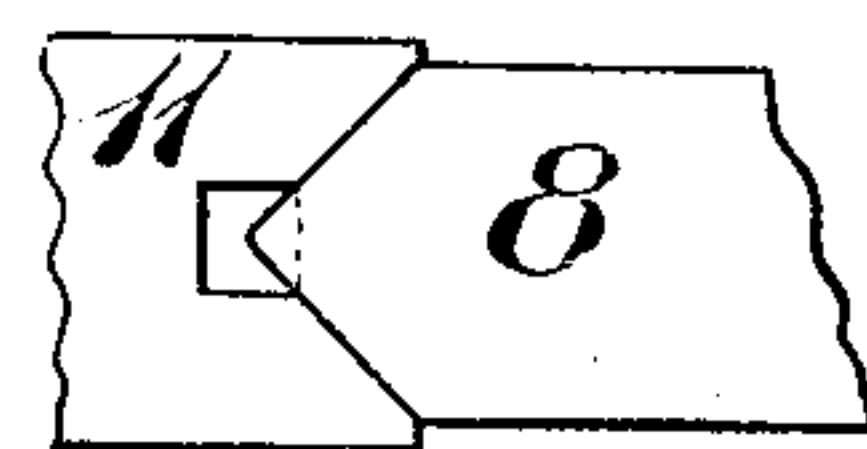


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRIC-CIRCUIT CONTROLLER FOR INTERNAL-COMBUSTION ENGINES.

No. 910,913.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Original application filed September 19, 1906, Serial No. 335,176. Divided and this application filed November 21, 1907. Serial No. 403,171.

To all whom it may concern:

Be it known that I, CHARLES CUNO, a citizen of the United States, residing at Meriden, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Electric-Circuit Controllers for Internal-Combustion Engines, of which the following is a full, clear, and exact description.

My invention relates to electrical apparatus particularly useful in connection with jump-spark ignition systems for internal combustion engines.

This application is a division from my former application Serial No. 335,176, filed September 19, 1906.

The object of the invention is to provide a simple and effective apparatus for accurately timing the moment of ignition. The construction is such that a clean and effective electrical connection is provided.

Many other advantages will be apparent to the mechanic skilled in this art from a reading of the following description.

In the drawings, Figure 1 is a cross section of my improved timer, certain of the parts being shown in elevation. Fig. 2 is a longitudinal section, certain parts being shown in elevation. Fig. 3 is a view partly in section, of a detail of construction. Figs. 4 and 5 are diagrammatic views of certain parts relatively enlarged.

1 represents a hollow casing of circular outline and provided with a flange 1^a.

2 is a cover adapted to the flange 1^a to close the open side of the casing.

3 is a shaft passing into the casing 1.

4 is a sleeve fixed on shaft 3.

5 represents the end of a "cam shaft", so-called, such as employed in gas engines, and by means of which the timer is usually driven.

6 is a lever-arm splined upon shaft 3 within the casing 1, whereby said lever-arm 6 will be driven therewith. This lever-arm projects from opposite sides of the shaft 3 and its forward end is forked to carry a swinging lever-arm 7, which latter lever-arm carries at one end a revoluble roller 8, having a beveled periphery. In the preferable form, the periphery of the roller 8 is provided with a double bevel, as best seen in Fig. 2.

9 is a spring connected to the lever-arm

7 at the end opposite the roller 8. This spring 9 is also connected to the rear extension of arm 6, as best seen in Fig. 1. The action of spring 9 is to force the roller 8 outwardly or away from the shaft 3.

Within the casing 1 is a lining 10 of insulating material.

11—11 are contact blocks insulated from the casing 1 and from each other by being set into or suitably carried by lining 10. These contact blocks 11 project slightly above the inner surface of the lining 10 and are shaped to correspond with the beveled contact edge of the roller 8.

12—12 are binding posts electrically connected with the several contact blocks 11—11, said binding posts being located externally of the casing 1, and being insulated therefrom, as by bushings 14—14.

The casing 1 and cover 2 are provided with suitable hub extensions which are in turn suitably recessed to receive anti-friction ball bearings 15. These ball bearings may be of any suitable type, and prevent lateral play of the casing 1 on the shaft 3 and afford a very light running engagement, so that the shaft 3 may be freely turned within the casing 1, which latter is ordinarily held against movement by means of a suitable rod connected to a post 16.

17 is a screw-threaded cap which is adapted to close the hub of the cover 2, the said cap being bored out at its center to afford clearance for the end of shaft 3. That part of the cap 17 around this bore rests against that set of ball bearings in the hub of cover 2, so that by screwing the cap 17 in or out, the proper end-wise adjustment of the ball bearings may be effected to regulate end play. When adjustment is effected, the cap 17 may be locked against movement by means of a set-screw 18, the end of which may be screwed down until it engages with the end of the hub of cover 2. The post 16 preferably extends entirely through the casing 1 and cover 2, penetrating lining 10. Whereas one end of this post 16 may be used to hold the timer casing against rotation and adjust the time of the spark, the opposite end may be provided with a nut 19 to hold the cover 2 in place. Any desired number of these cover fastenings may be employed, in fact, it is immaterial how the cover 2 is held in place.

In the modification shown in Fig. 3, the end of shaft 3 is bored out to receive a ball contact 20, pressed outwardly by means of a spring 21.

22 is a part of the cap 17 or an adjustable extension thereof, the function of which is to bear against the contact ball 20 and thus provide an effective electrical connection at all times, whereby a binding post 23 may be employed. This binding post 23 is electrically connected with the part 22.

In operation the shaft 3 is rotated, carrying with it the contact roller 8 which engages successively contact blocks 11—11. While not in engagement with a contact block, the extreme edge of the roller 8 rests upon the insulating lining 10, and is supported thereby. (See the diagrammatic view, Fig. 4). When the roller is in electrical contact with a block 11, it is only that part of the roller which has not been in engagement with the lining 10 that engages said block. (See the diagrammatic view, Fig. 5). As a result of this arrangement, that part of the contact roller which is to make an electrical contact with the blocks 11, is always clean, bright and free from dirt, thus guaranteeing an effective and uniform contact throughout that period when the circuit should be closed. By providing beveled contact faces, a light rubbing or slipping action is produced, tending to keep the contact surfaces bright, without producing undue wear.

In the ordinary use of devices of this character, the primary circuit leads from the several terminals 12 to the spark coil (not shown). The other leg of the primary circuit usually leads back and is grounded upon the engine, the latter being relied upon to complete the circuit to the timer through the cam shaft 5. It is preferable, however, to provide a properly insulated and effective return leg, and to that end I prefer to provide the binding post 23, to which said return leg may be connected. By this means a minimum of resistance is offered to the current in the primary circuit.

In the device shown in the drawings, the timer is adapted to a four-cylinder engine and consequently four terminals 12 are found. This, however, is immaterial, since the timer may be adapted to an engine having any number of cylinders.

An "early" or "late" spark may be secured by merely shifting the angular position of the casing and the contact blocks 11—11 carried thereby.

While the position of the lever-arm 7 carrying the roller, as shown in the drawings, is preferable for a rotation of the shaft clockwise, the shaft 3 may, however, be turned in either direction. The position of the roller may be readily reversed by merely moving the roller toward the shaft 3 to a sufficient extent to free its edge from the lining 10. By

then slipping the parts end-wise they may be removed from the shaft 3, reversed and replaced with little or no trouble. As shown in the diagrammatic view, Fig. 5, it is preferable to recess that part of the contact block which faces up with that part of the contact roller which is adapted to rest upon the insulating lining as the said roller moves from one to another of the contact blocks 11.

What I claim is—

1. In an electric circuit controller for internal combustion engines, the combination of a rotary shaft, a contact roller mounted thereon and movable towards and from said shaft, a relatively fixed contact piece projecting into the path of said roller, a spring tending to move and hold said roller away from said shaft, said contact piece and roller having opposing beveled faces adapted to make a rolling and rubbing contact as the roller traverses the contact piece, means to support said roller against pressure of said spring while said roller is not on said contact piece, said supporting means engaging a part of said roller not adapted to directly engage said contact piece.

2. In an electric circuit controller for internal combustion engines, the combination of a rotary shaft, a contact roller mounted thereon and normally movable towards and from said shaft, a relatively fixed contact block having a groove arranged to receive a portion of the rim of said roller adapted to make a rubbing contact therewith, and an insulating support for said roller while not traversing said block, said support being adapted to make contact with another portion of the rim of said roller.

3. In an electric circuit controller for internal combustion engines, the combination of a casing, a rotary shaft, an insulating lining, a contact roller yieldingly connected with said shaft and having a beveled rim adapted to traverse said lining, a contact block attached to said lining and having a beveled contact surface in the path of said roller and arranged to receive and make electrical connection with a portion of the rim of said roller, another portion of the rim of said roller making contact with said insulating lining when said roller leaves said contact piece.

4. In an electric circuit controller for internal combustion engines, a casing, a rotary shaft therein, a contact roller yieldingly connected with said shaft and normally moving outwardly, a contact piece within said casing in the path of movement of said roller and arranged to be engaged by a part thereof, an insulating support for said roller after it leaves said contact piece, said support engaging another portion of said roller than that through which electrical contact with the contact piece is effected.

5. In an electric controller, a casing, a

rotary shaft therein, a relatively fixed contact member carried by the casing, an insulating lining, a relatively movable contact member carried by the shaft and arranged to traverse the fixed contact member and lining, the fixed contact member engaging one part of the movable contact member, the lining engaging another part thereof.

6. In an electric controller, a casing, a rotary shaft therein, a relatively fixed contact member carried by the casing, an insulating lining, a relatively movable contact member carried by the shaft, having an edge and sides, the sides of said movable contact traversing the fixed contact member, the edge only of the movable contact member engaging the lining.

7. In an electric controller, a rotatable shaft, a casing revolubly mounted at two bearing points thereon, a terminal carried by the casing at the side of said shaft, a contact member carried by the shaft between the two bearings thereof and arranged for intermittent electrical connection with said terminal, another terminal insulated from the first and carried by said casing at the outer end of the shaft and arranged to make continuous electrical connection therewith, said terminals being the opposite poles of the same circuit.

8. In an electric controller, a rotatable shaft, a casing revolubly mounted at two bearing points thereon, a terminal carried by the casing at the side of said shaft, a contact member carried by the shaft between the two bearings thereof arranged for intermittent electrical connection with said terminal, another terminal insulated from the first and carried by said casing at the outer end of the shaft, and arranged to make continuous electrical connection therewith and including a

yielding spring-pressed member, said terminals being opposite poles of the same circuit.

9. In an electric controller, a casing, a rotary shaft therein, a relatively fixed contact member carried by the casing, an insulating lining member, a relatively movable contact wheel having a peripheral edge carried by the shaft and arranged to traverse the fixed contact member and lining member, one of said members engaging the movable contact away from the edge thereof, the other member engaging the movable contact at the edge only.

10. In an electric controller, a casing, a rotary shaft therein, a relatively fixed contact member carried by the casing, an insulating lining member, a relatively movable contact carried by the shaft and arranged to traverse the fixed contact member and lining member and be supported thereby, one of said members engaging one part of the movable contact, the other of said members engaging another part of said movable contact alternately.

11. In a timer, a case or container, a lining of insulating material, a segmental contact block having a groove extending longitudinally thereof, said groove having an inclined wall, a shaft, a contact roller carried by said shaft eccentric thereto and movable toward and from the axis thereof, the periphery of said roller being shaped to correspond with the wall of the groove in the block, and means to yieldingly press said contact roller away from said shaft to effect an electrical connection through said wall of the groove in the block while the roller is traversing said block.

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