

(No Model.)

2 Sheets—Sheet 1

T. K. AMES & E. A. PARKER.
MULTIPLE ELECTRIC CIRCUIT AND MECHANISM FOR MAINTAINING SAME.

No. 545,005.

Patented Aug. 20, 1895.

FIG. 1.

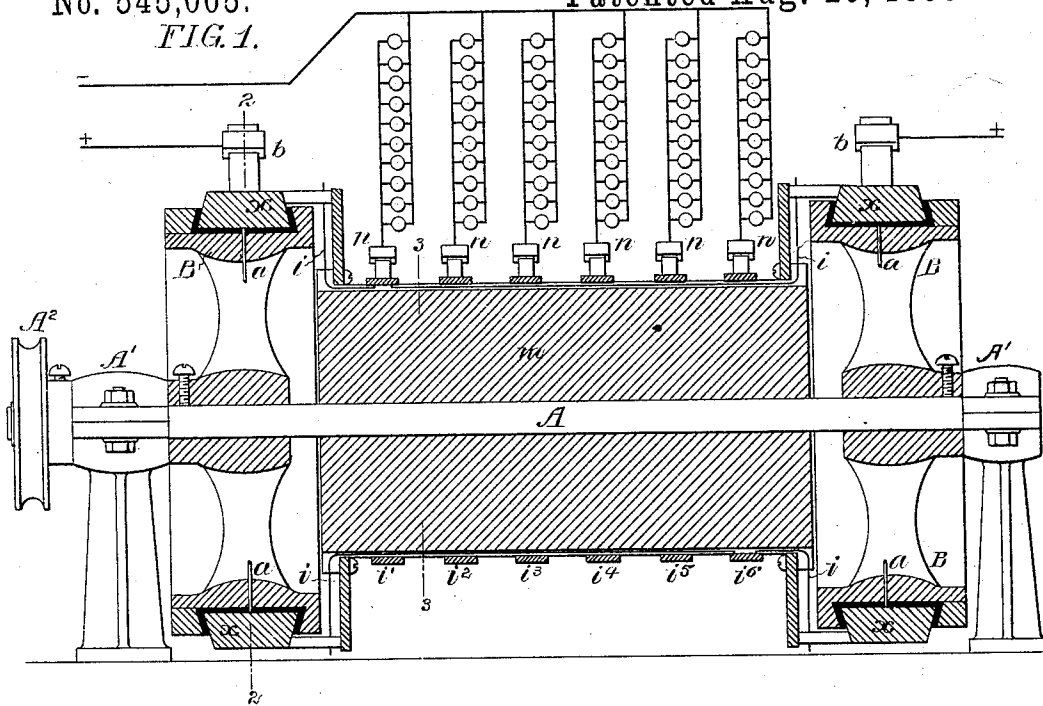


FIG. 2.

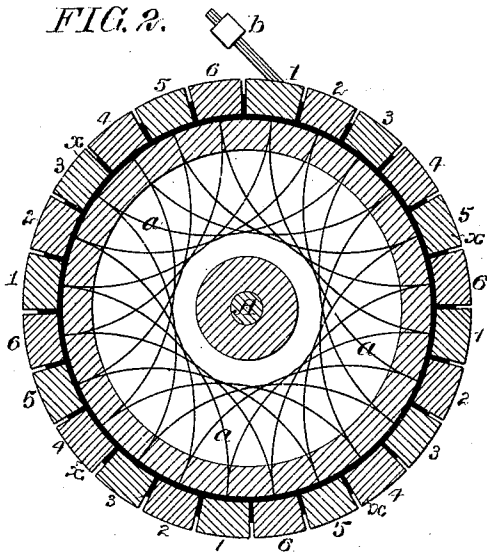
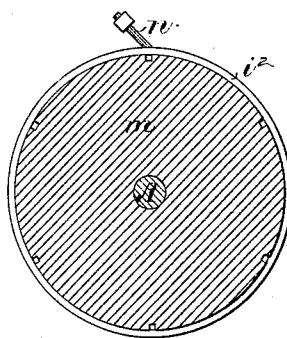


FIG. 3.



Witnesses:

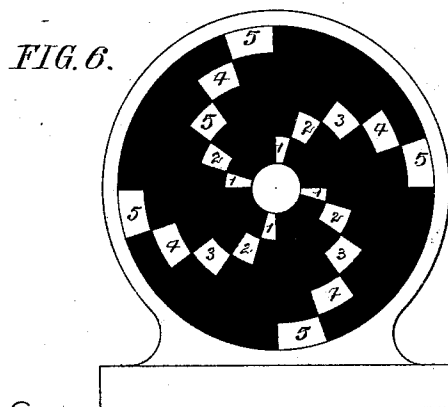
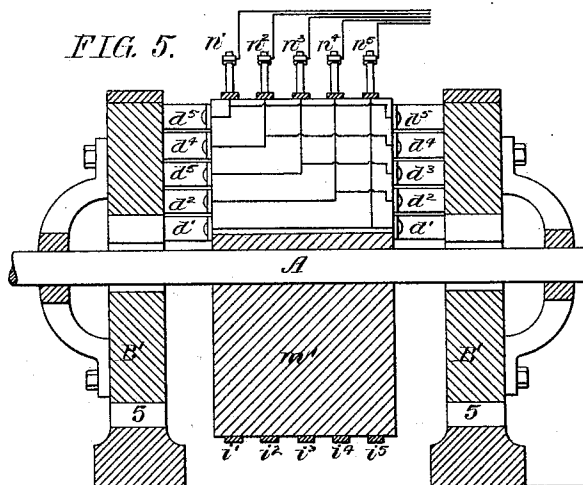
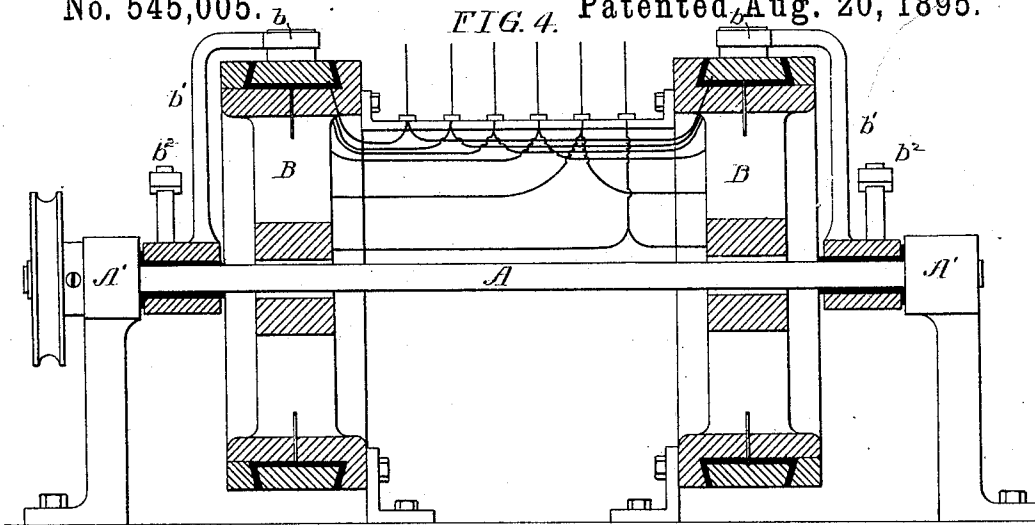
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UNITED STATES PATENT OFFICE.

TIMOTHY K. AMES AND ELBERT A. PARKER, OF PETERBOROUGH, NEW HAMPSHIRE.

MULTIPLE ELECTRIC CIRCUIT AND MECHANISM FOR MAINTAINING SAME.

SPECIFICATION forming part of Letters Patent No. 545,005, dated August 20, 1895.

Application filed October 19, 1894. Serial No. 526,342. (No model.)

To all whom it may concern:

Be it known that we, TIMOTHY K. AMES and ELBERT A. PARKER, citizens of the United States, and residents of Peterborough, Hillsborough county, New Hampshire, have invented certain Improvements in Mechanism for Maintaining Multiple Electric Circuits, of which the following is a specification.

The object of our invention is to construct a simple and effective device whereby an electric current may be caused to supply in succession a number of independent circuits containing lamps or other electrically-operated devices, and this object we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section, partly in elevation, of apparatus constructed in accordance with our invention. Fig. 2 is a transverse section of the rotating switch on the line 2 2, Fig. 1. Fig. 3 is a transverse section of the distributor-drum on the line 3 3, Fig. 1. Fig. 4 is a view similar to Fig. 1 of a modified form of the device. Fig. 5 is a longitudinal section of another modified form of the apparatus, and Fig. 6 is a face view of the switch-plate of the same.

In Fig. 1, A represents a shaft mounted in suitable bearings A' and having at one end a pulley A² for the reception of a driving-belt, whereby the shaft may be rotated at high speed. Secured to the shaft, near each end, is a switch-ring B, having upon its periphery a series of blocks *a*, insulated from each other and from the ring, there being in the present instance twenty-four of these blocks arranged in four sets, the blocks of each set being numbered consecutively from 1 to 6, and each block of each set being connected by an insulated wire *a* to the corresponding block of the next set, so that an electric current received by any block of either set is transmitted to the corresponding block of the other three sets. A brush *b*, connected to one pole of a dynamo-electric machine or other generator of an electric current, bears upon the periphery of the rotating switch, and the blocks of one set or of each set, if desired, are connected, respectively, by means of wires *i* to a series of rings *i'* *i''* *i'''*, &c., carried by a drum

m, which is secured to and rotates with the shaft A.

The drum *m* is, by preference, composed of insulating material slotted or grooved, as shown in Fig. 3, so as to provide channels for the reception of the wires, whereby the blocks of the switch-ring are connected to the rings of the drum, there being as many of these rings as there are blocks in each set on the switch-ring—that is to say, there are in the present instance six rings. Upon each ring bears a brush *n*, to which is connected one wire of a circuit containing electric lamps or other electrically-operated devices, as shown in Fig. 1, the other wire of each of said circuits being in communication with that pole of the generator which is opposite the pole connected to the brush *b*. As the device is rotated, therefore, the current from the brush *b* will be directed in succession to each of the working circuits and will, on each revolution of the machine, be directed to each circuit as many times as there are sets of blocks on said commutator-ring. For instance, whenever the brush *b* is in contact with a block 1 the current will be transmitted through the ring *i'* to the first circuit, and when the brush *b* is in contact with a block 2 the current will be transmitted through the ring *i''* to the second circuit, and so on. We have found that by thus switching the current with excessive rapidity from one circuit to another we are enabled to properly energize each circuit with a single current without material loss of voltage. In practice we have found this loss of voltage to amount to about fifteen or twenty per cent. Hence if the lamps are one-hundred-and-ten-volt lamps the dynamo would have to supply a current of, say, one hundred and thirty-two volts.

The rapidity with which the circuits are made and broken is an essential feature of the invention. Hence the employment upon the switch-ring of a number of sets of blocks, so that the circuits will be made and broken a number of times on each rotation of the ring, thus providing for the proper attainment of the object of our invention without excessively high speed. For instance, in the device illustrated in the drawings a speed of fifteen hundred revolutions per minute will effect a

making and breaking of each of the lamp-circuits at the rate of six thousand times per minute, and this rate can be increased to any desired extent by multiplying the number of sets of blocks upon the switch-ring, the number of blocks in each set being determined by the number of independent working circuits in the system.

By the use of the two switch-rings the area of the contacts is increased and there is less loss of voltage than if the contacts were smaller. Moreover, either brush *b* can be replaced or repaired without stopping the machine. While the use of the two switch-rings is therefore always to be preferred, the main feature of our invention can, it is evident, be embodied in a machine having but a single switch-ring. It is manifest, also, that so far as regards the main feature of our invention it is immaterial whether the switch-ring or the brush *b* rotates. For instance, the brushes may be carried by rotating arms *b'*, as shown in Fig. 4, so as to be brought into contact successively with the various blocks of the stationary switch-ring, the arms *b'* being, by preference, insulated from the shaft A, and the current being transmitted to the hub of each arm from a brush *b*².

In Figs. 5 and 6 we have shown a further modification of our invention, in which we employ fixed switch-rings and a rotating drum. In this case we have shown four sets of switch-blocks, each set comprising five blocks suitably insulated from each other, all of the blocks of each set being connected to one pole of the generator. Each block consists of a segment, the segments of each set being located at various distances from the center of the switch, so as to provide for the use of a series of brushes *d'* *d*² *d*³ *d*⁴ *d*⁵ upon the ends of the rotating drum *m'*. As the drum rotates the brush *d'* will make contact with the block 1 of one set, and as soon as its contact is broken the brush *d*² will make contact with the block 2 of the same set, and so on until the brush *d*⁵ breaks contact with the block 5 of said set, the brush *d'* then making contact with the block 1 of the next set, and so on. The brushes *d'* *d*² *d*³, &c., are connected, respectively, to the rings *i'* *i*², &c., upon the periphery of the drum *m'*, and brushes *n'* are in contact with said rings *i'* *i*², &c., and serve to convey the current there-

from to the working circuits. A palpable modification of this construction is one in which the drum *m'* is stationary and the switch-ring rotates. By the term "rotating switch," therefore, is intended either a construction in which the multiple-block ring rotates in connection with a stationary brush or brushes, or in which a rotating brush or brushes and a stationary ring are used.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination of a switch comprising a ring having a number of sets of blocks and a contact brush or brushes, means for rotating one part of said switch in respect to the other, conductors providing an electrical connection between the corresponding blocks of each set on the ring, a series of distributing terminals, one for each block of a set on the switch, each of said terminals being connected to one wire of the working circuit, electrical connections between each distributing terminal and its corresponding block of each set on the switch ring, and a direct line wire serving to return the current from the working circuits to the generator, substantially as specified.

2. The combination of a pair of switches, each comprising a ring having a number of sets of blocks and a contact brush or brushes, means for rotating one part of each switch, in respect to the other part of the same, a series of working circuits, comprising as many as there are blocks in each set on the switches, connections whereby the current is caused to pass in succession through the blocks of the successive sets on each switch, whereby each circuit receives its current through two blocks simultaneously, and the entire series of circuits is energized a number of times on each rotation of the switch, and a direct line serving to return the current from each working circuit to the generator, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

TIMOTHY K. AMES.
ELBERT A. PARKER.

Witnesses:

GEO. M. KETTELLE,
S. G. WHITE.