No. 635,276. Patented Oct. 17, 1899.

E. B. CUTTEN.

MAGNETO ELECTRIC MACHINE.

(Application filed Aug. 19, 1899.)

(No Model.)

Fig. 1

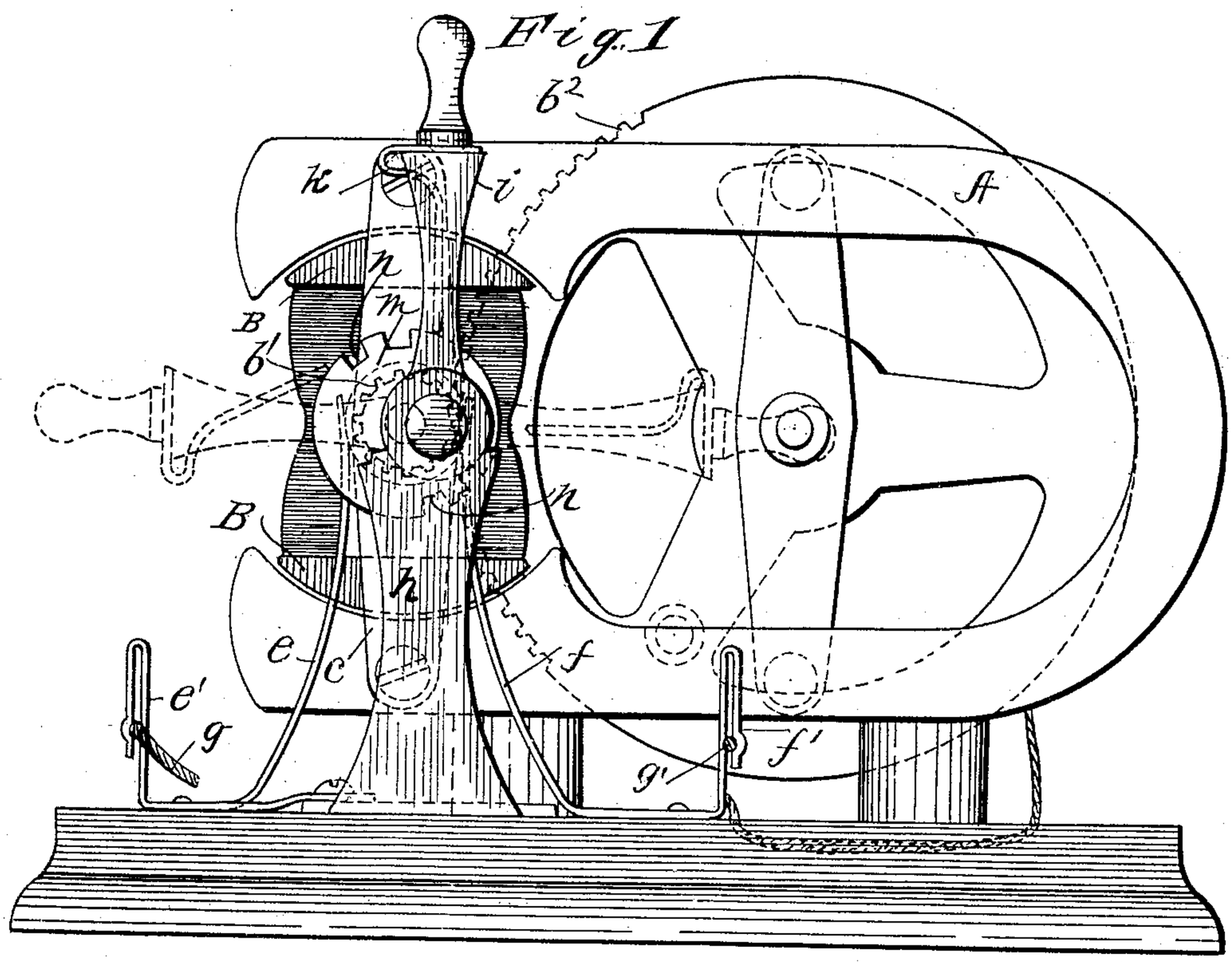


Fig. 3.

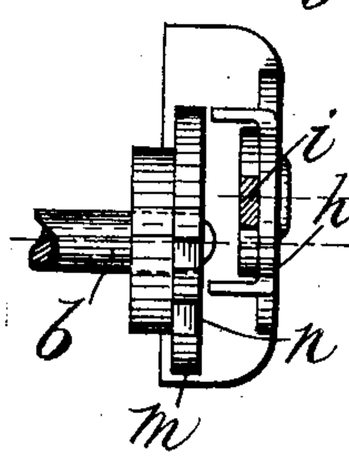
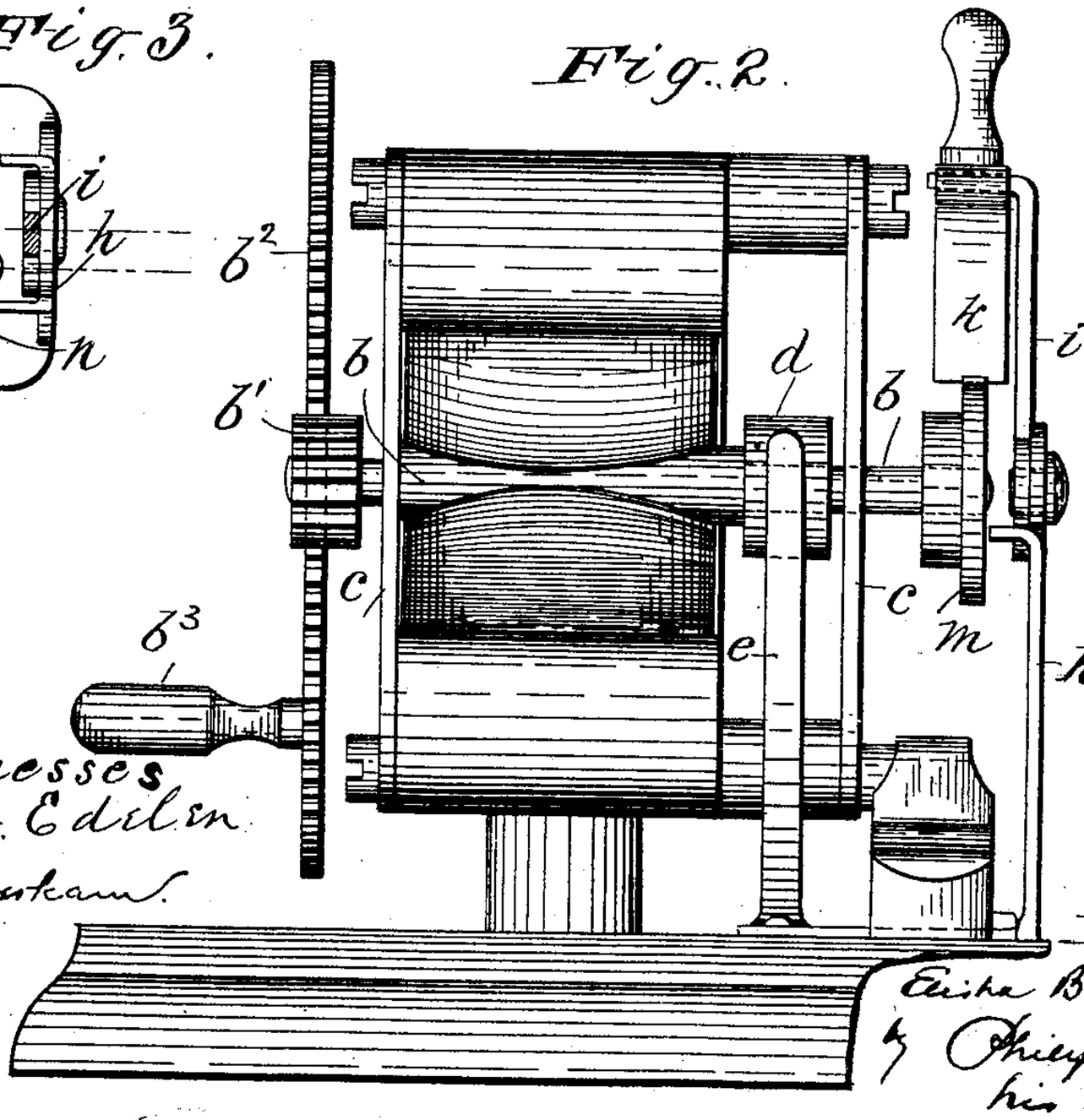


Fig. 2.



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MAGNETO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 635,276, dated October 17, 1899.

Application filed August 19, 1899. Serial No. 727,814. (No model.)

To all whom it may concern:

Be it known that I, ELISHA B. CUTTEN, a citizen of the United States of America, and a resident of the city of Butte, State of Montana, have invented a new and useful Improvement in Magnetic Electric Machines, which improvement is fully set forth in the following specification.

This invention relates to dynamo-electric or magneto-electric machines, and particularly to that class of machines which are operated by hand and which are used for curative purposes or for amusement and experiment. It is of course necessary in order to meet the demand for machines of this type that they should be of simple construction and capable of being manufactured with facility and economy. It is also necessary that they should be very light and of small size. These conditions limit the electrical capacity of the machines and the potential of current which they are capable of developing.

The object of the present invention is to satisfy the requirements above stated and at the same time to produce a machine capable of generating a current of relatively high potential and one in which the intensity of the current may be regulated or adjusted to any desired strength between the maximum and minimum.

As hereinafter described the apparatus embodying my invention has a normal circuit embracing the armature and terminating in the usual handles or terminal electrodes. It also has a shunt-circuit which can be closed by a suitable switch and which embraces an interrupter or current-breaking device whereby the short circuit can be rapidly opened and closed, the effect being the charging of the armature-winding during the periods of closure of the shunt-circuit and a reactionary discharge into the normal circuit during the interruptions of the short circuit. As thus far described the apparatus is not novel.

In order to develop a very high electromotive force and to permit of regulating the intensity of the discharge, the interrupter is movable in such manner that the point in the revolution of the armature at which the break occurs may be varied between the two extremes. If the break occurs when the poles are about reversing and the magnetic strain is at a maximum, a current of very high electromotive force will be developed. At a position of ninety degrees from this point the intensity of the current will be slight. This effect will be still further intensified if the degree of pressure of the interrupter upon the rotating contact be varied proportionately to the movement of the interrupter toward the strongest part of the field. Therefore in the preferred form of apparatus the interrupter (which is usually in the form of a light spring) is so mounted that as it is moved in the direction to increase the intensity of the shock it bears with gradually-increasing pressure upon the rotating contact disk or piece. The effect is that the breaks are more sharp or sudden, and the potential of the discharge thereby intensified. When the switch controlling the shunt-circuit is opened, the machine may be used in the ordinary way or by being connected with a battery or other generator may be used as a motor. For the sake of simplicity the interrupter and switch may be combined in one device, the spring above mentioned being actuated by a lever or handle and so mounted that it may be moved out of contact with the disk (thus opening the shunt) or caused to bear upon the latter with greater or less pressure. Obviously, however, the switch and interrupter may be separate. A commutator is preferably used in order to generate direct currents and to permit employment of the device as a motor.

The accompanying drawings, which form part of this specification, illustrate one form of apparatus embodying the invention.

Figure 1 is a side elevation of the invention; Fig. 2, an end elevation rear, and Fig. 3 a detail illustrating the interrupter and contact-disk.

A represents a horseshoe-magnet, (either permanent or electro, as desired,) and B the armature, mounted on a shaft *b*, journaled at its ends in the uprights *c*, which are supported at their ends by the pole-pieces of the

magnet A. On one end of shaft *b* is a pinion *b'*, which engages a large spur-gear b^2, to which is attached a crank-handle b^3 for imparting movement to the armature. On the other end of the shaft *b* is a commutator *d*, against which press the brushes *e f*. Brush *e* is in electrical connection with a binding-terminal *e'* and brush *f* with a similar terminal *f'*. Flexible conductors *g g* are attached to these terminals and complete the normal circuit. Terminal *e'* is in electrical contact with a plate or support *h*, to which is pivoted a lever *i*, the latter carrying a flat spring *k*, which in the construction here illustrated constitutes the switch for the shunt-circuit and also the interrupter. Adjacent to lever *i* and carried on the end of armature-shaft *b* is a disk *m*, with which the spring *k* makes contact when the shunt is closed. This circuit proceeds from terminal *e'* by plate *h* and lever *i* to spring *k* and thence from disk *m* through shaft *b* to the other terminal *f'*. Disk *m* has a notch or notches *n* or is otherwise constructed in any known or suitable way, so that during each revolution of the armature-shaft the shunt-circuit will be rapidly opened and closed one or more times. During such interruption there will be an impulse of greater or less strength in the main circuit. It will be observed that lever *i* is pivoted eccentrically to the axis of shaft *b* and that the relative positions of disk *m* and spring *k* are such that when the latter first makes contact with the former, as shown in full lines, Fig. 1, the interruptions caused by notches *n* will occur when the poles of the armature are directly opposite the poles of the magnet A. Hence the impulses generated in the main circuit will be of minimum intensity. By moving the lever *i* farther to the left, Fig. 1, the interruptions will be brought closer and closer to the point where the armature-poles reverse their polarity, until in the position illustrated by dotted lines, Fig. 1, the discharge will be of maximum intensity. Moreover, owing to the eccentricity of lever *i* the movement to the left causes spring *k* to bear with constantly-increasing pressure upon the edge of disk *m*, thus further intensifying the electromotive force of the discharge.

Obviously the means for displacing the interrupter with reference to the position of the armature may be of various sorts and the invention may in other respects be carried out in different ways without departing from the spirit thereof.

Having now fully described my said invention, what I claim is—

1. In a magneto or dynamo electric machine, the combination with the normal armature-circuit and a shunt-circuit, of a switch for opening and closing the latter, said switch consisting of a rotating part or disk in the shunt-circuit, said disk having interruptions in its conducting contact-surface, and an interrupter making contact with said disk and movable to vary the point of contact relatively to the armature-poles.

2. The combination with the normal armature-circuit and a shunt-circuit, of a switch consisting of a rotating part or disk in the shunt-circuit said disk having interruptions in its conducting contact-surface, and an interrupter also in the shunt-circuit movable into and out of contact with the contact-surface of the disk to normally close or open the shunt-circuit, and by the same movement while in contact with the disk to vary the point of contact relatively to the armature-poles, said movable interrupter being accessible to and adapted to be readily manipulated by an operator both while the machine is in and out of operation.

3. The combination with a magnet, and an armature having a helix wound thereon, of a normal armature-circuit leading from the terminals of said helix, a shunt-circuit for the armature-current, a switch consisting of a rotating part or disk in the shunt-circuit, said disk having interruptions in its conducting contact-surface, and an interrupter also in the shunt-circuit movable into and out of contact with the contact-surface of the disk to normally close or open the shunt-circuit, and by the same movement while in contact with the disk to vary the point of contact relatively to the armature-poles, said movable interrupter being accessible to and adapted to be readily manipulated by an operator both while the machine is in and out of operation.

4. The combination with the normal armature-circuit and the shunt-circuit, of a switch for opening and closing the latter, said switch consisting of a rotating part or disk in the shunt-circuit said disk having interruptions in its conducting contact-surface, and an interrupter making contact with said disk and movable to vary the point of contact relatively to the armature-poles.

5. The combination with the normal armature-circuit and the shunt-circuit, of a switch consisting of a spring making contact with a disk rotating with the armature, said spring and disk being in a shunt-circuit and said disk having interruptions or breaks in its conducting contact-surface, and a support for the spring accessible to the operator for manipulation when the machine is in as well as out of operation and movable to throw the spring into and out of contact with the disk to open and close the shunt-circuit and by the same movement to vary the point of contact of said spring with said disk relatively to the armature-poles.

6. The combination with the normal armature-circuit and with the shunt-circuit, of a contact-disk in the latter having a break in its conducting-surface, a contact-spring in said circuit and a movable support for said spring

whereby the latter can be moved with said disk to close the shunt-circuit, and the point of contact may be varied, the pressure of the spring upon the disk increasing as the point of interruption approaches the point of greatest magnetic strain.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ELISHA B. CUTTEN.

Witnesses:
PHILIP MAURO,
WM. B. HERKAM.