(No Model.) 2 Sheets—Sheet 1.

H. J. SMITH.

DYNAMO ELECTRIC IGNITING MACHINE.

No. 353,827. Patented Dec. 7, 1886.

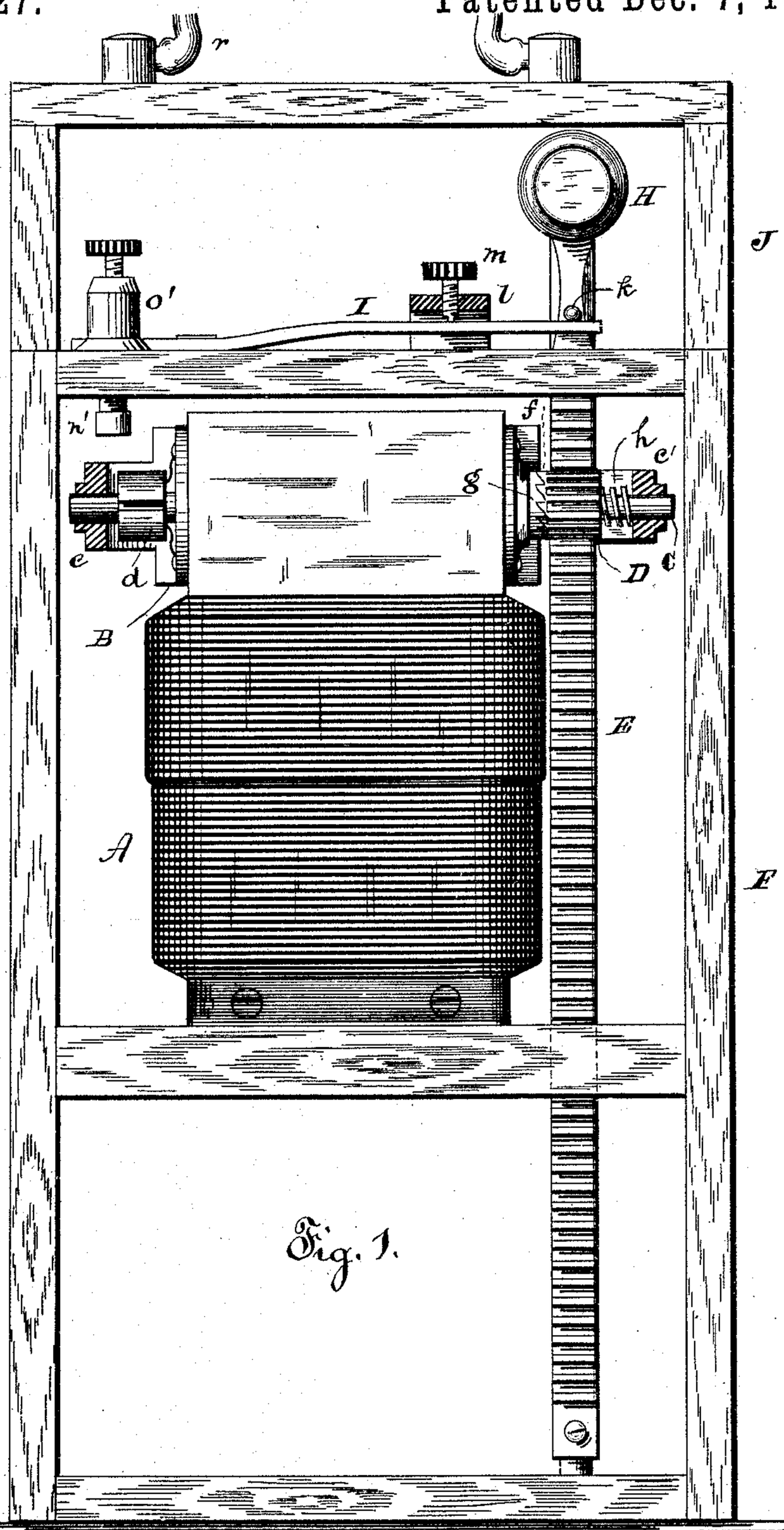

Fig. 1.

WITNESSES:

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INVENTOR:

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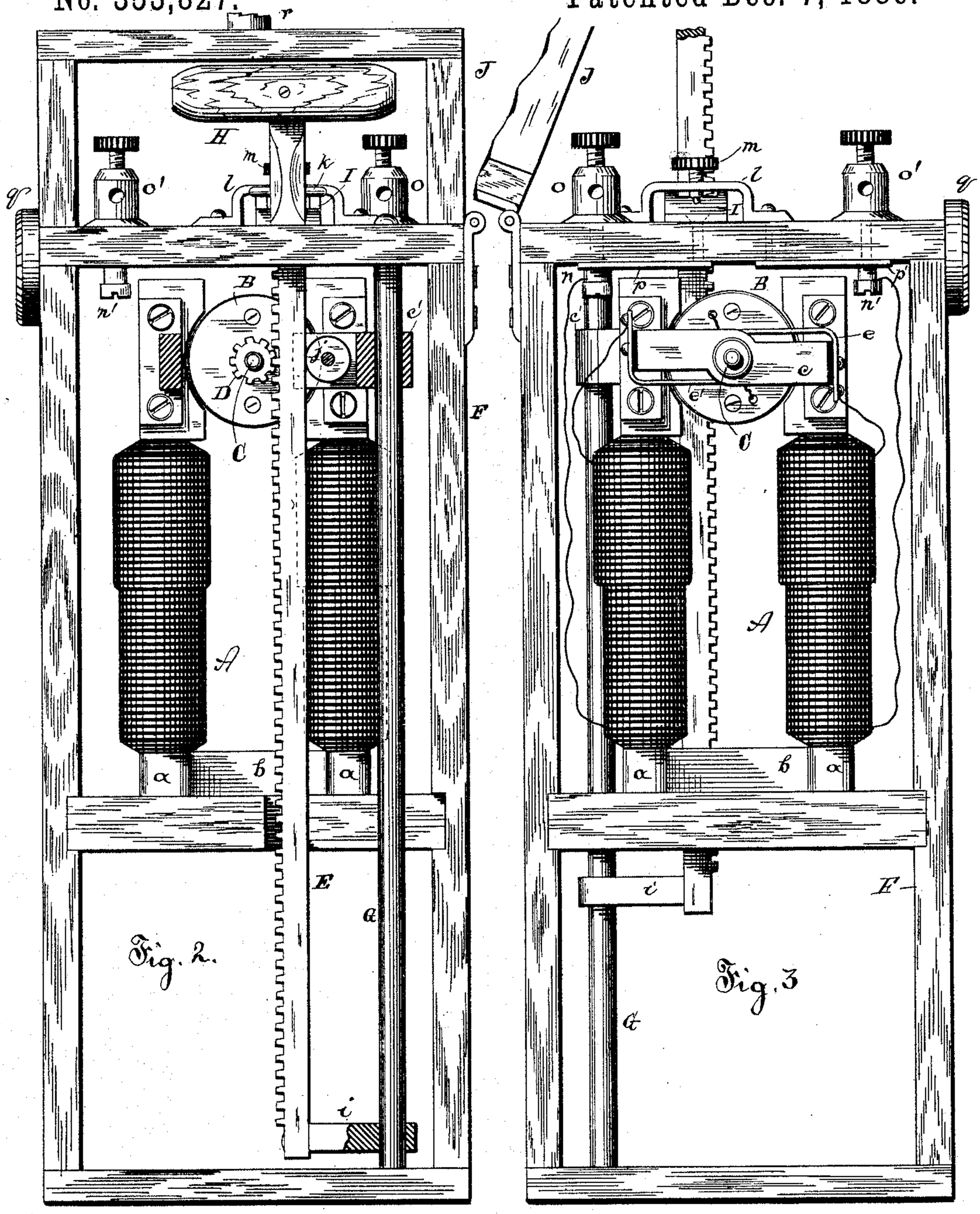

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UNITED STATES PATENT OFFICE.

H. JULIUS SMITH, OF MOUNTAIN VIEW, NEW JERSEY.

DYNAMO-ELECTRIC IGNITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 353,827, dated December 7, 1886.

Application filed May 18, 1886. Serial No. 202,538. (No model.)

To all whom it may concern:

Be it known that I, H. JULIUS SMITH, of Mountain View, in the county of Passaic, State of New Jersey, have invented new and useful Improvements in Igniting Dynamo-Electric Machines, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation of my improved igniting dynamo-electric machine with a part of the casing removed. Figs. 2 and 3 are respectively front and rear elevations with parts of the casing removed.

Similar letters of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to the class of dynamo-electric machines employed in generating an intense current of electricity for firing fuses, igniting gas-jets, and similar uses.

My present invention is an improvement on the magneto-electric machine for which Letters Patent No. 201,296 were issued to me March 12, 1878.

In my former application the circuit-breaking key was at the bottom of the casing, and the rack-bar employed to operate the armature of the dynamo-electric machine moved in bearings, which created considerable friction.

In my present invention I have removed the circuit-breaking key from the bottom of the casing to the top, and have provided a roller and a rod for guiding the rack-bar, my object being to remove the circuit-breaking key from a point where it is continually exposed to moisture and dirt to a point where it will always be kept dry and accessible for cleaning.

It is well known that the field-magnet and armature of a small dynamo-electric machine may be quickly brought to saturation, and that when the current is at its maximum the breaking of the circuit will cause the extra current generated in the coils to be discharged, either through the air at the point of rupture of the current or through a derived circuit connected with the terminals of the field-magnet. In my improved machine I take advantage of this fact, and also of the fact that an accelerated motion of the armature is more effective in bringing the field-magnet and armature to magnetic and electric saturation than a uniform rotation of the armature.

The field-magnet A is formed of the cores *a*, secured to the yoke *b* in the usual way, the cores being wound with a suitable quantity of insulated wire in the direction necessary to cause one of the poles of the magnet to show a north and the other a south polarity when the current passes through the winding of the magnet. The polar extremities of the field-magnet are concaved to receive the armature B, which is preferably of the Siemens **I** type, the armature being journaled in yokes *c c'*, secured to the sides of the field-magnet.

Upon one end of the armature-shaft C is placed a commutator, *d*, which is touched on diametrically-opposite surfaces by the commutator-springs *e e'*, which are secured to the yoke *c*, but insulated therefrom. Upon the opposite end of the armature-shaft C, between the armature and the yoke *c'*, is placed a pinion, D, which is provided with a series of ratchet-teeth, *f*, on its inner face, which are adapted to engage similar but oppositely-arranged teeth, *g*, formed on the end of the armature, and upon the shaft between the pinion and the yoke *c* is placed a spiral spring, *h*, which tends to press the pinion forward into engagement with the ratchet-teeth *g* of the armature.

A rack-bar, E, passes through the top of the casing F, which supports the dynamo-electric machine, and extends downward toward the bottom of the casing, and is provided with a right-angled arm, *i*, which extends from the side of the bar opposite the teeth, and is apertured to receive a guide-rod, G, which is secured to the top and bottom of the casing parallel with the path of the rack-bar E. The rack-bar E passes between the yoke *c'* and the end of the armature, and is held in engagement with the pinion D by a roller, *j*, journaled in the yoke *c'* behind the rack-bar. The upper end of the rack-bar which projects above the top of the casing F is provided with a **T**-handle, H, by which it is moved, and between the handle and the top of the casing a pin, *k*, is inserted in the rack-bar, and allowed to project a short distance from each side thereof.

To the top of the casing F is secured a spring-

key, I, which is forked at its free end and embraces the rack-bar E below the pin *k*. A bridge, *l*, extending over the spring-key I, is provided with a contact-screw, *m*, which normally rests in contact with the back of the key I.

The core of the armature B is wound in the usual way, and the terminals of the winding are connected with the halves of the commutator-cylinder *d*. The commutator-springs *e e'*, which contact with the surface of the cylinder *d*, are connected with the winding of the field-magnet A, and the remaining terminals of the winding of the field-magnet are connected with screws *n n'*, which serve the double purpose of clamping the binding-posts *o o'* upon the top of the casing F and securing the plates *p p'* to the under surface of the case-top. The plate *p* communicates electrically with the key I, and the plate *p'* communicates electrically with the bridge *l*. By means of this arrangement of the circuit the field-magnet and armature are normally short-circuited.

The wires of the external or derived circuit in which the work is done are connected with the binding-posts *o o'*, and include the fuses or igniters of the gas-jets. The handle H, binding-posts *o o'*, and the key I are inclosed by a cover, J, hinged to one side of the casing and shutting down over them. The cover J is secured in a closed position by a lock, *q*, and is provided with a handle, *r*, by which the machine is carried.

To arrange my improved machine for use, the binding-posts *o o'* are connected with the wire leading to the different fuses to be exploded, and the handle H is raised, rotating the pinion D on the shaft C without turning the armature, the clutch-connection between the pinion and the armature permitting of this action. When the handle H and rack-bar E are pushed down, quickly accelerated rotary motion is imparted to the pinion D, and the armature B is rotated between the poles of the field-magnet A, generating a current which passes through the wires of the field-magnet, through the screws *n n'*, plates *p p'*, key I, contact-screw *m*, and yoke *l*, very little of the current passing through the external or derived circuit on account of its comparatively low electro-motive force and the high resistance of the circuit. The current thus produced increases rapidly as the rack-bar E descends and charges the field-magnet and armature to saturation, or approximately so; and just before the rack-bar E reaches the extreme limit of its downward travel the pin *k* strikes the spring-key I and breaks the electrical connection between the screw *m* at the instant the maximum of current and of magnetization of the field-magnet is reached, so that the extra current flowing from the winding of the field-magnet and armature is compelled to pass through the external circuit, and thus heat the wires of the fuses included in that circuit, causing the explosion of the fuses at the distant points.

As is well known, the electro-motive force of the extra current from the machine is very much higher than that of the current generated in the normal working of the machine, and whereas the direct current from the dynamo could not pass through the external circuit, owing to its great resistance, the extra current readily traverses this circuit as soon as the short circuit is broken and performs the required work.

The ratchet-connection of the pinion with the armature permits of again placing the machine in condition for operation without revolving the armature in the reverse direction, thus avoiding the depolarization of the field-magnet.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an igniting dynamo electric machine, the combination, with the dynamo provided with a clutch-pinion, D, of a rack-bar, E, engaging the pinion, and the guide-roller *j* for holding the rack-bar in engagement with the pinion, substantially as herein shown and described.

2. The combination, with a dynamo provided with a clutch-pinion on its armature-shaft, of the rack-bar E, having the right-angled apertured arm *i*, and the guide-rod G, received in the aperture of the arm *i* and arranged to guide the rack-bar, substantially as herein shown and described.

3. In an igniting-dynamo, the combination, with the operating rack-bar E, of a spring-key, I, placed above the dynamo and arranged in the short circuit of the machine and in the path of the pin projecting from the rack-bar, and a contact arranged above the spring-key and in the short circuit of the dynamo, substantially as herein shown and described.

H. JULIUS SMITH.

Witnesses:
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C. SEDGWICK.