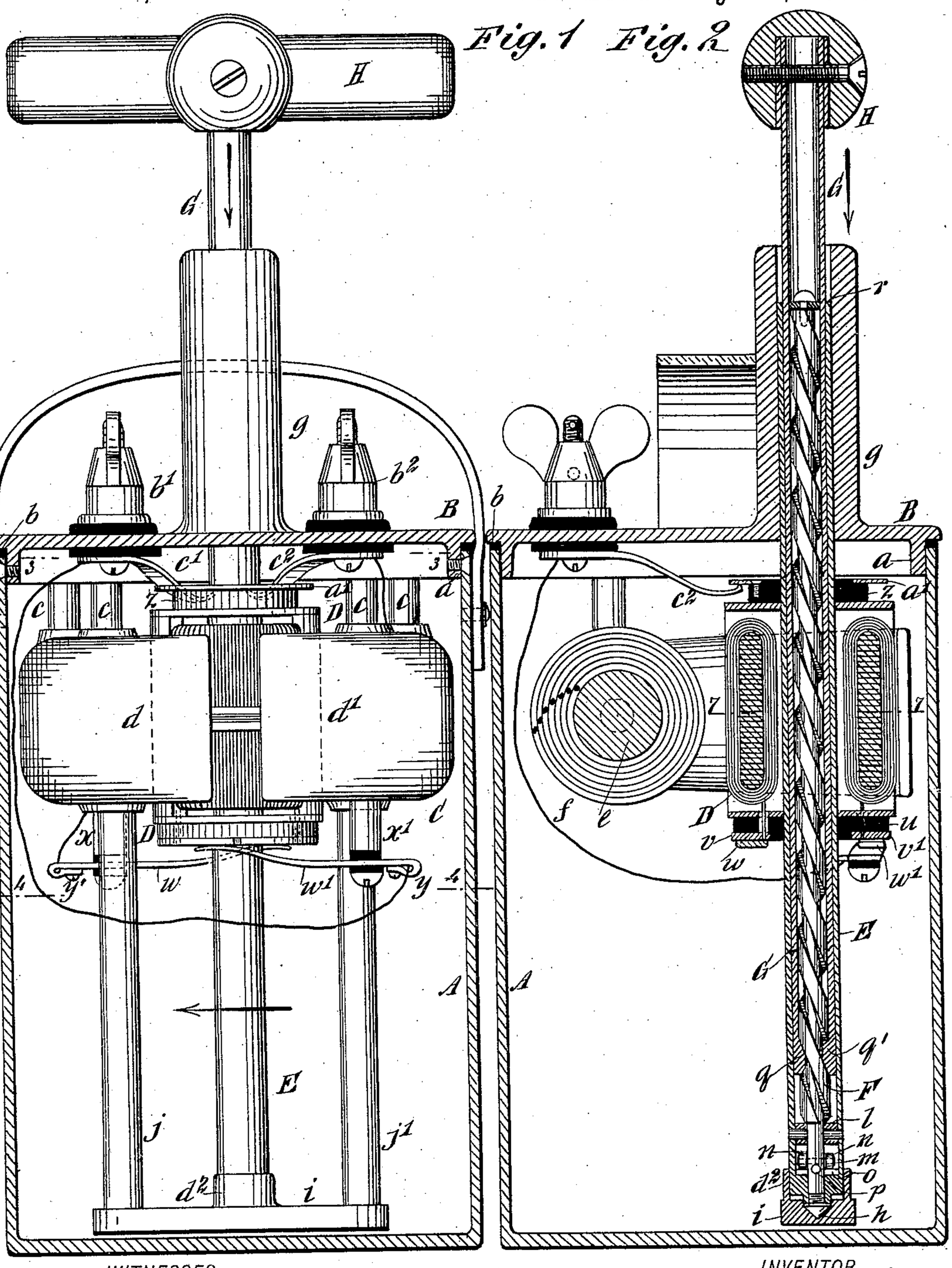
(No Model.) 2 Sheets—Sheet 1.

J. MACBETH.

ELECTRIC BLASTING MACHINE.

No. 564,437. Patented July 21, 1896.

Fig. 1 Fig. 2



WITNESSES:

C. Neveux

G. M. Hopkins.

INVENTOR

J. Macbeth.

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. MACBETH.

ELECTRIC BLASTING MACHINE.

No. 564,437. Patented July 21, 1896.

Fig. 3

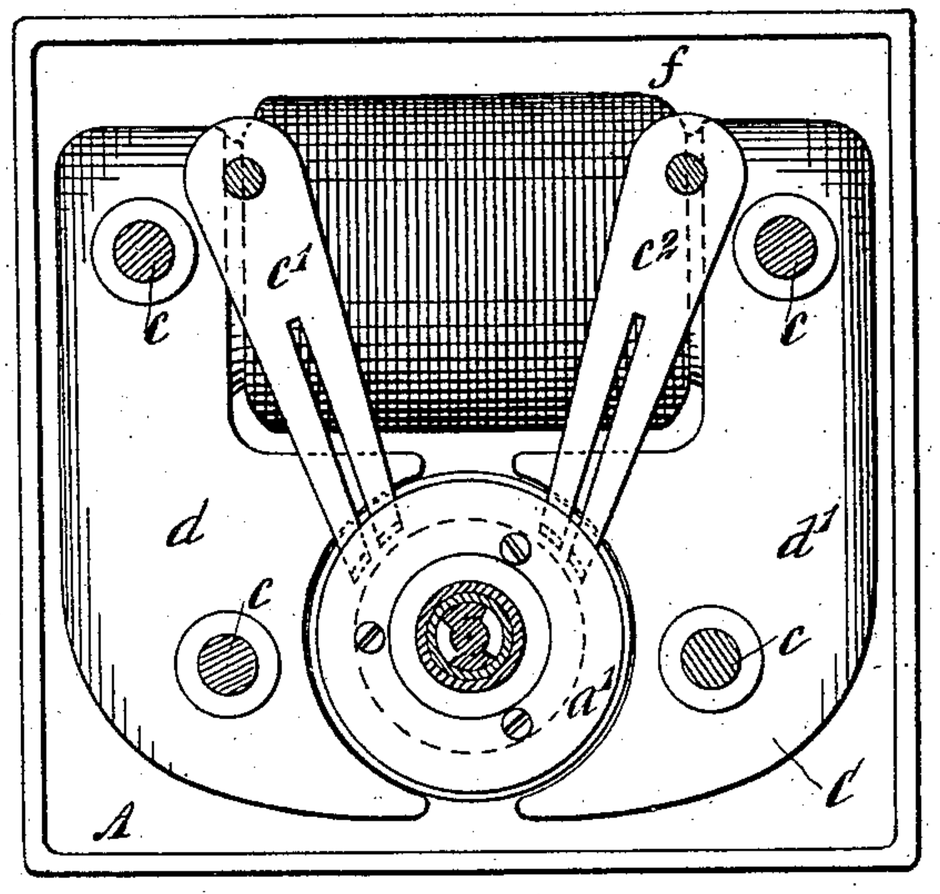


Fig. 4

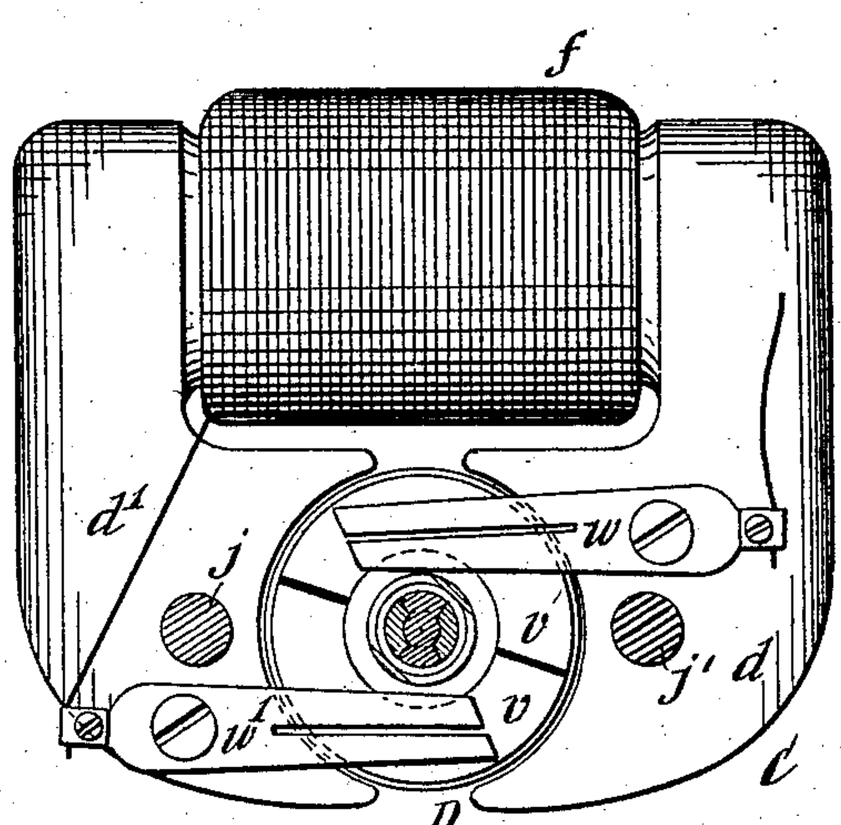


Fig. 5

Fig. 7

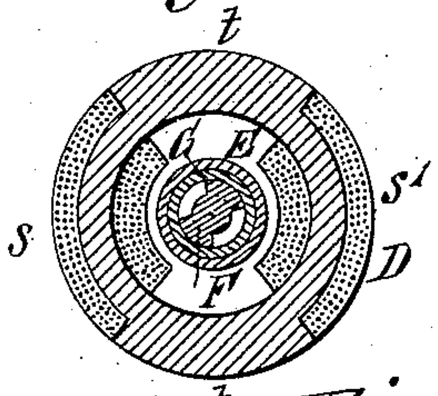


Fig. 8.

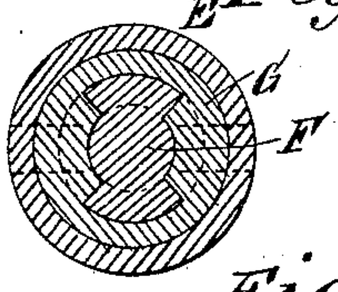
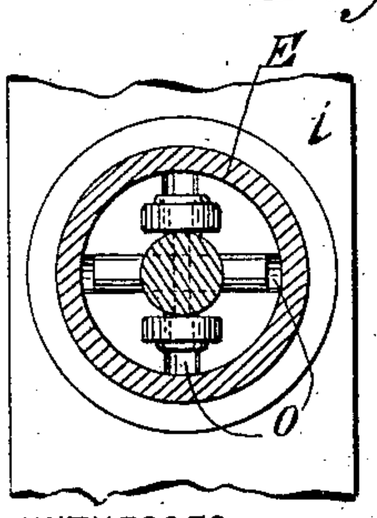


Fig. 9.



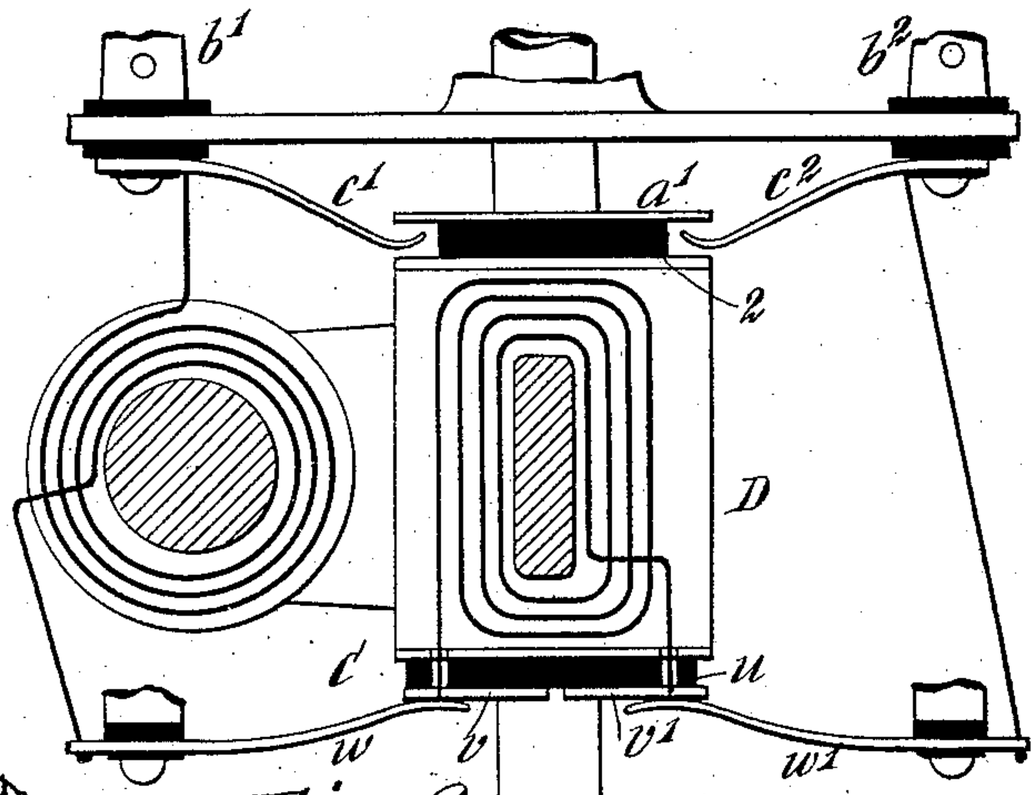
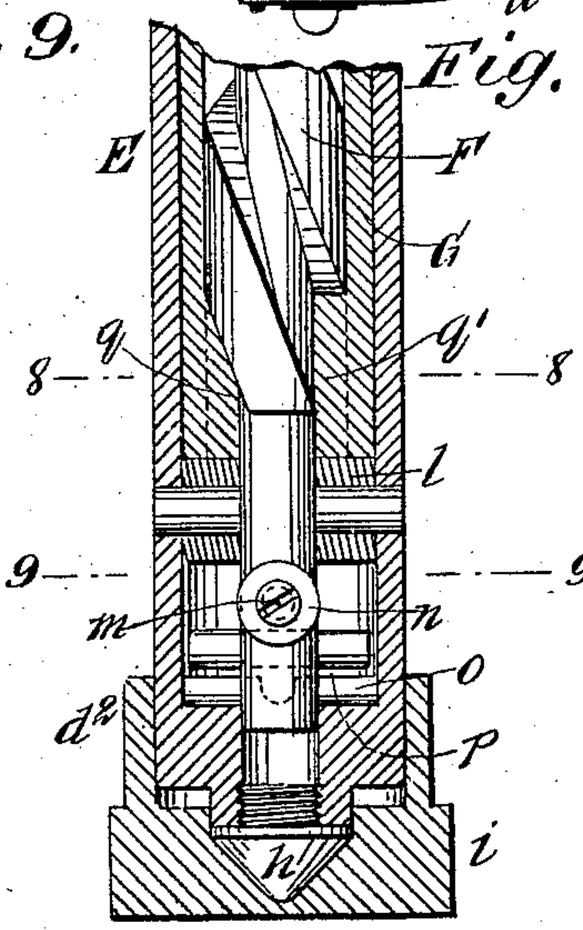
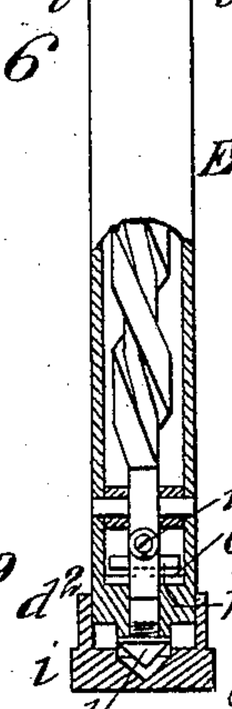


Fig. 6





WITNESSES:

C. Neveux

G. M. Hopkins.

INVENTOR

J. Macbeth.

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES MACBETH, OF BROOKLYN, NEW YORK.

ELECTRIC BLASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 564,437, dated July 21, 1896.

Application filed October 31, 1895. Serial No. 567,480. (No model.)

To all whom it may concern:

Be it known that I, JAMES MACBETH, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Electric Blasting-Machine, of which the following is a full, clear, and exact description.

The object of my invention is to construct a simple and effective machine for electrically igniting charges of explosives.

My invention consists in a dynamo-electric machine mounted in a case with the axis of its armature arranged vertically, and in the combination, with the said armature, of a propelling-screw and a sliding nut for operating the same.

It also consists in a device for detaching the propelling mechanism so that the armature may revolve by its own momentum.

It also further consists in automatic circuit-breaking mechanism, all as will be hereinafter more fully described.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of my improved blasting-machine with the side of the containing-case removed. Fig. 2 is a central vertical transverse section of the same. Fig. 3 is a horizontal section taken on line 3 3 in Fig. 1. Fig. 4 is an inverted sectional plan view, the section being taken on line 4 4 in Fig. 1. Fig. 5 is a diagrammatic view showing the circuits. Fig. 6 is an enlarged vertical section of the lower end of the screw and armature spindle. Fig. 7 is a horizontal section of the armature, taken on line 7 7 in Fig. 2. Fig. 8 is a horizontal section taken on line 8 8 in Fig. 6, and Fig. 9 is a horizontal section taken on line 9 9 in Fig. 6.

The casing A, which is preferably made in a single casting, is provided with a cover B, having a rim *a*, which fits into the top of the casing and is fastened by screws, or in any other convenient way. Between the flange of the cover and the upper edge of the case is placed a strip *b* of packing, which excludes moisture and dust.

From the cover B is suspended the field-magnet C of the dynamo, by non-magnetic rods *c*. In the present case the field-magnet has two concave polar extremities *d d'*, which embrace the armature D, and the single magnetic core *e* of the magnet is inclosed by a single coil *f*, but I do not limit myself to this or any particular form of field-magnet.

Between the polar extremities of the field-magnet C the armature D is supported upon a tubular shaft E, the upper end of which is journaled in a perpendicular sleeve *g*, formed with the cover B. In the tubular shaft E is placed a double-threaded screw F, the lower portion of which is reduced in diameter and journaled in a collar *l*, secured in the tubular shaft E near the lower end thereof. The lower end of the journal of the screw extends into an opening in the lower end of the tubular shaft E, and on a rod *m*, extending through the lower portion of the screw-spindle below the collar *l*, are placed rollers *n* on opposite sides of the screw-spindle. The head of the lower end of the tubular shaft E is furnished with transverse slots *o*, crossing each other at right angles, and in the screw-spindle below the rod *m* is inserted a rod *p*, which is capable of entering either of the slots *o* in the head of the tubular shaft E. The lower extremity of the screw F is provided with a point *h*, which revolves in a cross-bar *i*, suspended from the field-magnet by the rods *j j'*.

In the tubular shaft E, between the screw F and the tubular shaft, is inserted a tube G, which is provided at its lower end with lugs *q q'*, entering into the grooves of the screw. To the upper end of the tube G is attached a handle H, by means of which the tube can be drawn up or pushed down, and to prevent the withdrawal of the tube G from the tubular shaft E a washer *r* is fastened to the top of the screw F so that the lugs *q q'* will strike the said washer when the tube G is drawn up.

The armature D in the present case is of the Gramme ring pattern, but provided with only two coils *s s'*. The core of the armature is built up of sheet-iron rings notched on diametrically opposite sides to receive the winding. The armature is provided with two diametrically-opposite coils and is furnished with two intermediate core projections *t*. To the lower head of the armature is attached an insulating-disk *u*, to which are affixed the commutator-segments *v v'*. The two coils *s s'* are connected in series and the terminals of the armature-winding are con-

nected with the commutator-sections v v', as shown. The commutator-brushes w w', which rest normally on the commutator-sections, are supported by studs x x', inserted in the poles of the field-magnet, the said brushes being insulated from the studs. The brushes, which consist of curved pieces of spring metal, are prolonged beyond their support, and their extremities are bent over and returned upon themselves, forming clamps y y' for the wire connections, the ends of the clamps being drawn down upon the body of the brushes by screws. To the upper head of the armature D is secured an insulating-disk z, to which is attached a metallic disk a'.

The cover B supports binding-posts b' b^2, which are insulated therefrom, and with which are connected the contact-springs c' c^2, the free ends of which extend into the space between the upper head of the armature and the disk a'. The binding-post b' is connected electrically with the clamp y. The clamp y' is connected electrically with one terminal of the field-magnet winding, the other terminal of the field-magnet winding being connected with the binding-post b^2.

The operation of my improved blasting-machine is as follows: The handle H is drawn up to the extreme limit of its upward stroke. The first upward movement of the tube G withdraws the rod p from the groove in the lower head of the tubular shaft E, and a continued upward movement of the tube G causes the screw F to revolve without turning the tubular shaft E. When it is desired to ignite the charge containing the fuse which is connected electrically with the binding-posts b' b^2, the handle H is quickly pushed down. The first operation of the downward movement of the handle is to force the rod p into one of the slots o in the head of the tubular shaft E, and a continuation of this movement of the tube G, by virture of the engagement with the screw F of the lugs q q', causes the said screw to revolve rapidly, and the screw being positively connected with the tubular shaft E in the manner described causes the said shaft and the armature D, attached thereto, to revolve, generating a current which passes from one of the brushes to the field-magnet through the contact-spring c^2, disk a', contact-spring c', back to the armature D through the brush w. This rapid movement of the armature generates a current in the armature, which builds up the magnetism of the field-magnet and produces in the dynamo a strong current which is short-circuited so long as the disk a' is in contact with the springs c' c^2; but when the tube G reaches the limit of its downward excursion the armature D and tubular shaft E, revolving by their own momentum, cause the screw F to rise by its engagement with the lugs q q', lifting the rod p out of the slot in the lower head of the tubular shaft E, thereby disengaging the screw from the shaft and allowing the armature to revolve by its own momentum. At the same instant the rollers n come into engagement with the collar l and lift the tubular shaft E and armature D a short distance, thereby disengaging the disk a' from the contact-springs c' c^2, breaking the short circuit of the dynamo and allowing the self-induced current to flow out through the binding-posts b' b^2 to the fuse or fuses connected with the binding-posts, thus igniting the charge of explosive containing the fuse.

To prevent the lower end of the tubular shaft E from lateral motion, it is surrounded by a sleeve d^2, formed on or attached to the cross-bar i.

It will be observed that by my improved construction cog-gearing and springs and other complications are avoided, and the necessary impetus is given to the armature by the simple downward push of the handle, which also interrupts the short circuit, so as to allow the self-induced current to flow out through the conductors connected with the binding-posts.

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

1. In an electrical blasting-machine, the combination with the armature, of a tube forming the hollow armature-shaft, a tube fitted to the hollow armature-shaft and provided at its lower end with a nut and at its upper end with a handle, a screw journaled in the inner tube and fitting the nut, and an automatically-detachable connection for temporarily connecting the screw and tubular armature-shaft, substantially as specified.

2. In an electrical blasting-machine, the combination of the field-magnet, the armature provided with an insulated contact-disk and made movable in the direction of its length, electrical contact-springs held in the path of the contact-disk, and the electrical connections, substantially as specified.

3. In an electrical blasting-machine, the combination with the armature, of a tubular shaft, a propelling-screw detachably connected with the tubular shaft, and a sleeve carrying a device for engaging the screw and provided with a handle by which it may be moved up or down, substantially as specified.

4. In an electrical blasting-machine, the combination with the propelling-screw, and the tubular shaft provided with an internal collar, of rollers carried by the spindle of the screw for engaging the internal collar, substantially as specified.

5. In an electrical blasting-machine, the combination of a casing provided with a cover furnished with a sleeve, a dynamo suspended from the cover, a cross-bar suspended from the dynamo, a tubular shaft journaled in the said cross-bar in the sleeve on the cover, an armature mounted on the tubular shaft, and armature-propelling mechanism contained by the tubular shaft, substantially as specified.

6. In an electrical blasting-machine, the combination with the armature, of a tubular shaft provided with a head having transverse grooves and furnished with an internal collar, a screw journaled in the collar and head of the tubular shaft and provided with a cross-bar and rollers below the internal collar, and means for rotating the screw, substantially as specified.

JAMES MACBETH.

Witnesses:
EDWIN F. COREY,
GEO. H. COREY.