No. 639,849. Patented Dec. 26, 1899.

S. EVERSHED.

PORTABLE HAND DYNAMO.

(Application filed Aug. 25, 1899.)

(No Model.) 3 Sheets—Sheet 1.

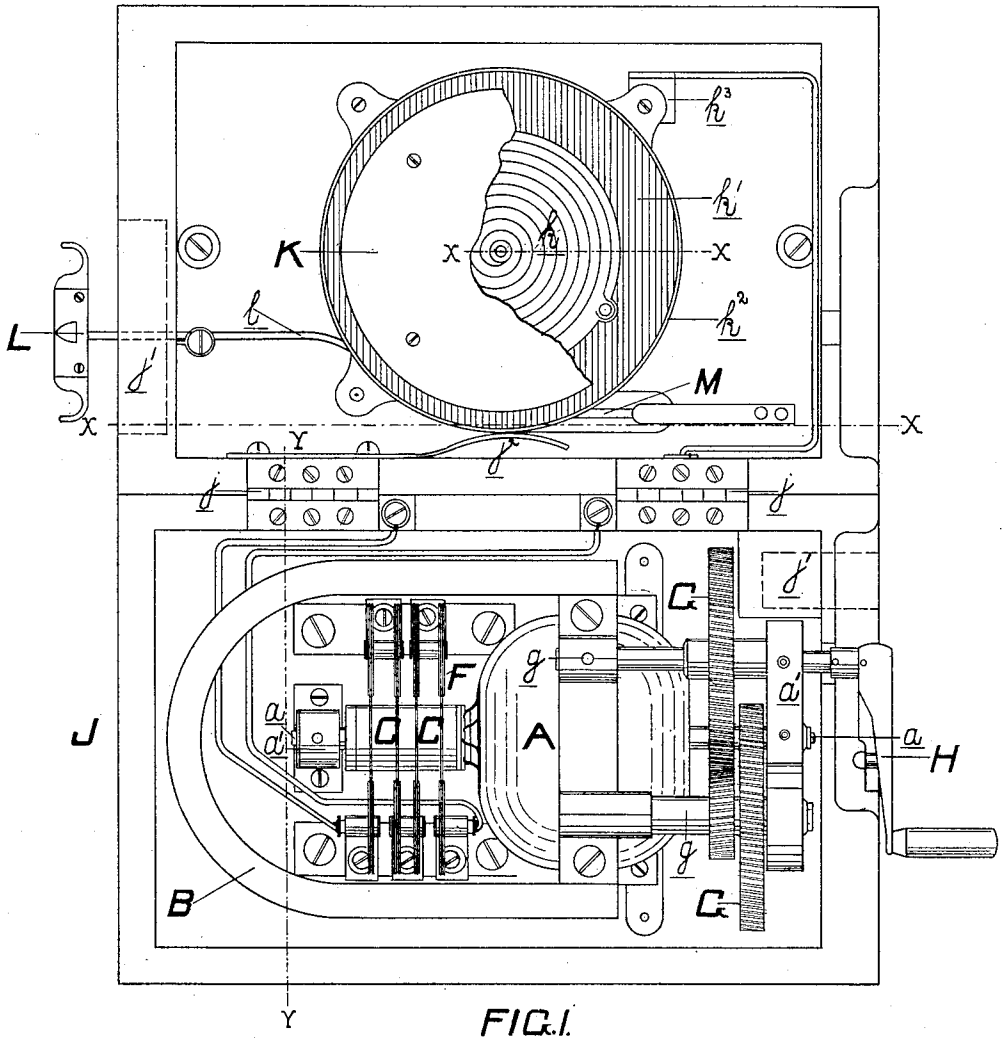

FIG. 1.

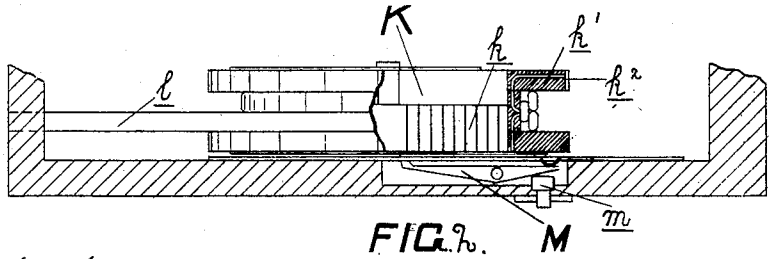

FIG. 2.

Attest
Wm. F. Hall
C. Middleton

Inventor
Sydney Evershed
by Richards & Co.
Attys

No. 639,849. Patented Dec. 26, 1899.

S. EVERSHED.

PORTABLE HAND DYNAMO.

(Application filed Aug. 25, 1899.)

(No Model.) 3 Sheets—Sheet 2.

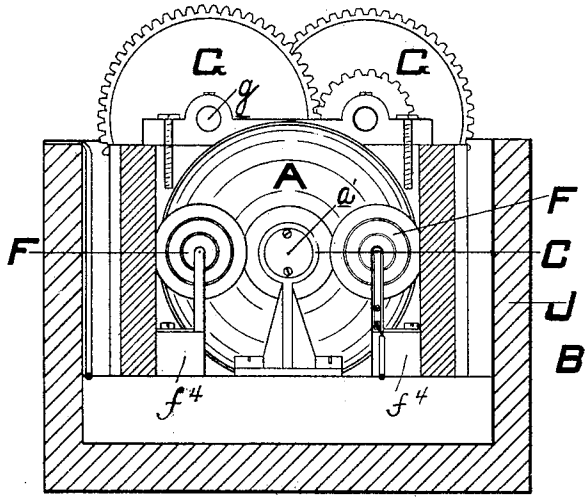

FIG. 3.

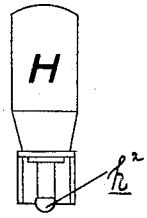

FIG. 7.

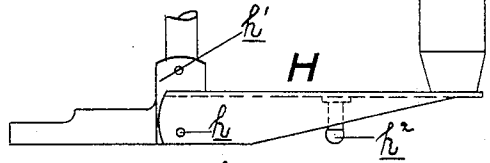

FIG. 6.

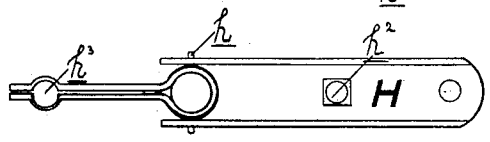

FIG. 8.

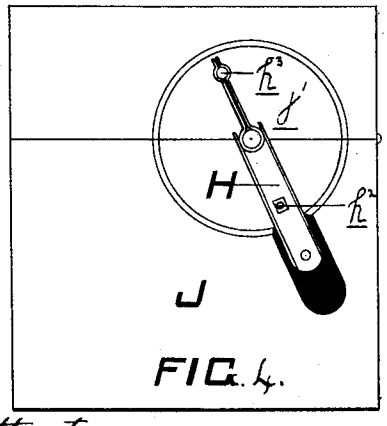

FIG. 4.

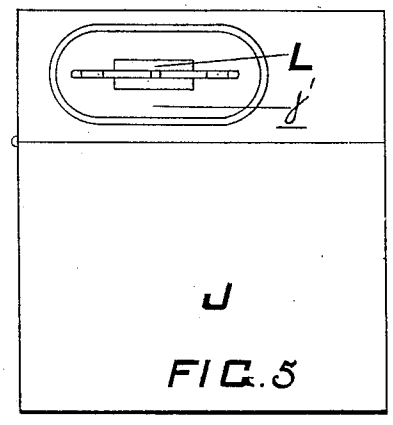

FIG. 5.

Attest
Wm. F. Hall.
C. Middleton.

Inventor
Sydney Evershed
by Richards & Co Attys.

No. 639,849. Patented Dec. 26, 1899.

S. EVERSHED.

PORTABLE HAND DYNAMO.

(Application filed Aug. 25, 1899.)

(No Model.) 3 Sheets—Sheet 3.

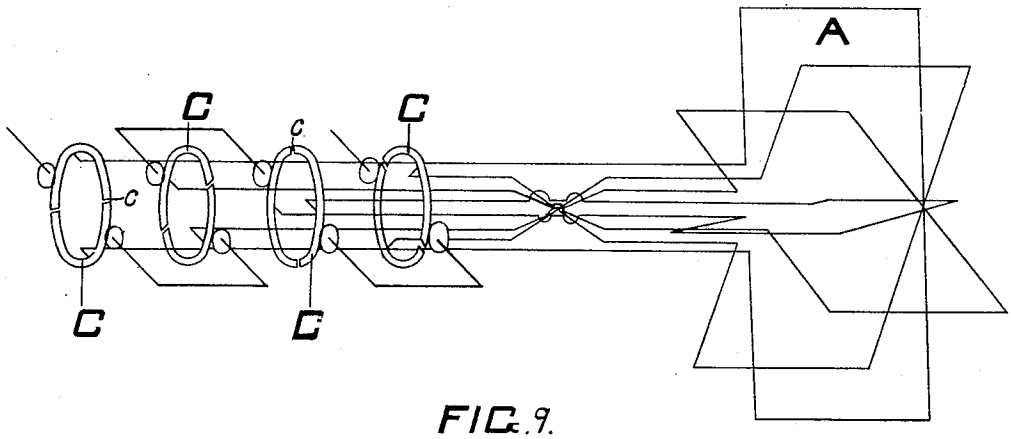

FIG. 9.

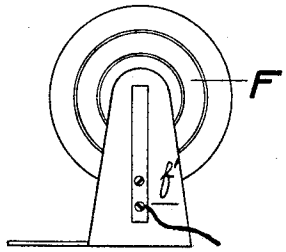

FIG. 11.

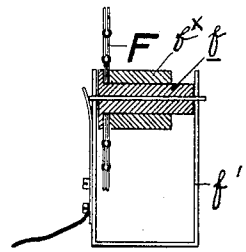

FIG. 10.

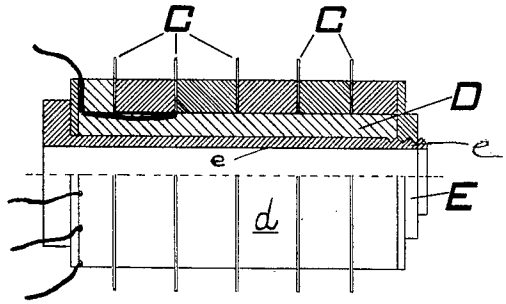

FIG. 12.

Attest,
Wm. F. Hall.
C. Middleton

Inventor
Sydney Evershed
by Richards & Co.
Attys.

UNITED STATES PATENT OFFICE.

SYDNEY EVERSHED, OF LONDON, ENGLAND, ASSIGNOR TO HIMSELF AND THE EVERSHED & VIGNOLES, OF SAME PAACE.

PORTABLE HAND-DYNAMO.

SPECIFICATION forming part of Letters Patent No. 639,849, dated December 26, 1899.

Application filed August 25, 1899. Serial No. 728,482. (No model.)

To all whom it may concern:

Be it known that I, SYDNEY EVERSHED, a subject of the Queen of Great Britain and Ireland, residing at London, England, have invented a new and useful Improvement in Portable Hand-Dynamos, (for which I have made application for Letters Patent in Great Britain under No. 1,758, bearing date January 25, 1899,) of which the following is a specification.

This invention relates to portable hand-dynamos, such as are used for testing purposes or for firing electric fuses or the like purposes, where a small current of high electromotive force can be utilized; and it consists in an improvement whereby the frictional resistance to rotation (of importance in such small appliances) is reduced to a minimum both in the armature-bearings and in the commutator, the current is collected with highest electromotive force, the hand which is made collapsible when not in use and is then in a protected position, and connection to any instrument or object, at a reasonable distance from the generator, is rendered easy and rapid without the use of loose wires, which may be mislaid, and without any binding-screws projecting from the portable box containing the dynamo.

Figure 1 is a plan of the box, with the lid open, containing the dynamo in the body of the box and the winch-handle ready for operation issuing therefrom and the connection device in the inside of the lid. Fig. 2 is a double broken cross-section through the lid and connecting device on the lines X X. Fig. 3 is a cross-section through the body of the box on the line Y Y. Figs. 4 and 5 are outside elevations of each end of the closed box. Figs. 6 and 7 are a side and an end elevation of the collapsible winch-handle turned over, and Fig. 8 is a plan of the same. Fig. 9 is a diagram of the connections from the armature through the commutator and brushes. Figs. 10 and 11 are a longitudinal section and an end view of the double disk-brush. Fig. 12 is a part-longitudinal section through the commutator.

A is the armature of the dynamo, which is preferably of the drum type, and B is a permanent magnet or magnets providing the necessary induction when the required output is small; but equivalently, if desired, the dynamo may be shunt or series wound.

To obtain maximum electromotive force with the minimum number of turns of wire, as many diametrical coils are wound upon the armature as a convenient number of holes in the periphery of a core of soft-iron disks will admit of, and each coil is connected to one of a series of two-part commutator divided rings C, fixed alongside one another and insulated one from the other upon the axle *a* of the dynamo. There are thus as many two-part commutator-rings C as there are coils. This is seen in the diagram of armature and commutator connections in Fig. 9, in which all the disk-brushes but the two extremes are connected in pairs, so that the coils on the armature are all in series, thus giving double the electromotive force which would be obtained from the ordinary drum-winding and usual multiple-segment commutator.

The metallic commutator-rings C are in the form of deep and narrow washers having radial slots *c* cut through at opposite points of a diameter to insulate the two halves from one another. The rings C are mounted upon a sleeve of insulating material D, Fig. 12, and have distance-pieces of insulating material *d* between them, the whole being gripped together, so that the divided rings C are firmly held by a nut E, screwed home on the metal-headed sleeve *e*.

The brushes F, Figs. 1, 3, and 10, are formed from two adjacent disks of thin elastic metal, such as hard-rolled copper or phosphor-bronze. They may be corrugated in concentric rings to give strength as regards lateral bending, with elasticity from the center. A pair of such disks are securely pressed together upon a metal-flanged spindle *f* by a metal collar f^2, fixed by a set-screw f^3 and mounted by pin-bearings in a standard-bracket *f'*.

As seen in the diagram Fig. 9, in Figs. 10 and 11, and in the plan Fig. 1, the end brushes to terminals are single, while the other brushes are in duplicate, forming a bridge between adjoining commutator-rings C, all the sup-

porting-brackets f' being mounted on an insulating-base f^4, Fig. 3, and therefore insulated from one another. The frictional resistance of these brushes to the commutator is very small and may be reduced to any desired amount by increase of the diameter of the rotary disk-brushes and by the reduction of the overlap of the two combined disk-brushes upon the commutator-ring between them until this contact becomes almost a rolling contact without rub. A certain small amount of overlap and consequent rubbing between the disks and rings is, however, valuable to burnish and keep clean the surface in contact.

In order to still further reduce the frictional resistance of this hand-dynamo, the axis a of the armature is mounted in ball or roller bearings in the plumber-blocks a' a', of any known and convenient form of construction, and such ball or roller bearings may be also applied to the bearings g g of the axles of the double speed-gearing G G from the driving winch-handle H to the armature A.

The whole of the dynamo and connections are fixed in the body and lid of a box J, preferably of wood, the connections between the terminals of the dynamo and the special spring-drum connection K in the lid (hereinafter more fully described) being made through the hinges j j of the box, and the exterior of the box and lid is provided with recesses j' j', Figs. 4 and 5, one for the reception of the winch-handle H when folded up and the other for reception of a double terminal-piece L, specially adapted to engage with the terminals of the instrument, apparatus, or circuit with which the dynamo is to be used and connected through the spring-drum K to the terminals of the dynamo.

The drum K is free to rotate upon a central spindle and is controlled by a spiral spring k, which causes the drum to normally wind upon its periphery a flexible cord connection l, so as to bring up the double terminal L into the recess j' of the box-lid. One of the wires from the inner lap of cord connection l is brought through the body of drum formed of insulating material k', Fig. 2, to an outer periphery of metal k^2, which makes constant rubbing connection by the spring j^2 with one terminal of the dynamo. The other wire of the flexible cord l goes to the bottom metal base of the drum K and connects through the contact-piece k^3 with the other terminal of the dynamo. A spring-pressed pawl-catch M, Fig. 2, is let into the lid of the box, engaging into a hole or holes on the under face of the drum K, so that when the terminal L is pulled out to any desired distance the drum K is held from recoiling by the catch-pawl M until the latter is released by the push-button m, when the flexible cord is rewound on the drum and the terminal L rests in its recess j'.

The winch-handle H is shown in Figs. 4, 6, and 8 turned over, with the handle toward and entering a hole in the box, the handle pivoting upon a pin h in the sleeve h', pinned to the axle a of the dynamo. When the handle is required for use, it is brought out of its recess and turned outward through one hundred and eighty degrees on its pivot until a knob-detent h^2 engages in an eye h^3 of two spring-arms of the sleeve h'. The handle is then engaged with the sleeve h' clear of the box and will serve to rotate the dynamo.

This hand-dynamo is well adapted for all kinds of testing work, particularly where a high electromotive force is required for testing or for firing electric fuses and detonators or for similar work where a hand-generator is applicable.

What I claim, and desire to protect by Letters Patent, is—

1. In combination, an inclosing box, a hand-driven dynamo therein; a hand-winch operating by speed-gearing the armature of said dynamo with antifrictional bearings for rotating axles; a multidivided ring commutator upon axis of said armature; duplicate elastic disk rotating brushes, contacting with said segmental rings of commutator; and means for connection of terminals of dynamo to other instrument, adapted to be extensible and to be withdrawn into box without disconnection from the hand-dynamo, substantially as described.

2. In combination, an armature revolving in a magnetic field; a commutator upon the axis of said armature, consisting of divided rings insulated from one another and from the axis; connections to said rings from coils of said armature; and elastic disk-brushes adapted to rotate on a supported spindle; such disks being in pairs, adapted to embrace and elastically press upon, the commutator-segments between them; substantially as described.

3. A rotary brush-disk, consisting of two thin metal disks, in combination with a metal-flanged spindle upon a central-pin axis, and a metal collar pressing said disks together.

4. The combination with an armature revolving in a magnetic field, of a commutator having divided and insulated conducting-rings equal in number to the number of armature-coils; separate connections from each coil to each divided ring, a single rotary brush in rolling contact with each of the end segment-rings for the terminals of the armature; and double-bridge disk-brushes connecting adjacent rings so that all the armature-coils are in series, substantially as and for the purposes described.

5. In combination with a hand-driven dynamo, a box inclosing same, recesses in the thickness of the walls of said box, one about the issue of the winch-handle, and one about the issue of the connections; a winch-handle on armature-spindle, adapted to pivot on end of spindle, and to fold over into one of said recesses with handle inward; and a spring-recoil connecting device, having a double ter-

minal-bridge, adapted to be withdrawn into one of said recesses when not in use, substantially as described.

6. In combination, a dynamo inclosed in box and lid, a spring-recoil drum fitted in said lid; connections from the terminals of dynamo through the hinges of the box to an insulated peripheral metallic ring on said drum, and to lower metallic plate and base respectively; a check-pawl engaging holes on said drum; a flexible connector containing two insulated wires, connected respectively to said peripheral metallic ring and base, wound about such drum, and a double head at end of said flexible connection, where it issues from the side of lid, substantially as and for the purposes described.

7. In combination, a dynamo, a sleeve carrying two spring-arms pinned to the extremity of the armature-spindle; a winch-handle, pivoted transversely to said sleeves; and a knob-detent from under side of said winch-handle, adapted to engage into said spring-arms with the handle outward, and on release permitting the handle-arm to be turned over with the handle inward, substantially as and for the purposes described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

SYDNEY EVERSHED.

Witnesses:
T. M. TULEY,
J. D. TOYE.