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D. J. HAUSS & C. W. MILES.

ELECTRICAL TOOL.

APPLICATION FILED APR. 24, 1903.

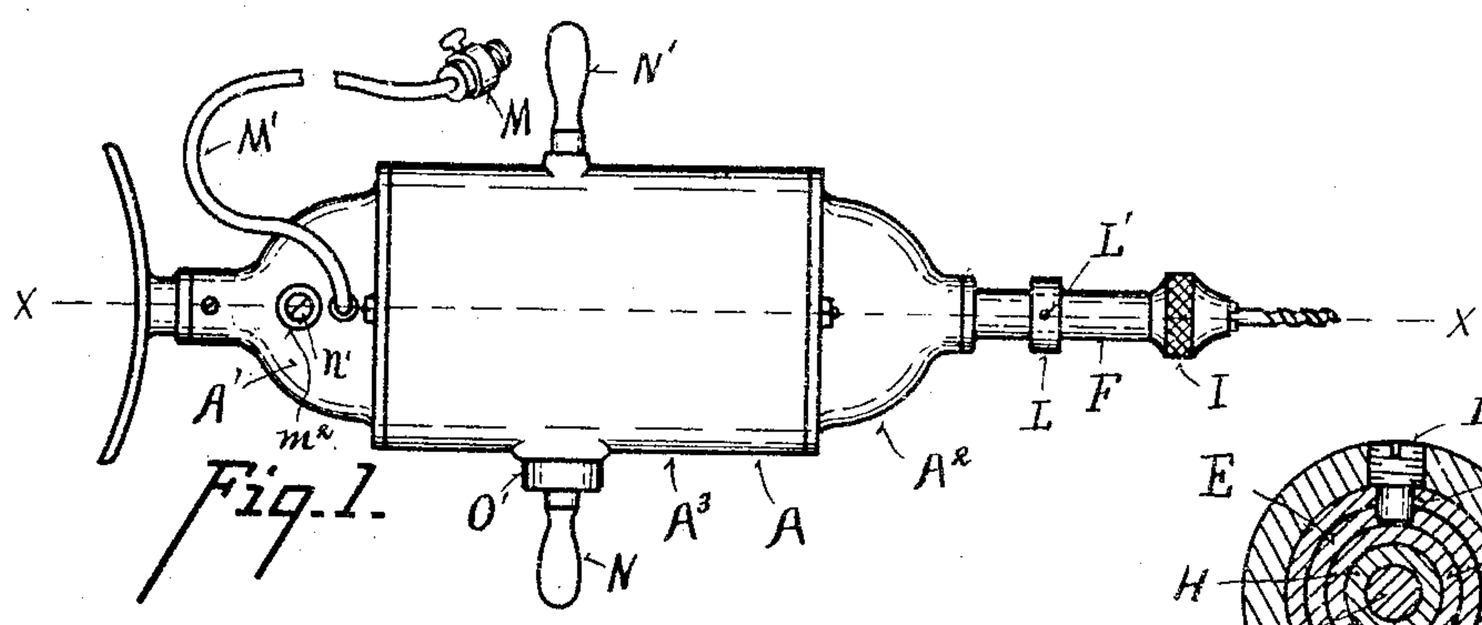

Fig. 1.

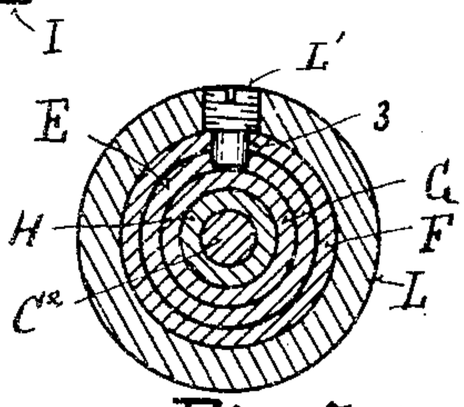

Fig. 5.

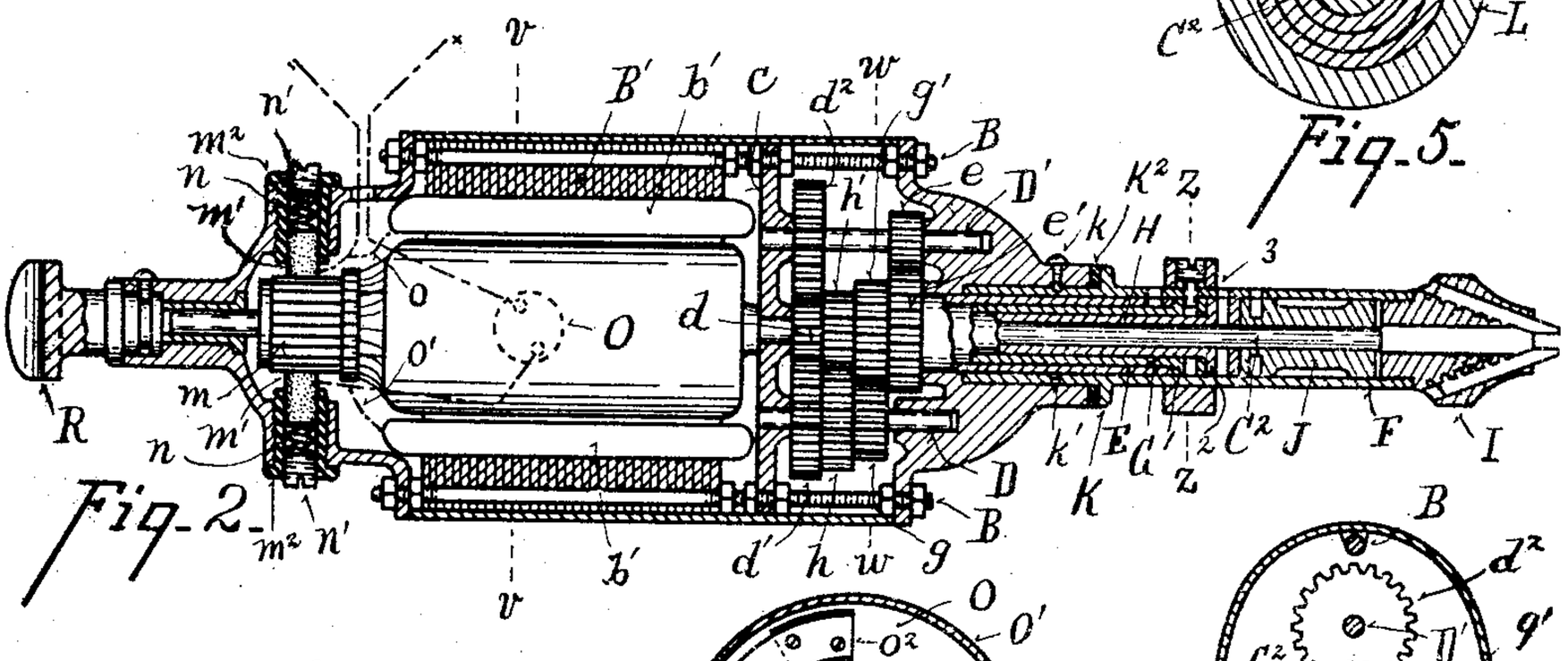

Fig. 2.

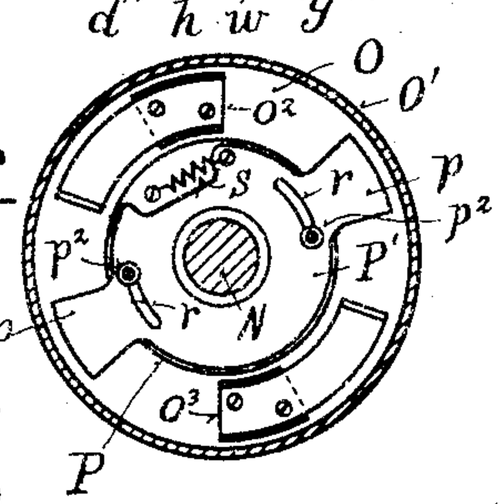

Fig. 6.

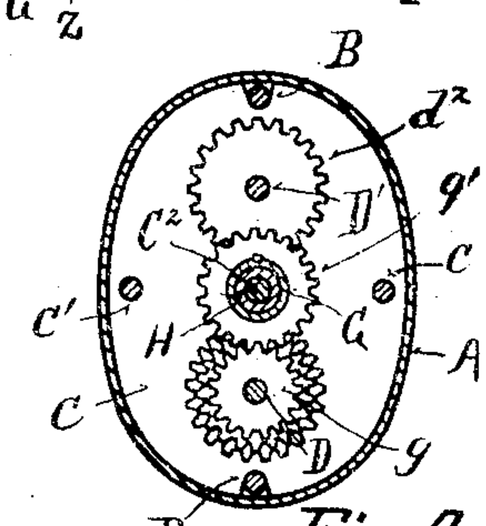

Fig. 4.

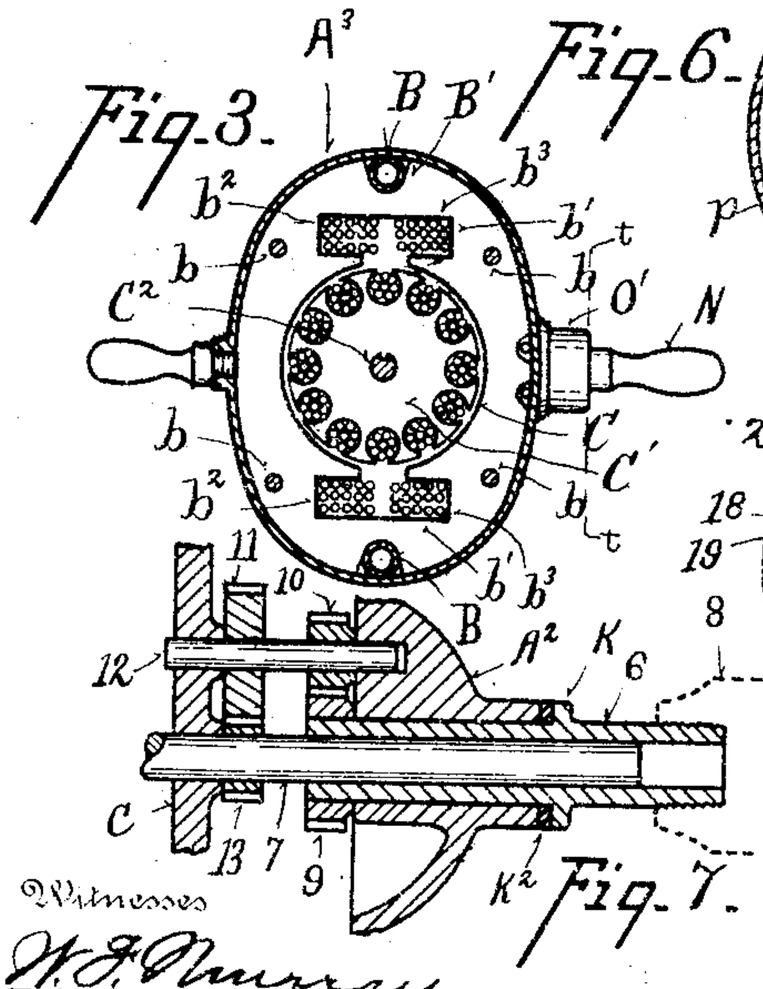

Fig. 3.

Fig. 7.

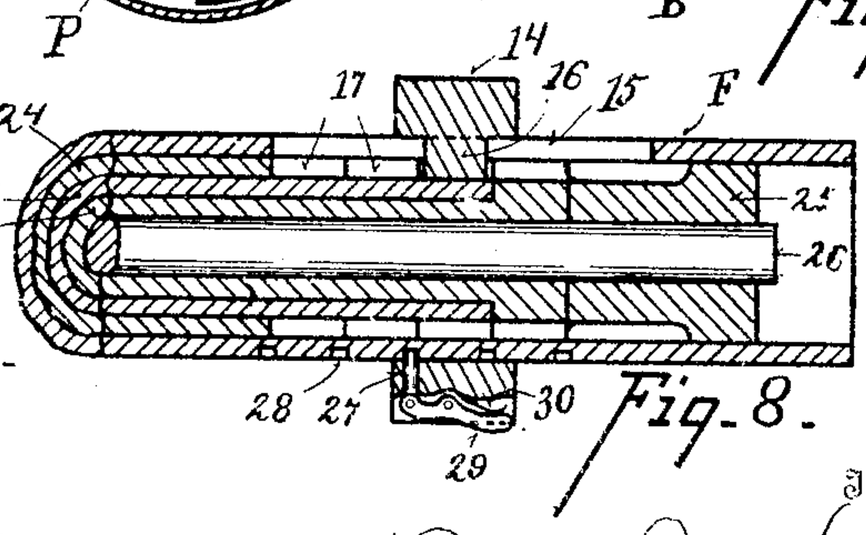

Fig. 8.

Witnesses

W. F. Murray

L. Hogan

Inventors

David J. Hauss.

Casper W. Miles

No. 781,062. Patented January 31, 1905.

UNITED STATES PATENT OFFICE.

DAVID J. HAUSS AND CASPER W. MILES, OF CINCINNATI, OHIO, ASSIGNORS TO THE CINCINNATI ELECTRICAL TOOL COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

ELECTRICAL TOOL.

SPECIFICATION forming part of Letters Patent No. 781,062, dated January 31, 1905.

Application filed April 24, 1903. Serial No. 154,100.

To all whom it may concern:

Be it known that we, DAVID J. HAUSS and CASPER W. MILES, citizens of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Electrical Tools; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in electrically-operated drills. One of its objects is to provide a portable drill which can be conveniently connected to a source of power wherever desired for use.

Another object is to provide an electrically-operated breast-drill.

Another object is to provide a compact and improved motor for the above purpose.

Another object is to provide an improved assemblage of parts which can be readily taken apart for repairs or other purpose and reassembled.

Another object is to provide an improved switch mechanism for controlling the movements of the drill.

Another object is to provide improved means for imparting motion from the motor to the drill.

Another object is to provide improved means for changing the speed of the drill.

It also consists in certain details of form, combination, and arrangement, all of which will be more fully set forth in the description of the accompanying drawings, in which—

Figure 1 is a side elevation of our improved drill. Fig. 2 is a section through the same on line *x x* of Fig. 1. Fig. 3 is a section on line *v v* of Fig. 2. Fig. 4 is a section on line *w w* of Fig. 2. Fig. 5 is a section on line *z z* of Fig. 2. Fig. 6 is a detail plan view of the switch mechanism on line *t t* of Fig. 3. Fig. 7 is a view similar to Fig. 2, showing a modification thereof where only one speed is required. Fig. 8 is a view similar to Fig. 2, showing a modification of the mechanism for effecting a change of speeds.

The casing A is preferably formed of the heads A' A^2 and the shell A^3, preferably of elliptical form. These parts are secured together by means of screw-threaded rods or tubes B and nuts thereon. The rods B also serve to support and hold in place the motor, field B′, which is preferably composed of thin laminations of sheet metal stamped to proper form and clamped together by bolt-rods *b* and by the rods B. The field-coils b' b^2 are introduced through the central opening and occupy the extensions b^3 thereof, the central opening C being occupied by the armature C′ of ordinary construction. The ends of the armature-shaft revolve in bearings in the heads A' A^2.

c represents a plate between the field and the head A^2, which is locked in place by nuts on the rods B and also by similar rods *c*′, connecting it with the head A^2. This plate is provided with journal-bearings for the ends of the shafts D D′, which carry the transmitting-gears.

d represents a gear on the armature-shaft which meshes with the gears d' d^2 on the shafts D D′, and thereby drives them. The shaft D′ carries a gear *e*, which drives a gear *e*′ on the sleeve E, to which the drill-spindle or sleeve F may be coupled to obtain one speed, the direction of motion of the sleeve E being the same as that of the armature-shaft. Gear *g* on shaft D meshes with and drives gear *g*′ on sleeve G, which also turns in the same direction as the armature-shaft and may be coupled to drive the drill-spindle. In like manner the gear *h* drives gear *h*′ on the sleeve H, which turns in the same direction as the armature-shaft and may be coupled to the drill-spindle.

The armature-shaft C^2 itself is extended through the sleeve H and has an enlargement J at its lower end adapted to be coupled to and drive the drill-spindle at the same speed as the armature. The drill-spindle or sleeve F fits over the outside of the respective sleeves E G H and is provided at its outer end with a chuck I, adapted to hold drills or other tools. Its inner end journals in the head A^2 and has a thrust-collar K bearing against the end

thereof, while a screw *k* enters the annular groove *k'* and prevents the spindle being withdrawn.

K² represents an antifriction-washer serving as a bearing for the thrust-collar.

The outer end of each of the sleeves G H have enlargements 1 2, bringing the ends of said sleeves in contact with the inner face of the spindle F.

L represents a collar adapted to slide along the spindle, and L' a screw, the inner reduced end of which is adapted to pass through openings in the spindle and enter one of the holes 3 in the ends of the respective sleeves E G H J to lock one of these sleeves or the armature-shaft to the spindle. When the screw is in place, nothing projects from the outside of the spindle or collar L to injure the workman, and we are thus enabled to secure a wide range of speeds.

M represents a socket at the end of flexible cords M', which may be substituted for any ordinary incandescent-lamp socket in order to secure power to operate the motor.

m represents the commutator, and *m'* carbon brushes seated in insulated sleeves *m²* and held in place by springs *n* and screws *n'*.

N N' represent handles by means of which the drill can be controlled and pressed to its work. One of the lead-wires—say the plus-wire (see Fig. 2)—after passing through the opening in the head A' passes to an electric switch O, located in a casing O' at the base of the handle N, and from thence to one of the brushes, while the other wire leads direct to the opposite brush. The field-coils are connected, preferably, in shunt-circuit by means of the branch wires *o o'*. The switch is composed of the two stationary terminals *o² o³*, each preferably in the form of a pair of spring-fingers, between which the blades *p* of the movable member P' are introduced to make contact between the terminals *o² o³*. The member P' is mounted on an insulated block P, secured to and adapted to be partially rotated by turning the handle N. In order to prevent the formation of an arc when the switch is opened, I provide means for quickly separating the blades from the terminals or spring-fingers as soon as they are released therefrom, which preferably consists in securing the member P' to the block P by means of screws *p²* passing through the slotted openings *r*.

s represents a spring which tends to normally hold the blades in the position shown in Fig. 6 relative to the block P. It will be noted that in breaking the circuit the instant that the blades are freed from the spring-fingers the spring *s* acts to instantly increase the distance between the blades and terminals by shifting the blades relative to the block P, and thereby breaks any arc which may be formed.

R represents a breastplate swiveled to the head A' to assist the operator in pressing the drill to its work.

For special work where only one speed of the drill is desired we preferably employ the modification shown in Fig. 7, in which 6 represents the drill-spindle, which is preferably hollow to receive and form a bearing for the end of the armature-shaft 7. The outer end of the spindle 6 receives a drill-chuck 8, and its inner end has a gear 9, which receives motion through gears 10 11 on shaft 12 from a gear 13 on the armature-shaft, whereby any predetermined speed may be imparted to the drill-spindle, the whole being strong, simple, and efficient.

In the modification Fig. 8 we have shown another method of effecting the change of speed of the drill-spindle where it is required to frequently change from one speed to another. 14 represents a collar adapted to slide along the outside of the drill-spindle. 15 represents a slot in the spindle, and 16 a key forming part of the collar 14 and sliding in said slot and adapted to enter grooves or keyways 17 in the enlarged ends of the respective sleeves 18 19 and also in the end of the sleeve 24 and the enlargement 25 of the armature-shaft 26 in order to couple said sleeves and shaft selectively to the drill-spindle. 27 represents a pin entering recesses 28 in the spindle to lock the collar in position relative to the spindle, and 29 a lever to release the pin and which is normally acted upon by a spring 30 to hold the pin in the recesses.

It is obvious that one or more of the sleeves and accompanying change-gears may be dispensed with or more supplied for a greater range of speeds.

The mechanism shown may be variously modified without departing from the principle of our invention.

Where it is desired to mount said tool in ways or guides, so as to use it as a sensitive drill or for other similar purposes, we employ tubes in place of the solid rods B, as indicated in Fig. 3, whereupon rods secured in a framework to serve as ways can be passed through the tubes to act as guides for the tool.

If desired, the rods *b* may be extended through from head to head in the same manner as the rods or tubes B.

Having described our invention, what we claim is—

1. In a portable tool, a field having a rigid exterior adapted to protect the field-coils and armature, a tight-fitting casing surrounding the same, heads at opposite ends of the casing, through-bolts and nuts adapted to clamp and hold the several parts to their adjusted position, a breastplate attached to one of the heads, and handles upon opposite sides of the casing, to hold and guide the tool to its work.

2. In an electrical tool, a driving-shaft, a series of concentric sleeves, transmitting-gears

to drive said sleeves at varying speeds in the same direction as the driving-shaft, a hollow tool-spindle having bearings in the tool-frame, and means for selectively clutching the spindle to said sleeves or shaft to drive the spindle at different speeds.

3. In a portable tool, an electric motor, a driving-shaft, a sleeve concentric with the driving-shaft, transmitting-gears adapted to drive said sleeve in the same direction as the driving-shaft, a hollow tool-spindle having bearings in the tool-frame, and means for selectively clutching the driving-shaft and sleeve to the tool-spindle.

4. In an electrical tool, a driving-shaft, a series of concentric sleeves, transmitting-gears receiving motion from the driving-shaft to drive said sleeves at varying speeds in the same direction, a hollow tool-spindle having bearings in the tool-frame, and a clutch adapted to move along the spindle and selectively clutch the spindle to said sleeves.

5. In an electrical tool, a driving-shaft, a series of concentric sleeves mounted thereon, mechanism for driving said sleeves at varying speeds in the same direction as the shaft, a tool-spindle fitting over the outer sleeve, enlargements at the ends of the inner sleeves to bring them in contact with the inner face of the tool-spindle, and a sliding clutch adapted to selectively engage the tool-spindle and the sleeves to drive the tool-spindle at different speeds.

6. In a portable tool, an electric motor, a revolving tool-holder driven by said motor, a handle swiveled to the tool-frame and adapted to hold and guide said tool, an electrical switch carried by and located at the base of said handle, electrical contacts stationarily mounted relative to the tool-frame, and adapted to be engaged by said switch to control the circuit through the motor.

In testimony whereof we have affixed our signatures in presence of two witnesses.

DAVID J. HAUSS.
CASPER W. MILES.

Witnesses:
C. HOGAN,
W. F. MURRAY.