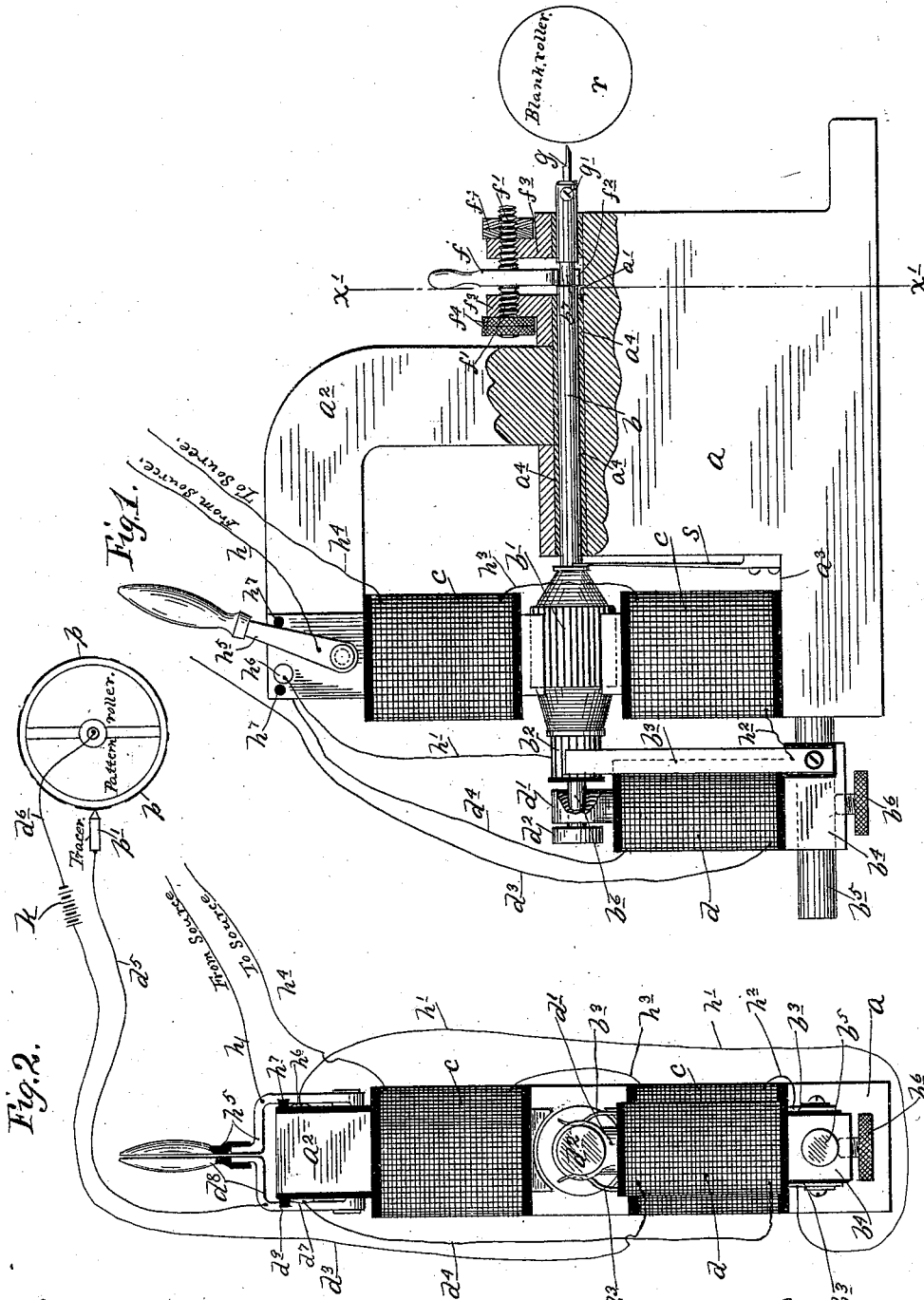


B. S. MOLYNEUX. ENGRAVING MACHINE.

No. 555,581.

Patented Mar. 3, 1896.



Witnesses,
 E. F. Elmore
 Frank Merchant

Inventor,
 Barton S. Molyneux
 By his Attorney,
 Jas. F. Williamson

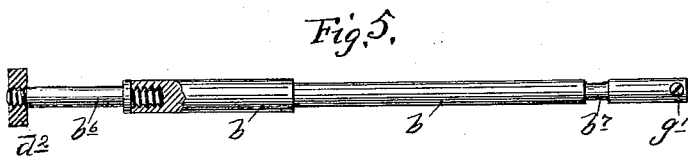
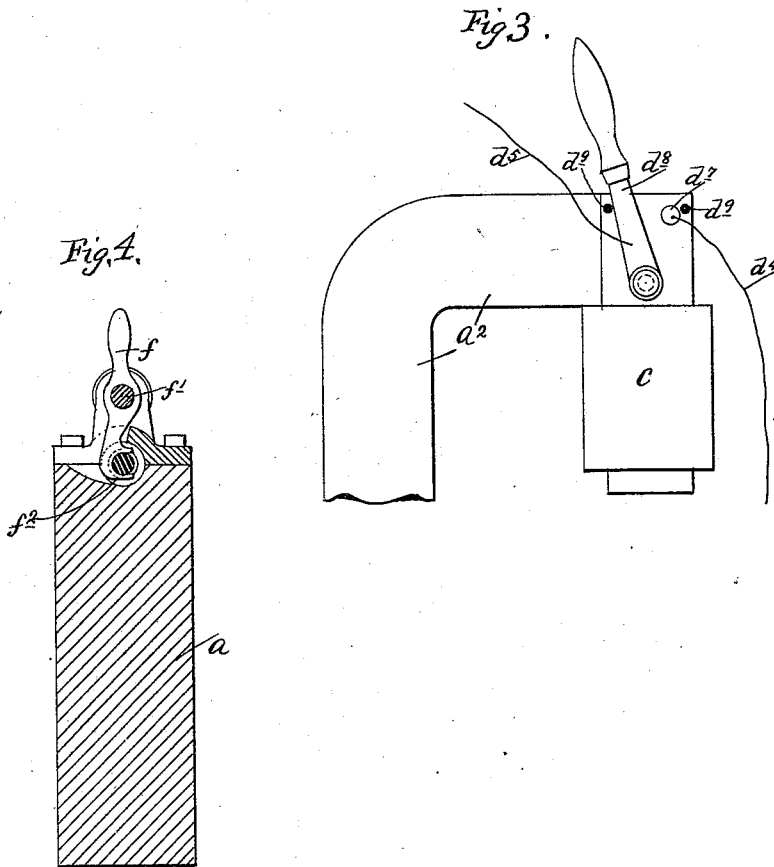
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

BARTON S. MOLYNEUX, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO THE MOLYNEUX ELECTRIC MANUFACTUR-
ING COMPANY, OF NEW YORK.

ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,581, dated March 3, 1896.

Application filed May 1, 1894. Renewed September 12, 1895. Serial No. 562,337. (No model.)

To all whom it may concern:

Be it known that I, BARTON S. MOLYNEUX, a citizen of the United States, and a resident of the city of Minneapolis, in the county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Engraving-Machines; and I 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.

My invention relates to engraving-machines, and has for its object to provide an improved means for operating the rotary drill or graver.

The invention is especially designed for use in the class of engraving-machines fully shown and described in a companion case filed by me of even date herewith, under the same title, designated as "Case No. 2," which companion application bears Serial No. 509,656. The object is to obtain an extremely high rotary speed on the drill and an extremely quick to-and-fro movement of the drill with respect to the blank on which it works.

To these ends the invention consists of the novel devices and combinations of devices, hereinafter fully described and defined in the claims.

The accompanying drawings illustrate the invention, therein like letters referring to like parts.

Figure 1 is a side elevation of the device. Fig. 2 is a left end view of the same, with some connected parts shown in diagram-lines. Fig. 3 is a detail in rear elevation of some of the parts shown in Figs. 1 and 2. Fig. 4 is a section on the line X' X' of Fig. 1, looking from the left toward the right; and Fig. 5 is a detail in plan, showing the combined armature and drill-shaft detached.

A pedestal-block *a* constitutes a part of the motor-frame and is provided with a long bearing *a'* for the combined armature and drill shaft *b*. An angular bracket *a²* is fixed to the bed-block *a* and serves to support some of the field-magnets *c*, the other members of which are mounted on a shouldered part *a³* of the pedestal *a*. The armature *b'*, with its com-

mutator *b²*, is fixed to the shaft *b*. The commutator-brushes *b³* are shown as supported on and insulated from a block *b⁴*, adjustable on a stud-shaft *b⁵*, fixed to and projecting from the pedestal *a*, and is securable in any position on said stud-shaft by a jam-screw *b⁶*. On the block *b⁴* and insulated therefrom is secured an electromagnet *d*, which, on account of its function, may for distinction be called the "slide-motion" magnet, the pole-piece *d'* of which magnet *d* is extended upward and made to form a bearing for the outer end of the armature and drill shaft *b*. The said shaft is preferably composed of brass at the section *b⁶* of the same which passes through the pole-piece bearing *d'*, and has secured in the outer end of the same a soft-iron nut or head *d²*, which serves as an armature, for co-operation with the pole-piece *d'* of the magnet *d*.

The long bearing *a'* is fitted with bushings *a⁴*, in which and the armature-bearing *d'* the said shaft *b* is rotatively mounted with freedom for a limited sliding motion. The amount of this motion is determined by an adjustable stop consisting of a lever *f* fixed to a screw-shaft *f'* and having a hook-like end *f²* engaging a reduced part *b⁷* of the said shaft *b*.

The stop-lever *f*, with its rigid screw *f'*, is mounted in bearing-lugs *f³*, and is adjustable thereon, and may be clamped thereto in any desired position by the double thumb-nuts *f⁴* engaging the opposite ends of the screw *f'* and bearing against the outer faces of the lugs *f³*. When the stop *f f'* is properly adjusted and clamped in position, it will be perfectly rigid and will limit the inward throw of the shaft *b* by the engagement with the raised or shouldered part of the shaft at the outer end of the reduced portion *b⁷*. The graver or drill-tool *g* is shown as secured within its seat on the inner end of the shaft *b* by a set-screw *g'*, but in practice would be secured thereto by a chuck in the ordinary way.

The wires for the motor-circuit are partly shown at *h h' h² h³ h⁴*. In the said motor-circuit connections is located an insulated hand-lever *h⁵*, to which the wire *h* is attached, as shown, and through which connection may be made to a contact *h⁵* in the bracket-arm *a²*,

insulated therefrom and connected with the wire h' . The lever h^5 works between a pair of insulating-stops h^7 , and when in one position the motor-circuit will be open, and when
 5 in the other position the motor-circuit will be closed.

The wires for the slide-motion magnet d are shown at d^3 , d^4 , d^5 , and d^6 , which extend from and return to a suitable source k through a
 10 pattern-roller p and a tracer p' , by which the said circuit is controlled. The wire d^4 connects to a contact d^7 , seated in and insulated from the bracket-arm a^2 at the back, and the
 15 wire d^5 connects with the insulated lever d^8 , which plays between the insulating-studs d^9 , and by which the circuit through the magnet d may be opened or closed at the contact d^7 . The levers h^5 and d^8 are of angular or half-
 20 bail form and fitted with half-sections or split handles. This construction permits the two levers either to be operated together by one hand or separately, at will. The position of the blank roller, upon which the drill or
 25 graver g operates to produce the design under the control of the pattern-roller p and tracer p' , is shown at r in Fig. 1.

Having regard to the action, the electric motor is constructed for the highest available speed by means well known to those skilled
 30 in the art. I expect, for example, to employ a motor which will give a speed of eighteen or twenty thousand revolutions per minute on the combined armature and drill-shaft b .

Under the control of the pattern and tracer, whenever the circuit is closed through the
 35 magnet d , the armature-collar d^2 on the shaft b will be attracted to the pole-piece d' of the magnet d , and the shaft b , together with the graver g , will be thrown inward and held in
 40 engagement with the blank roller r for effecting the cut. When the circuit through the magnet d is broken, the pull from the field-magnets of the motor will throw the armature and shaft b back outward into its normal
 45 position, withdrawing the drill g from the blank roller r . To make sure that this return movement of the shaft b will be sufficiently quick, I provide for reinforcing the centering pull of the motor-magnets by a suitable spring s ,
 50 reacting against some fixed part and tending to throw the shaft b outward to its limit.

In the working machine the whole frame a^2 , with all the parts carried thereby, would be mounted on the slide-rest of a lathe or
 55 otherwise, so as to secure the necessary lateral feed of the drill, and the blank roller r and the pattern-roller p will receive rotary motion from some moving parts of the lathe, and the tracer will be mounted on a suitable
 60 carriage for the necessary feed of the same.

The construction above described eliminates all difficulties arising from the use of belts and pulleys or other forms of indirect drive mechanisms for producing the high-
 65 speed rotary motion, while at the same time the drill is subject to the most direct action

from the slide-motion magnet d for producing the necessary to-and-fro motions of the drill under the control of the tracer and pattern.

The motor may, of course, be comparatively
 70 small, and the armature-shaft be sufficiently light for sensitive and quick slide motion.

The machine is adapted for producing deep-cut engravings with great accuracy and fine, distinct, and smooth printing-edges from a
 75 single action of the drill.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a graver or drill, of an electric motor, with the motor-armature and the drill on a common shaft which is free for sliding movement in fixed bearings,
 80 substantially as described.

2. The combination with a graver or drill, of an electric motor, with the drill and the
 85 motor-armature on a common shaft mounted for sliding motion in fixed bearings, and intermittently-acting means for imparting sliding motion to said shaft in one direction, whereby the motor-magnets will rotate the
 90 drill and slide the same backward into its normal position, substantially as described.

3. The combination with a drill or graver, of an electric motor, with the drill and motor-armature on a common shaft, mounted for
 95 sliding movement in fixed bearings, and an electromagnet adjacent to said shaft in a circuit independent from the motor, co-operating with an armature-collar fixed to said shaft, for imparting a sliding motion thereto
 100 in one direction against the centering pull of the motor-magnets, substantially as and for the purposes set forth.

4. The combination with the drill or graver, of the electric motor, with the drill and motor-
 105 armature on a common shaft, which is free for sliding movement in fixed bearings, an electromagnet adjacent to said shaft in a circuit independent of the motor, co-operating with an armature-collar on said shaft, to slide
 110 the same in one direction against the centering pull of the motor-magnets, and a retracting-spring for reinforcing the motor-magnets, for effecting the return motion of said shaft, substantially as described.
 115

5. In an engraving-machine, the combination with the graver or drill, of an electric
 120 motor, with the motor-armature and the drill on a common shaft free for sliding motion in fixed bearings, and a slide-motion magnet in a circuit controlled by the pattern and tracer, and co-operating with an armature-collar on said shaft, and a retracting-spring, to impart the to-and-fro motion of the drill, with respect to its work, substantially as described.
 125

6. The combination with the motor and motor-circuit and with the slide-motion magnet and its circuit, controlled by the tracer and pattern, of a pair of circuit-controllers, one in each of said circuits, in the form of
 130 pivoted levers, having handpieces adapted to be gripped by one hand, whereby said le-

vers may be operated, at will, either independently or as a single lever, substantially as described.

5 7. The combination with the shaft *b*, having the reduced portion *b'*, of the adjustable stop *ff' f''*, the portion *f''* being of less width than said reduced portion *b'*, and engageable therewith, for permitting and limiting the

to-and-fro motion of said shaft *b*, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BARTON S. MOLYNEUX.

Witnesses:

JAS. F. WILLIAMSON,
FRANK D. MERCHANT.

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