(No Model.)

4 Sheets—Sheet 1.

G. B. LAMB.

WIRE DRAWING MACHINE.

No. 604,769. Patented May 31, 1898.

Fig. 1,

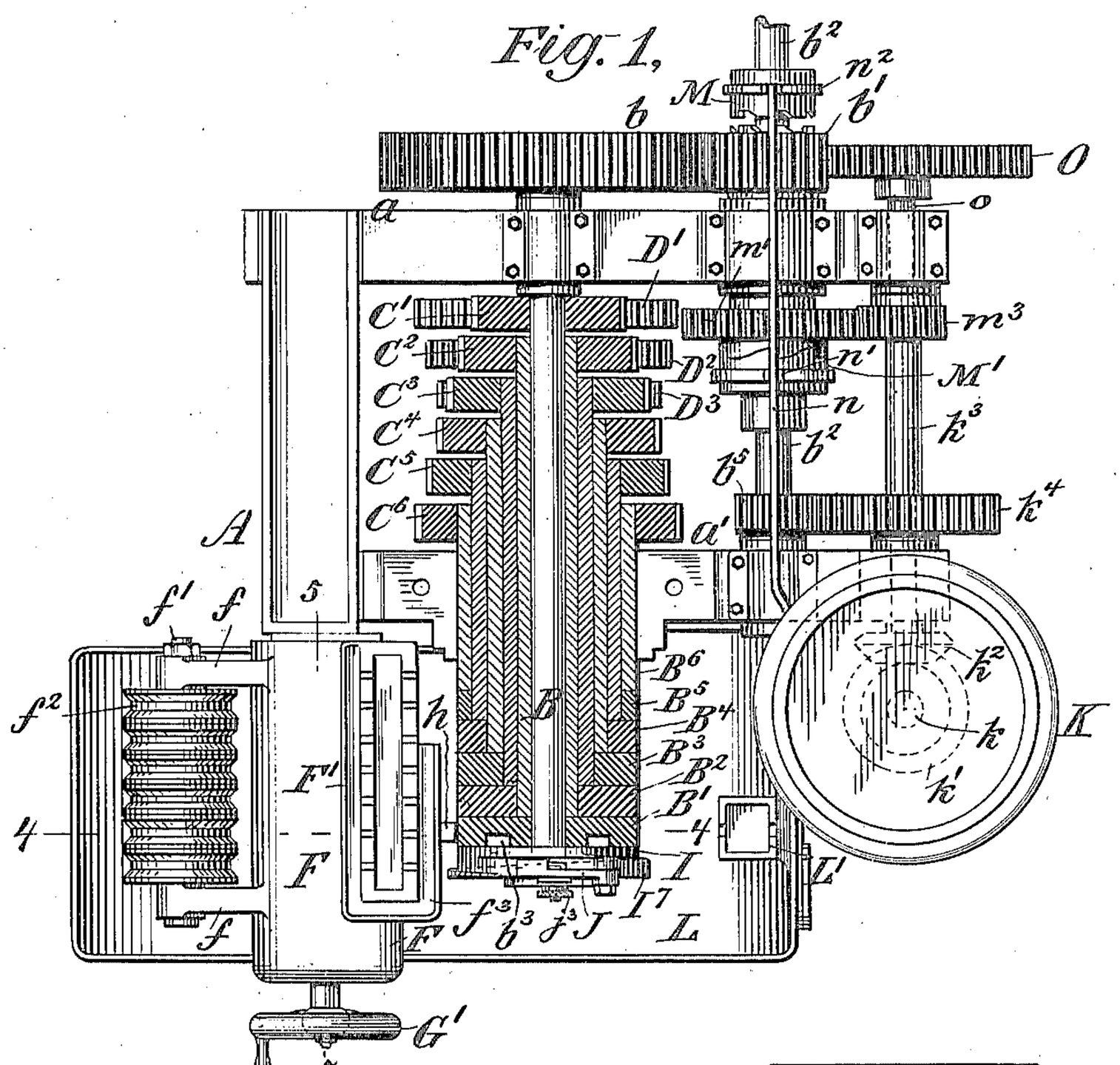
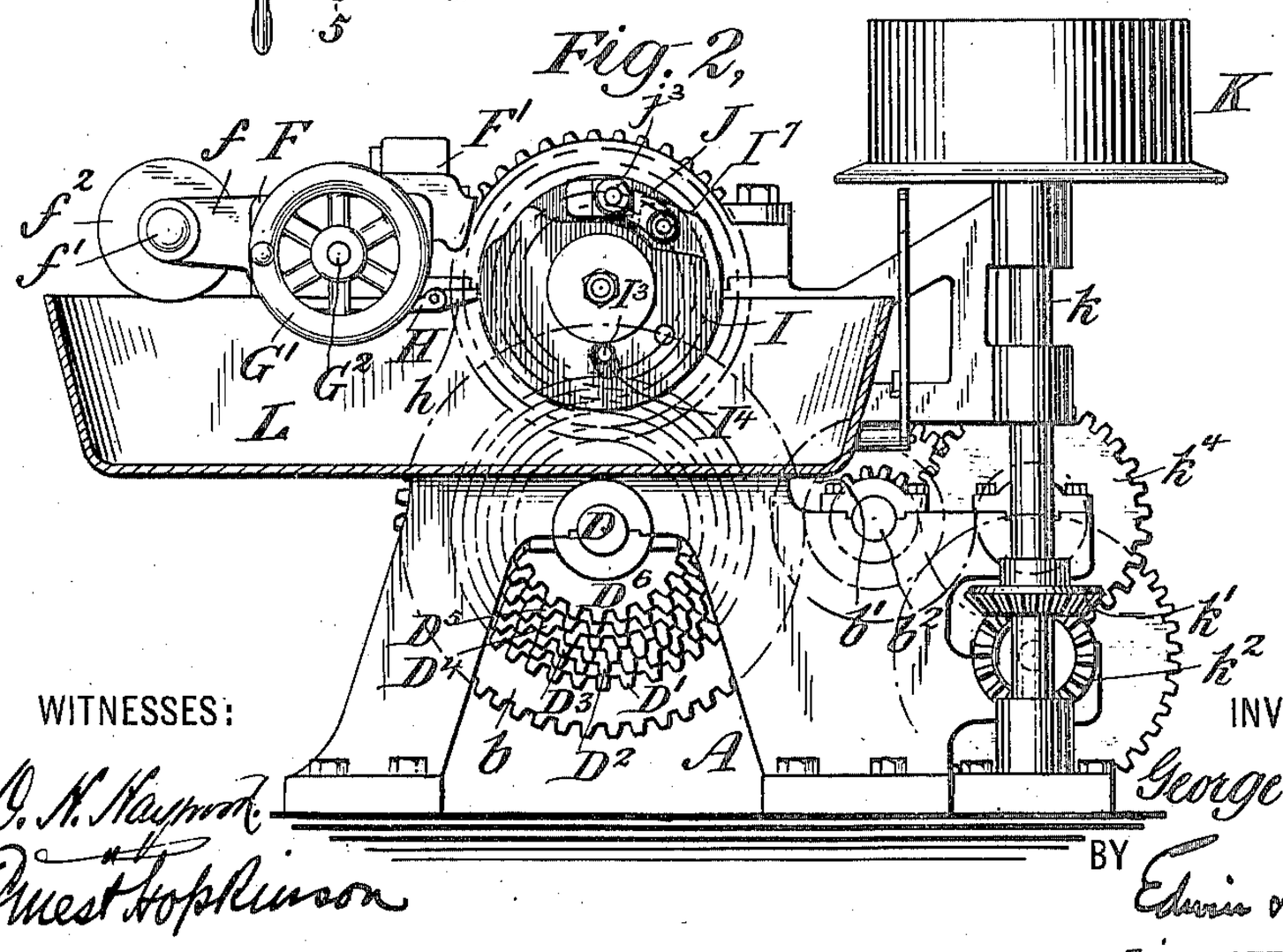


Fig. 2,



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INVENTOR

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BY Edwin H. Brown

his ATTORNEY

(No Model.)

4 Sheets—Sheet 2.

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Fig. 3,

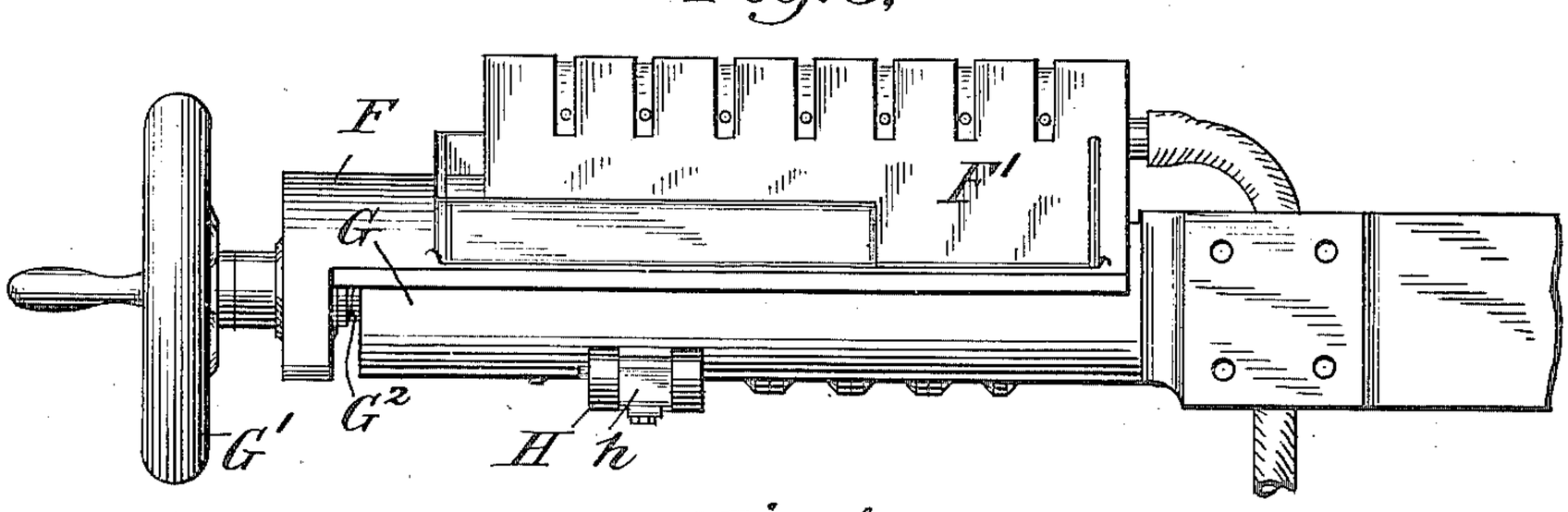

Fig. 4,

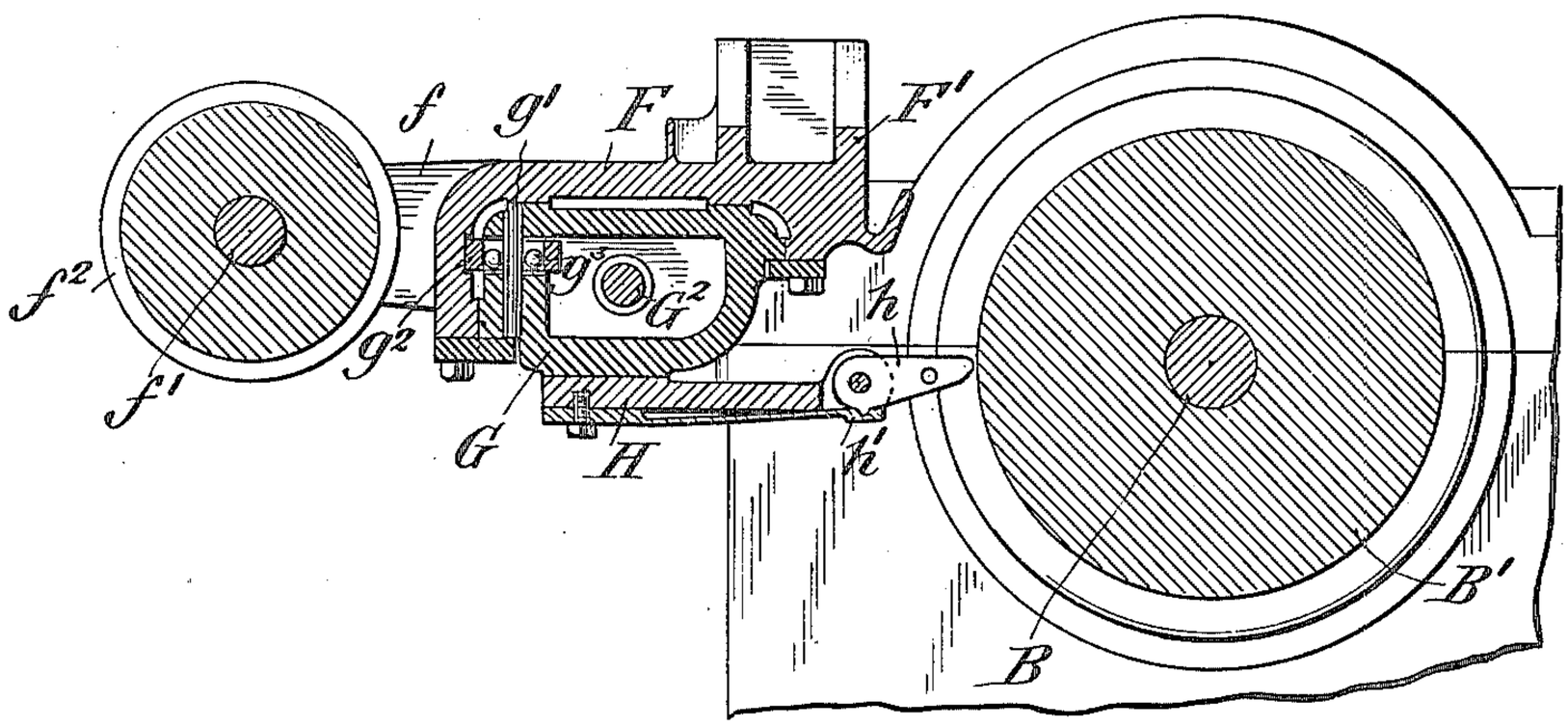

Fig. 5,

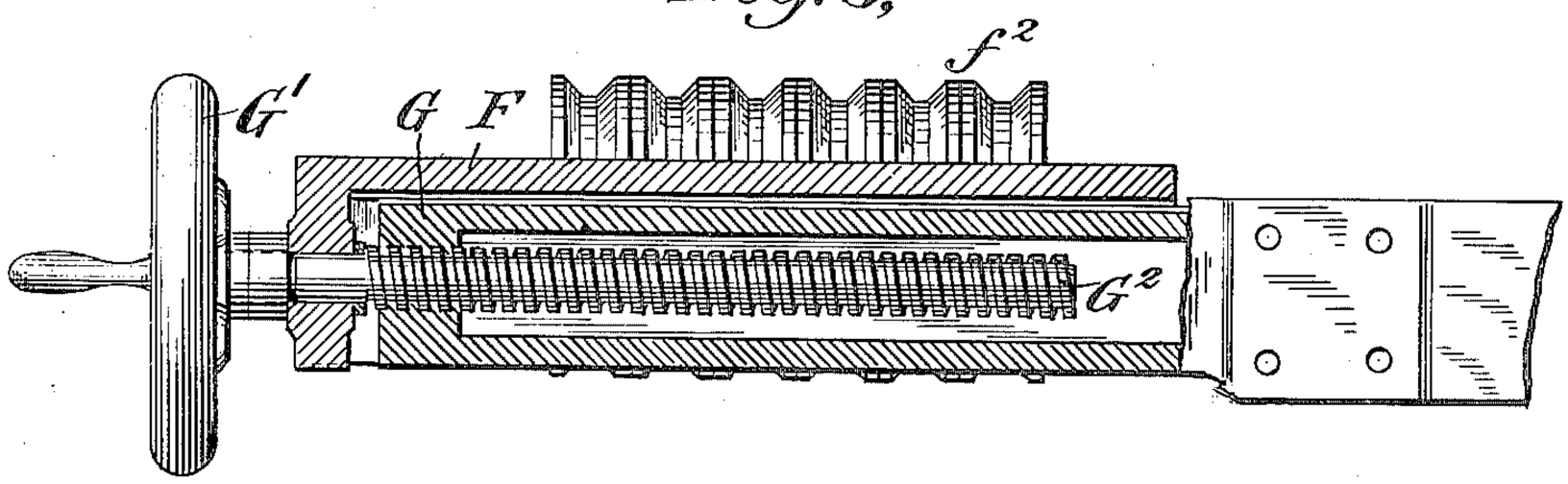

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Fig. 6,

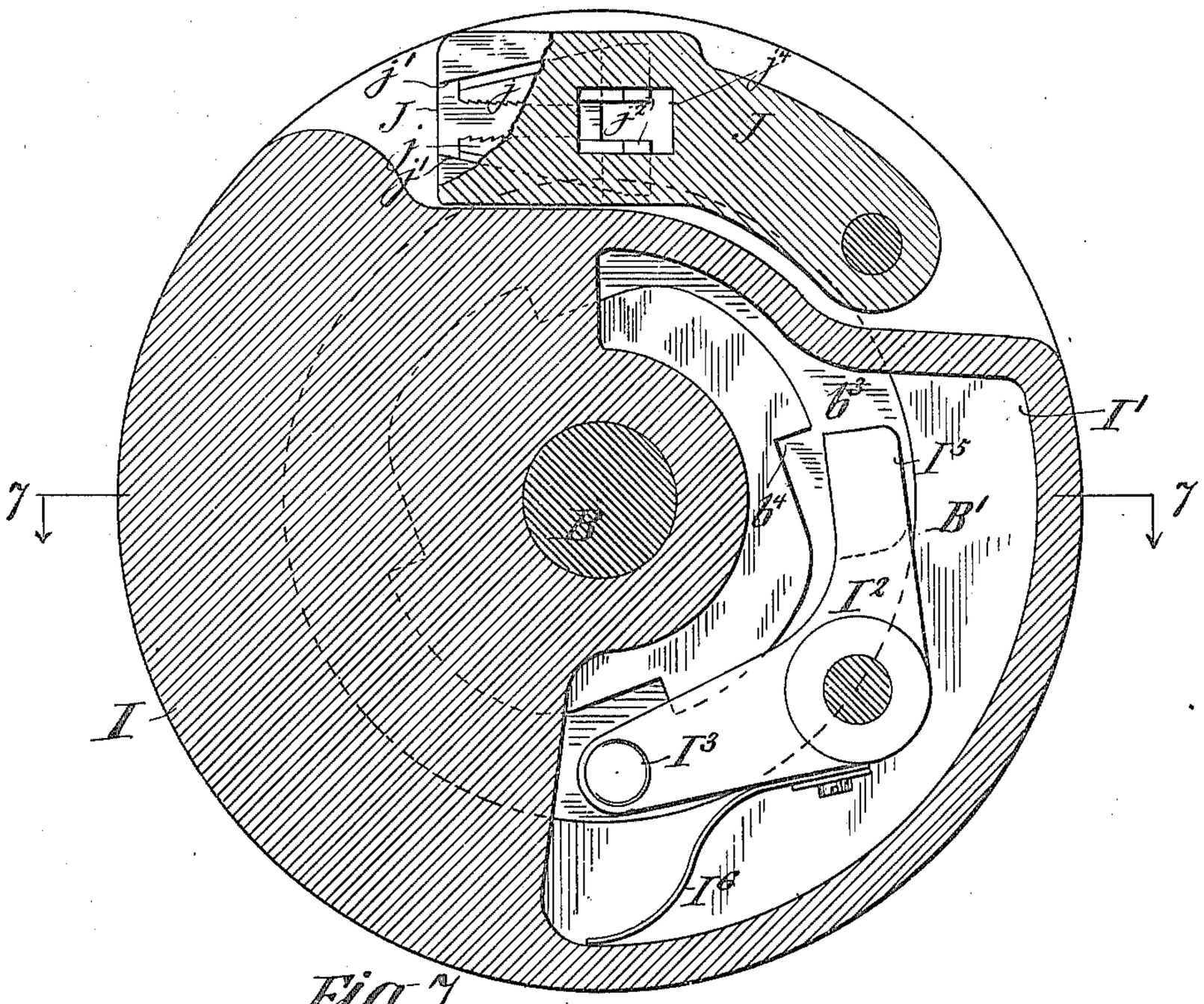

Fig. 7,

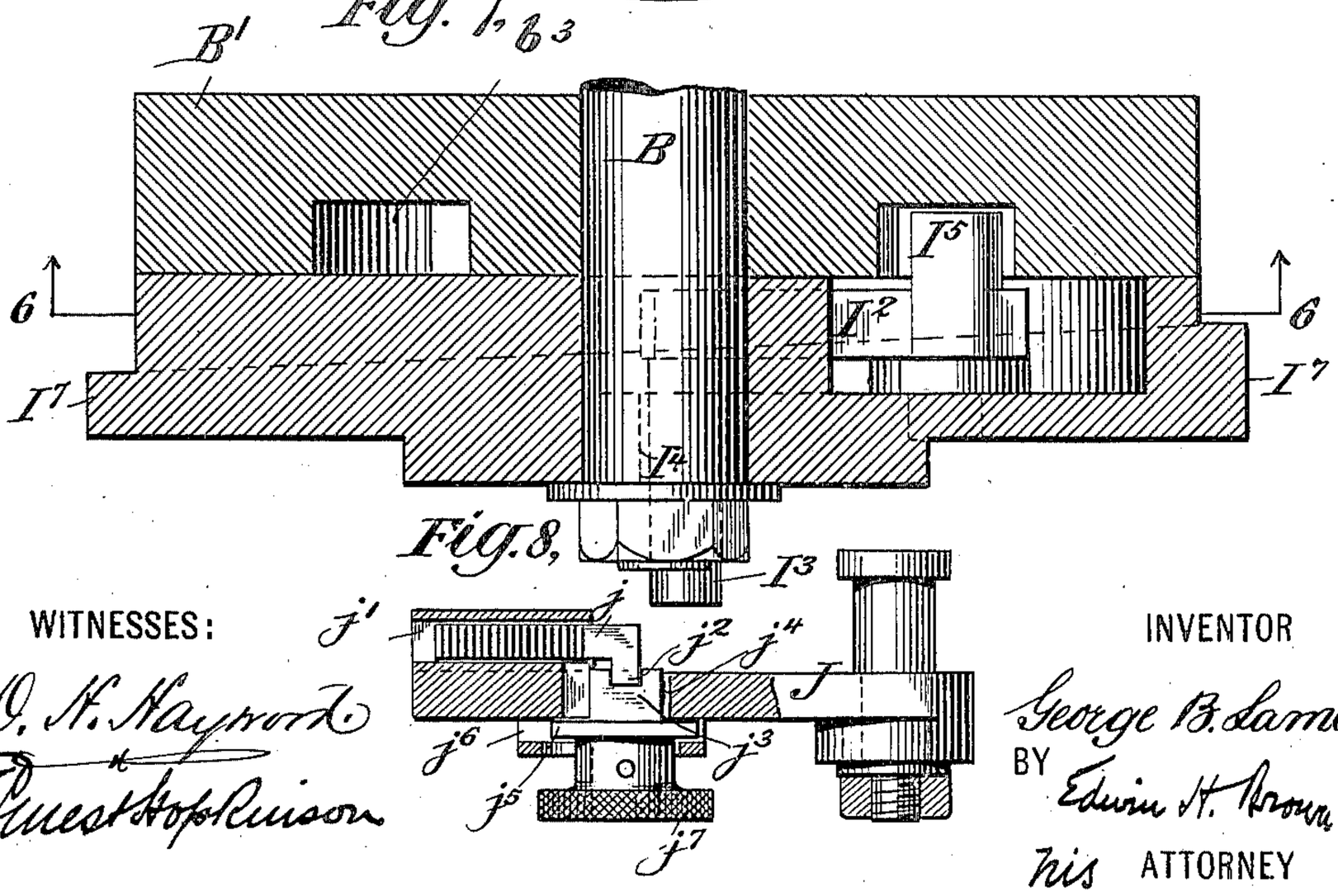

Fig. 8,

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WIRE DRAWING MACHINE.

No. 604,769. Patented May 31, 1898.

Fig. 9.

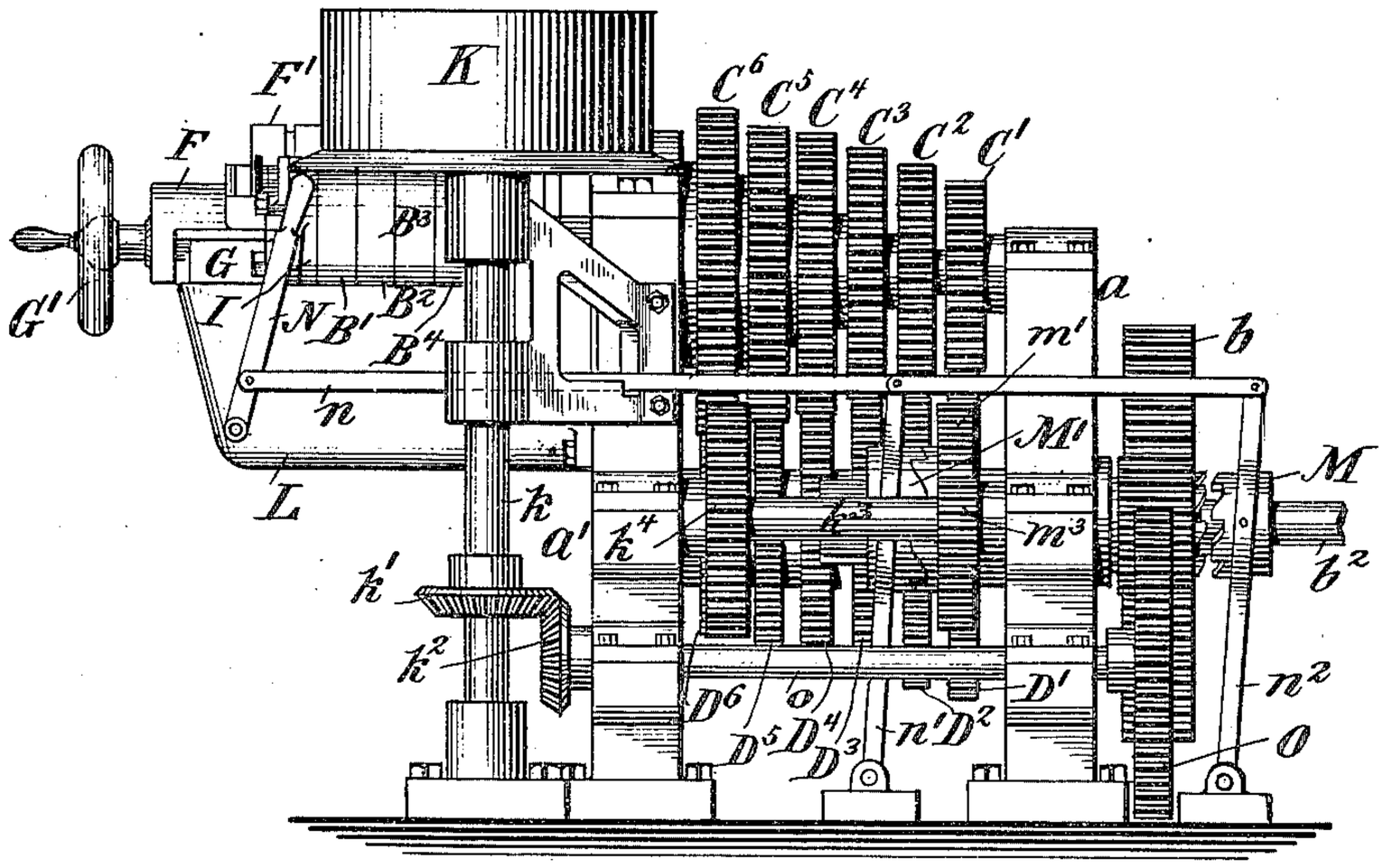
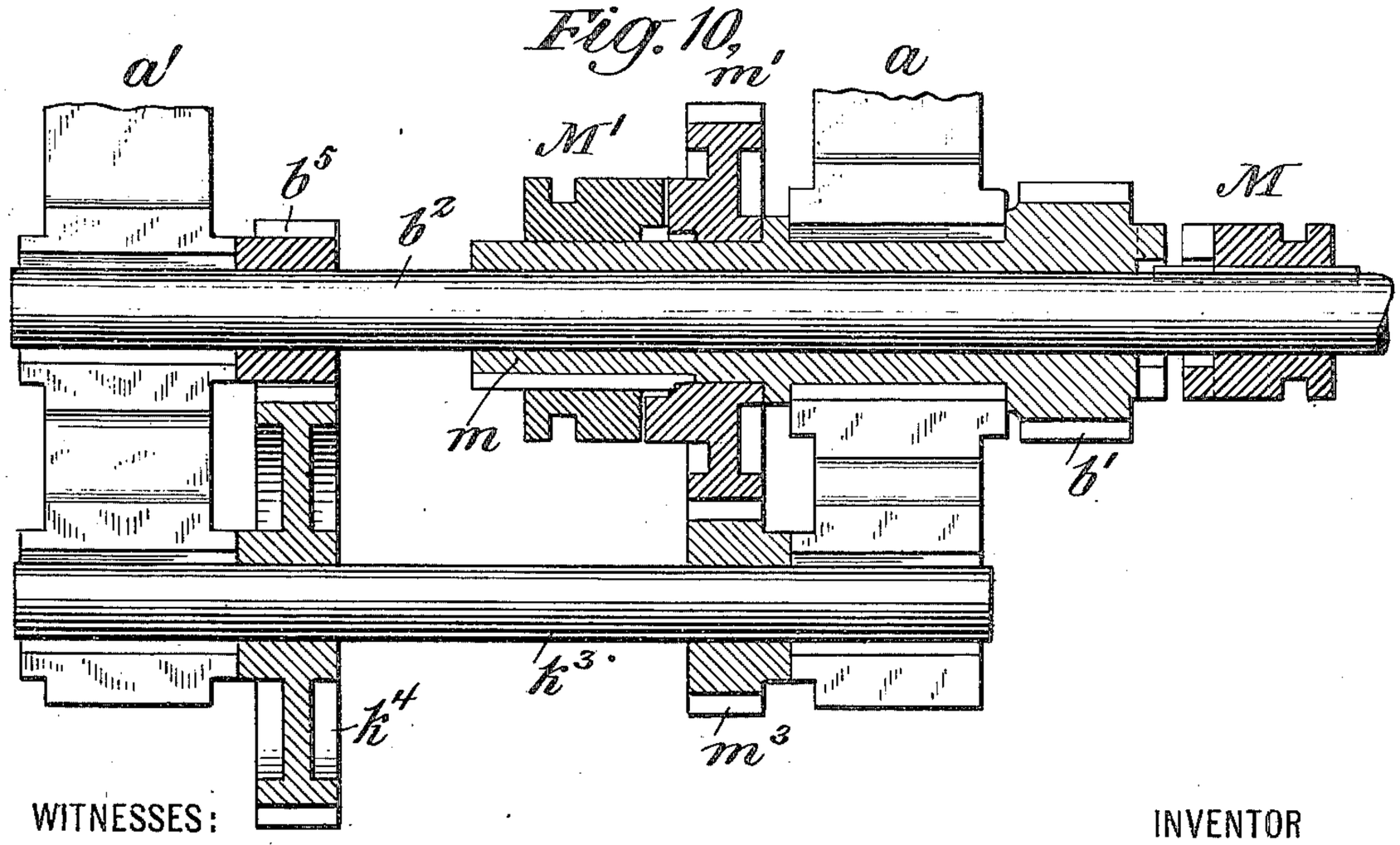


Fig. 10.



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UNITED STATES PATENT OFFICE.

GEORGE B. LAMB, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE WATERBURY MACHINE COMPANY, OF SAME PLACE.

WIRE-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,769, dated May 31, 1898.

Application filed June 16, 1897. Serial No. 640,964. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. LAMB, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Wire-Drawing Machines, of which the following is a specification.

The present invention relates to machines for drawing wire, and especially has for its object the provision of means for threading the wire through the several dies and gradually moving of such dies from an initial position wherein the wire is wound about a roll and consecutively threaded through the several dies while the die-box is moved up to its normal position, wherein the respective dies are located opposite their appropriate rolls.

The subject of the present application is an improvement upon the devices shown and described in my application filed April 14, 1896, and serially numbered 587,462.

In the several views of the drawings I have shown a construction embodying the features of the present invention, in which—

Figure 1 is a plan view of the machine, certain parts being in horizontal section. Fig. 2 is an end elevation, the tank being shown in vertical section. Fig. 3 is an enlarged detail view, in side elevation, of the sliding die-box. Fig. 4 is an enlarged detail sectional view along line 4 4 of Fig. 1. Fig. 5 is an enlarged sectional view along line 5 5 of Fig. 1. Fig. 6 is an enlarged detail sectional view of the drawing-in roll, taken on the line 6 6 of Fig. 7, looking in the direction of the arrows. Fig. 7 is a detail sectional view taken along line 7 7 of Fig 6, looking in the direction of the arrows. Fig. 8 is an enlarged detail plan view, partly in section, of the wire-gripping mechanism of the drawing-in roll. Fig. 9 is a side elevation view, and Fig. 10 is an enlarged detail view in section, of the gearing for driving the parts at varying rates of speed.

Like letters of reference refer to like parts in the several views of the drawings.

Referring to the drawings in detail, A represents the base of the machine, which is provided with standards a a', on which are supported the various parts of the machine. A series of drawing-rolls B′, B², B³, B⁴, B⁵, and B⁶ are mounted on a shaft B, these drawing-rolls being of the same diameter, but driven at varying rates of speed. The drawing-roll B′ is directly secured to the shaft B, while the drawing-rolls B², B³, B⁴, B⁵, and B⁶ are mounted on sleeves rotating one within the other and each provided with a driving gear-wheel. Each of the sleeves is provided with a gear-wheel, by means of which it is driven, these respective gear-wheels being designated C′, C², C³, C⁴, C⁵, and C⁶. These gear-wheels are of varying diameters and mesh with corresponding gear-wheels D′, D², D³, D⁴, D⁵, and D⁶, mounted on shaft D, the relative proportions of these intermeshing gear-wheels being such as to develop a gradually-increasing rate of revolution of the drawing-rolls B′, B², B³, B⁴, B⁵, and B⁶.

F designates a frame carrying the die-box F′, in which are supported the several dies. Projecting from one side of the frame F are studs f, in which is journaled a shaft f', on which are mounted grooved rollers or idlers f^2, about which the wire passes from one die-box to the next succeeding. The frame F slides upon a stationary frame G, being moved longitudinally on the frame G by means of a hand-wheel G′, provided with a threaded rod G², screwing into the hollow frame G. For the purpose of lessening the friction between the frame F and the supporting-frame G roller-bearings are provided, which bearings consist of a spindle g' and an annular ring g^2. Between the spindle and ring are placed antifriction-rolls g^3.

In the operation of the machine the side strain upon the movable frame F is considerable, and the use of roller-bearings permits of an easy manipulation of the frame F in the operation of threading the dies. Upon the under side of the frame G is secured an arm H, provided at its projecting end with a pawl h, which is held in position by a spring h', provided with a notch engaging a projection formed on the pawl. Normally the pawl bears against the wire passing around the drawing-rolls, preventing it from becoming unwound when the end of the wire is released from the gripping-tongs or in case of the breaking of the wire. A channel f^3 surrounds the

die-box and is for the purpose of conducting the fluid pumped into the die-box back again into the main fluid-tank.

Loosely mounted on the end of the shaft B is the drawing-in roll I. This roll acts in conjunction with the roll B′ to draw the wire through the dies and around the drawing-rolls. For this purpose the roll B′ is provided with an annular cut-out portion b^3, the inner face of the cut-out portion being provided with a series of notches b^4 to constitute a ratchet. In a recess I′ on the face of the drawing-roll I opposed to the face of the contiguous roll B′ is mounted a bell-crank lever I^2, having a stud I^3 projecting through the face of the roll and working in the slot I^4, formed therein. The other end of the bell-crank lever is provided with a stud I^5, working in the annular groove b^3, formed in the face of the roll B′, being normally held out of engagement with the notches b^4 by means of the spring I^6. The drawing-in roll I is provided with wire-gripping tongs J. The jaws of the tongs consist of two pieces j, sliding in a way j', the sides of which converge. The inner ends of the jaws j are provided with lugs j^2, engaging a cut-out portion formed in a stud j^3, sliding in a slot j^4. The stud j^3 is provided with a flange j^5, sliding in ways j^6, and a milled head j^7. For the purpose of guiding the wire onto the drawing-rolls the drawing-in roll I is provided with a spiral flange I^7.

K designates the wire-block, which is mounted on shaft k, upon which is secured beveled gear-wheel k', meshing with beveled gear-wheel k^2 on shaft o.

Situated under the drawing-rolls, the die-box, and the idler-rolls is a tank L, containing the fluid which is supplied to the die-box. For this purpose the fluid is pumped out of the tank into the die-box, passing therethrough and being discharged therefrom into the channel f^3 surrounding it, which channel is inclined so as to conduct the fluid back into the tank L. L′ designates the finishing die-box, which is placed on the opposite side of the rollers to the die-box F′, the wire passing from this die-box directly to the wire-block K. When the end of the wire is first secured to the block K, it is desired that the machine shall run at a much slower rate of speed than its normal rate, and for the purpose of varying the speed of rotation of the several parts the following construction is availed of: On the shaft b^2 slides a clutch M, adapted to engage the gear b', which has made integral with it a sleeve m. On this sleeve is loosely mounted a gear-wheel m' and a clutch M′, the clutch M′ being feathered on the sleeve m. On the shaft b^2 is keyed a gear-wheel b^5, meshing with gear-wheel k^4 on shaft k^3, on which shaft is also keyed a gear-wheel m^3. The clutches are operated so that when the clutch M′ is in engagement the clutch M is out of engagement, and vice versa, the movement of the clutches being accomplished by a hand-lever N, to which is engaged a link n, which operates the clutch-yokes n' n^2. When the wire is first attached to the block and it is desired to run the machine more slowly, the parts are in the position shown in Fig. 10, the clutch M′ being in engagement with the gear-wheel m'. In this position the shaft b^2, rotating at its normal rate, drives the gear-wheel b^5, meshing with gear-wheel k^4, driving the shaft k^3, on which is mounted the gear-wheel m^3, which meshes with the gear-wheel m', this rotating the sleeve m and the gear-wheel b' by means of the clutch M′, the gear-wheel b' meshing with the gear-wheel O on shaft o, which carries the beveled gear k^2, meshing with the beveled gear k' to drive the block K. When it is desired to operate the machine at full speed, the clutch M is thrown into engagement and the clutch M′ is thrown out of engagement. The shaft b^2 then drives the gear-wheel b', which then directly drives the block K by meshing with the gear-wheel O.

The operation of the device is as follows: The sliding frame F, carrying the die-box, is drawn out to its furthermost position, so that the opening in the die-box for the first of the series of dies comes opposite the drawing-in roll I. The end of the rod or coarse wire to be reduced after having been properly tapered is passed through the largest die and placed between the jaws j of the gripping-tongs. The jaws of the tongs are then caused to grip the wire tightly by sliding them by means of the milled head j^7 along the converging ways, so that the jaws come together and grip tightly the rod placed between them. The machine is then set in operation and the bell-crank lever I^2 is rocked, so that the projecting portion I^5 engages one of the teeth of the ratchet b^4, formed on the inner face of the roll B′. By this means the drawing-in roll and the roll B′ move together, and the wire is drawn through the die-box and is guided inward toward the rolls by the spiral flange I^7. The sliding frame F is then moved up, so as to bring the opening for the next die opposite drawing-in roll. The wire is then passed underneath the die-box and over its appropriate grooved roller or idler back through the die and is placed in the grip of the tongs again and the operation repeated. These operations are repeated until all the dies are filled, the last being placed in the finishing die-box and the end of the wire secured to the block K. It will be seen that by this arrangement each die is handled but once and that it remains in its place throughout the stringing up. As the rolls are turning while the frame F is advanced, but little power is required to run the coils from roll to roll, and the graduation in speed being constant throughout the tension on the wire is constant. The wire is prevented from uncoiling when the end is released from the tongs by the pawl h bearing against it. When the roll is turning, the wire passes over this pawl; but on releasing

the jaws the tendency of the coil is to spread out to a larger diameter, which is prevented by the pawl *h*.

What I claim as new is—

1. The combination of a series of drawing-rolls, means for operating the same, a die for each of said rolls and a sliding die-box carrying said dies, for moving the dies in front of the rolls, substantially as specified.

2. The combination of a series of drawing-rolls, a drawing-in roll, a die for each of said rolls and a sliding die-box carrying said dies whereby each die may be successively moved in front of the drawing-in roll, and then in front of its drawing-roll, substantially as specified.

3. The combination of a series of drawing-rolls, a drawing-in device, a die for each of said rolls, a frame carrying the series of dies, and means for moving the frame longitudinally relatively to the drawing-rolls, substantially as specified.

4. The combination of a series of drawing-rolls, a frame carrying a series of dies and a corresponding series of idler-rolls, and means for moving said frame longitudinally relatively to the drawing-rolls, substantially as specified.

5. The combination of a series of drawing-rolls, a drawing-in roll, means for engaging and disengaging the drawing-in roll with one of the series of drawing-rolls, a die-box, and means for moving the die-box longitudinally relatively to the series of drawing-rolls, substantially as specified.

6. In a wire-drawing machine, the combination of a series of drawing-rolls of the same diameter, means for rotating the drawing-rolls at varying rates of speed, a wire-block having means for driving it, and mechanism in engagement with the driving means of the rolls and block for varying the speed of the block to correspond with the rate of speed of the drawing-rolls, substantially as specified.

7. In a wire-drawing machine, the combination of a series of drawing-rolls of the same diameter, means for rotating the drawing-rolls at varying rates of speed, a wire-block having means for driving it, and means for varying the rates of speed of the drawing-rolls and the block, said means comprising a driving-shaft, a sleeve on said shaft carrying a fast gear which drives the gearing of the drawing-rolls and block, and a loose gear, each of said gears being provided with a clutch, a sliding clutch on said shaft, a sliding clutch on said sleeve, a gear fast on said shaft, a second shaft having gears fast thereon, one of which is in engagement with the fast gear on the driving-shaft, and the other in engagement with the loose gear on the sleeve, and means for alternately operating the sliding clutches, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE B. LAMB.

Witnesses:

THOMAS C. LANE,

WM. E. FULTON.