No. 672,568. Patented Apr. 23, 1901.

J. H. O'DONNELL.

WIRE DRAWING MACHINE.

(Application filed July 18, 1900.)

(No Model.) 3 Sheets—Sheet 1.

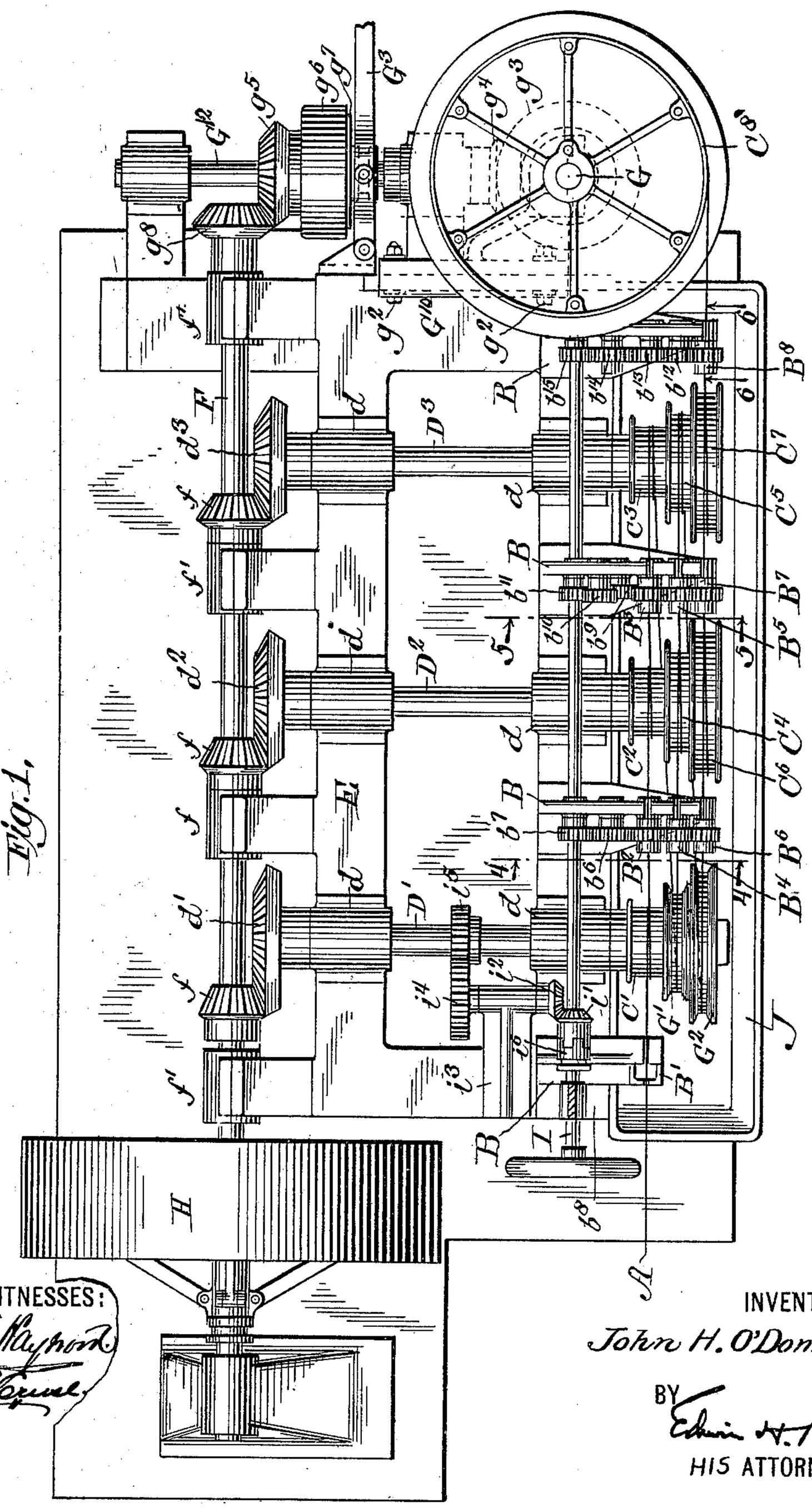

Fig. 1.

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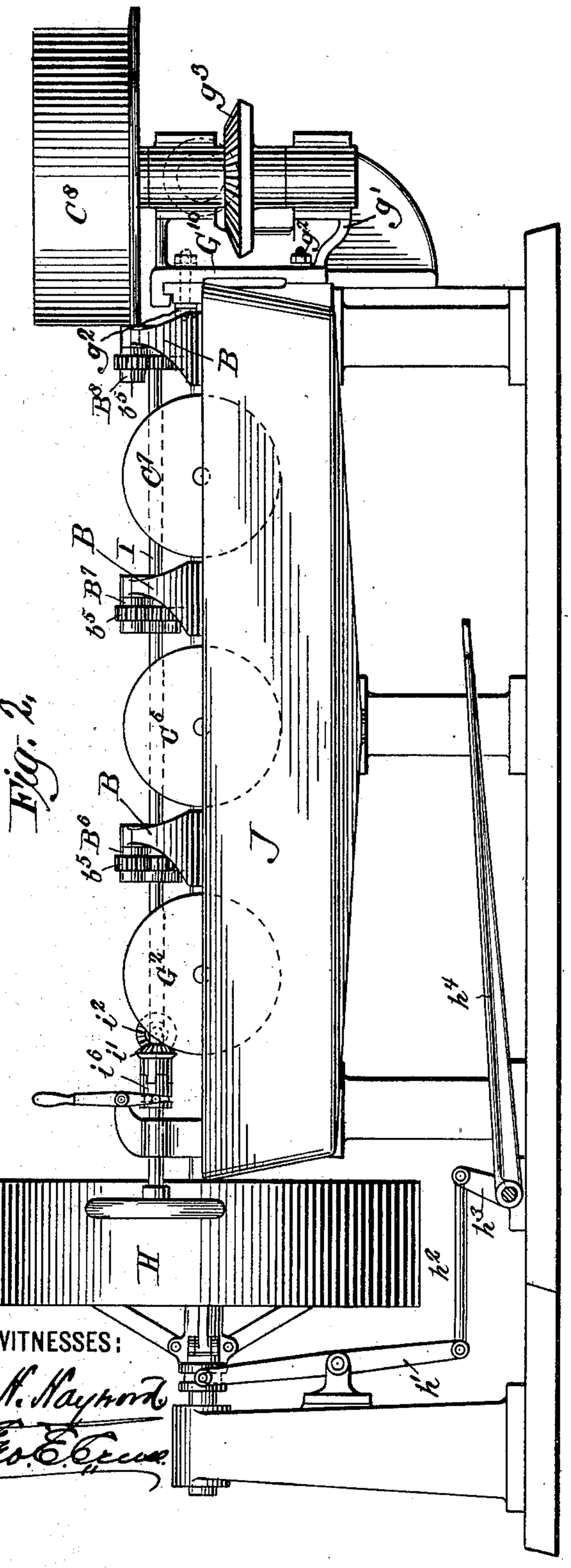

Fig. 2.

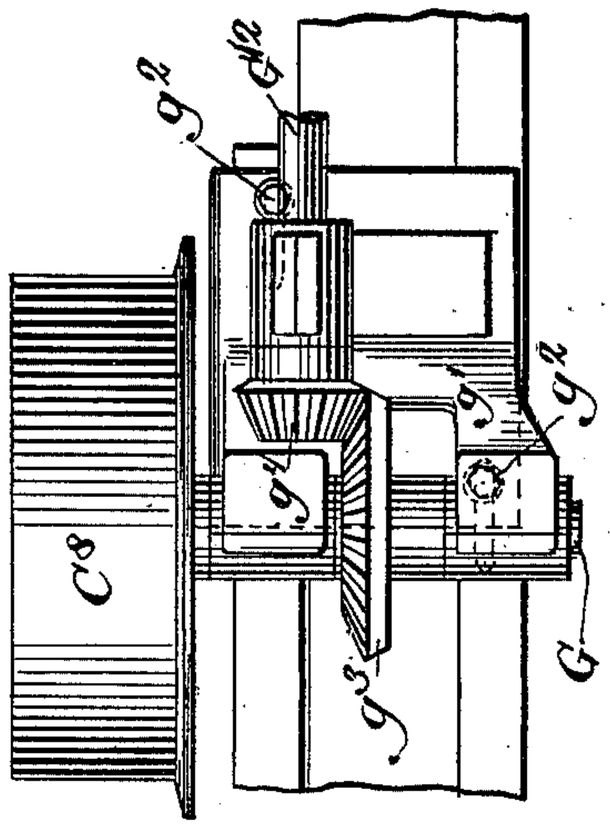

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 4.

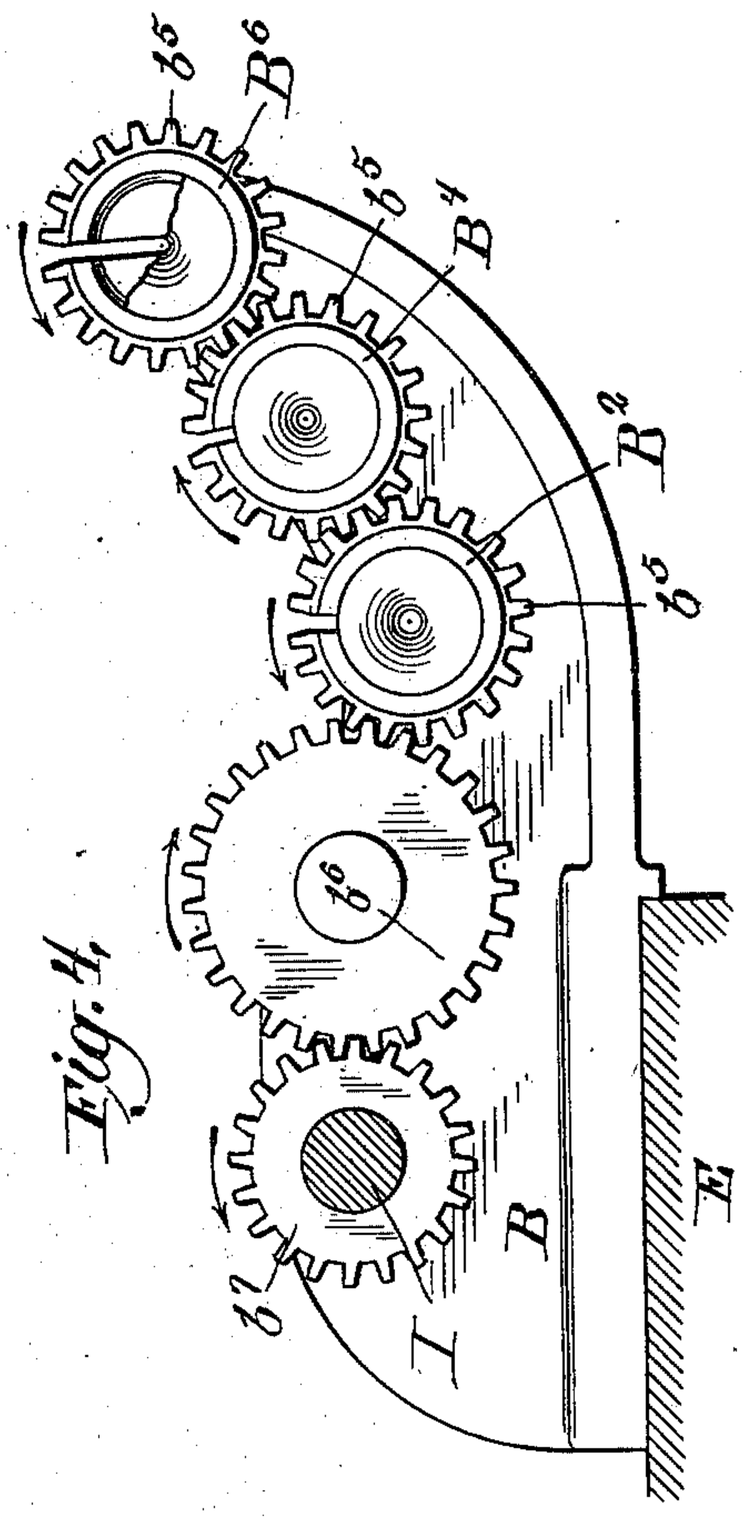


Fig. 5.

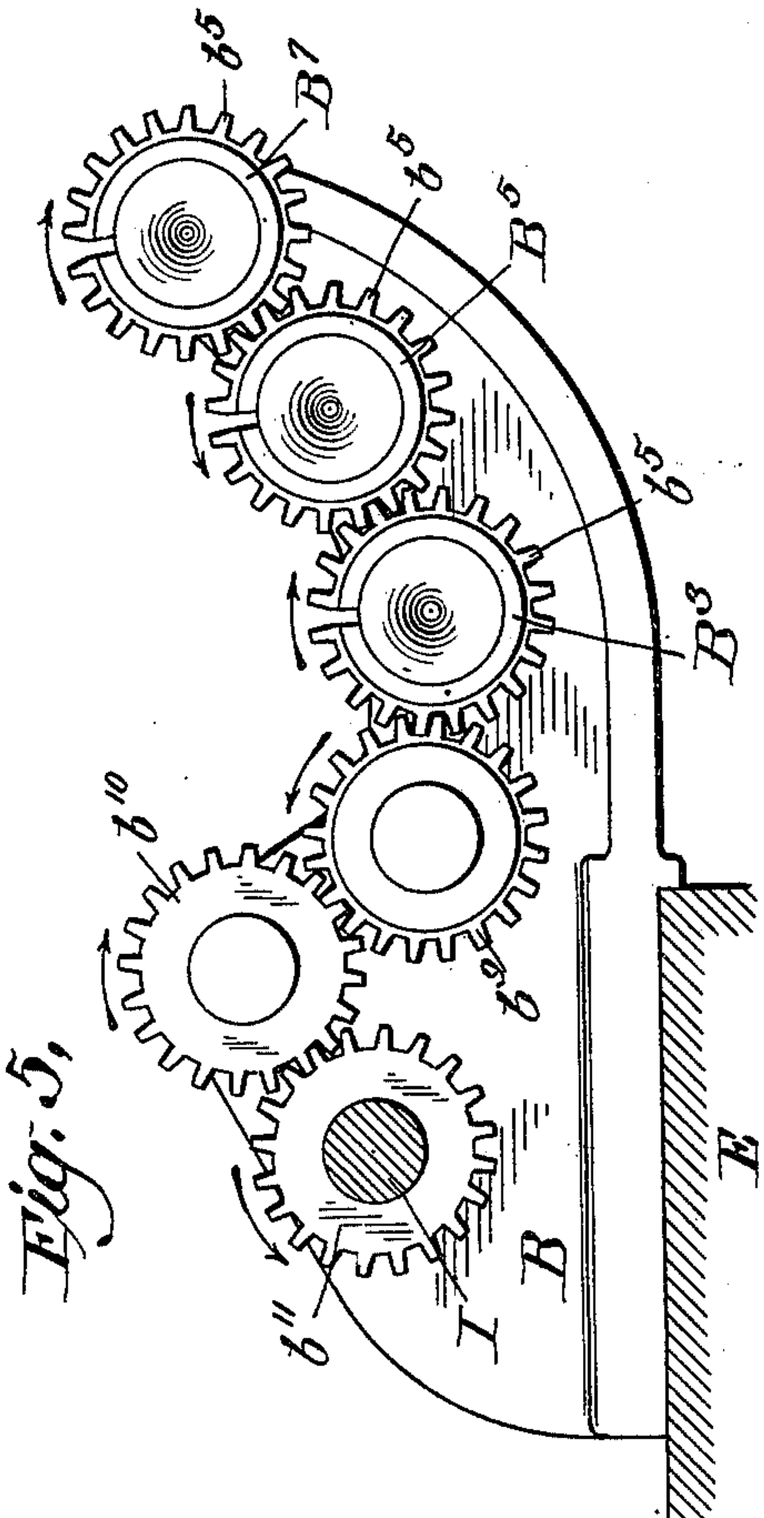
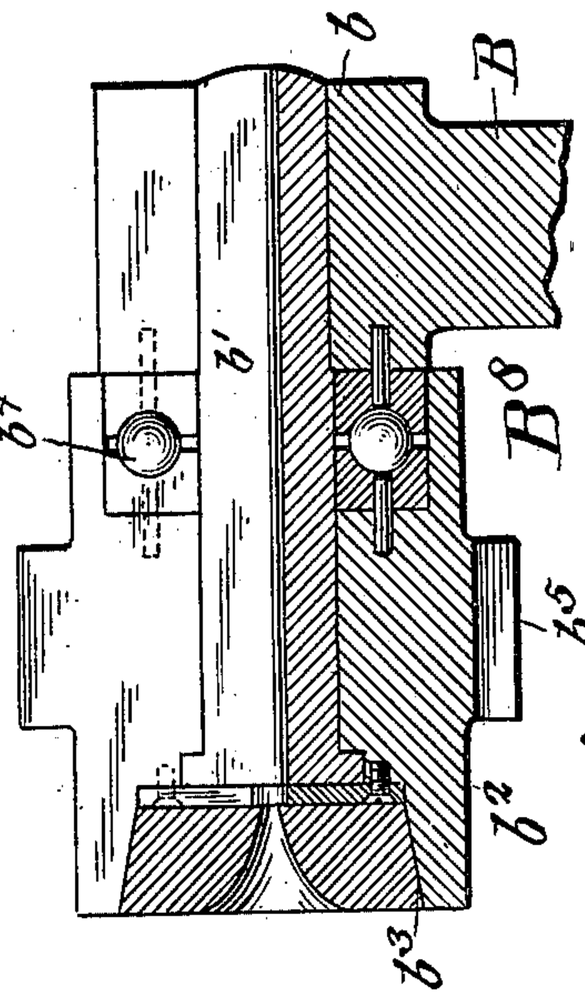


Fig. 6.



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JOHN H. O'DONNELL, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE WATERBURY MACHINE COMPANY, OF SAME PLACE.

WIRE-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 672,568, dated April 23, 1901.

Application filed July 18, 1900. Serial No. 24,027. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. O'DONNELL, of Waterbury, New Haven county, State of Connecticut, have invented a new and useful Improvement in Wire-Drawing Machines, of which the following is a specification.

A machine embodying the invention will be described and afterward its novel features will be pointed out in the claims.

In the accompanying drawings, Figure 1 is a top view of a machine embodying the improvement. Fig. 2 is a side elevation. Fig. 3 is a view of the front end of the machine. Fig. 4 is a transverse section at the plane of the dotted line 4 4, Fig. 1. Fig. 5 is a transverse section at the plane of the dotted line 5 5, Fig. 1. Fig. 6 is a longitudinal section at the plane of the dotted line 6 6, Fig. 1.

Similar letters of reference refer to corresponding parts in all the figures of the drawings.

A designates wire to be drawn. It passes first through a die-holder B′, then around a roll or head C′, thence through a die-holder B^2, thence around a roll or head C^2, thence through a die-holder B^3, and afterward around a roll or head C^3. The die-holders B′ B^2 B^3 are in substantially the same longitudinal plane. The rolls or heads C′ C^2 C^3 are affixed to shafts D′ D^2 D^3, mounted in bearings *d*, comprised in the frame E of the machine. These shafts have affixed to them bevel gear-wheels *d′* d^2 d^3, which mesh into bevel gear-wheels *f*, affixed to a shaft F, mounted in bearings *f′*, comprised in the frame E and constituting a driving-shaft. It will be noticed that the bevel gear-wheel *d′* is larger than the bevel gear-wheel d^2 and that the bevel gear-wheel d^2 is larger than the bevel gear-wheel d^3, so that the roll or head C^2 will be rotated more rapidly than the roll or head C′ and the roll or head C^3 will be rotated more rapidly than the roll or head C^2. Leaving the roll or head C^3, the wire A extends backward to an idler-pulley G′, mounted loosely upon the shaft D′, and thence it passes through a die-holder B^4. After emerging from the die-holder B^4 the wire passes around a roll or head C^4, which is rigidly affixed to the shaft D^2, but is so much larger in diameter than the roll or head C^3 that it moves at a greater surface speed, although the shaft D^2 carrying it rotates less rapidly than the shaft D^3, carrying the roll or head C^3. After passing around the roll or head C^4 the wire passes through a die-holder B^5. Afterward it passes around a roll or head C^5, affixed to the shaft D^3. Then it extends backward and passes around an idler-pulley G^2, mounted loosely upon the shaft D′. Then it passes through a die-holder B^6. Afterward it passes around a roll or head C^6, which is rigidly affixed to the shaft D^2, but moves at a faster surface speed than the surface speed of the roll or head C^5, because of its larger diameter, notwithstanding that the shaft D^3, carrying the roll or head C^5, is rotated more rapidly than the shaft D^2. The wire after passing around the roll or head C^6 passes through a die-holder B^7. Subsequently it passes around a roll or head C^7, affixed to the shaft D^3. Next it passes through a die-holder B^8, and from there it passes to a head or reel C^8.

The head or reel C^8 is affixed to a shaft G, journaled in a bearing provided in a bracket *g′*, which is mounted upon a block G^{10}, fitted to slideways provided at the forward end of the frame E. Bolts g^2, fitted to the slide-block G^{10} and passing through slots formed longitudinally in the slideways supporting said slide-block, serve to clamp the slide-block to the slideways in different positions. Provision is thus afforded for using a head or reel C^8 of any desired size and shifting it so that its circumference will be in alinement with the wire passing from the last die-holder B^8.

Rotary motion is imparted to the head or reel C^8 by means of a bevel gear-wheel g^3, affixed to the shaft G and engaging with a bevel gear-wheel g^4, affixed to the horizontal shaft G^{12}. Loosely mounted on the shaft G^{12} is a bevel gear-wheel g^5, and this bevel gear-wheel is connected to one part g^6 of a clutch. The other part g^7 of the clutch is connected with the shaft G^{12} by a spline, so as to rotate therewith, but is free to slide relatively to the part g^6 of the clutch. It has a circumferentially-grooved hub, with which engage pins extending from a lever G^3. By moving this lever in one direction the two parts of the clutch will be engaged and motion will be transmitted

from the part g^6 of the clutch to the part g^7 of the clutch and thence to the shaft G^{12}. The shaft G^{12} is supported near one end in a bearing connected with the slide-block G^{10} and at the other end with a bearing with which the frame E is provided. The bevel gear-wheel g^5 engages with a bevel gear-wheel g^8 on the shaft F, and consequently the bevel gear-wheel g^5 rotates continuously while the shaft F is in operation. When one head or reel is substituted for another, change of speed of the shaft G will have to be made. This may be done by substituting a different pair of gear-wheels for the pair of gear-wheels g^3 g^4 or for the pair of gear-wheels g^5 g^8.

The shaft F derives motion from a belt applied to a pulley H, which, as here shown, is a clutch-pulley of suitable form, which may be engaged and disengaged from the shaft F by means of a lever h', rod h^2, rocker-arm h^3, and a treadle h^4. Preferably the treadle h^4 will extend throughout the length of the machine, so that a workman may operate it from any point where he may be working so as to start or stop the machine.

The die-holders B′ B^2 B^3 B^4 B^5 B^6 B^7 B^8 are supported by brackets B. They are all secured to the frame E. The first bracket B is provided only with the single non-rotary die-holder B′. The second bracket B is provided with rotary die-holders B^2 B^4 B^6. The third bracket B is provided with rotary die-holders B^3 B^5 B^7, and the last bracket B is provided with the rotary die-holder B^8. The construction of the die-holders is illustrated upon an enlarged scale in Fig. 6.

It will be seen that each die-holder consists of a shank-like part b' and a head b^2. The shank-like part b' fits in a bearing b in one of the brackets B. The head is provided with a socket b^3 for a rotary die. There is a longitudinal slot from the interior to the exterior of the shank b' of each of these die-holders, and a corresponding slot through the head b and also through the bracket B, so that the rotary dies after having been strung upon the wire may be introduced by adjusting the rotary die-holders so that their slots will be in line with the slots of the brackets B and then entering the wire by a movement transverse to its length, the dies being afterward moved lengthwise into their sockets b^3.

To facilitate the rotation of the rotary die-holders, they are provided with ball-bearings b^4, intermediate of their heads b^2 and the brackets B.

A gear-wheel b^5 is arranged upon the head b^2 of each rotary die-holder to provide for rotating the same and with it the rotary die which it carries. The gear-wheels b^5 on the rotary die-holders B^2 B^4 B^6 intermesh. With the gear-wheel b^5 of the rotary die-holder B^2 intermeshes a gear-wheel b^6, arranged upon a stud extending from the bracket B, supporting the said rotary die-holders B^2 B^4 B^6. The gear-wheel b^6 meshes with a gear-wheel b^7 upon a shaft I, supported by the brackets B, and by a bracket b^8, affixed to the frame E. The gear-wheel b^5 of the rotary die-holder B^3 meshes with a gear-wheel b^9, affixed to a stud projecting from the bracket B, supporting the die-holders B^3 B^5 B^7. The gear-wheel b^9 meshes with a gear-wheel b^{10}, mounted upon a stud projecting from the said bracket B, and the gear-wheel b^{10} meshes with a gear-wheel b^{11}, affixed to the shaft I.

The gear-wheel b^5 of the rotary die-holder B^8 meshes with a train of gear-wheels b^{12} b^{13} b^{14}, mounted upon studs projecting from the bracket B, supporting the rotary die-holder B^8, and the gear-wheel b^{14} meshes with a gear-wheel b^{15}, affixed to the shaft I. Owing to the number of gear-wheels in the train transmitting motion from the shaft I to the rotary die-holders supported by the several brackets B the rotary die-holders B^2 B^4 B^6 will rotate in one direction, while the rotary die-holders B^3 B^5 B^7 will rotate in the reverse direction and the rotary die-holder B^8 will rotate in the same direction as the rotary die-holders B^2 B^4 B^6.

The shaft I has mounted upon it a gear-wheel i', which engages with a gear-wheel i^2, affixed to a shaft supported in a bracket i^3, fastened to the frame E, and provided with a gear-wheel i^4, that meshes with a gear-wheel i^5, affixed to the shaft D′. Rotary motion is thus transmitted from the shaft D′ to the bevel gear-wheel i' upon the shaft I. This bevel gear-wheel i' is furnished with one part of a clutch. The other part i^6 of the clutch is secured to the shaft I, so as to be free to slide along the same, but so as not to be capable of independent rotary movement. It may be secured to the shaft by a spline. A lever or other device engaging the part i^6 may be employed for shifting the part i^6 lengthwise of the shaft to engage and disengage it and the other part of the clutch which is formed with the bevel gear-wheel i'. The two parts of the clutch are to be engaged during the running of the machine; but while the dies are in place in the die-holders the parts of the clutch will be disengaged. Thus the shaft I will be left free to be turned by hand for the purpose of adjusting the rotary die-holders so that their slots will be uppermost and in alinement with the corresponding slots of the brackets B.

A tank J for containing cooling and lubricating liquid is supported by the frame E beneath the rolls C′ C^2 C^3 C^4 C^5 C^6 C^7 and the idlers G′ G^2. It should be so full of liquid that the rolls or heads C′ C^2 C^3 C^4 C^5 C^6 C^7 and idlers G′ G^2 shall dip into it.

It will be seen that by my invention, involving rolls driven at different speeds by imparting to them a different number of rotations and other rolls having greater surface speeds by reason of greater diameter in connection with idlers and the arrangement of

dies which I have shown, I am enabled to make an exceedingly compact machine of a given capacity.

Obviously changes may be made without departing from the principle of my invention—as, for instance, all of the dies except the one nearest the head or reel C^8 may be non-rotary.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a wire-drawing machine the combination of dies arranged in sets, with the dies of each set side by side, of rolls or heads in advance of certain of the dies and rotated the forward faster than the rearward, an idler rearward of one of the dies, and a roll or head on the same shaft as the rearward roll or head before mentioned, and made of such diameter as to have a faster surface speed than the forward roll or head before mentioned, substantially as specified.

2. In a wire-drawing machine, the combination with a die supported by a die-holder B^2, a roll or head C^2 in advance thereof, a die supported by a die-holder B^3, a roll or head C^3 driven by gearing so as to have a greater surface speed than the roll or head C^2, an idler G' and a roll or head C^4 made of such diameter relatively to the roll or head C^3 as to have a greater surface speed.

3. In a wire-drawing machine, the combination with die-holders and dies B', B^2, B^3, B^4, B^5, B^6, B^7 and B^8 arranged in such holders, dies B^2, B^4 and B^6 being arranged in a series, dies B^3, B^5 and B^7 in a second series, die B' in advance of the first series and die B^8 in the rear of the second series, a roll C' in advance of the die B', rolls C^2, C^4 and C^6 each having different surface speed in advance of the first series of dies, rolls C^3, C^5 and C^7 each having different surface speed in advance of the second series of dies and a reel C^8 in advance of the die B^8, and idlers G', G^2 provided on the same shaft as the roll C'.

4. In a wire-drawing machine, the combination of dies arranged in sets, with the dies of each set side by side, of rolls or heads, one of said rolls or heads being affixed to a shaft upon which an idler is loosely mounted, substantially as specified.

5. In a wire-drawing machine the combination of dies arranged in sets with the dies of each set side by side, and means for rotating the dies of one set in a reverse direction to those of another set, of rolls or heads in advance of certain of the dies and rotated the forward faster than the rearward, an idler rearward of one of the dies, and a roll or head on the same shaft as the rearward roll or head before mentioned, and made of such diameter as to have a faster surface speed than the forward roll or head before mentioned, substantially as specified.

6. In a wire-drawing machine the combination with dies arranged in sets, the dies of each set being side by side and geared together, of rolls, and a roll or head for drawing the wire through such dies, and means for rotating the dies comprising a shaft, and a single clutch whereby the rotation of all the dies may be stopped.

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

JOHN H. O'DONNELL.

Witnesses:
WILLIAM D. PIERAM,
W. J. MATON.