

No. 662,860.

Patented Nov. 27, 1900.

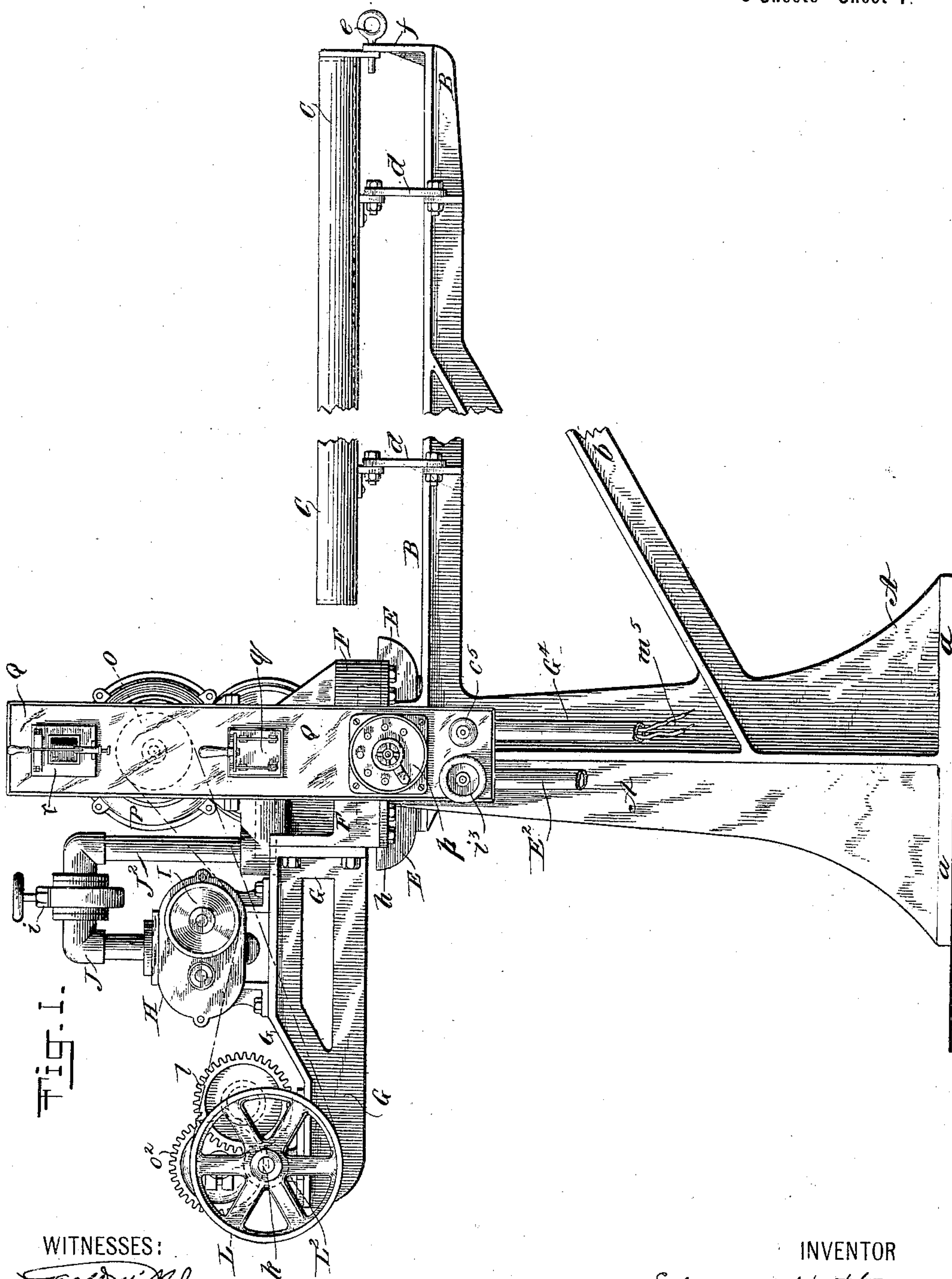
E. HETT.

APPARATUS FOR ETCHING ROLLS.

(Application filed Jan. 4, 1899.)

(No Model.)

6 Sheets—Sheet 1.



WITNESSES:

Geordie Williams
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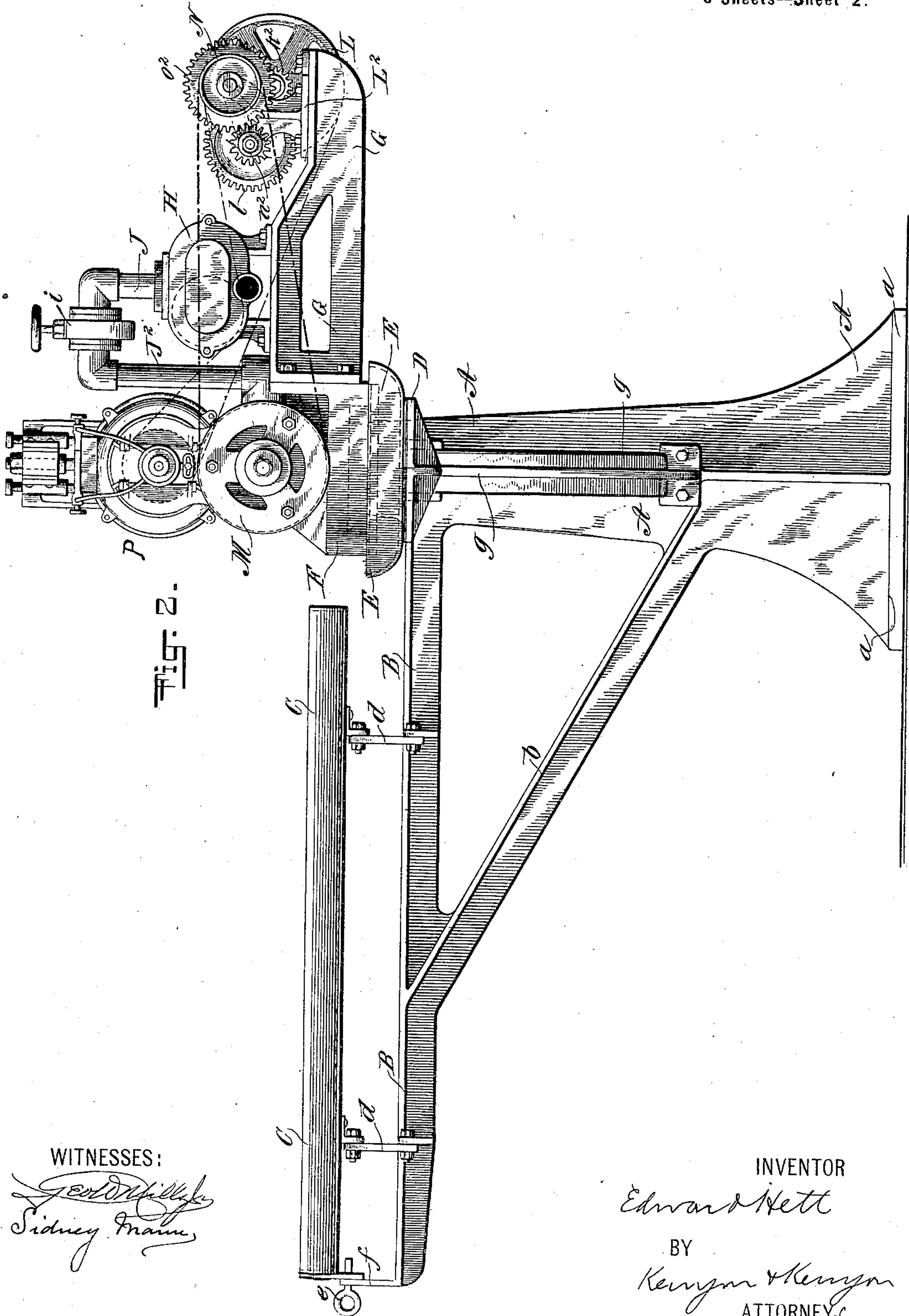
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(Application filed Jan. 4, 1899.)

(No Model.)

6 Sheets—Sheet 2.



WITNESSES:

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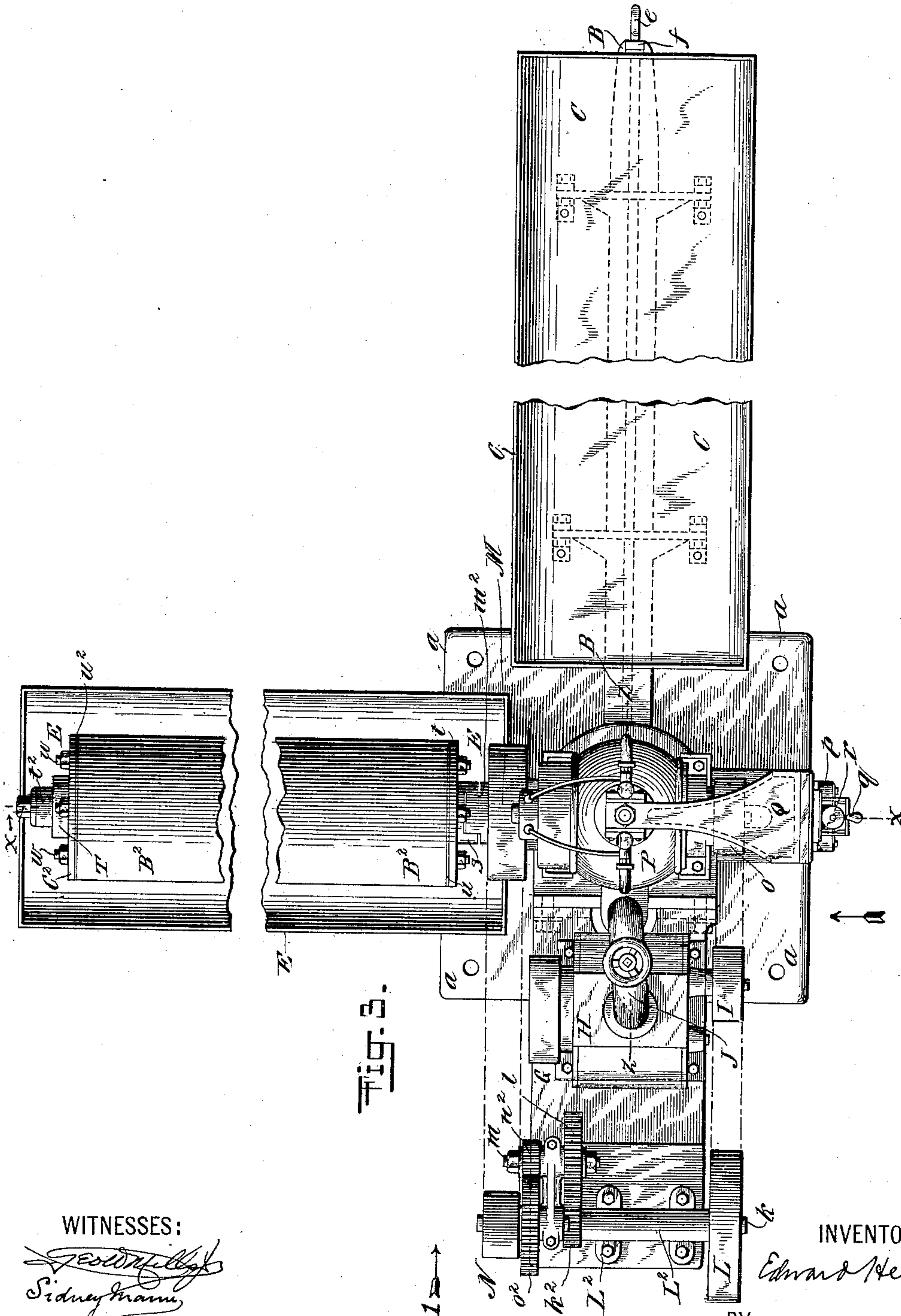
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6 Sheets—Sheet 3.



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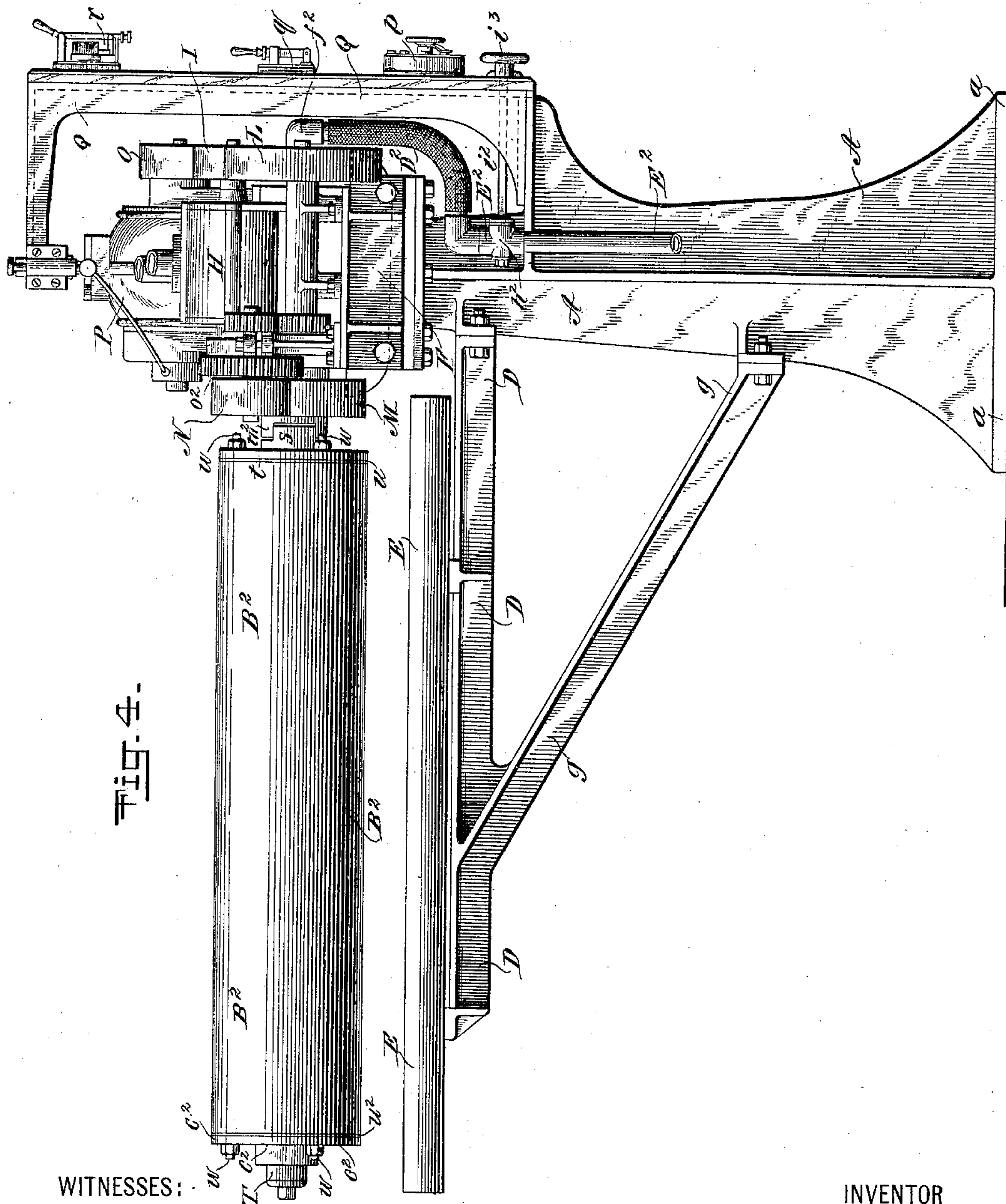
E. HETT.

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(No Model.)

6 Sheets—Sheet 4.



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E. HETT.
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6 Sheets—Sheet 5.

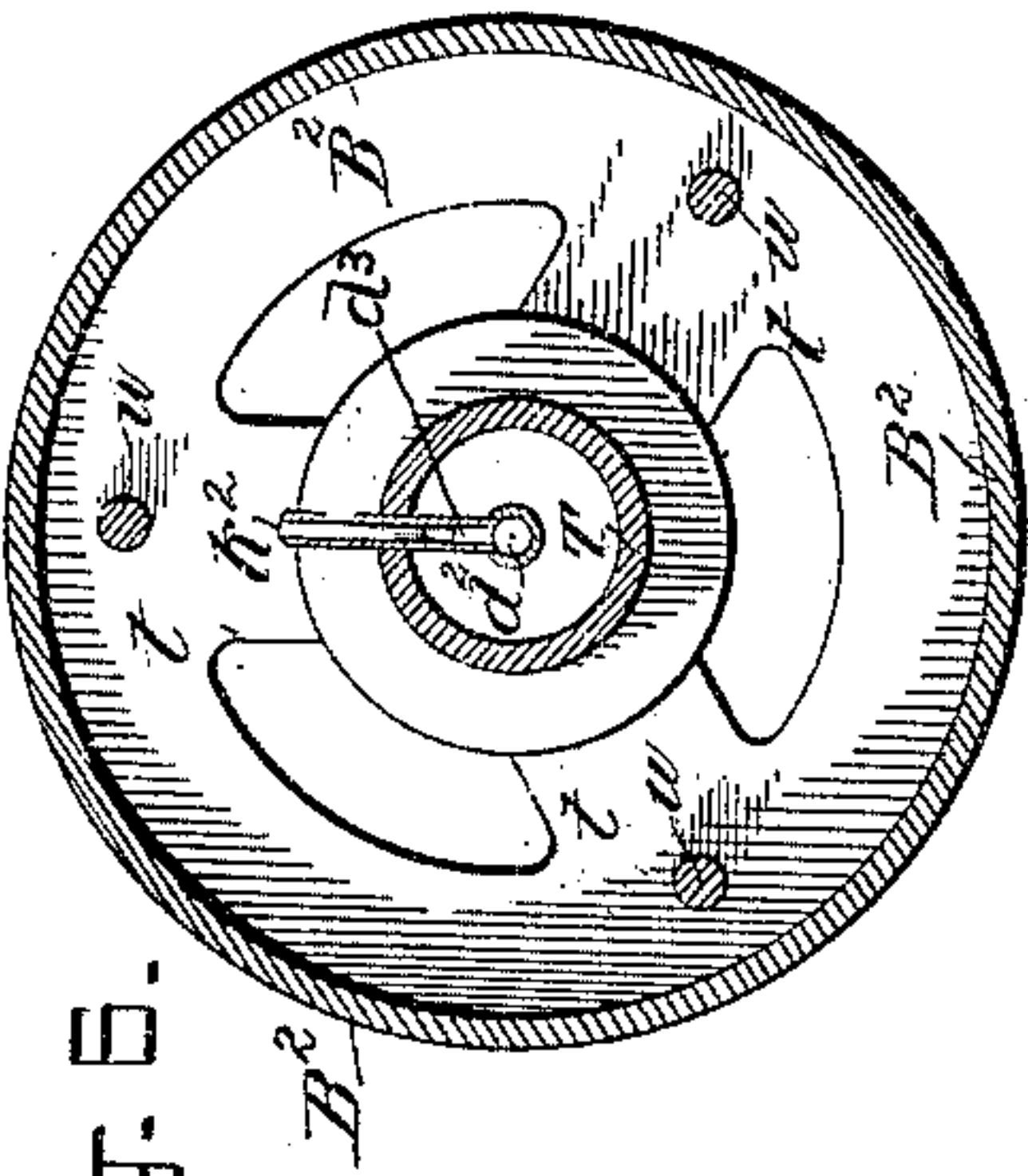


Fig. 6.

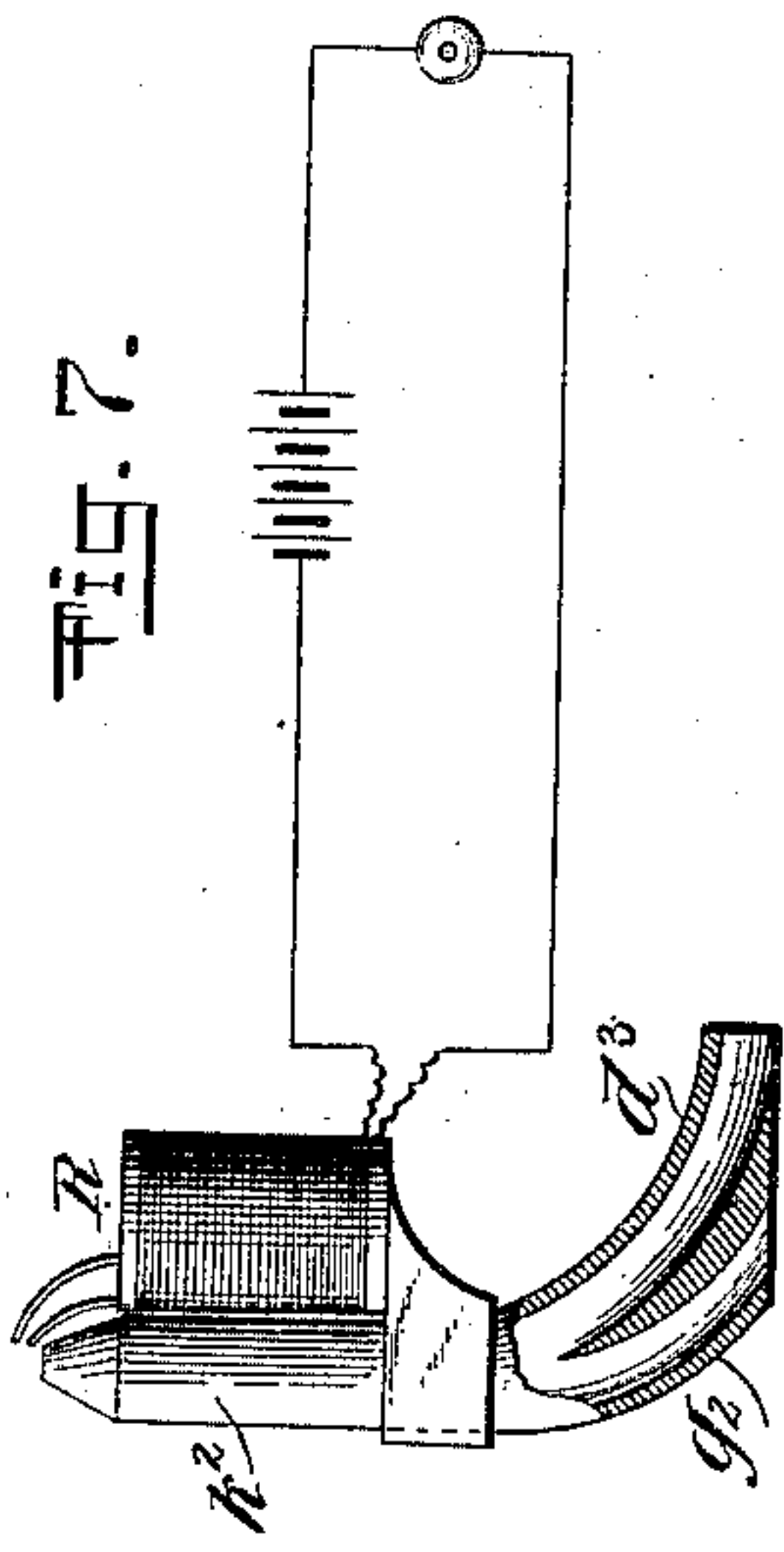


Fig. 7.

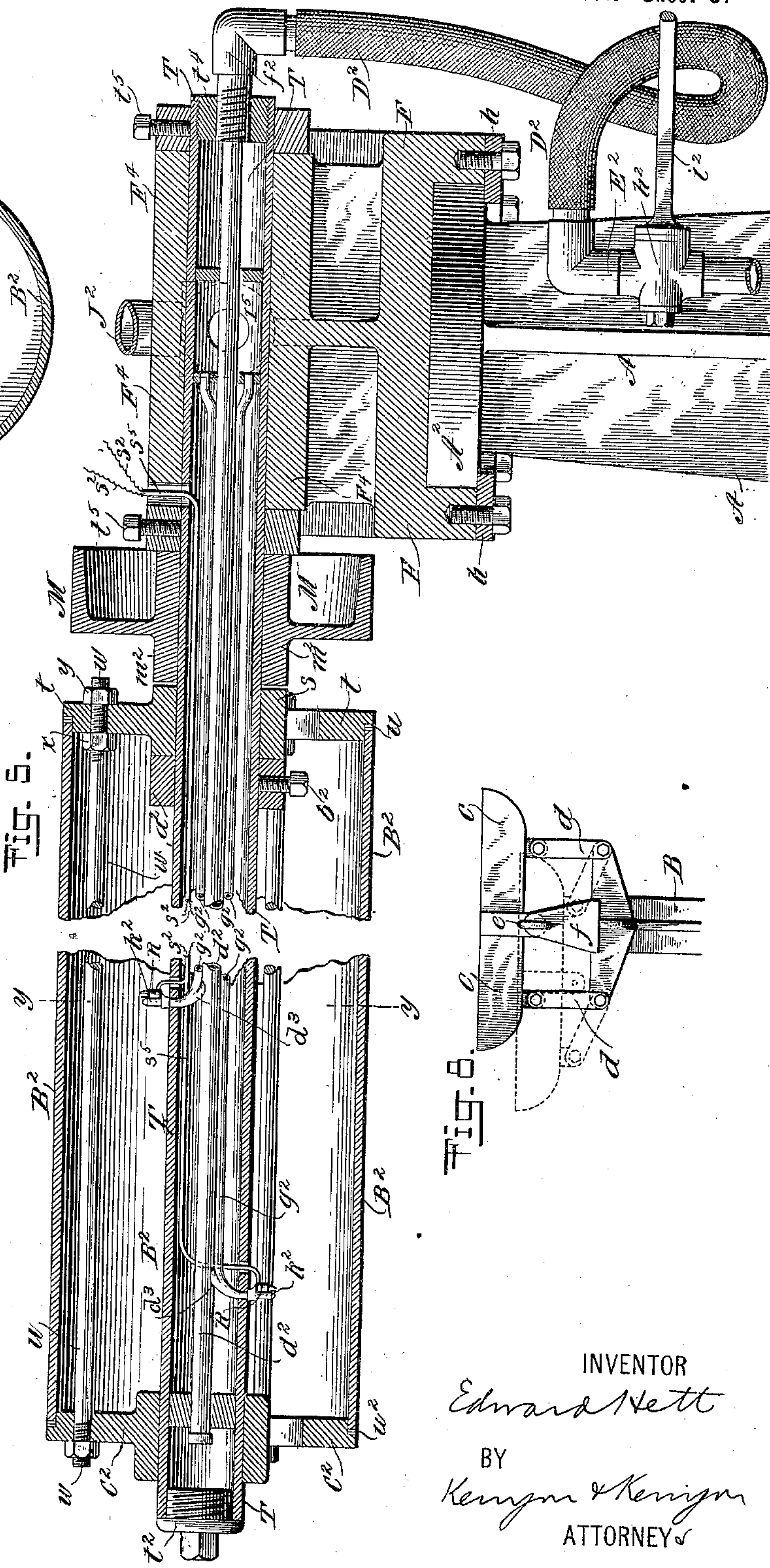


Fig. 5.

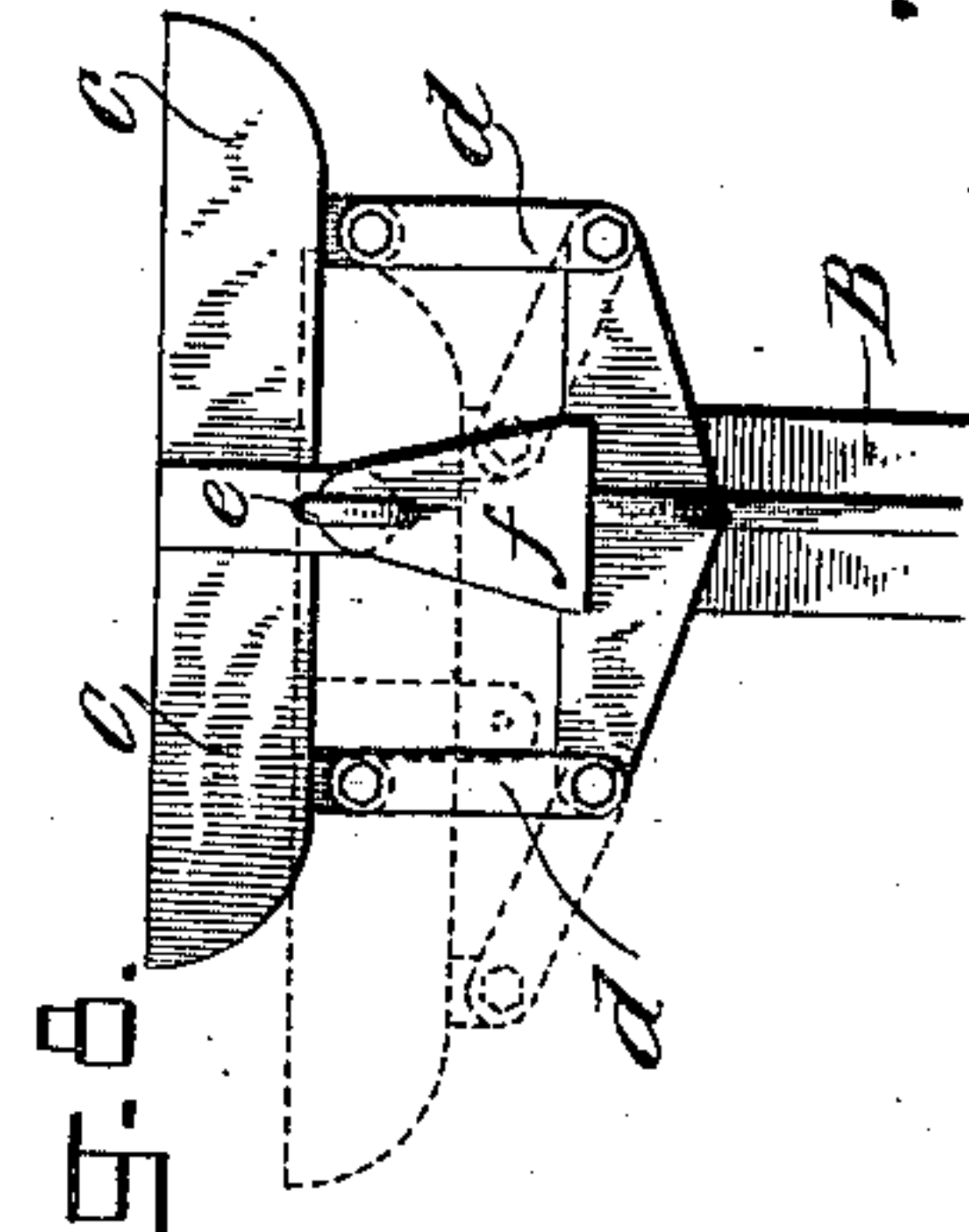


Fig. 8.

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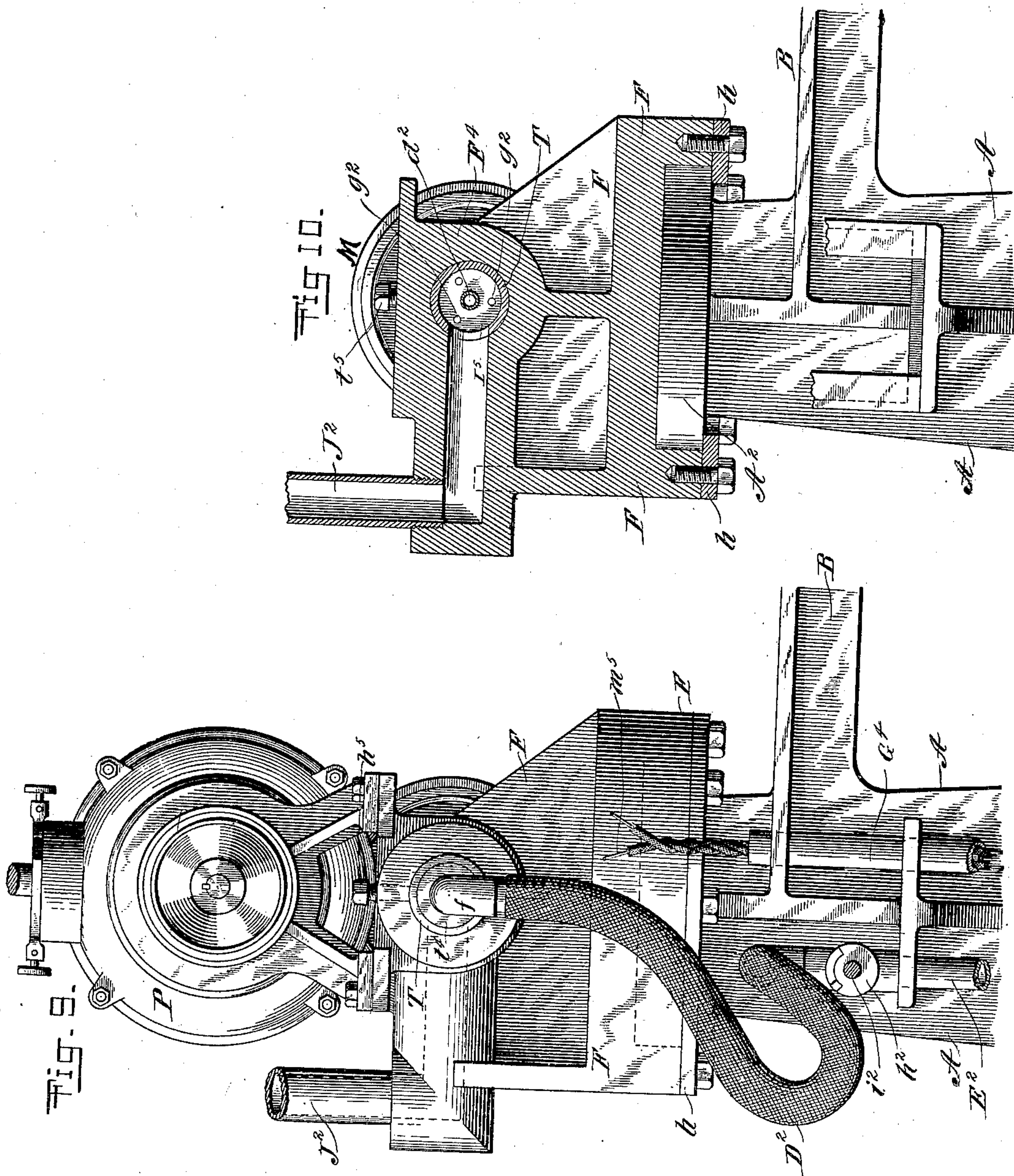
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(No Model.)

6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

APPARATUS FOR ETCHING ROLLS.

SPECIFICATION forming part of Letters Patent No. 662,860, dated November 27, 1900.

Application filed January 4, 1899. Serial No. 701,103. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond,
5 State of New York, have invented certain new and useful Improvements in Apparatus for Preparing Printing-Surfaces, of which the following is a specification.

My invention relates to means for etching
10 the printing-surfaces of a form-cylinder, and more especially to a machine for performing the necessary etching operations upon a tubular device such as devised by me and used in connection with the supporting arbors or
15 mandrels of a printing-press for doing planographic, relief, or intaglio printing; and my invention consists in a machine involving the novel devices or structural features and combination of devices that will be found
20 hereinafter fully described and that will be most particularly pointed out in the claims of this specification.

To enable those skilled in the art to which my invention relates to make and use a machine involving either in part or in whole
25 the principle of construction and mode of operation peculiar to my said invention, I will now proceed to more fully describe the latter, referring by letters to the accompanying
30 drawings, which form part of this specification, and in which I have shown and described my new machine.

In the drawings, Figure 1 is a front elevation. Fig. 2 is a rear elevation. Fig. 3 is a
35 top view. Fig. 4 is an end elevation taken from a point of view indicated by the arrow 1 at Fig. 3. Fig. 5 is a partial vertical section taken on a plane indicated by the broken line *xx* of Fig. 3 and drawn on an enlarged
40 scale. Fig. 6 is a detail vertical section in a plane indicated by the broken line *yy* of Fig. 5 and drawn on the same scale as said figure. Fig. 7 is a diagrammatical view illustrating on a greatly-enlarged scale one of a series of
45 burners arranged to operate within the tubular shell or cylinder to be treated and showing a battery connection for an electrical burner - lighter, although in the machine shown and described the electricity used for
50 lighting said burners is taken from the source of supply which affords the electrical current for running the motor of the machine. Fig.

8 is a detail partial end view of one of the troughs of the machine and its supporting-bracket, showing by dotted and full lines the
55 adjustment or movements of said trough.

Fig. 9 is a detail view, drawn on the same scale as Fig. 5, showing the parts seen in the latter figure, with the addition of the motor,
60 &c. Fig. 10 is a detail partial vertical section on the same scale as Fig. 9, taken in a plane indicated by the dotted line *zz* at Fig. 3.

In the several figures the same parts will be found always designated by the same reference-letter.

A is the main iron frame of the machine, which is formed or made with a laterally-projecting bracket-arm, the main horizontal portion of which is seen at B and the obliquely-
65 arranged bracing part of which I have lettered *b*. On the main horizontal portion of this projecting arm or stand B is mounted, by means of hinged or linked connections *d*, a rocking or adjustable metallic trough C, which, as shown in the drawings, (see particularly Figs. 1, 2, and 8,) may be either ad-
70 justed or set in the position shown in full lines, as shown in the first-named two figures and as also shown in full lines in Fig. 8, in which position it is secured by means of a
80 securing-pin *e*, which engages with an aperture in the upper end of the lug *f* of the arm B, or may be thrown down into the lower position (indicated in dotted lines at Fig. 8) for
85 purposes to be presently described. Projecting laterally from said main frame A and in a plane at right angles from that in which projects the supporting bracket-like stand B
90 is another somewhat similarly constructed bracket-like support composed of a horizontal member D and an obliquely-bracing member *g*, both of which are securely bolted to said main frame, as shown, (see particularly Fig. 4,) and on top of the main member D of
95 said bracket is permanently arranged another trough or shallow segment of a hollow cylinder E, designed for a purpose to be presently explained. The upper end of said main stand or casting A is formed with a cylindrical or
100 disk-like top piece A², on which is mounted, to turn freely around about said part A, (after the fashion of a turn-table,) the base of a casting F, which is held down in place on the said part A² (see specially Figs. 9 and 10) by means

of an annular casting or ring h , which, as shown, is securely bolted to the under face of the casting F and the inner portion of which projects laterally beneath the part A^2 of the main frame or casting. By this arrangement of parts the casting F , while held vertically and laterally in place on top of the main frame, is free to revolve about a vertical axis on motion to the required extent. On this main revoluble or oscillatory casting are mounted all the main working parts of the machine, the arrangements and functions of which parts I will now explain. Bolted to said casting F (see particularly Figs. 1 and 2) is a laterally-projecting bracket-like frame G , on which is mounted an ordinary blower or air-blast device H and which also carries near its outer end a suitable and securely-fastened metallic stand L^2 , in or on which are mounted the shaft k , which carries at one end the pulley L and at its other end a spur-pinion k^2 , and also the counter-shaft or stud m , on which are mounted the spur-gear l , which engages with pinion k , and the spur-pinion n^2 , which meshes with the spur-gear o^2 on the same stud with which is made fast the smaller pulley or band-wheel N , all as plainly shown in the drawings. P is an ordinary electrical motor which is also mounted on and securely fastened to the upper part of said oscillatory casting, which motor is supplied through the wires m^5 , arranged within the tube G^4 , (see Figs. 1 and 9,) with a sufficient and proper supply of current in the usual manner of electrical motors, and on the revoluble shaft of said motor is made fast the main driving-pulley O , from which an endless band travels to and drives the pulley L of the gear system, the upper surface of the top run of said driving-band passing beneath and operating to drive the band-wheel or pulley I of the blower H , (see Figs. 1 and 2,) while the power and motion transmitted by said belt to the pulley L operate through said pulley and its shaft to drive the system of gearing k^2 , l , n^2 , and o^2 , and thus rotate at a greatly-reduced rate of speed the small pulley N , which is fast on the arbor of the spur-gear o^2 , while from this pulley N passes an endless belt to the larger pulley M for a purpose to be presently explained. The air-blast pipe J of the blower H extends upwardly from the latter, thence horizontally, and thence downwardly, as shown at J^2 , (see Figs. 1 and 2,) and supplies the air-blast through said pipe J^2 (see Fig. 10) to the interior of a long hollow shaft or tube T , one end of which is securely fastened in the portion F^4 of the casting F , from which said long hollow shaft projects laterally to serve a purpose which will be presently explained. That end of said hollow shaft which is mounted fast in the upper part of said casting is preferably held in engagement therewith in the proper relative position by means of the set-screws t^5 t^5 (see Fig. 5) and has its extreme end closed up by a sprue-plug t^4 , into which is tapped cen-

trally the threaded end of a gas-supply elbow-pipe f^2 , the outer end of which is coupled to a flexible tube D^2 , which in turn is coupled to the upper elbowed end of the gas-supply pipe E^2 , mounted on the main frame A of the machine and provided at h^2 with a suitable cock or valve, through the manipulation of which by means of the valve-stem i^2 a supply of gas may be at pleasure cut off from or allowed to enter the elbow-pipe f^2 , from which latter extends axially within the tube T the gas-pipe d^2 , which, as shown, extends nearly to the farther or outer end of said tube or hollow shaft. The gas-pipe d^2 is provided with a series of small branch pipes d^3 , extending from different points of the length of said pipe laterally and in different directions and which pass radially through apertures made in the said hollow shaft or tube T and terminate in burners k^2 . The air supplied to the interior of said tube T through the supply-pipe J J^2 enters a chamber I^5 in said tube, from one of the heads of which chamber extend three supply-pipes g^2 , which at their ends communicate, respectively, with the interior of the gas-pipes d^3 , just above referred to, so as to cause the air from J J^2 to unite with the gas in said pipes d^3 , and thereby cause commingled gas and air to flow out of the burners k^2 . Through a small tube s^5 and its branches, which enters the hollow shaft T at a point within the embrace of the part F^4 of the casting F , pass electrical wires s^2 , (see Fig. 5,) which where they terminate at the said burners are used for the purpose of lighting said burners at pleasure, the electrical current for this burner-lighting purpose being controlled or manipulated at pleasure by means of the push-button c^5 (see Fig. 1) on a switchboard Q , that is mounted, as shown, on the main frame of the machine and which carries also an ordinary rheostat at p for controlling the electrical current supplied to the machine, also a double knife-edge switch at q and an ordinary automatic circuit-breaker at r .

The pulley M , which is mounted to turn on the stationary tubular shaft T , is formed or provided at its outer portion with one member m^2 of an ordinary clutch, the other member s of which clutch is formed on the outer oblique projection of a circular disk or cylinder-head t , which is also mounted loosely on the shaft T and which is held laterally in place (in one direction) by a collar or ring a^2 , mounted on the shaft T and secured thereto by an ordinary set-screw b^2 , as most clearly shown at Fig. 5. The outer or farther end of the tubular shaft T is closed up by a screw-plug t^2 , and on said shaft, near said end, is mounted to turn freely a cylinder-head or hubbed disk c^2 , between which disk and the disk t , nearer the other end of said hollow shaft, is placed and clamped in position by means of the tie-rods w , of which there are three, more or less, supplied with suitable nuts, as shown, the tubular roll or cast form

shell B^2 , that is to be subjected to the etching process or operations; rubber gaskets applied at the points u and u^2 for the purpose of effectuating a yielding and tight contact or union between the ends of the shell B^2 and the shouldered annular surfaces of the disks c^2 and t , between which said roll B^2 is securely held. Thus by the arrangements as shown or the assembling of the parts of the shell B^2 with the disks c^2 and t and their appurtenances a hollow cylinder is formed free to revolve on the hollow shaft T and adapted to be rotated at pleasure by being thrown into clutch with the driving-pulley M , which pulley, as before mentioned, is driven at a comparatively low rate of speed through the medium of the system of gearing, pulleys, and bands actuated primarily through the main drive-pulley O by the electrical motor of the machine.

From what has so far been said with reference to the construction and arrangement together of the several parts of the machine alluded to and bearing in mind that the swiveling or oscillatory casting F , on which are mounted all the working parts of the machine, including the motor itself, is adapted to be turned a quarter-revolution at pleasure, so as to locate the laterally-projecting hollow shaft T and all the parts which it carries either immediately over the stationary segmental pan or trough E or over the vertically-adjustable pan or trough C , the following description of the general operation of the machine will, I think, suffice to make plain the whole subject-matter of my invention:

Supposing electrical current to be turned on to the motor in the usual way by manipulation of the rheostat at p and the double knife-edge switch q be set in position to effectuate the proper electrical connection, the working parts of the machine or mechanism will be set in motion, the electric motor operating to drive by the means and in the manner already described both the blower for supplying a blast of air through the pipe J^2 to the air-tubes arranged within the hollow shaft T and the geared shafts, pulleys, and drive-bands, through the medium of which the requisite motion is imparted to the pulley M , mounted loosely on said shaft, and through the medium of the clutch already described said pulley M may be caused at pleasure to impart the requisite rotatory motion to the hollow-form cylinder or shell B^2 , the outer surface of which is to be subjected to the etching operation, and by alternately shifting or oscillating the casting or part F around about the part A^2 of the main frame to the extent of a quarter turn or circle the said tubular roll B^2 to be treated may at pleasure be brought into position immediately over the stationary trough E , which is the washing-trough of the machine, or immediately over the trough C , which contains the acid or chemical liquid within which the said roll B^2 is to

be revolved. The washing of the roll B^2 is effected by applying the washing liquid to the roll as it revolves by means of a hose, brush, cloth, or in any other convenient manner, said liquid falling into the trough E . In periodically bringing the roll B^2 into connection with the contents of the trough C said trough must always be lowered into the dotted-line position (seen at Fig. 8) before swinging the cylinder into place and then elevated to effect the immersion of the lower peripheral surface of the roll B^2 in the liquid contents of said trough, and during the continuous or intermittent (as the case may be) rotation of the clamped-in tubular roll B^2 around about the stationary hollow shaft T the combined air and gas burners may be lighted or extinguished as the process or operations being carried on may require by simply manipulating the button c^5 of the electrical lighting contrivance, while at the same time the proper currents of gas and air are supplied to said burners through the medium of the devices already explained, the air-supply devices being all mounted on and turning with the oscillatory casting F of the machine, while the flexible tube D^2 permits the turning of the gas-supply devices relatively to the main gas-pipe E^2 , which, as before mentioned, is secured to the upper part of the stationary main frame A . I need not describe the details of the electrical motor and its connections, which may be of any approved form, and need only say further, with reference to the general operation of the machine, that by the means shown and described the cast tubular roll B^2 , which is to be subjected to the etching process, may be treated to any extent and in the desired manner by reason of the capacity of the machine to permit the placing of the said cylinder at and to rotate the same axially in the two positions in which the surface of the cylinder is to be subjected to the action of the liquid in the adjustable trough C and to the usual and necessary washing operation immediately over the stationary trough E , while at the same time the interior of the hollow cylinder formed by the temporary union of the tubular roll B^2 with the clamping heads or disks c^2 and t of the machine may at pleasure be heated as required and to the requisite degree by means of the burners k^2 , the operation of which may be controlled by the attendant or operator of the machine, as before described. Of course when the tubular roll B^2 shall have been treated to the requisite extent and in the proper manner it may be removed from the machine by simply unscrewing the nuts of the tie-rods w and sliding endwise off of the hollow shaft T the outer head or disk c^2 , between which and the other head t the said tubular roll B^2 is seen to be clamped in place, whereupon another similar shell or form-cylinder-castings surface will be substituted for B^2 and similarly treated in the machine shown and described.

Manifestly the apparatus may be employed to suitably develop a planographic or lithographic printing-surface, or to suitably develop a relief printing-surface, or to suitably develop an intaglio printing-surface, and it is equally manifest that where the surface to be treated has a design or impression previously imparted to it the design or impression may have been imparted to it in any manner, and it is also manifest that the surface might previously or subsequently be treated in other apparatus, as in a routing-out machine, such as is commonly used in making plates for relief printing.

The apparatus of my invention is especially valuable and important for the purpose of developing relief printing-plates from planographic surfaces to which the design to be printed has been in any way suitably transferred or imparted, as in the form of transfer for lithographic ink. In employing the apparatus to that end the following procedure will be found effective: To the tubular printing device, preferably a hollow cylinder having a continuous cylindrical surface exteriorly of zinc, either electrodeposited upon the inner hollow copper shell or cast upon such a shell, the outer surface of the cylinder being suitably adapted as for planographic printing, is accurately transferred in any suitable way and rolled up with suitable lithographic ink the design or picture to be ultimately printed. Parts of the surface are then painted by hand with asphaltum where occur the big masses of the surface that are to be removed. This asphaltum is to protect those portions of the surface from the action of the acid, so as to leave them for the later action of the routing-machine. The entire surface is then powdered with dragon's-blood powder, which is especially dusted carefully over all of the portions of the surface occupied by the ink of the design. The cylinder or roll is then heated by means of the internal gas-jets described. This melts the dragon's-blood powder and causes it to adhere to the ink of the design. The cylinder is rotated slowly during this heating, so as to cause the melted dragon's-blood to certainly reach every part of the ink of the design. The continued heat bakes it into the ink, and thus subsequently protects the ink and the metal under it from the etching acid. The surplus is then washed off with water, the gas having been turned off. The water cools as well as washes the roll. Thus far the cylinder has been kept over the rinsing-trough E. The cylinder or roll is then swung over the etching-trough C and is there given a slight etching, which is called the "first bite," which may be done by revolving the cylinder slowly in the etching liquor in the trough or by applying that liquor by a brush or otherwise to the surface of the roll. The cylinder is then swung quickly back over the rinsing-trough and thoroughly rinsed with water. The roll is then ordinarily powdered again with

dragon's-blood and baked and washed. It is then swung a second time over the etching-trough and given a second bite with the etching liquor and is then again quickly swung back and rinsed, and this operation is repeated half a dozen times, more or less, with sometimes more than two bakings. The tube or roll will at that point be found to be etched to about half the depth required. It is then painted by hand with asphaltum a second time over those finer and more delicate parts of the design that in the judgment of the operator have had enough etching, this to prevent further etching and so overetching of those parts. Dragon's-blood powder is again applied and the baking operation gone through with and careful washing. The cylinder-roll is then swung over the etching-trough and is etched more boldly than before with stronger liquor and for a longer time, and this is repeated. It is then swung back and washed off. This is repeated two or three times for the deeper etching, and thereupon the roll will be found to be sufficiently etched. The ink of the design and the dragon's-blood and the asphaltum are then suitably removed, as by turpentine, this over the rinsing-trough, and after a good and thorough washing the cylinder is a clean metallic relief-plate without any ink on it at all. The roll is then removed from the apparatus in the drawings and is put into a suitable routing-machine, where the big masses of the surface originally painted over with asphaltum are, according to the design desired to be printed, routed out. The plate after suitable cleansing is then a relief-plate suitable for printing the design originally transferred to it and is ready for printing upon being inked up with suitable inking devices.

Having now sufficiently shown and described my new machine to enable those skilled in the art to understand and practice my invention, either in the precise form in which I have shown it or under some modification thereof, and either as to all or only part of the invention set forth, what I claim as new, and desire to secure by Letters Patent, is—

1. A machine adapted to effectuate the treatment of the external surface of a cylindrical shell or roll, and having a support for said roll, and means for heating the roll, two troughs for containing material for treating the roll exteriorly, the roll-support being mounted in a movable frame whereby the roll may be moved to a position over either trough, and means for revolving said roll, substantially as set forth.

2. A machine adapted to effectuate the treatment of the external surface of a cylindrical shell or roll, consisting of a movable support for said roll, two troughs or receptacles, one for containing liquid for treating the surface of the roll and the other for containing washing liquid, and said support arranged to move the roll over each trough,

and means for revolving said roll while in either of such positions, substantially as set forth.

3. The combination with an oscillatory
5 frame, a shaft for supporting a hollow roll, a motor, and driving mechanism connecting said motor and shaft for revolving the roll on the shaft, the oscillatory frame carrying the shaft and motor and driving mechanism,
10 of a suitable blower, for supplying a blast of air, mounted on said oscillatory frame, and a gas-supply pipe carried by the supporting-

shaft, and within the roll, and having outlets in the same, and such gas-supply pipe being flexibly connected with a stationary source 15 of supply, substantially as set forth.

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

EDWARD HETT.

Witnesses:

EDWIN SEGER,
GEO. W. MILLS, Jr.