

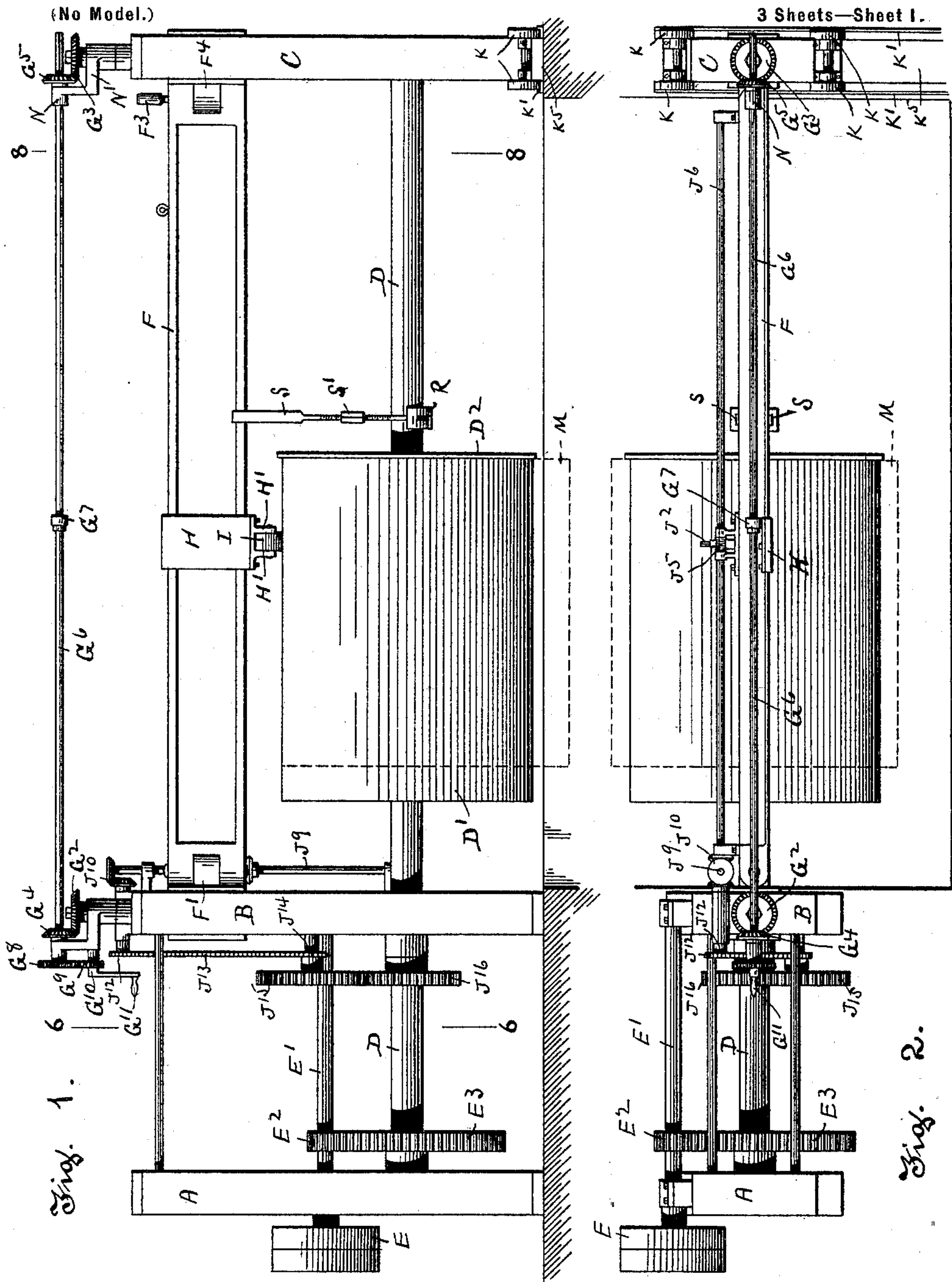
No. 626,260.

Patented June 6, 1899.

J. H. WHITTLE & G. LAYNG.

MACHINE FOR ROLLING SHEET METAL CYLINDERS.

(Application filed Dec. 30, 1896.)



Witnesses  
 A. Whiting  
 Henry W. Fowler

Inventors  
 James H. Whittle  
 George Layng  
 By their Attorney  
 Rufus D. Fowler

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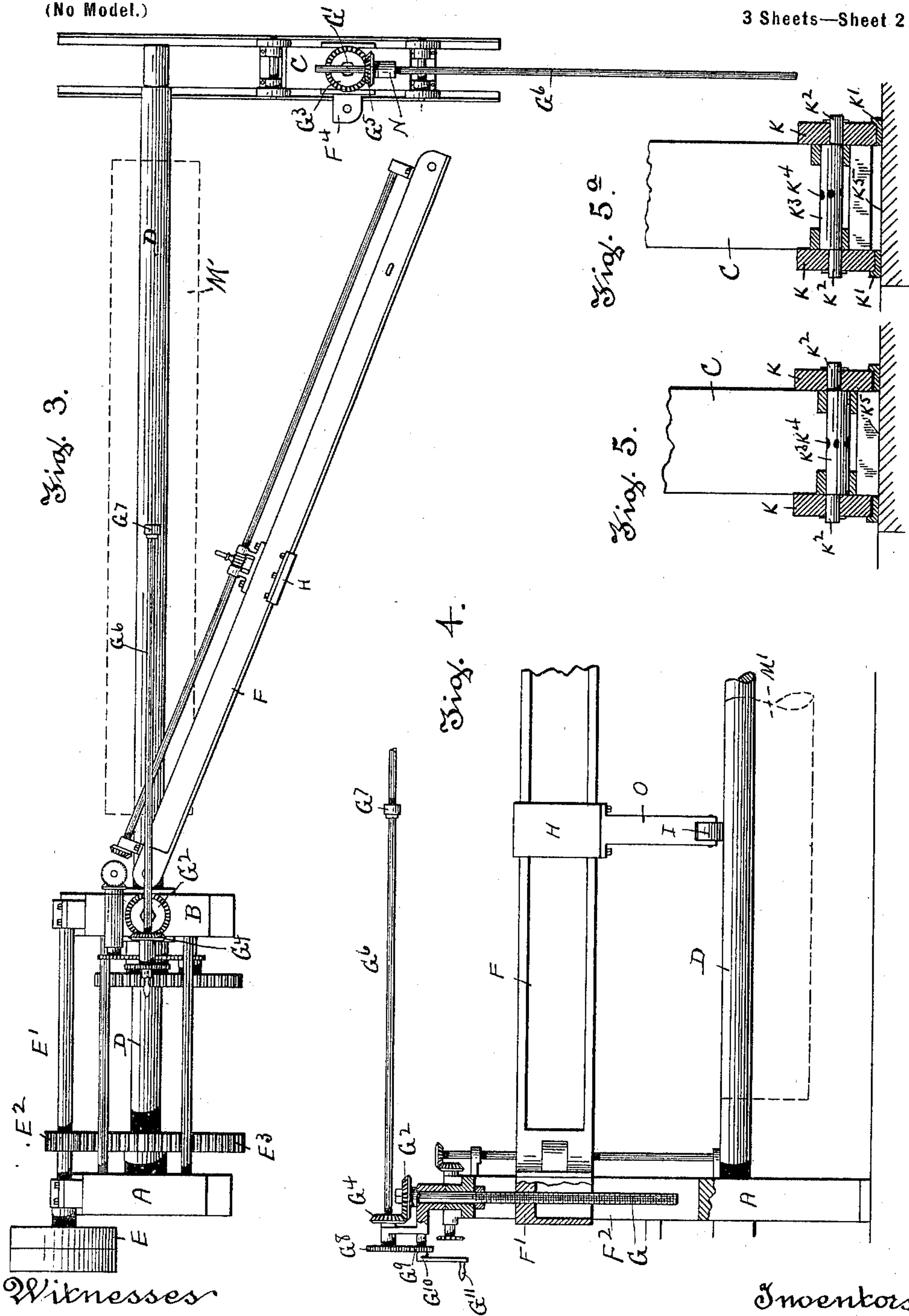
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3 Sheets—Sheet 2.



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Refus B. Fowler



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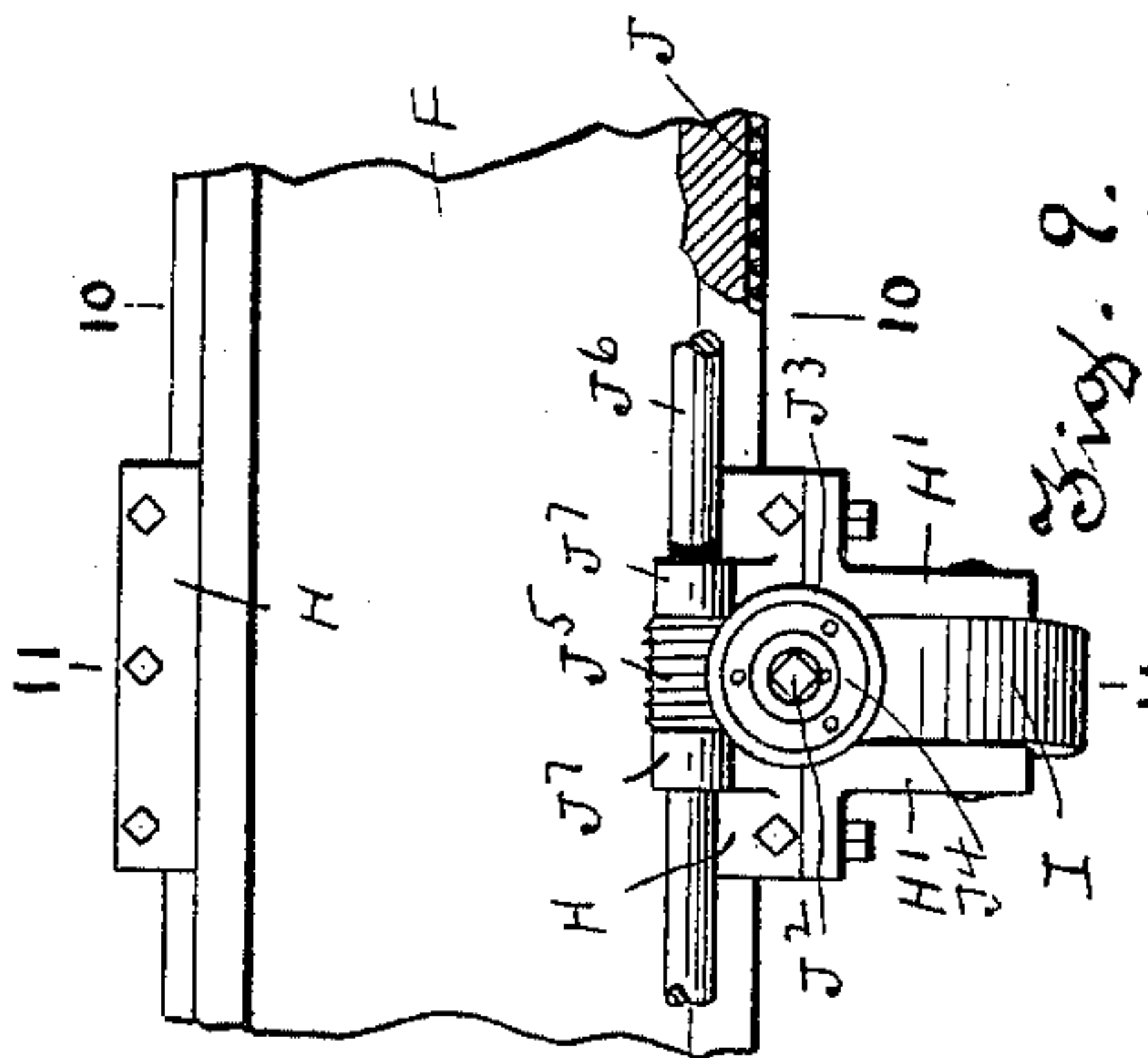
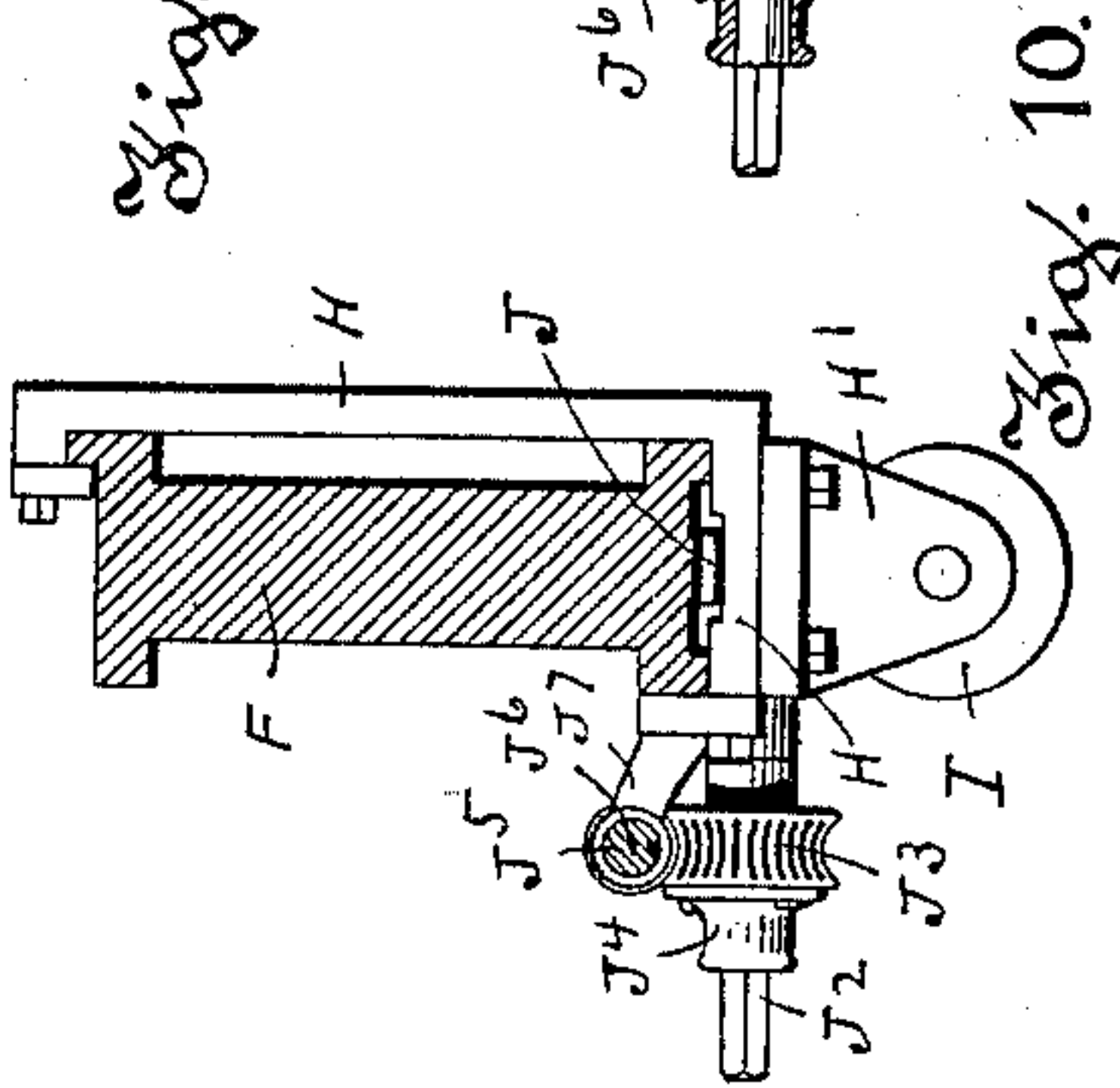
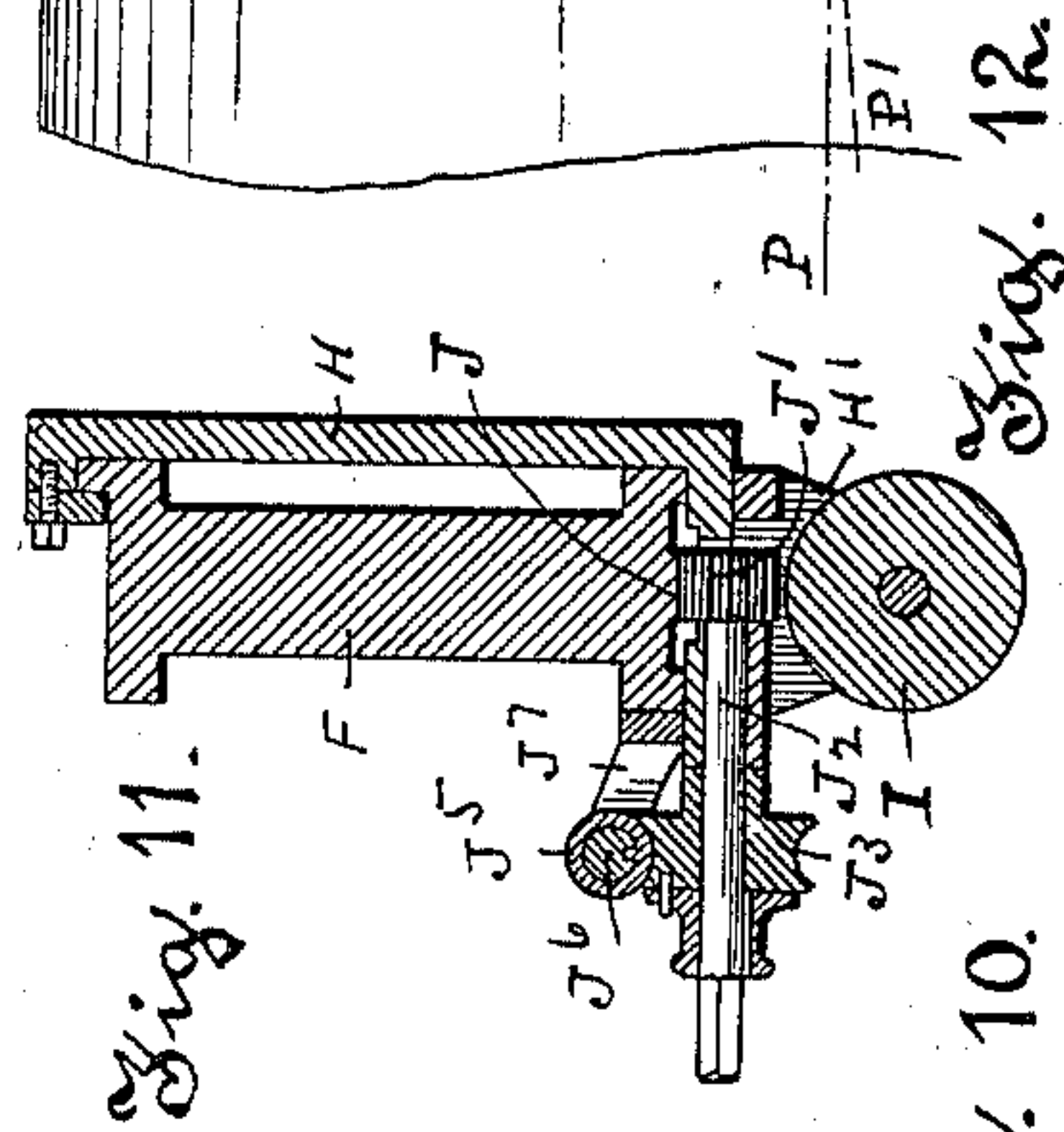
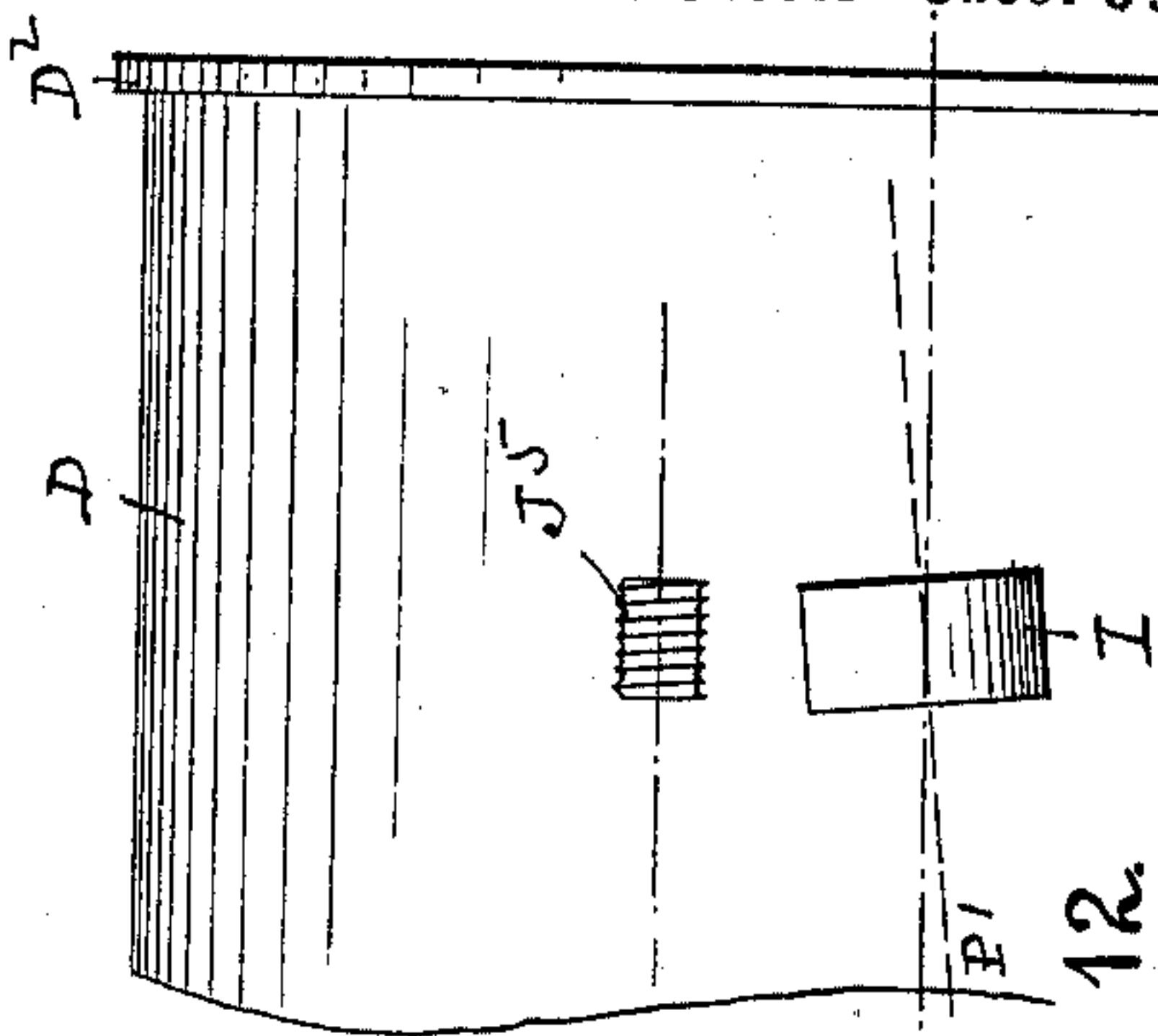
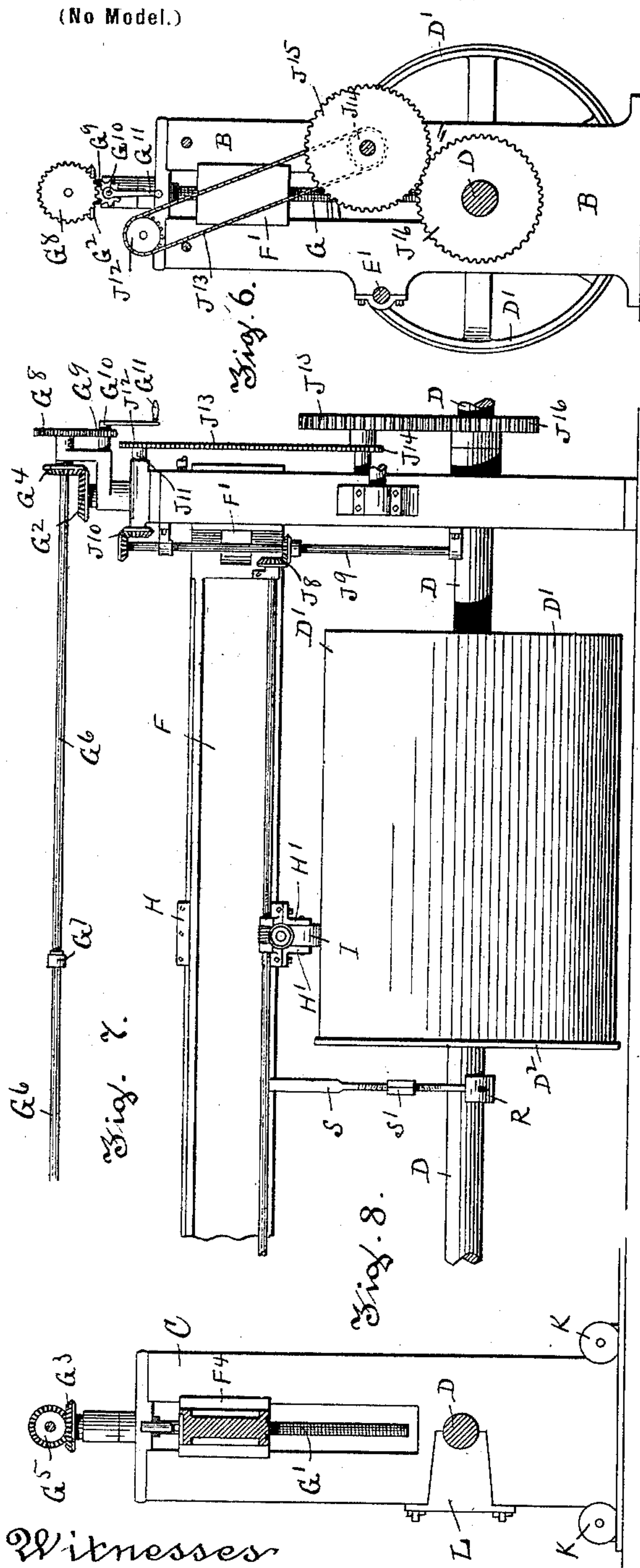
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By their Attorney... George Layng  
Rufus B. Fowler



# UNITED STATES PATENT OFFICE.

JAMES H. WHITTLE AND GEORGE LAYNG, OF WORCESTER, MASSACHUSETTS;  
SAID LAYNG ASSIGNOR TO SAID WHITTLE.

## MACHINE FOR ROLLING SHEET-METAL CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 626,260, dated June 6, 1899.

Application filed December 30, 1896. Serial No. 617,532. (No model.)

*To all whom it may concern:*

Be it known that we, JAMES H. WHITTLE and GEORGE LAYNG, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Machines for Rolling Sheet-Metal Cylinders, of which the following is a specification, reference being had to the accompanying drawings, representing a machine embodying our improvement, in which—

Figure 1 shows a side elevation of the machine. Fig. 2 is a plan view of the same. Fig. 3 is a plan view of the machine, showing one of the housings disconnected therefrom and moved to one side to permit a sheet-metal cylinder to be applied to the machine or removed therefrom. Fig. 4 is a side elevation of a portion of a machine, showing the end containing the removable housing. Fig. 5 represents a portion of the removable housing, showing the supporting truck-wheels rotating upon bearings formed by the ends of a shaft journaled in the housing eccentrically to the truck-wheel bearings. Fig. 5<sup>a</sup> represents the same view as shown in Fig. 5, but with the eccentric shaft K<sup>3</sup> turned to bring the axes of the truck-wheels K below the axis of the shaft for the purpose of raising the housing off its supporting-bed. Fig. 6 is a vertical sectional view on line 6 6, Fig. 1. Fig. 7 is a side elevation of a portion of the machine. Fig. 8 represents a central sectional view on line 8 8, Fig. 1. Fig. 9 is a side view of the traversing carriage carrying the smoothing-roll, shown upon a larger scale than in Fig. 7. Fig. 10 represents a traversing carriage carrying the smoothing-roll, with the cross-bar forming a way for said carriage shown in vertical sectional view on line 10 10, Fig. 9. Fig. 11 is a vertical sectional view on line 11 11, Fig. 9. Fig. 12 is a diagrammatic view representing the drum D', smoothing-roll I, and worm-gear J<sup>5</sup>, showing the angle at which the axis of the smoothing-roll is set relatively to the axis of the drum corresponding with the pitch of the worm-gear.

Similar letters refer to similar parts in the different figures.

The object of our present invention is to

provide an improved machine for rolling sheet-metal cylinders into true cylindrical form and for removing all kinks and inequalities from the surface of the cylinder.

The cylinders to be operated upon by our improved machine are first formed from sheet metal, which is joined at its edges to form a cylinder, the joints being preferably scarf-joints, which are soldered or brazed together.

Our improved machine is especially designed for smoothing and reducing to a true cylindrical surface the outside of copper or brass cylinders such as are usually employed in textile manufacture in spinning or warpdressing machinery; and our invention consists in the construction and arrangement of parts, as hereinafter described, and set forth in the annexed claims.

It is now the custom to smooth the outer surface of such cylinders by forming the cylinder with open ends and placing it upon a heavy horizontal arm adapted to pass through the cylinder and support the same upon its upper surface, which is curved with a curvature either equal to or somewhat less than the curvature of the cylinder, and then rolling the outer surface of the cylinder by means of a small roll, which is made to travel back and forth across the outer surface of the cylinder in a parallel direction with its axis, and at the same time applying pressure to the roll to compress the sheet of metal of which the cylinder is composed between the roll and the upper curved surface of the horizontal arm. This method is effectual in smoothing the outer surface of the cylinder; but it fails to shape it into true circular form by making each portion of its surface to correspond accurately to the arc of the circle, whose diameter equals the diameter of the cylinder. By the present custom the smoothing-roll has a reciprocating motion back and forth over the surface of the cylinder in a line parallel with its axis, and the action of the smoothing-roll at each movement is confined to the narrow path running lengthwise the cylinder. By the use of our improved machine the smoothing-roll is moved slowly lengthwise the cylinder while the cylinder is being rotated, so that the pressure is applied in a spiral path



running around the cylinder from end to end, and the cylinder when finished is not only smooth upon its outer surface, but it is found to be rolled into true cylindrical shape, so that when the cylinder is mounted with suitable heads upon a revolving shaft it will turn with approximate accuracy, due to its outer surface being closely concentric with its axis of rotation.

10 The machine represented in the accompanying drawings as embodying our invention consists of three upright housings A, B, and C, in which is journaled a strong horizontal shaft D, carrying a drum D', upon which the  
15 cylinder to be operated upon is mounted. The housings A and B are maintained in a fixed position and support a driving mechanism by which the shaft D is rotated. Power is applied to rotate the shaft D through a  
20 belt-pulley E, attached to a short counter-shaft E', carrying a pinion E<sup>2</sup>, which engages the gear E<sup>3</sup> on the shaft D.

Between the housings B and C is an I-beam F, hinged at one end to the block F', which  
25 is capable of being adjusted in vertical ways F<sup>2</sup> in the housing B by means of the screw G, which is held from vertical movement in the housing and engages a screw-thread in the block F'. The opposite end of the I-beam F  
30 is detachably connected by a pin F<sup>3</sup> with the block F<sup>4</sup>, which is adjustable in vertical ways F<sup>5</sup> in the housing C by means of a screw G', held from vertical movement in the housing and entering a screw-thread in the block F<sup>4</sup>,  
35 so that the rotation of the screws G and G' will raise or lower the I-beam F. The screws G and G' are provided with beveled gears G<sup>2</sup> and G<sup>3</sup>, which are engaged by beveled gears G<sup>4</sup> and G<sup>5</sup>, attached to a horizontal shaft G<sup>6</sup>.  
40 The shaft G<sup>6</sup> is made in two parts and is connected in the middle by the coupling G<sup>7</sup>. One end of the horizontal shaft G<sup>6</sup> has a spline connection with the beveled gear G<sup>5</sup>, allowing one half of the shaft G<sup>6</sup> to be moved endwise  
45 for the purpose of discontinuing the two halves of the shaft at the coupling G<sup>7</sup>. The opposite end of the shaft G<sup>6</sup> carries a spur-gear G<sup>8</sup>, which is engaged by the pinion G<sup>9</sup> on a crank-shaft G<sup>10</sup>, turning upon a fixed stud  
50 and provided with a crank G<sup>11</sup>.

The I-beam F forms a way for the carriage H, which is provided on its under side with lugs H' H', in which is journaled the smoothing-roller I. The under side of the I-beam  
55 F is provided with a rack J, which is engaged by the pinion J', Fig. 11, attached to the short shaft J<sup>2</sup>, journaled in the carriage H transversely to the I-beam F. The shaft J<sup>2</sup> is provided with a worm-gear J<sup>3</sup>, capable of turning  
60 loosely upon the shaft J<sup>2</sup>, but connected therewith by the clutch J<sup>4</sup>, which has a spline connection with the shaft J<sup>2</sup>. The worm-gear J<sup>3</sup> is engaged by the worm-gear J<sup>5</sup>, carried upon and having a spline connection with the horizontal shaft J<sup>6</sup>, journaled in bearings attached  
65 to the side of the I-beam F. The ends of the

worm-gear J<sup>5</sup> are inclosed by lugs J<sup>7</sup> J<sup>7</sup>, attached to the carriage H, so that the worm-gear J<sup>5</sup> is moved along the shaft J<sup>6</sup> by the movement of the carriage H. The shaft J<sup>6</sup> is  
70 driven through beveled gears J<sup>8</sup> by a vertical shaft J<sup>9</sup>, which is connected by beveled gears J<sup>10</sup> with the short shaft J<sup>11</sup>, carrying a sprocket-wheel J<sup>12</sup>, connected by a chain J<sup>13</sup> with the sprocket-wheel J<sup>14</sup>, attached to the hub of the  
75 gear-wheel J<sup>15</sup>, which turns upon a fixed stud projecting over the side of the housing B and is engaged by a gear-wheel J<sup>16</sup>, attached to the rotating shaft D, by which a traversing motion is given to the smoothing-roll I along  
80 the drum D'. After the smoothing-roll I has moved the length of the drum it is returned by disconnecting the clutch J<sup>4</sup> and applying a crank to the end of the shaft J<sup>2</sup>.

The housing C is mounted upon truck-wheels K, adapted to run upon the rails K', forming a horizontal track. Each of the truck-wheels K turns upon the ends K<sup>2</sup> K<sup>2</sup> of a shaft K<sup>3</sup>, which is journaled in the housing C eccentrically with the axes of the truck-wheels  
85 K. The shaft K<sup>3</sup> is provided with a series of holes K<sup>4</sup> to receive a spanner for the purpose of rotating the shaft K<sup>3</sup> in its bearings, so it may be turned half a revolution from the position shown in Fig. 5 to the position shown  
90 in Fig. 5<sup>a</sup> in order to bring the axes of the truck-wheels below the axis of the shaft. When the shaft K<sup>3</sup> is in the position shown in Fig. 5, the bottom of the housing rests upon the bed K<sup>5</sup>; but when the shaft K<sup>4</sup> is turned  
100 half a revolution into the position shown in Fig. 5<sup>a</sup> the housing is raised off the bed K<sup>5</sup> and becomes supported by the truck-wheels K. The end of the shaft D is journaled in a bearing in the housing C, which is closed by  
105 a removable block L, Fig. 8, which allows the housing C to be released from the shaft D and moved along the rails K' for the purpose of freeing the end of the shaft D and allowing  
110 a cylinder to be carried over the end of the shaft and upon the drum D' into the position indicated by the broken lines M, Figs. 1 and 2.

When it is necessary to release the end of the shaft D for the purpose of entering or removing the cylinder, the upper horizontal  
115 shaft G<sup>6</sup> is parted in the middle by releasing the coupling G<sup>7</sup>, as represented in Fig. 3, and as one end of the shaft G<sup>6</sup> is supported in a bearing N in the end of a bracket N', pivoted upon the screw G', the shaft G<sup>6</sup> is capable of  
120 being swung around the screw G', as represented in Fig. 3. One end of the I-beam F is released from the block F<sup>4</sup> by the withdrawal of the pin F<sup>3</sup>, allowing the I-beam F to be swung to one side by means of its hinged  
125 connection with the block F'. The removable block L in the housing C is then withdrawn, and the eccentric shaft K<sup>3</sup> is turned from the position shown in Fig. 5 to the position shown in Fig. 5<sup>a</sup>, and the housing C is then  
130 moved to one side, as represented in Fig. 3, thereby freeing the end of the shaft D.



When cylinders of smaller diameter are to be formed, they may be placed directly upon the shaft D, as represented by broken lines M', Figs. 3 and 4, and when such is the case the revolving roller instead of being held in lugs H' H', as shown in Fig. 1, is carried in the end of an extension-arm O, Figs. 4 and 12. The drum D' is provided at one end with a flange D<sup>2</sup> to prevent the longitudinal movement of the cylinder upon the drum while it is being compressed by the smoothing-roll I. The smoothing-roll I is journaled in the lugs H' H', with its axis in a horizontal plane parallel with the horizontal plane containing the axis of the shaft D; but the vertical plane containing the axis of the smoothing-roll I is not parallel with the vertical plane containing the axis of the shaft D, it being at an angle thereto, as represented in the diagrammatic Fig. 12, where the broken line P indicates the vertical plane of the axis of the drum D' and the broken line P' indicates the vertical plane of the smoothing-roll I. The axis of the smoothing-roll I is placed at a sufficient angle to the axis of the drum D' so that the rolling contact of the smoothing-roll I with the surface of the drum will tend to carry the roller in a spiral path around the drum, said spiral path corresponding with the pitch of the screw-thread in the worm-gear J<sup>5</sup> for the purpose of relieving the worm-gear from strain.

The shaft D may be supported near its center by a block R, held against the under side of the shaft D by the rods S, which are made in two parts having right and left hand screw-threaded sections connected by the right and left hand nuts S', whereby the block R may be drawn into close contact with the under side of the shaft D.

The drum D', or, in case a small cylinder is turned, the shaft D, will serve as an anvil to receive the pressure of the smoothing-roll, and the I-beam F is arranged parallel with the axis of the shaft D and in the same vertical plane and is provided with a track along which the carriage H moves, carrying the smoothing-roll I, lying in the plane including the I-beam F and the shaft D, so that the pressure upon the smoothing-roll is exerted in the plane of the I-beam F.

The operation of our improved machine is as follows: A cylinder formed of ductile sheet metal, with open ends, is placed upon the drum D' in the position indicated by the broken lines M, Figs. 1 and 2. The removable housing C is then moved along the rails K' to bring the free end of the shaft into its bearing, the truck-wheels are raised, allowing the housing to rest in a fixed position, and the removable block L is inserted. The I-beam F is then connected with the housing C by means of the pin F<sup>3</sup>, and the horizontal shaft G<sup>6</sup> is connected by the coupling G<sup>7</sup>. The screws G and G' are then rotated to lower the I-beam F and bring the smoothing-roll I into contact with the cylinder at the end opposite

the flange D<sup>2</sup>. Power is applied to rotate the shaft D and drum D', carrying the cylinder supported thereon beneath the smoothing-roll, which bears with sufficient pressure to completely smooth the surface of the cylinder. During the rotation of the cylinder carried by the drum D' the smoothing-roll I is fed along toward the flange D<sup>2</sup> until the entire surface of the cylinder has been traversed. The shaft D and the I-beam F are then released from the housing C and the housing is moved to one side to allow the cylinder to be removed and a new one placed upon the drum D', when the operation is repeated.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a machine for rolling sheet-metal cylinders, the combination of housings for a horizontal shaft, a shaft journaled in said housings and forming an anvil for the cylinder, a smoothing-roll, a carriage supporting said roll, a beam parallel with the axis of said shaft and provided with a way for said carriage, means for moving said bar toward said shaft for the purpose of applying pressure to said roll, substantially as described.

2. In a machine for rolling sheet-metal cylinders, the combination of a horizontal shaft properly journaled to serve as an anvil for the cylinder, a carriage capable of a movement parallel with the axis of said shaft, a rotating screw by which said carriage is actuated and a smoothing-roll supported by said carriage and having its plane of rotation at an angle to the line of movement to said carriage corresponding to the pitch of the thread on said screw, substantially as described.

3. In a machine for rolling sheet-metal cylinders, the combination of a pair of housings, a shaft journaled in said housings, one of said housings being removable to free one end of said shaft, a beam hinged to one of said housings and detachably attached to the other of said housings, a carriage adapted to run on said beam, a smoothing-roll supported by said carriage and means for traversing said carriage along said beam, substantially as described.

4. The combination with housings and a shaft journaled in said housings of a beam located in a vertical plane above said shaft and having a rack and a way for a carriage, a carriage, a roll supported by said carriage, a pinion journaled in said carriage and engaging said rack and means for rotating said pinion, substantially as described.

5. In a machine for rolling sheet-metal cylinders, the combination of a rotating shaft adapted to turn a cylinder resting thereon by frictional contact, a smoothing-roll arranged to bear upon that portion of the cylinder resting upon said shaft, and means for applying pressure to said roll, whereby the cylinder is compressed by a pressure received simultaneously upon its outer and inner surface, substantially as described.



6. The combination of a fixed housing, a  
track, a movable housing provided with truck-  
wheels adapted to run on said track, means  
for fixing the position of said movable hous-  
5 ing, a shaft journaled in said housing, a  
smoothing-roll arranged to bear on a cylinder  
carried by said shaft, means for applying pres-  
sure to said roll, and means for moving said

roll parallel with the axis of said shaft, sub-  
stantially as described.

Dated this 19th day of December, 1896.

JAMES H. WHITTLE.

GEORGE LAYNG.

Witnesses:

RUFUS B. FOWLER,

HENRY W. FOWLER.