

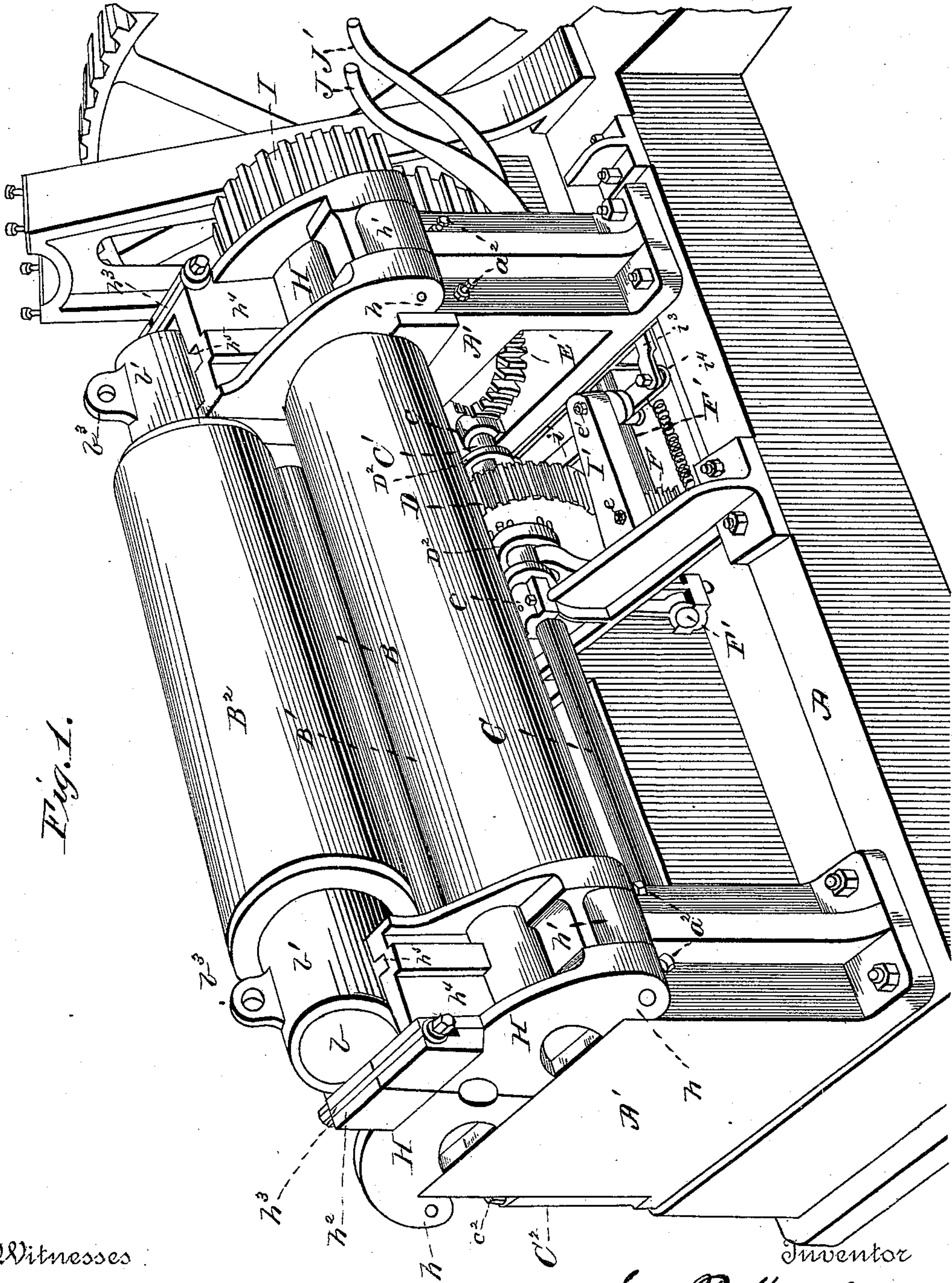
(No Model.)

6 Sheets—Sheet 1.

S. P. WATT.
ROLLS.

No. 437,540.

Patented Sept. 30, 1890.



Witnesses

M. B. Harris

K. B. Brereton

Inventor

S. P. Watt

By his Attorney

Wm. H. Brereton

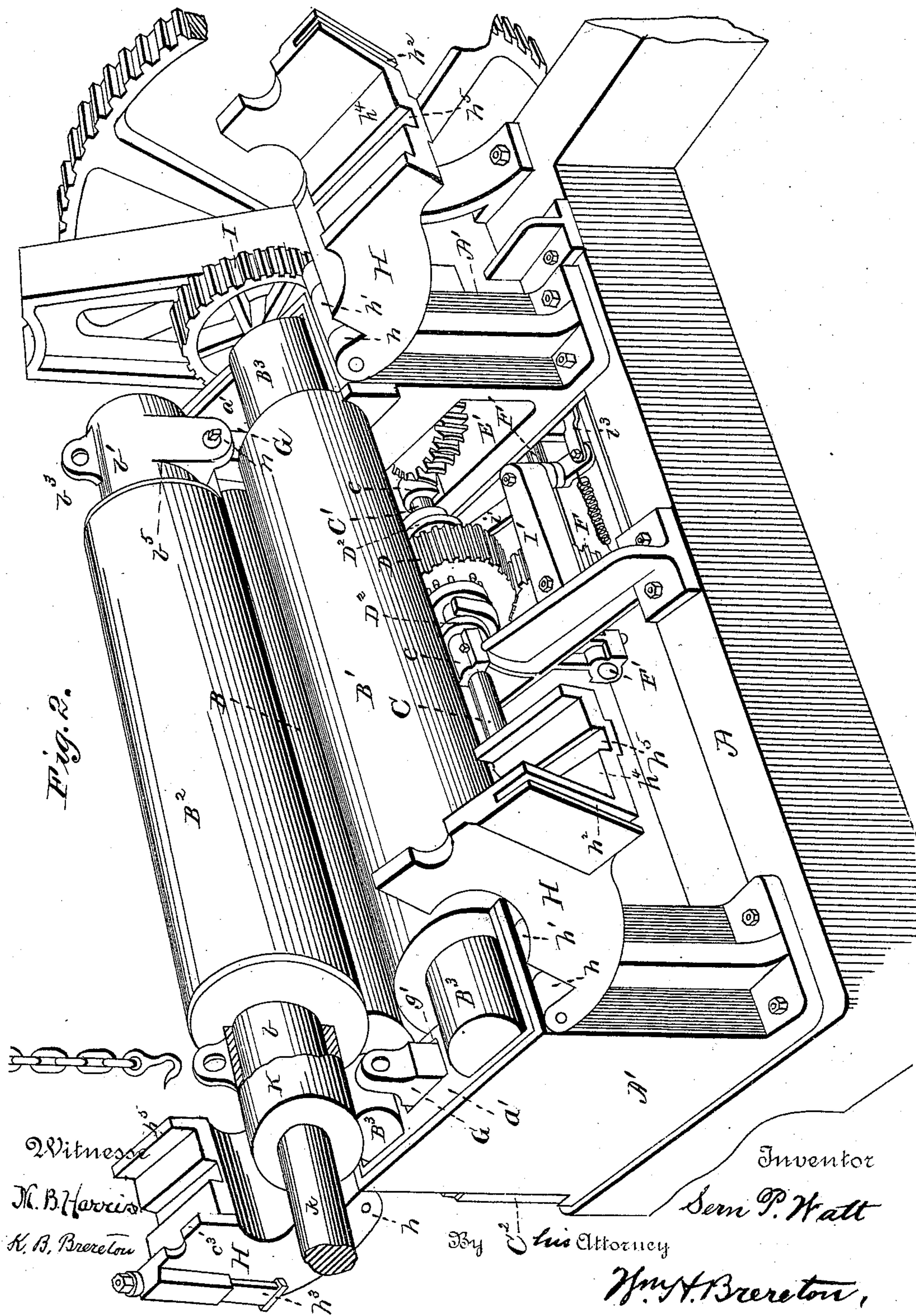
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6 Sheets—Sheet 2.

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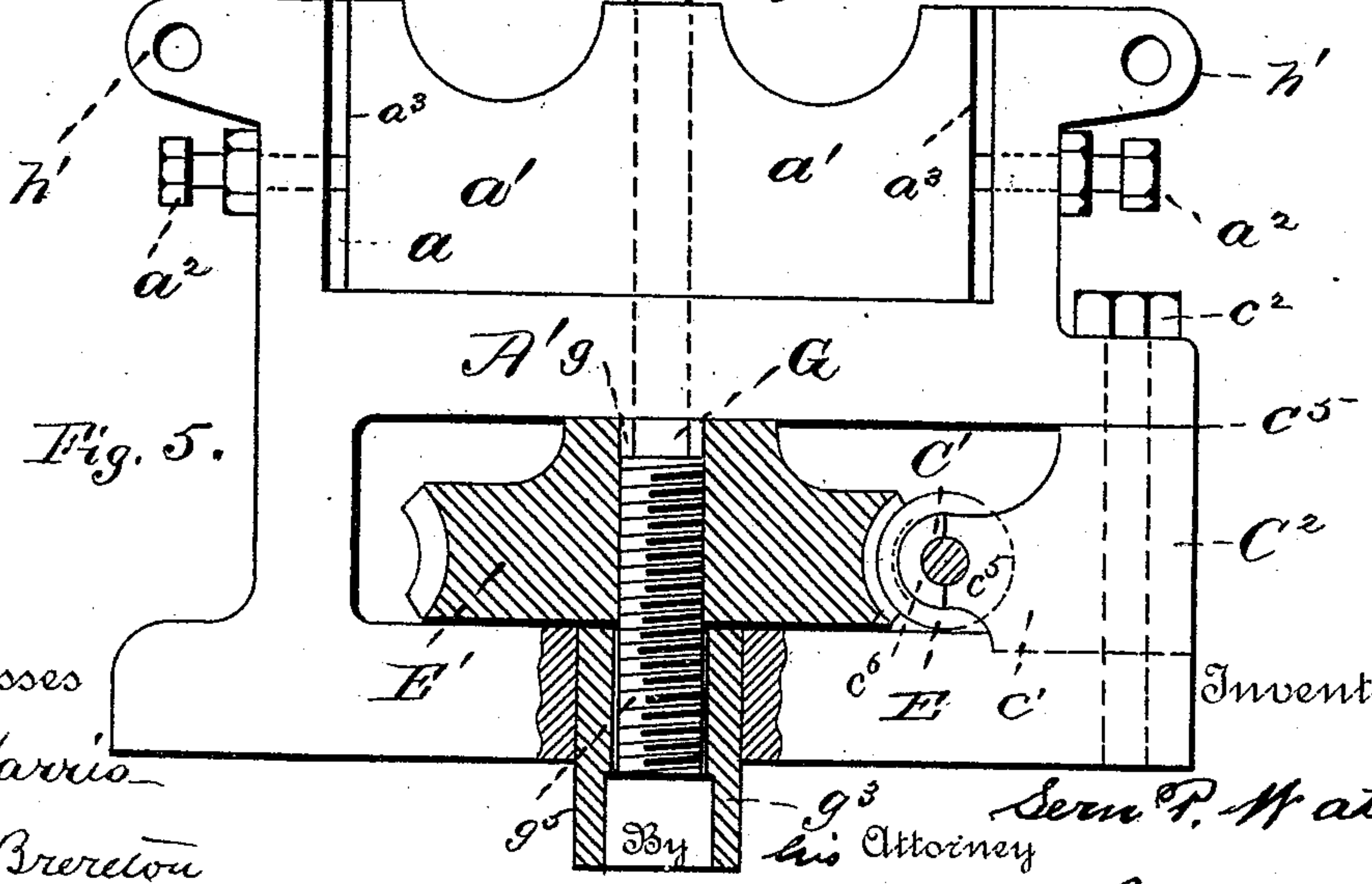
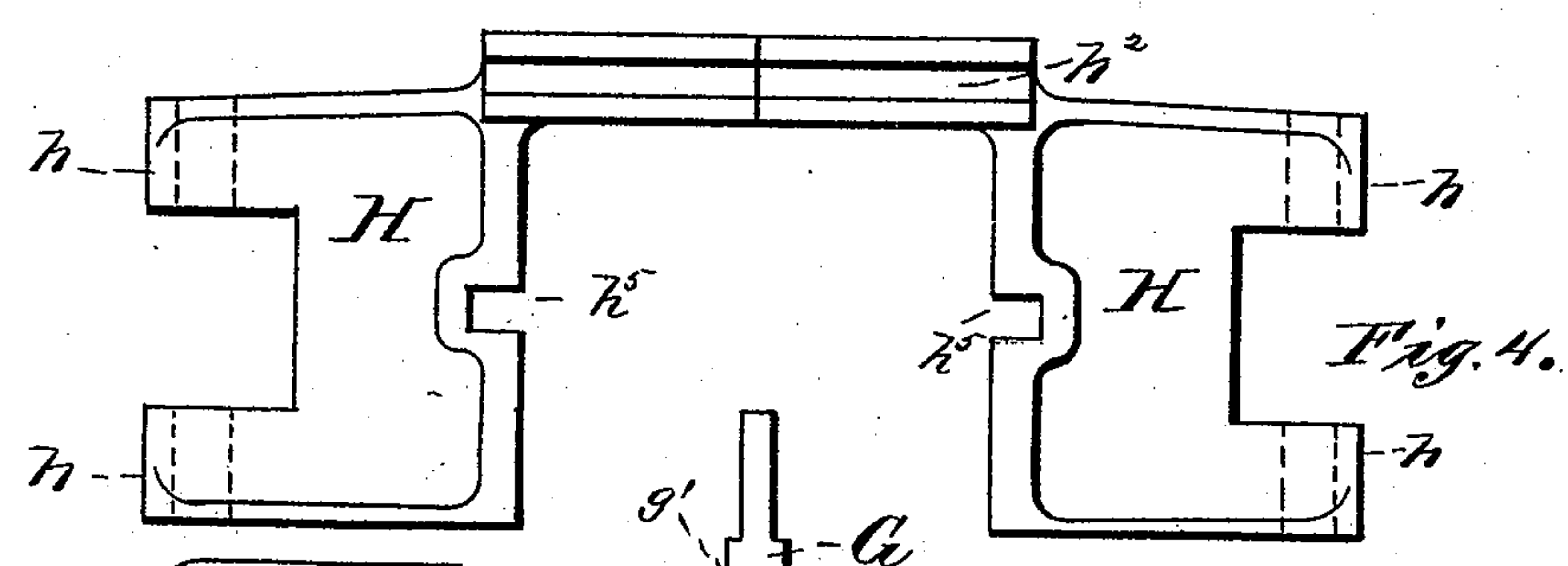
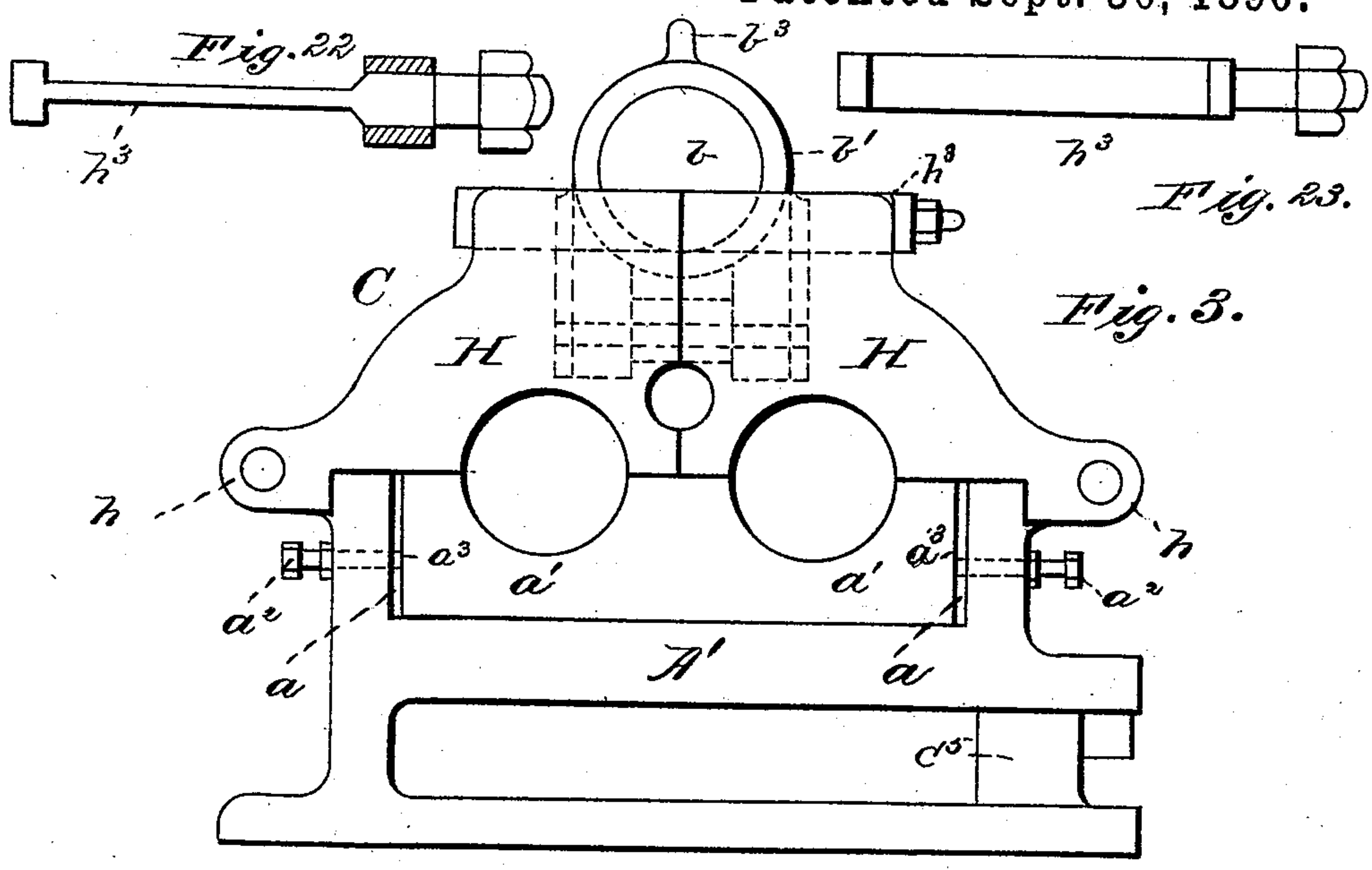
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6 Sheets—Sheet 3.

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Witnesses
M. B. Harris
N. B. Brereton

Inventor
S. P. Watt
his Attorney
Wm. H. Brereton

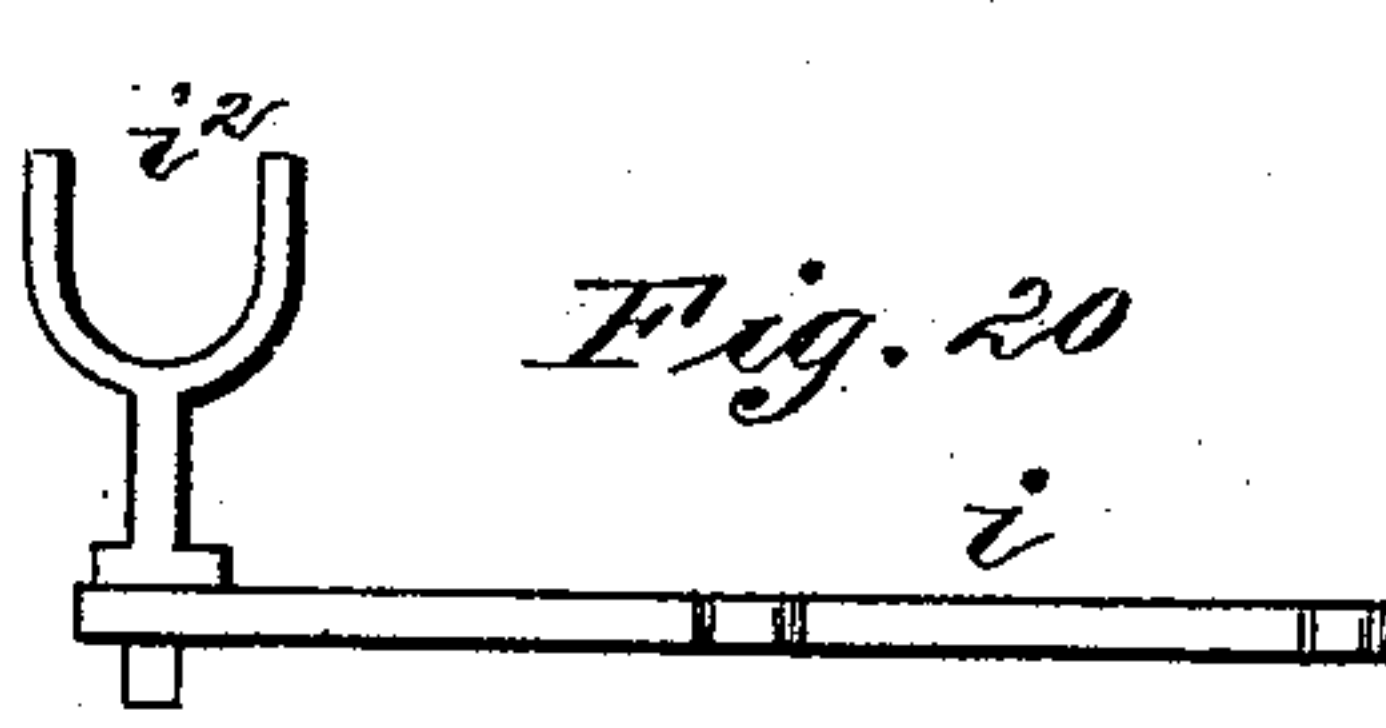
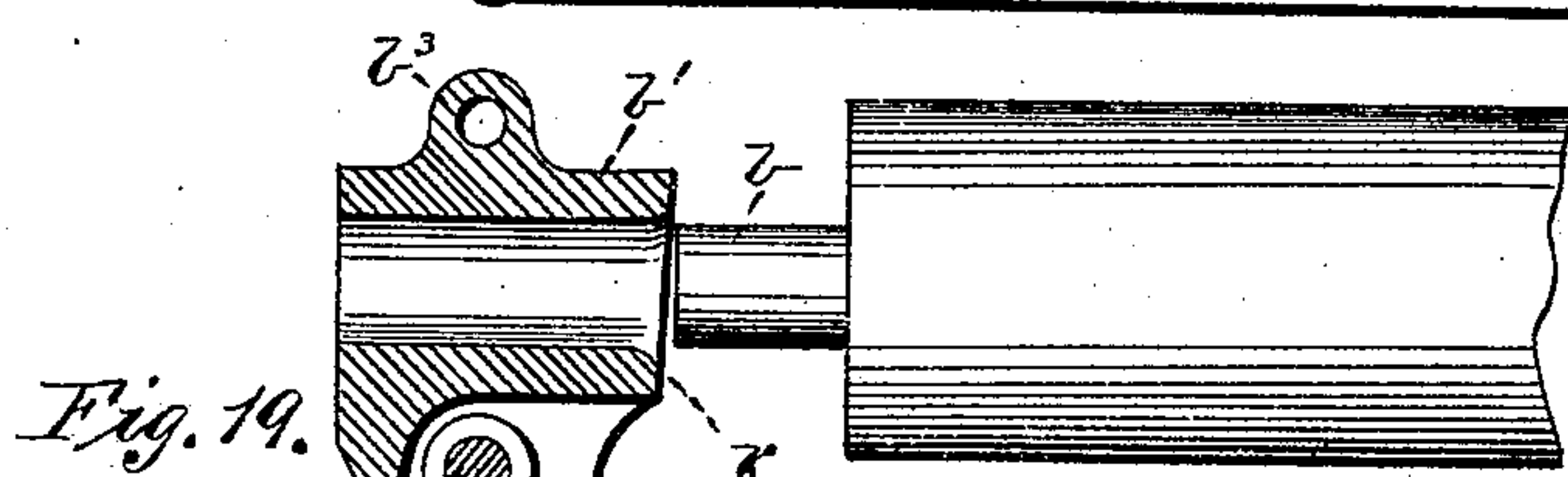
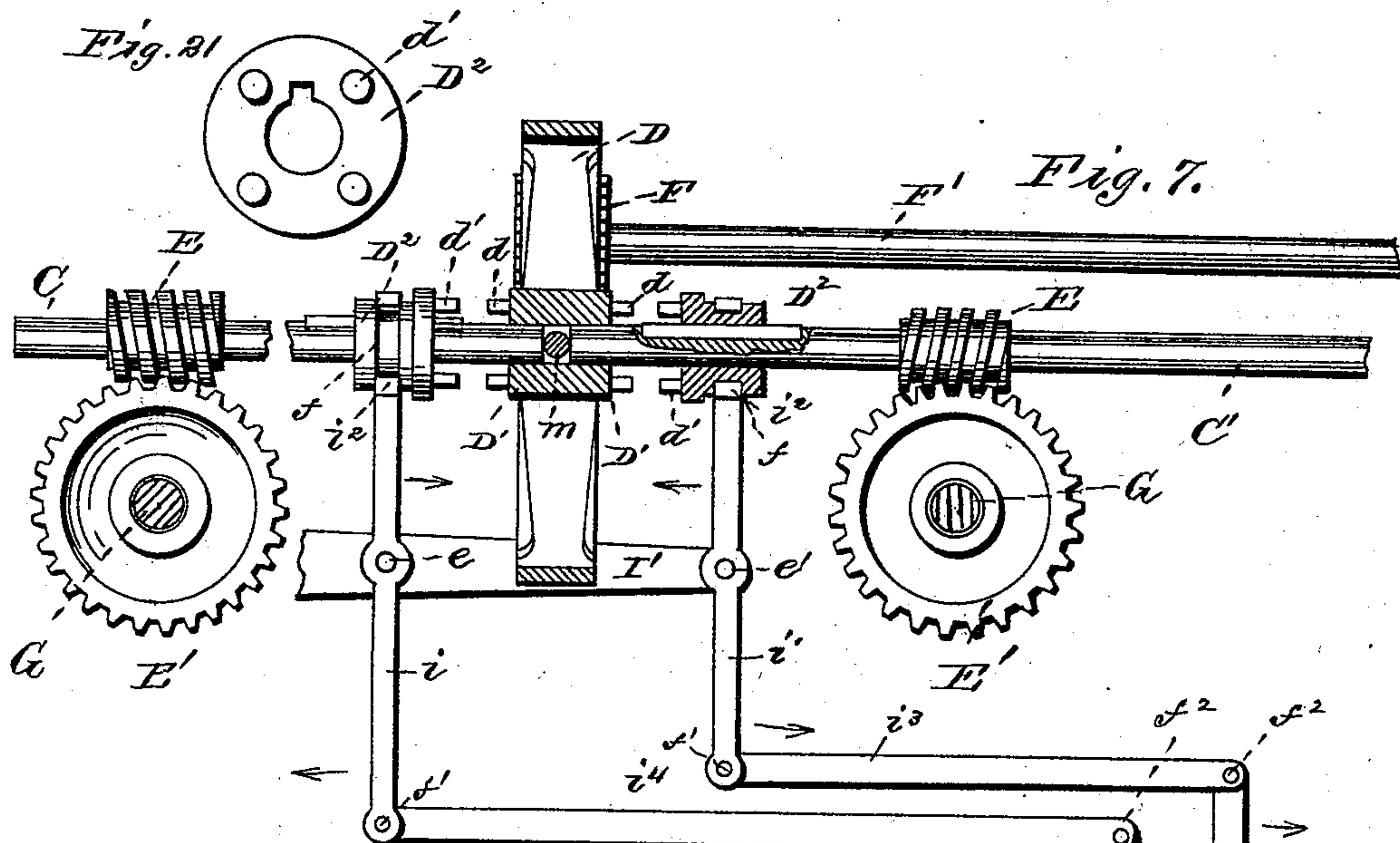
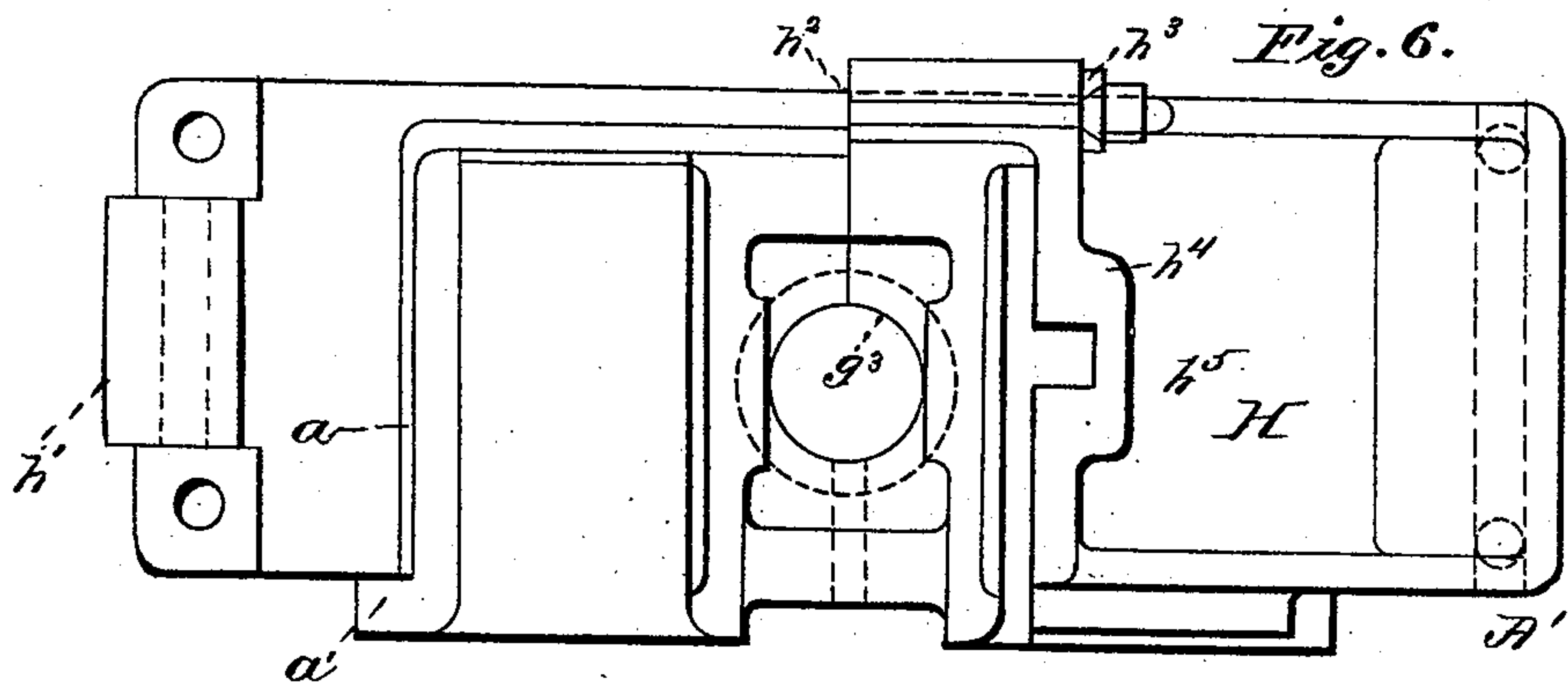
(No Model.)

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ROLLS.

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Witnesses

M. B. Harris

H. B. Brereton

Sern P. Watt

By his Attorney

Wm. H. Brereton

(No Model.)

6 Sheets—Sheet 5.

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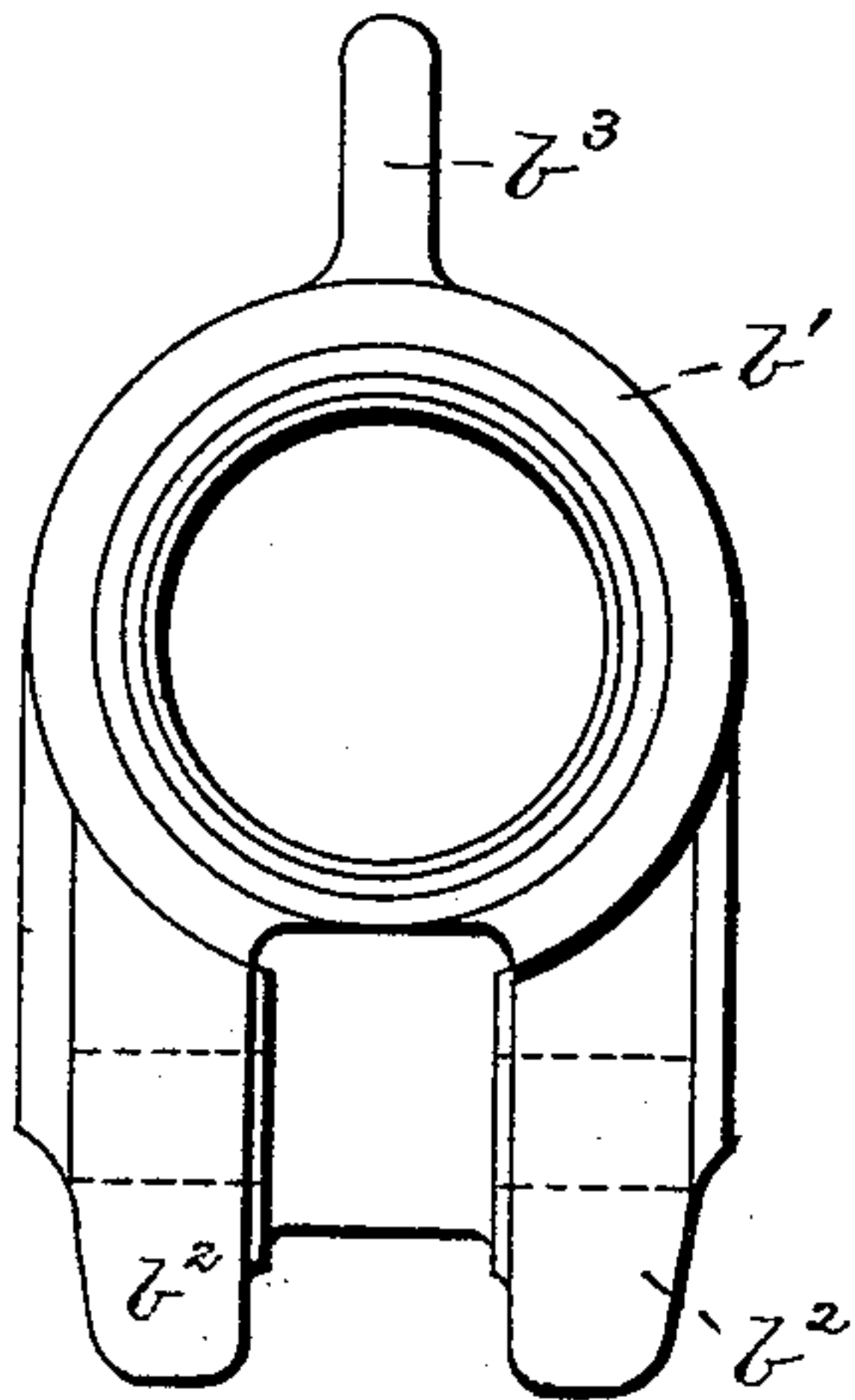


Fig. 9.

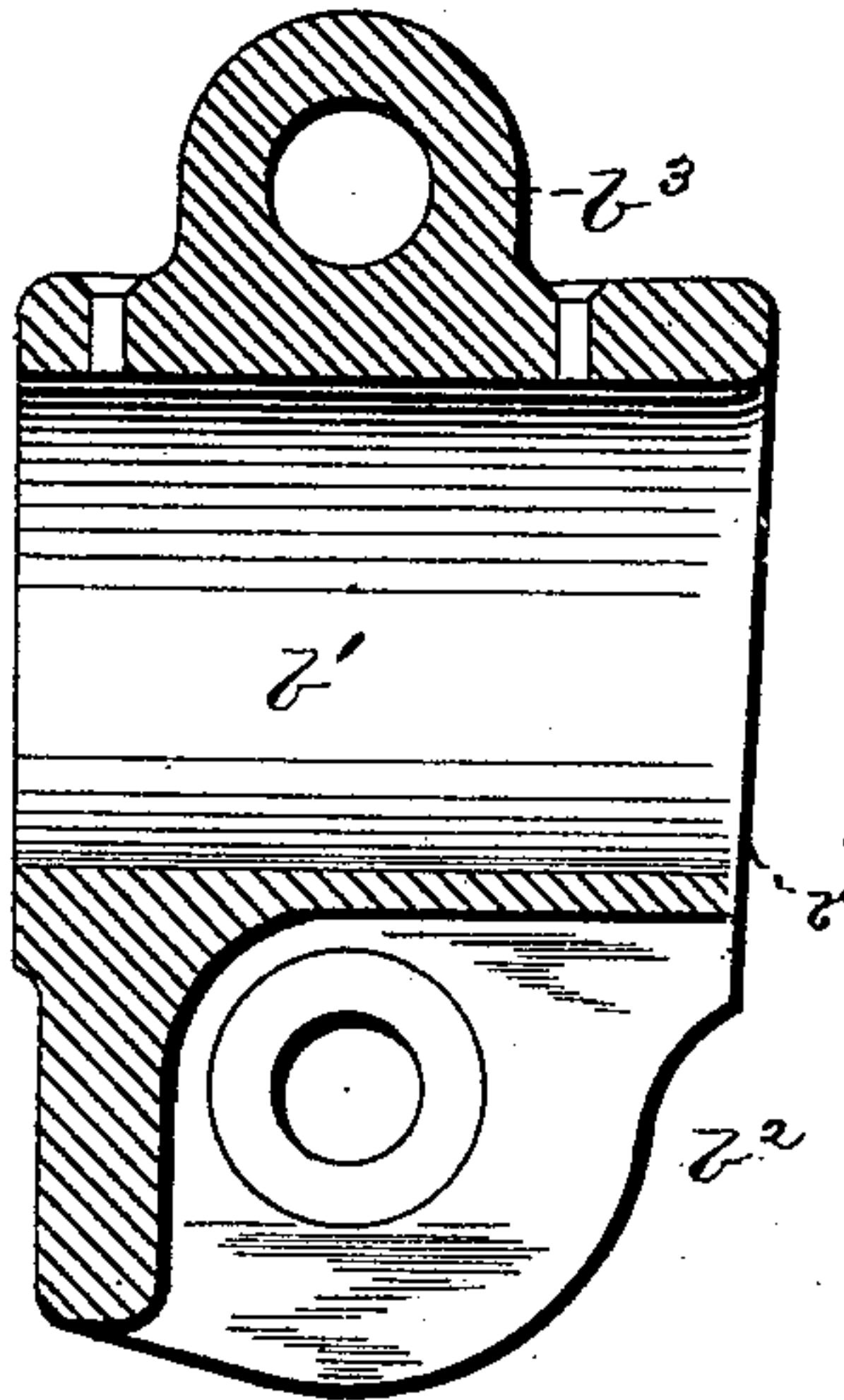


Fig. 10.

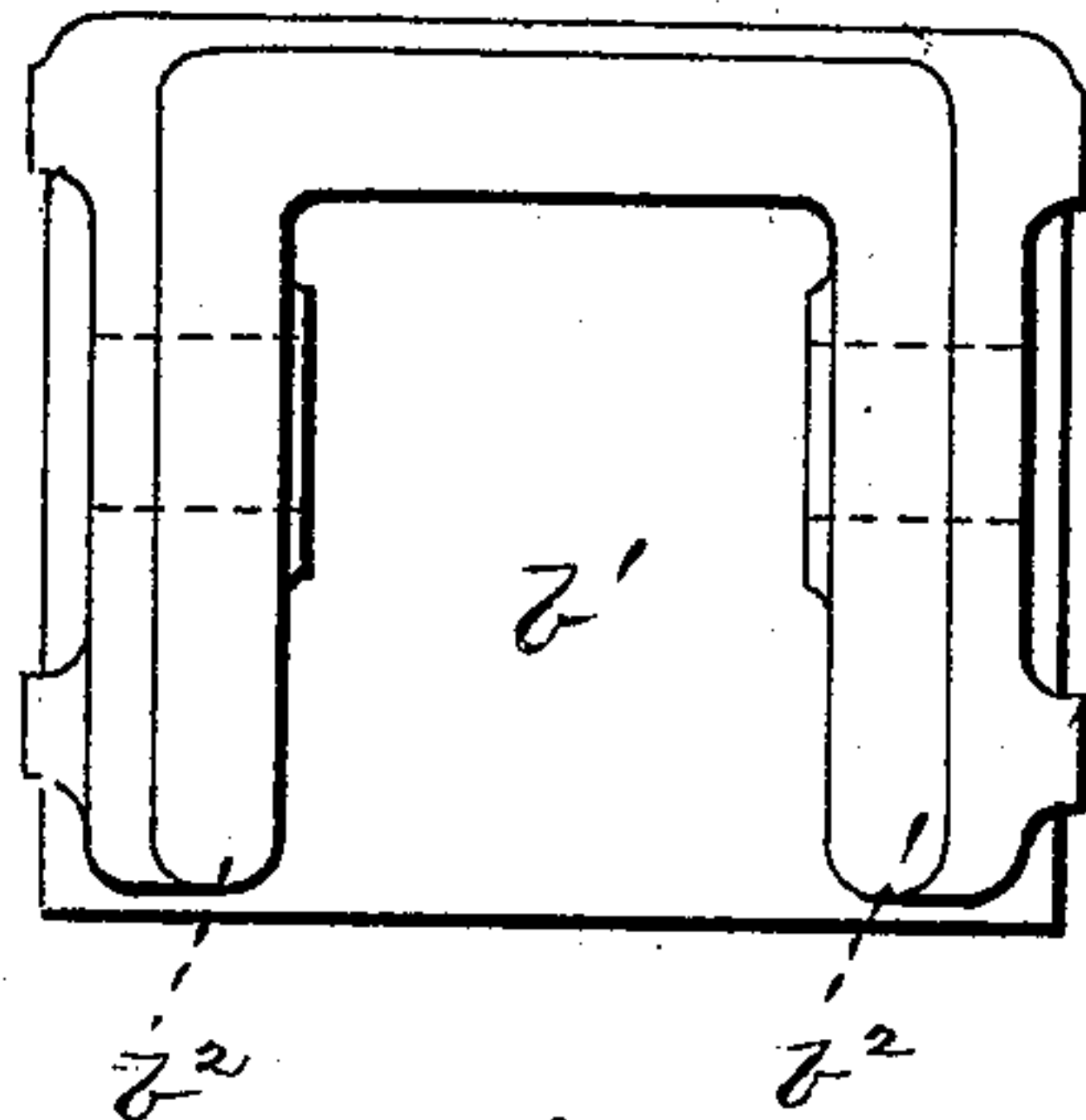


Fig. 11.

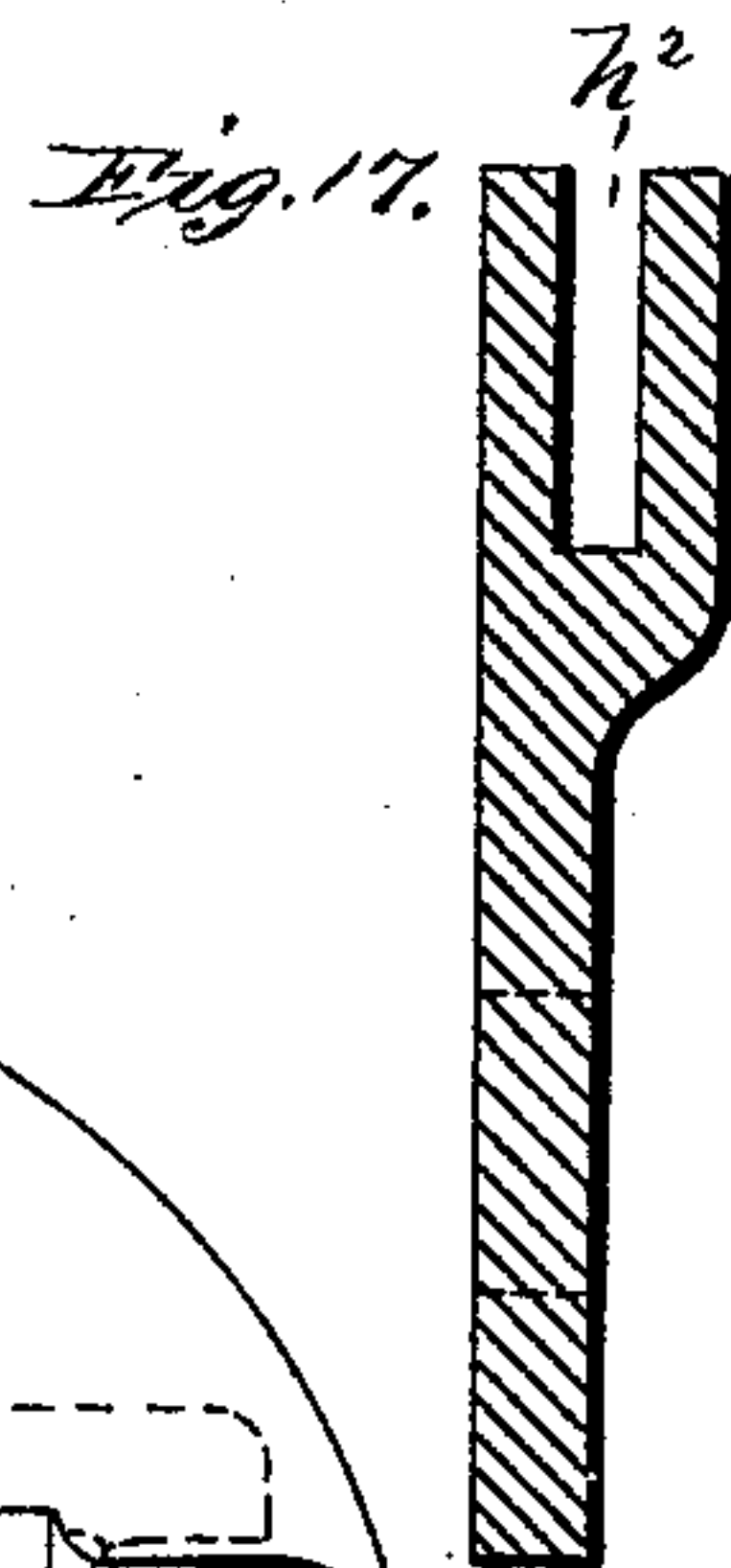


Fig. 17.

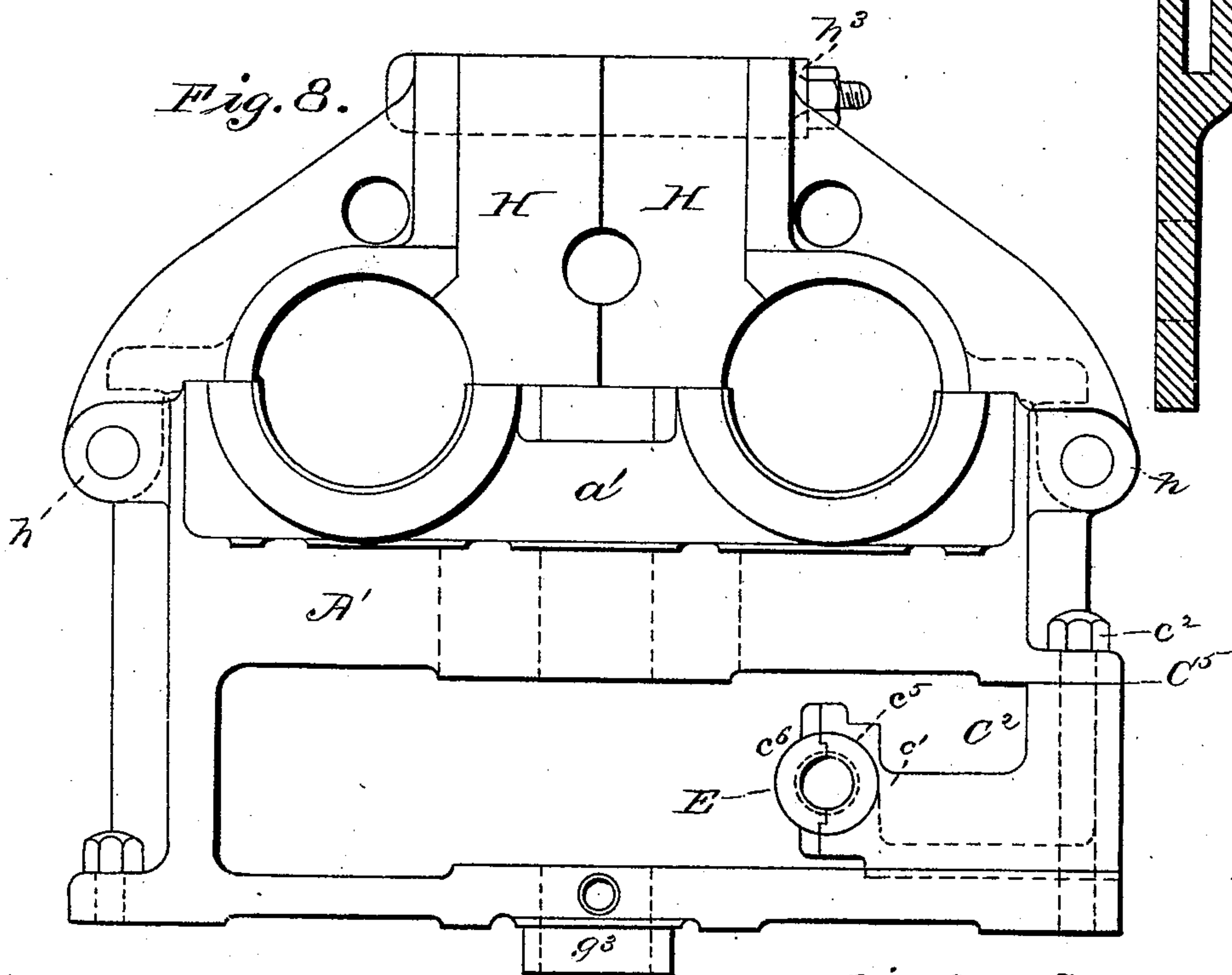


Fig. 8.

Witnesses

H. B. Harris

H. B. Brereton

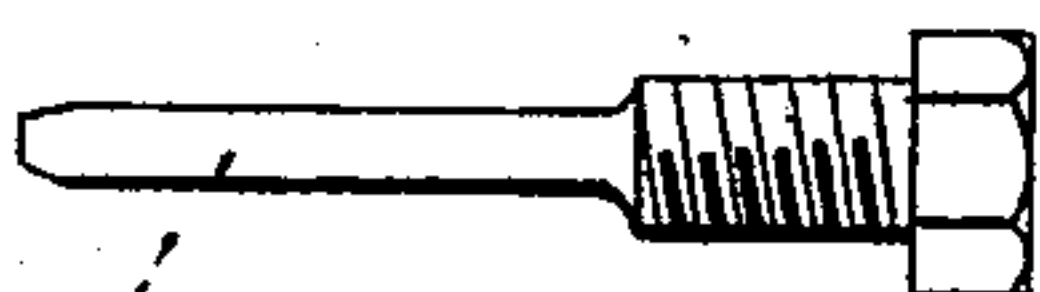


Fig. 18

Inventor

Sern P. Watt

By his Attorney

H. B. Brereton

(No Model.)

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Fig. 16.

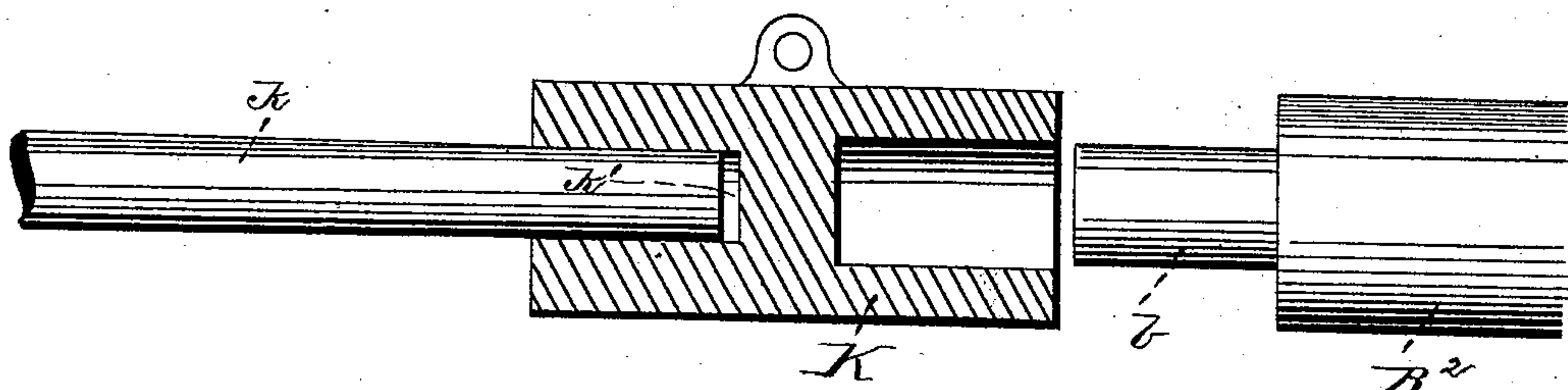


Fig. 12.

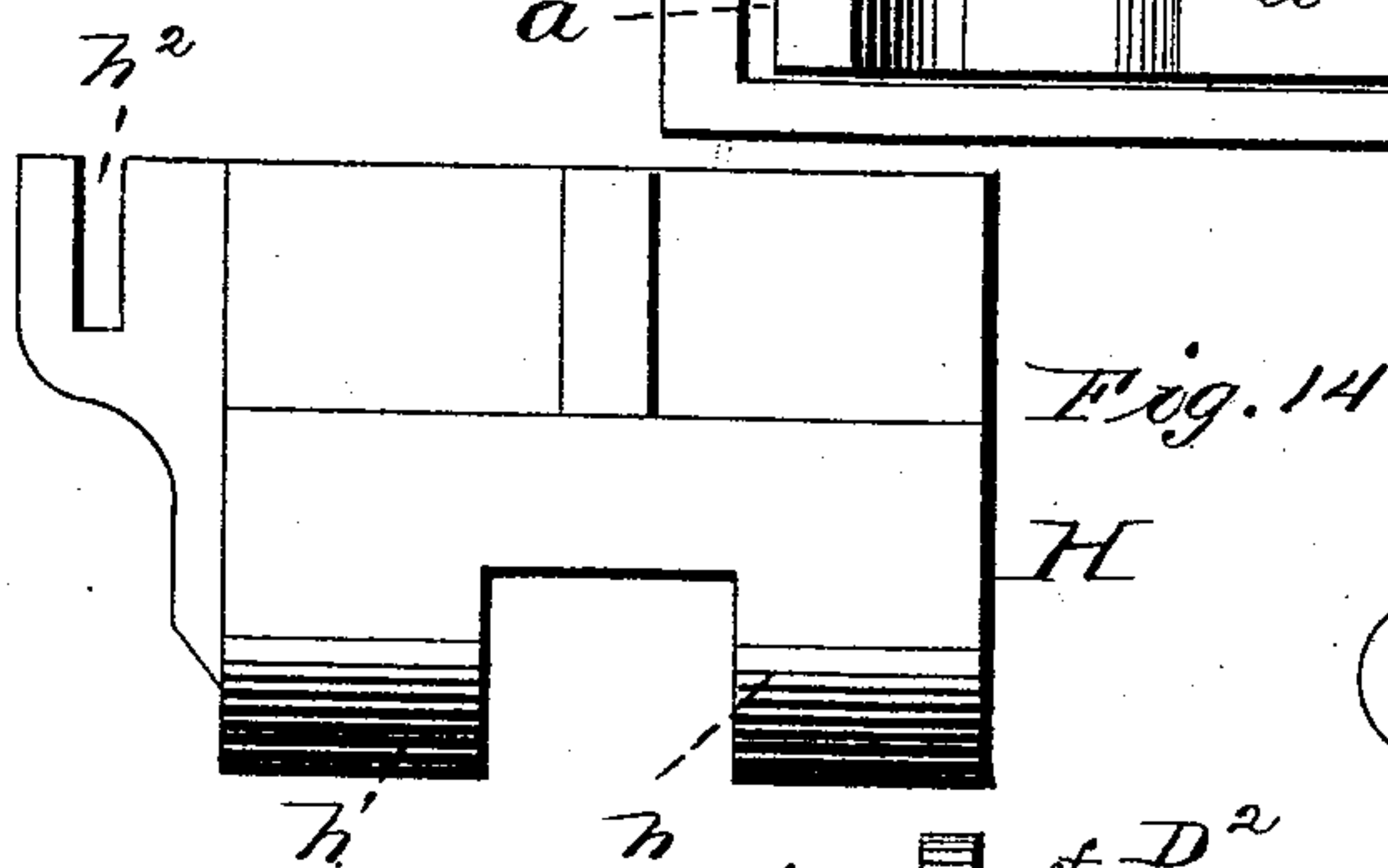
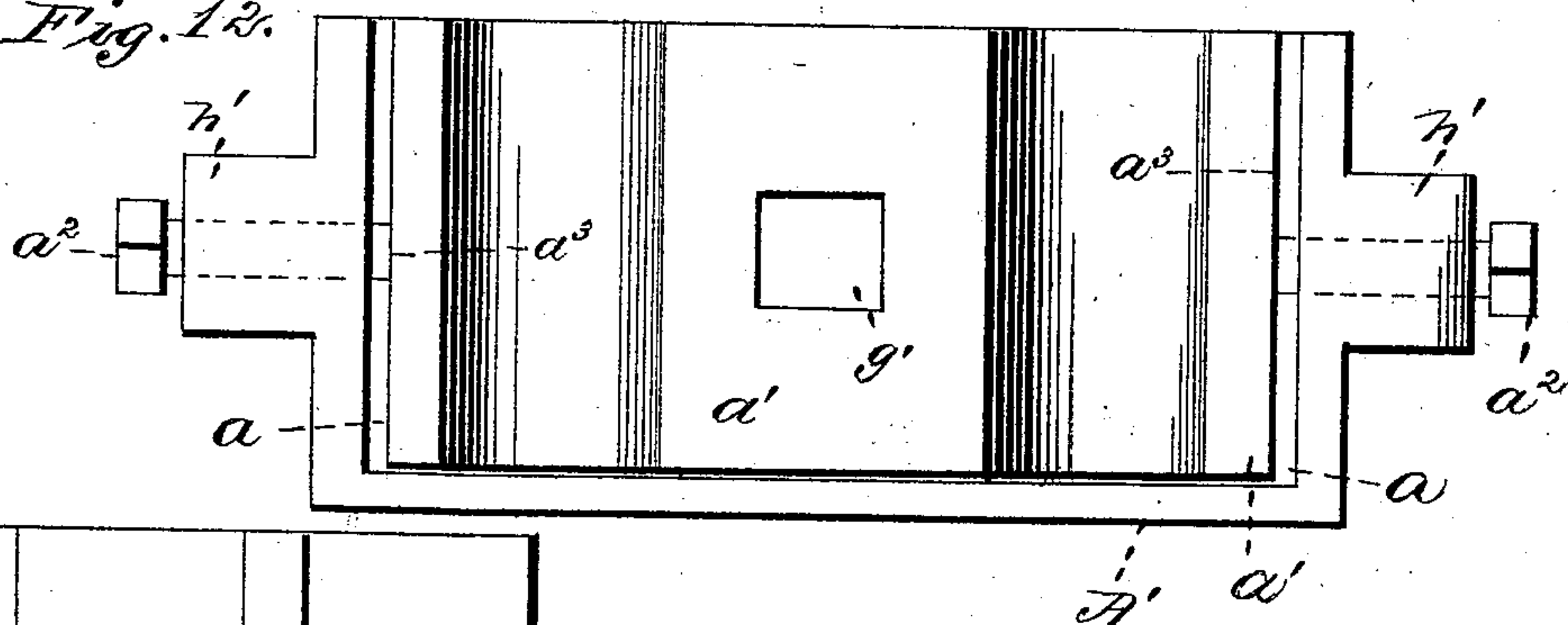


Fig. 13.

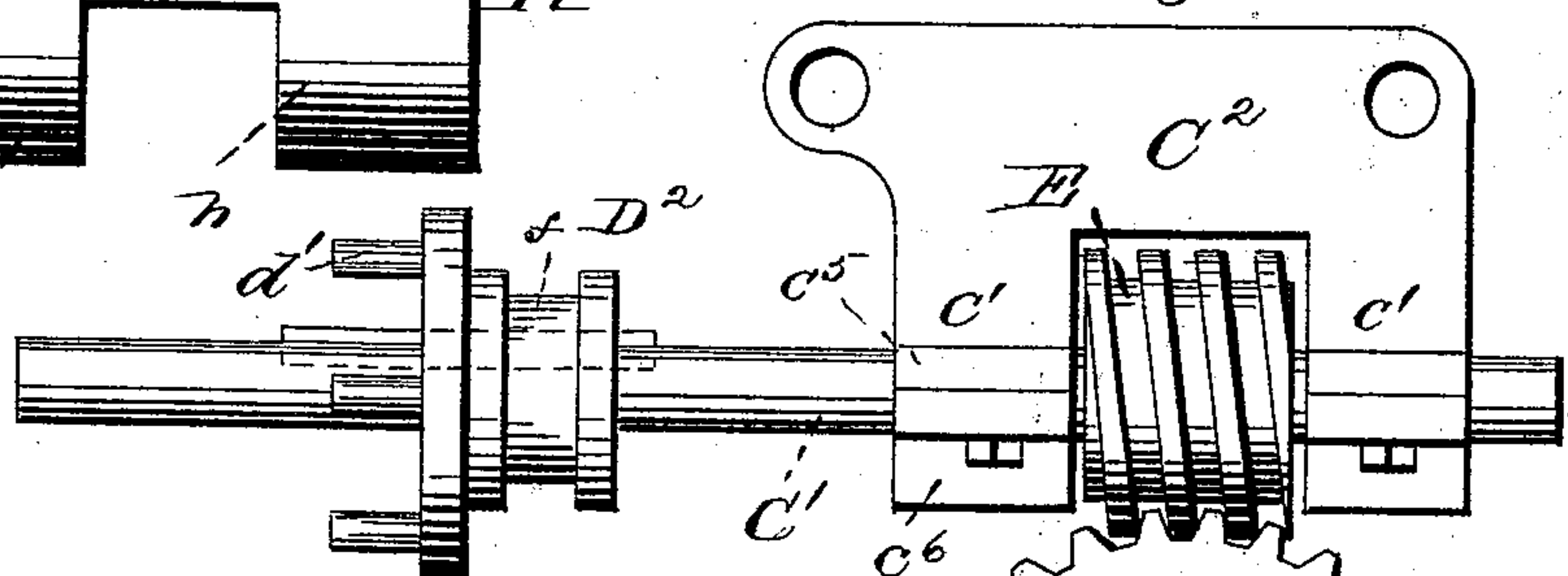
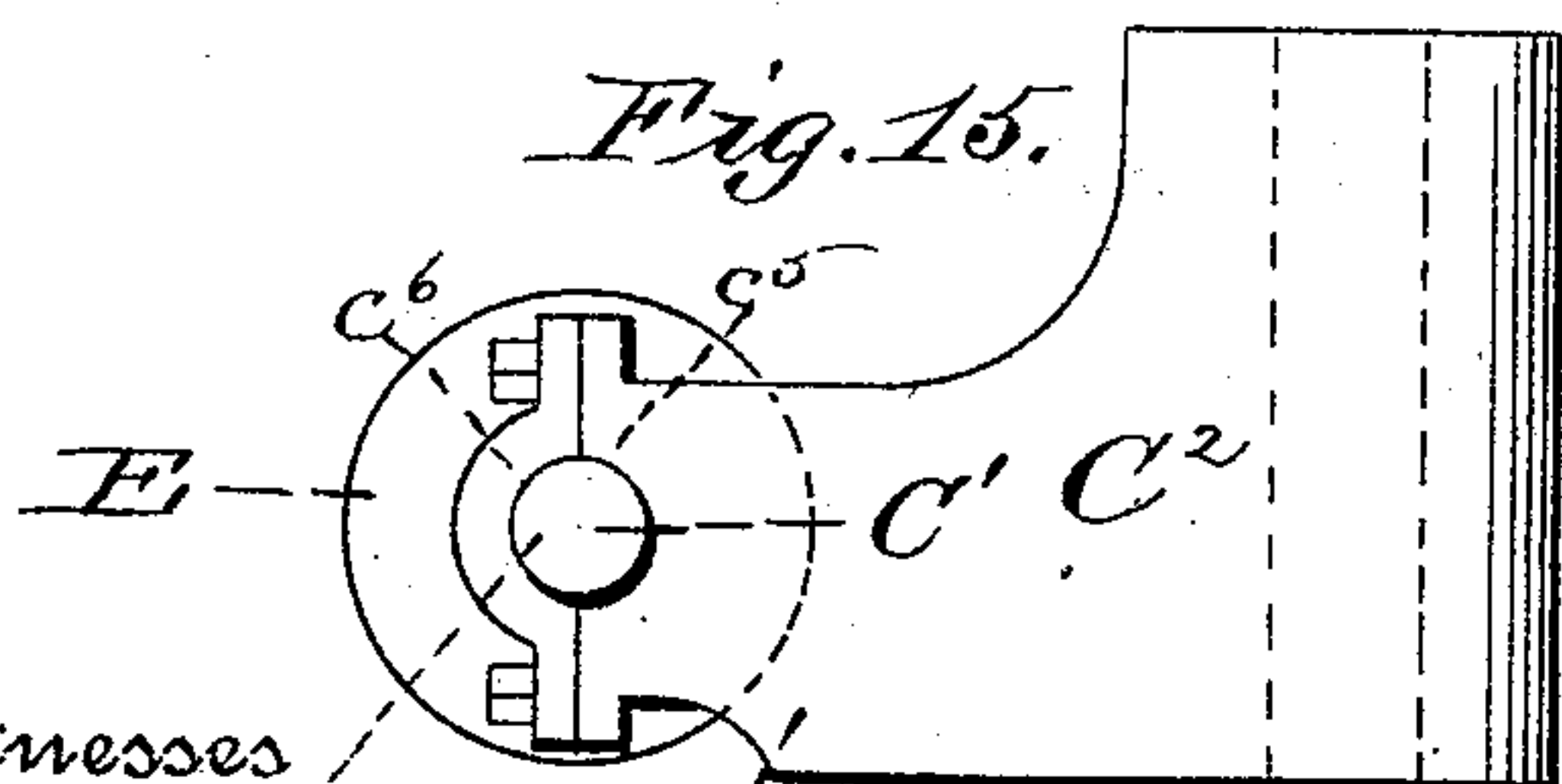


Fig. 15.



Witnesses

M. B. Harris

H. B. Breton

Inventor
S. P. Watt

By his Attorney

H. B. Breton

UNITED STATES PATENT OFFICE.

SERN PERLEY WATT, OF COLUMBUS, OHIO, ASSIGNOR TO THE COLUMBUS MACHINE COMPANY, OF SAME PLACE.

ROLLS.

SPECIFICATION forming part of Letters Patent No. 437,540, dated September 30, 1890.

Application filed July 5, 1890. Serial No. 357,802. (No model.)

To all whom it may concern:

Be it known that I, SERN PERLEY WATT, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Rolls; and I do 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 has relation to pyramid rolls for shaping shells or plates; and it consists in the construction and novel arrangement of parts, as hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

The objects of my invention are, first, to so construct the machine that the half-bearing blocks for the lower rolls may be laterally adjusted with reference to the longitudinal center of the bending-roll; secondly, to so construct the caps forming top bearings of the lower rolls and guides for the removably-secured heads on the bending-roll that they may be disconnected at their upper edges and swung back out of the way when it is desired to remove the heads on the bending-roll journals after a plate or shell has been rolled; thirdly, to provide a simple means for adjusting the bending-roll vertically when it is desired to remove a plate or shell; fourthly, to so construct the adjusting mechanism of the bending-roll that either end of said roll may be vertically adjusted when it is desired to form a conical or tapering shell; fifthly, to provide the main frame with castings removably secured therein by through-bolts having bearings in which are journaled the shafts of the adjusting mechanism, whereby said shafts may be easily and readily lined up.

In the drawings, Figure 1 is a perspective view of a set of pyramid rolls embodying my improvements; Fig. 2, a similar view showing the caps uncoupled and the double-socketed head in position on one of the journals of the bending-roll; Fig. 3, an end view of one of the frames, showing caps in place, also the bending-roll; Fig. 4, a plan view of the caps; Fig. 5, an end view of one of the frames, partly in section, showing the adjusting-shaft,

the worm-wheel E', and the bushing in section; Fig. 6, a plan view of one of the frames, one of the caps being removed; Fig. 7, a plan view of the mechanism employed for raising the bending-roll; Fig. 8, an end view of one of the frames, showing the caps locked and the removably-secured casting C² in place; Fig. 9, an end view of one of the heads; Fig. 10, a vertical longitudinal section of the same; Fig. 11, an inverted plan view of the same; Fig. 12, a plan view of one of the frames and bearing-blocks; Fig. 13, a detail plan view of one of the castings C², showing worm E and worm-wheel E' and shaft C', journaled therein; Fig. 14, a detail side view of one of the caps; Fig. 15, an end view of one of the castings C², showing worm E' and shaft C'; Fig. 16, a side view of the bending-roll, showing the head removed and the double-socketed head in position to be placed on the journal of the bending-roll; Fig. 17, a detail vertical section of the kerf at the upper edges of the caps; Fig. 18, a detail view of the set-bolt g²; Fig. 19, a detail side view of the bending-roll, showing head in section and the pivoted adjusting-shaft connected thereto, the head being removed from the roll; Fig. 20, a detail view of one of the forked levers; Fig. 21, a detail end view of one of the clutches; Fig. 22, a detail plan view of the coupling-bar; Fig. 23, a detail side view of the same.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in all the figures, the letter A indicates the base of the machine, of a general rectangular form, and has secured in any desired manner upon its upper face near the ends thereof suitable bearing-frames A', recessed, as shown at a, and adapted to receive and support the half-bearing blocks a', said bearing-blocks being somewhat shorter than the length of the recesses and adapted to be laterally adjusted in said recesses by set-screws a², passing through the sides of the frames and having their inner ends bearing against the sides a³ of the half-bearing blocks, as shown.

B and B' designate rolls provided with journals B³, adapted to rest and work in the half-bearings a'.

B² designates the bending-roll, provided at each end with journals *b*, adapted to receive the removable heads *b'*, said heads being provided with downwardly-projecting perforated ears *b*². Upon the upper edges of the heads are secured thereto in any desired manner eyes *b*³, by means of which said heads may be readily removed from the bending-roll journals when desired. In order that the bending-roll may be vertically adjusted at both ends when different thicknesses of plates are to be rolled, or to adjust one end of said roll when it is desired to form a tapering or conical shell, I employ the following means:

C and C' designate shafts placed in line with reference to each other and journaled near their inner ends in suitable bearings *c*, formed on the base of the machine. To allow of the shafts to be readily adjusted and kept in line, the frames are cut away, as at C⁵, and have secured therein by means of bolts *c*² suitable castings C², provided with laterally-extending horizontal arms *c'*, having at their outer ends the half-bearings *c*⁵, in which are secured by means of caps *c*⁶ the outer ends of the shafts C and C'. Loosely mounted upon said shafts at their meeting ends is a gear-wheel D, the hub of which is provided upon its inner face with a pin *m*, extending from side to side thereof between the meeting ends of said shafts, as shown in Fig. 7, and prevents lateral play of said wheel upon the shafts. On opposite sides of the hub are formed clutches D', consisting of the laterally-extending pins *d*, preferably four in number, and are adapted to alternately engage or disengage the pins *d'* of the movable clutches D², said clutches being similar in form to the clutches D' and are splined upon the shafts C and C' and designed to have a longitudinal movement thereon by means of suitable spring-controlled levers to the front of the machine, as hereinafter explained. Near their outer ends and between the arms *c'* of the castings C² the shafts C C' have rigidly mounted upon them worms E, which mesh with like wheels E', located at the bottom of the frames A'.

F designates a gear-wheel rigidly secured to the inner end of a shaft F', journaled in suitable bearings formed on the base of the machine, and is provided at its outer end with a pinion having a suitable connection with the main driving-shaft, and is designed to impart motion to the shafts C C' through the gear-wheel D, as will hereinafter appear.

Loosely pivoted at their upper ends between the perforated ears *b*² of the heads *b'* by bolts *n* are the vertical adjusting-shafts G, which pass downward through an opening *g'* in the half-bearing blocks and have their lower ends screw-threaded, as at *g*⁵, and pass through like openings *g* in the worm-wheels E', and, as will be noticed, said adjusting-shafts further serve as shafts for the worm-wheels E' in the lower part of the frames A'. Below the end of the shaft G in the frames A' are openings in which are secured by means of a set-screw *g*²

bushings *g*³, their lower edges passing below the bottom of the frames and serve as guards for the screw-threaded ends of the shafts G when in their lowered position.

In order that the bending-roll may be adjusted by the shaft G, and to prevent the binding of the heads upon the bending-roll journals or the binding of the worms or shafts, I form the heads *b'* with their rear faces *r* inclined upwardly and outwardly, as shown.

H designates caps provided at their lower outer edges with perforated lugs *h*, between which fit perforated lugs *h'* on the upper edges of the frames A'. Said caps are further provided upon their upper ends with vertical transverse kerfs *h*², in which are designed to fit a coupling-bar *h*³, which locks said caps together when in a closed position, as shown in Figs. 1, 3, and 8. Upon the inner vertical faces *h*⁴ of the caps H is formed a vertical recess *h*⁵, designed to receive the projecting ends of the coupling-pins *n* and prevent the same from working out by accident.

The rolls B B' upon one end are provided with gear-wheels I, which are suitably connected by means of intermediate pinions and gear-wheels to the main driving-shaft, whereby motion is imparted to said rolls.

Pivoted by means of pivot-pins *e e'* on a laterally-extending arm I' on the main frame are the spring-controlled levers *i i'*, provided at their inner ends with the upwardly-projecting forked portion *i*², designed to fit in a suitable groove or recess *f* formed in the clutches D².

The letters *i*³ *i*⁴ indicate levers pivoted at one end by means of pivot-pins *f'* to the outer ends of the levers *i i'*, their opposite ends pivoted to the lower ends of suitable operating-handles J J' by pivot-pins *f*², said operating-handles being fulcrumed near their inner ends to the main frame by pivots *f*⁴. After a shell has been rolled or formed and it is desired to remove the same from around the bending-roll, I employ the following means: The coupling-bars *h*³ having been removed from the kerfs, the caps H are swung outward, as shown in Fig. 2, and the outer one of the adjusting-shafts G uncoupled from between the perforated ears *b*² of the head *b'*. Said head is then removed from the journal *b* by means of a suitable connection with a derrick and a double-socketed head K placed upon the journal *b*, and a bar *k* inserted in the outer socket *k'*, designed to raise the roll and receive the shell when it is slid from the bending-roll, when it may be removed to any desired place. The head K is then removed and the head *b'* replaced and the caps H locked in position, as shown in Fig. 1.

To raise or lower the bending-roll at both ends to accommodate plates of different thicknesses or to adjust one end vertically when it is desired to form a conical or tapering shell, proceed as follows: Power is applied and the machine put in motion, which causes the gear-wheel F to revolve, and with it the gear-wheel

D, and by forcing the operating-levers J and J' together at their outer ends, as indicated by the arrows, the clutches D², through the media of the levers *i i'* and *i³ i⁴*, will move laterally upon the shafts C and C' and engage the clutches D', which will give motion to the shafts C and C', and, through the media of the worms E, worm-wheels E', and adjusting-shafts G, cause the bending-roll to be raised or lowered at will.

It will be readily seen that, owing to the independent connection of each of the adjusting-shafts, either end of the bending-roll may be raised or lowered when it is desired to form a tapering shell.

I do not desire to confine myself to the precise construction herein shown and described, as many changes may be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pyramid roll, the combination, with the base of the machine, provided at each end with frames, of suitable rolls journaled in bearing-blocks on said frames, adapted to be laterally adjusted with reference to the longitudinal center of the bending-roll, substantially as described.

2. In a pyramid roll, the combination, with the base of the machine, provided at each end with frames, of bearing-blocks fitted in recesses in said frames and adapted to be laterally adjusted and suitable rolls journaled therein, substantially as described.

3. In a pyramid roll, the combination, with the base of the machine, provided at each end with frames having laterally-extending perforated lugs, of caps, constructed as described, pivoted thereto, for the purpose specified.

4. In a pyramid roll, the combination, with the base of the machine, having at each end frames recessed for the reception of the laterally-adjustable bearing-blocks, and the perforated lugs at the upper edges of said frames, of caps provided with perforated lugs, hinged to the frames, and means, substantially as described, for locking the caps in a closed position, as specified.

5. The combination, with the base of the machine, provided at each end with frames recessed for the reception of the laterally-adjustable bearing-blocks, of caps hinged to said frames, having at their upper edges kerfs, and the coupling-bars therein, for the purpose specified.

6. The combination, with the base of the machine and the frames secured thereto, of the bearing-blocks laterally adjustable in said frames, the caps hinged to the frames, provided with a kerf for the reception of the projecting ends of the coupling-pin *n*, whereby the same are prevented from working out, substantially as described.

7. The combination, with the base of the machine, having journaled therein shafts carrying at their meeting ends a gear-wheel

meshing with a like wheel having a connection with the main driving mechanism, of a connection between said shafts and the heads on the bending-roll journals for raising and lowering said roll, substantially as described.

8. The combination, with the main frame having journaled therein shafts carrying at their meeting ends an alternately fixed and loose gear-wheel meshing with a like wheel having a connection with the main driving mechanism, of the worm-wheels carried by the screw-threaded adjusting-shafts and meshing with wheels on the shafts C C', and means, substantially as described, for imparting motion to said shafts, for the purpose specified.

9. The combination, with the main frame having journaled therein shafts carrying at their meeting ends a loosely-mounted gear-wheel provided in its hub with means for preventing lateral play upon said shafts, of clutches adapted to be alternately engaged or disengaged with clutches on the loosely-mounted gear-wheel, for the purpose specified.

10. The combination, with the main frame having journaled therein shafts carrying a loosely-mounted gear-wheel at their ends, provided in its hub between the meeting ends of the shafts with a pin, of the pivoted adjusting-shafts screw-threaded at their lower ends and passing through like openings in worm-wheels, and the worms on the shafts C and C', for imparting motion to said adjusting-shafts, for the purpose specified.

11. The combination, with the main frame having journaled therein shafts carrying at their meeting ends a gear-wheel meshing with a like wheel having a suitable connection with the main driving mechanism, of pivoted forked levers engaging clutches on said shafts and adapted to force the clutches in engagement with the loosely-mounted gear-wheel by suitable levers, substantially as described.

12. The combination, with the main frame having journaled therein shafts carrying a gear-wheel provided with means for preventing lateral play upon said shafts, of the clutches adapted to be moved longitudinally upon said shafts by spring-controlled levers and engage clutches on the hub of the gear-wheel, for the purpose specified.

13. The combination, with the main frame provided with bearings, the shafts C C', journaled therein, carrying a gear-wheel provided with means for preventing lateral play, and provided on opposite sides with laterally-projecting pins adapted to engage like pins on movable clutches on said shafts, of forked levers engaging recesses in the clutches D² and having a pivotal connection with the operating-handles, substantially as described.

14. The combination, with the shafts C C', journaled near their inner ends in bearings on the main frame and at their outer ends in bearings formed in arms on a removably-secured casting in the frame, of the worms car-

ried by said shafts between the arms and meshing with like wheels having a screw-threaded hub and the pivoted adjusting-shaft working therein, substantially as described.

5 15. The combination, with a set of pyramid rolls, of the heads adapted to fit on journals on the bending-roll, provided with dependent perforated ears, the vertical adjusting-shaft pivoted between said ears, screw-threaded at
10 its lower end, and carrying a worm-wheel meshing with like wheels on the shafts C C', substantially as described.

16. The combination, with a set of pyramid rolls, of the heads fitted on the journals of
15 the bending-roll, adapted to fit and work between caps hinged to the main frames and be supported therein by vertical shafts screw-threaded at their lower ends, and carrying worm-wheels upon said screw-threaded por-
20 tion, substantially as described.

17. The combination, with a set of pyramid rolls, of the removable heads forming bearings for the bending-roll journals, provided with dependent perforated ears, the recess
25 formed in the hinged caps for the ends of a coupling-pin, the screw-threaded adjusting-shafts carried by said pins, and the worm-wheels upon said shafts meshing with worms secured in arms upon a removable casting
30 in the frame, substantially as described.

18. In a set of pyramid rolls, the combination, with the base of the machine, having secured thereto bearing-frames recessed, as described, for the reception of the half-bearing
35 blocks, of the removably-secured castings C² in said frames, provided with parallel arms having formed in their outer ends half-bearings, and the shafts C and C', journaled therein, substantially as described.

40 19. The combination, in a set of pyramid rolls, of the rolls B and B', adapted to have a

lateral adjustment, and a bending-roll supported on shafts and capable of vertical adjustment with reference to the rolls B and B', substantially as described.

20. In a set of pyramid rolls, the combination, with the shafts C and C', journaled therein and carrying clutches consisting, essentially, of four laterally-extending pins, of a gear-wheel carried by said shafts, provided
50 on opposite sides with four laterally-extending pins forming clutches D', adapted to be engaged by the clutches on the shafts C and C', in the manner described.

21. In a set of pyramid rolls, the combination, with the bending-roll carrying upon its journals heads, of shafts pivoted to said heads, whereby the bending-roll may be vertically
55 adjusted at either end, substantially as described.

22. In a pyramid roll, the combination of the heads having pivoted thereto adjusting-shafts, and suitable intermediate mechanism between said heads and the gear-wheel D, carried by the shafts C and C', whereby the
60 bending-roll is capable of vertical adjustment at either or both ends, substantially as described.

23. In a set of rolls, the combination, with the bending-roll carrying upon its journals
70 heads having pivoted thereto shafts carrying worm-wheels, of an independent connection between each end of the bending-roll and the gear-wheel D and suitable lever mechanism for adjusting said roll, substantially as de-
75 scribed.

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

SERN PERLEY WATT.

Witnesses:

ROBT. B. COLLIER,
R. W. WEAVER.