

No. 610,201.

Patented Sept. 6, 1898.

J. L. PERRY.

SANDPAPERING MACHINE FOR BENT WORK.

(Application filed Apr. 16, 1897.)

(No Model.)

6 Sheets—Sheet 1.

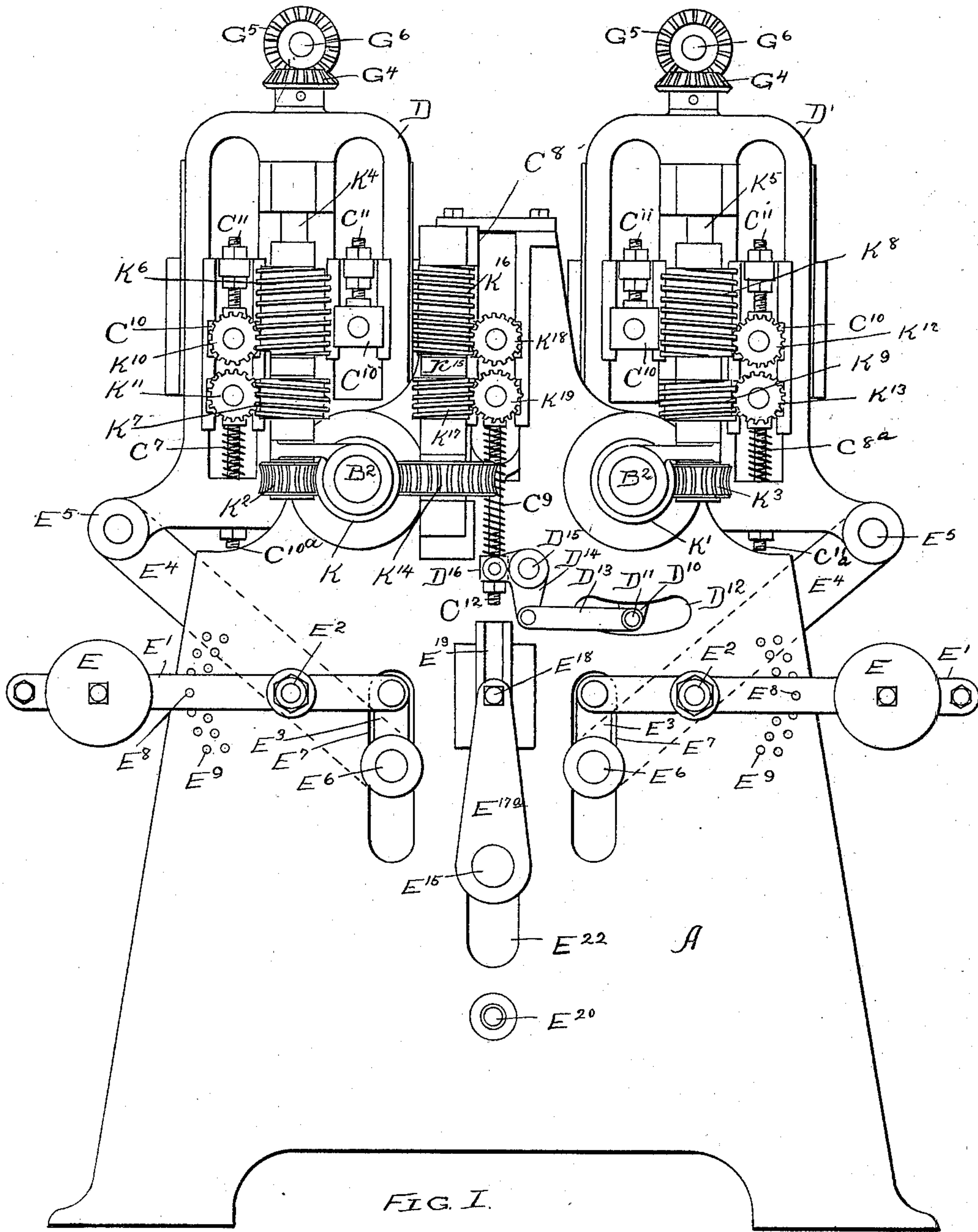


FIG. I.

WITNESSES:

Sew. E. Lewis
H. W. Munday

INVENTOR:

James L. Perry
BY *Munday, Davis & Alcock*

HIS ATTORNEYS

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6 Sheets—Sheet 2.

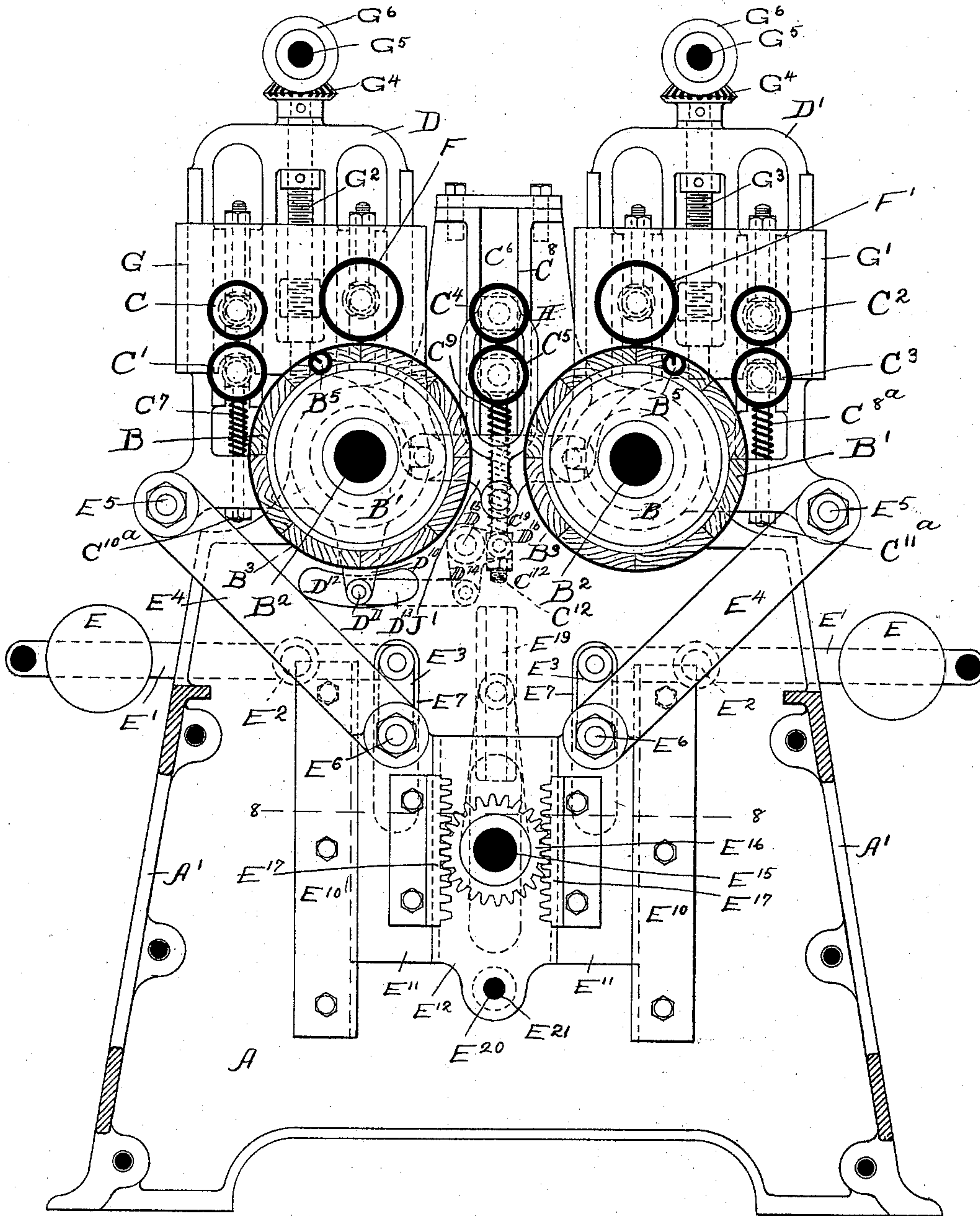


Fig. 2

Witnesses:

At Monday
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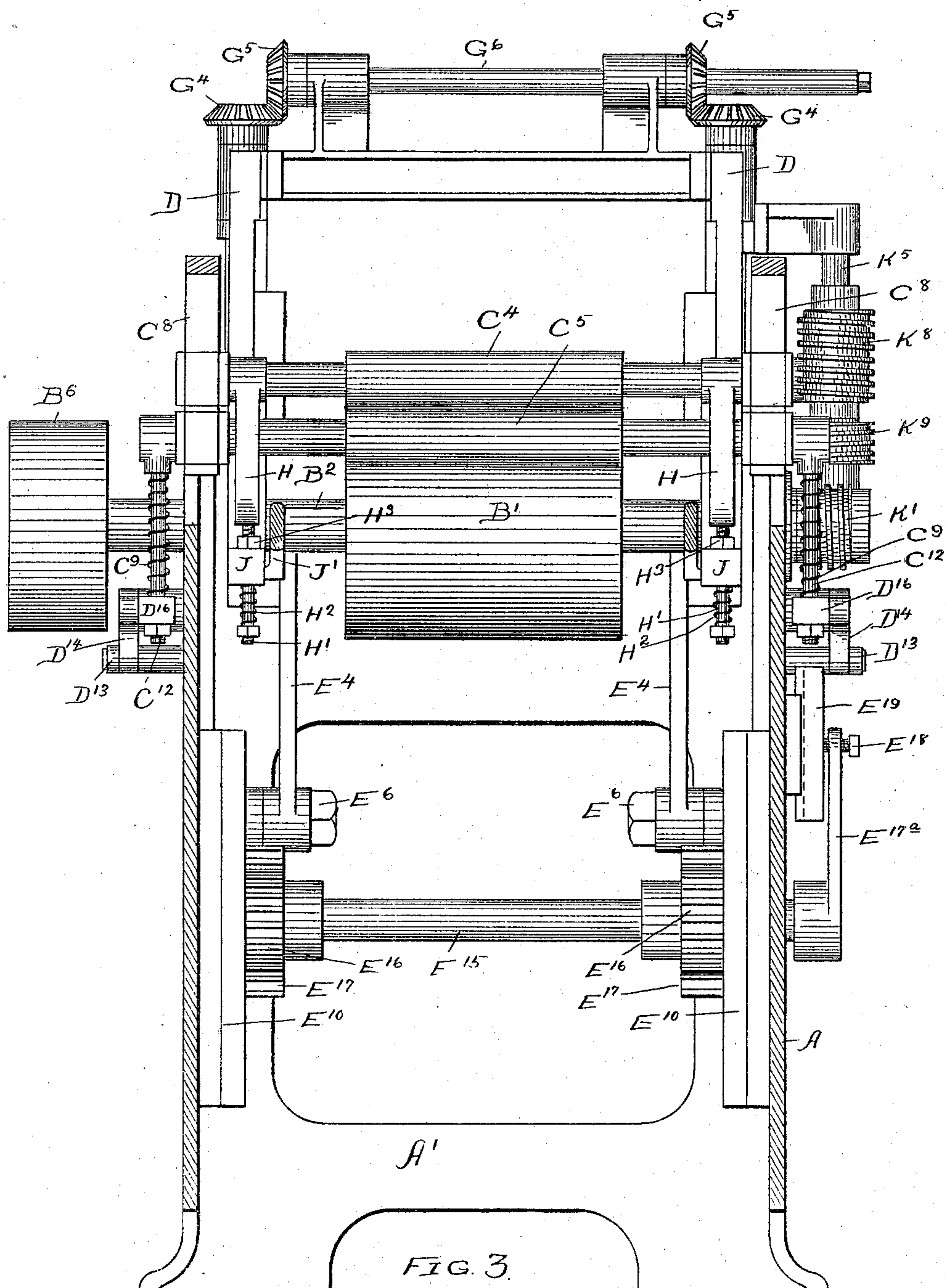
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6 Sheets—Sheet 3.



WITNESSES.

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6 Sheets—Sheet 5.

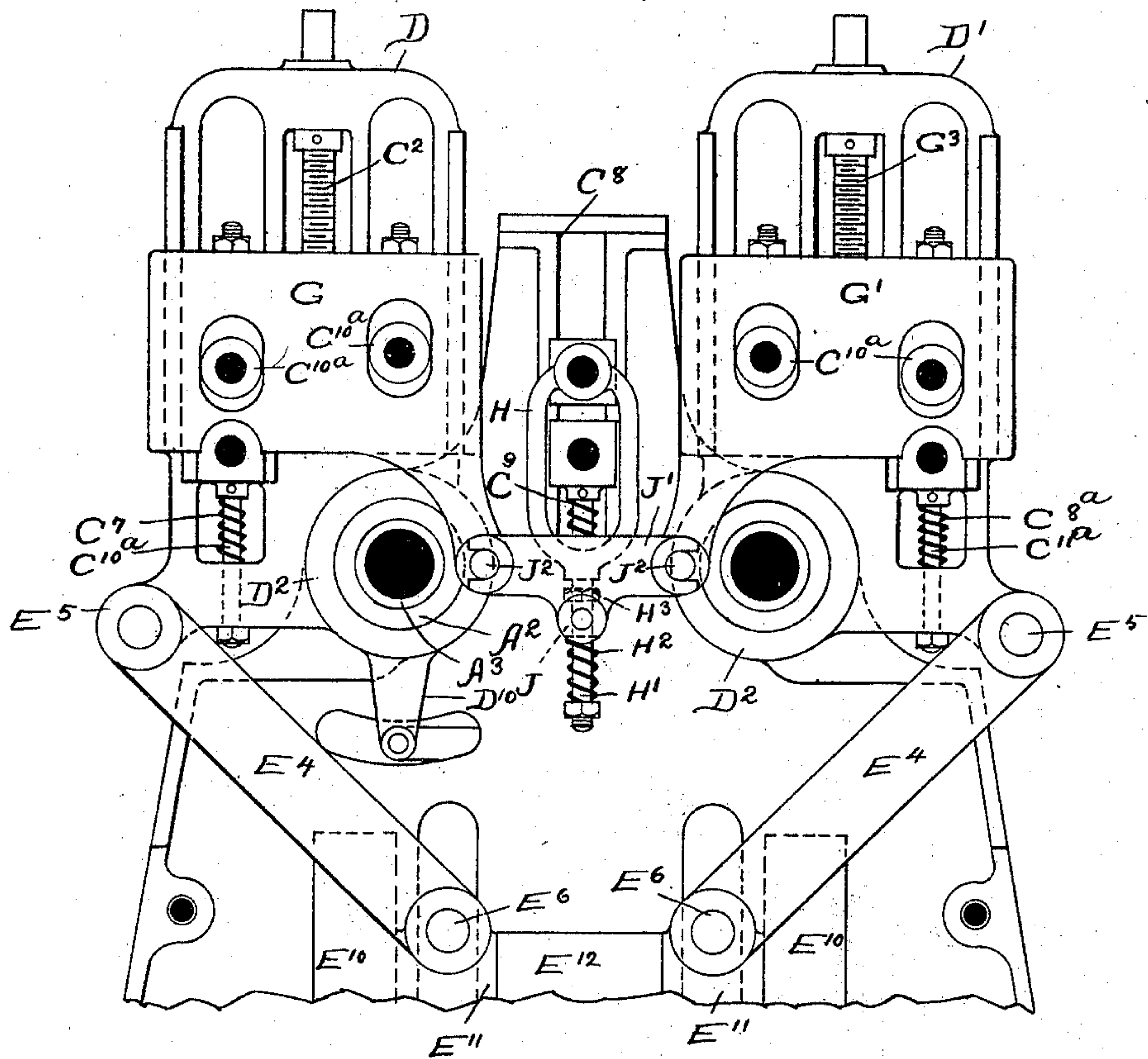


FIG. 5

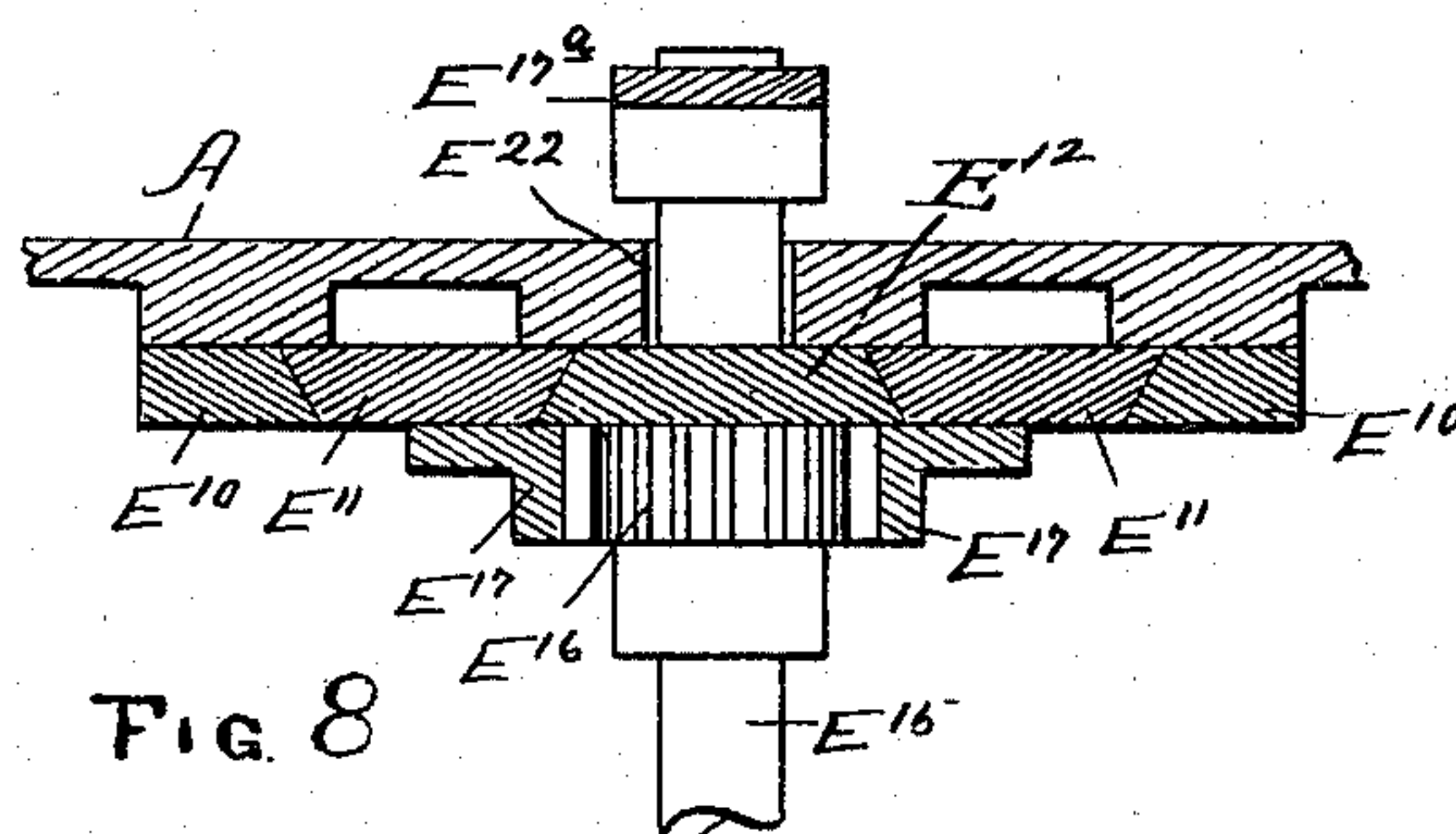


FIG. 8

Witnesses
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6 Sheets—Sheet 6.

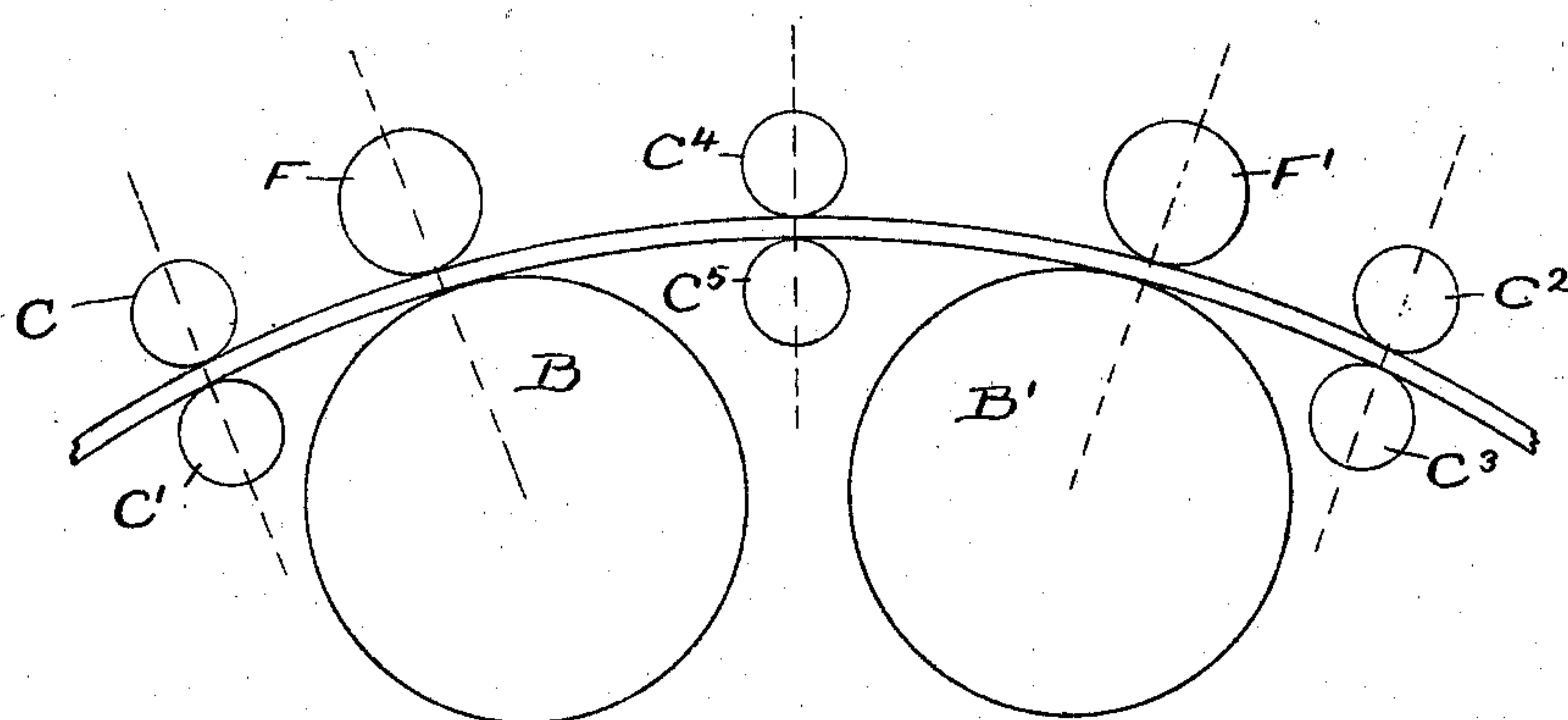


FIG. 6

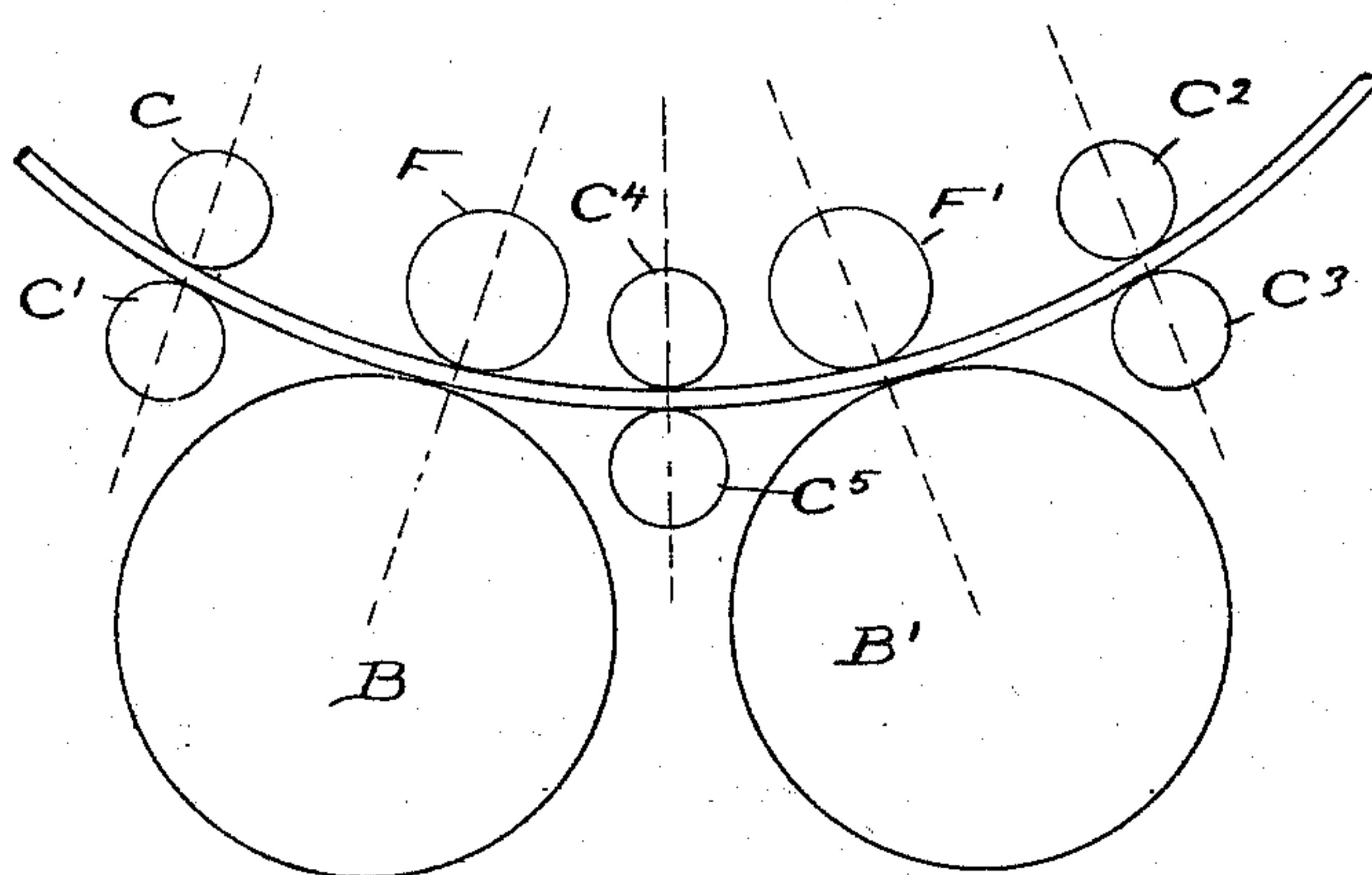


FIG. 7

WITNESSES:

Lew E. Curtis
H. W. Munday

INVENTOR:

James L. Perry

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HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES L. PERRY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE UNIVERSAL SANDER COMPANY, OF SAME PLACE.

SANDPAPERING-MACHINE FOR BENT WORK.

SPECIFICATION forming part of Letters Patent No. 610,201, dated September 6, 1898.

Application filed April 16, 1897. Serial No. 632,488. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. PERRY, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sandpapering-Machines for Bent Work, of which the following is a specification.

This invention relates to improvements in sandpapering-machines for polishing the surfaces of curved or bent work—such, for instance, as chair-backs or the like. The machine is also adapted to operate upon straight work.

The main feature of the invention consists in combining with the sandpaper-cylinder of a wood-polishing machine feed-rolls movable through the arc of a circle concentric with the surface of the cylinder, so that such rolls may move into any position required by the curvature of the work.

It also consists in combining with the sandpaper-cylinder of a wood-polishing machine both feed and pressure rolls movable through the arc of a circle concentric with the surface of the cylinder.

It also consists in the combination, with the sandpaper-cylinder of a wood-polishing machine, of a pressure-roll supported from the cylinder-bearings and movable through the arc of a circle whose axis is coincident with that of the cylinder.

It further consists in the combination, with the sandpaper-cylinder of a wood-polishing machine, of feed devices supported in frames oscillating about the cylinder-shaft and carrying said devices through the arc of a circle whose axis coincides with that of the shaft.

It further consists in the combination, in a wood-polishing machine, of two parallel sandpaper-cylinders and feed-rolls movable through arcs of circles concentric with the surfaces of the cylinders.

It further consists in the combination, with two parallel sandpaper-cylinders, of feed-rolls at the outer side of said cylinders, movable through arcs of circles concentric with the surfaces of the cylinders, and guide-rolls located between the cylinders and acting to conduct the stock from one cylinder to the other.

It further consists in the novel features of construction and in the novel combinations of parts and devices hereinafter set forth.

In the accompanying drawings, forming a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a side elevation of the machine. Fig. 2 is a longitudinal vertical section. Fig. 3 is a transverse vertical section. Fig. 4 is a plan view. Fig. 5 is a partial longitudinal section. Figs. 6 and 7 are diagram views showing the positions of the rolls while acting upon differently-curved surfaces, and Fig. 8 is a section on the line 8 8 of Fig. 2.

In said drawings, A represents the side and A' the end frames of the machine. The polishing-cylinders, of which there are preferably two, are marked B and B', and their shafts B² are supported in boxes or hollow studs A², attached to the side frames in positions side by side and parallel. Antifriction-rings A³ may be inserted between the shafts and boxes, if desired. The cylinders are covered with sandpaper B³, which is fastened on in any suitable manner—as, for instance, by passing the edges of the paper through slots in the peripheries of the cylinders and into the grasp of suitable holders, such as B⁵, located within the cylinders and in such proximity to said slots as to enable them to seize and securely hold said edges. The cylinders are driven by the pulleys B⁶ and B⁷.

The feed mechanism, wherein my invention principally lies, consists in the preferred form of my invention of a pair of feed-rolls C C' at the outer side of the cylinder B, another similar pair of rolls C² and C³ at the outer side of the cylinder B', and an intermediate pair of rolls C⁴ and C⁵. Of these the rolls C C' are supported in swinging frames D, and the rolls C² C³ are likewise supported in swinging frames D', and each of said frames is adapted to swing about the axis of the adjacent cylinder B or B' by providing it with sleeves D², adapted to fit over the studs A² of the cylinder-bearings. The feed-rolls and their swinging frames are provided at each end with counterbalances adapted to maintain them in normal position and tend-

ing at all times to force them to the vertical position shown in the principal figures, and such counterbalance consists in the case of the rolls C and C' and their frames D of weights E E, levers E' supporting the weights and pivoted to the side frames A at E², links E³ connecting the inner ends of the levers E' with the links or connecting bars E⁴, pivotally joined to the feed-roll frames at their outer corners E⁵. Each pivot E⁶, whereby the links E⁴ and E³ are connected, passes through and works vertically in a guide-slot E⁷ in the stationary frames A. The counterbalancing-weights and mechanism employed with the frames carrying rolls C² and C³ are similar in all respects to those just described and are similarly lettered. The levers E' may be locked in any desired position so as to hold the feed-roll frames stationary by passing the pins E⁸ through the levers and the proper one of the series of openings E⁹ in the frames A. Said pins and openings may also be used to limit the swinging movement of the roll-frames in either direction when the machine is working upon stock which requires that they be left free to swing while operating.

The swinging roll-frames D and D' are also connected together in such manner as to permit them to be simultaneously adjusted for work on either convex or concave or straight surfaces. This connection I prefer to establish through the medium of the links E³ and E⁴ and pivots E⁶, as follows: Each side of the frame A is provided with two guides or ways E¹⁰, in which a compound slide composed of side members E¹¹ and a central member E¹² may move vertically. Extending from one of said central slide members to its corresponding slide member at the other side of the machine and journaled in both of them is a cross-shaft E¹⁵, carrying a gear E¹⁶ at each end. Each of these gears meshes with two racks E¹⁷, secured each to one of the slides E¹¹, as plainly shown at Fig. 2. The shaft E¹⁵ may be left free to turn or it may be locked against turning by securing the swinging end of a crank E^{17a}, carried upon one end of the shaft, to a bolt E¹⁸, the head of which is movable freely up and down in the guideway E¹⁹. When the shaft is thus locked, it will be seen that all the parts of the slide must of necessity move together and thus compel the frames to swing toward or away from each other, according as they are being adjusted for convex or concave or straight work; but when the shaft is released the side slides are free to move independently, the gears simply traveling idly in such case along the rack of the slide which does not move. The central slide may be locked against movement by inserting a pin E²⁰ through the side frame and into the bottom opening E²¹ in said slide, and it is desirable that it be so locked when working on straight stock. The side frames are slotted at E²² to permit the changes in position of shaft E¹⁵.

Pressure-rolls are provided on the upper side of the stock immediately above the point where the cylinders are acting upon it, as shown at F and F', and they are supported in the swinging frames which carry the feed-rolls, and consequently are movable with and change their position relative to the cylinders in the same manner as do the feed-rolls.

The intermediate feed-rolls C⁴ and C⁵ move in vertical ways C⁸ in the side frames. The lower rolls C', C³, and C⁵ are supported upon springs C⁷, C^{8a}, and C⁹, respectively, and their uppermost positions are regulated by bolts C^{10a}, C^{11a}, and C¹², respectively. These springs and bolts are of course duplicated at both ends of the rolls. The springs are intended to keep the stock firmly against the pressure-rolls, so that the latter may determine the position of the stock relative to the cutting-cylinders, the depth of the cut, &c.

The upper feed-rolls C, C², and C⁴ and the pressure-rolls are all made adjustable, so as to permit the changes rendered necessary by the differences in the thickness of the stock, and I prefer that the upper one of each pair of the swinging feed-rolls be adjustable in unison with the pressure-roll supported in the same swinging frames in order that many of the necessary adjustments may be quickly made, and for this purpose said upper roll and the accompanying pressure-roll are both journaled in adjustable slides G or G', which slides are mounted upon the frames D or D' and are adjusted vertically thereon by screws G²G³. Uniformity of adjustment of the slides at both ends of the machine is obtained by providing said adjusting-screws with bevel-gears G⁴ and connecting such gears by a shaft G⁵, carrying bevel-gears G⁶, adapted to mesh with gears G⁴, so that by applying power to said shaft the supporting-slides at both ends of the rolls may be adjusted to the same position.

The rolls C and C² and the pressure-rolls are also adjustable independently and for this purpose are all supported in boxes which are movable vertically by screws C¹⁰ C¹¹ upon the slides G or G', by which the boxes are carried.

The upper intermediate roll C⁴ is held down upon the work by spring-pressure by means of yokes or loops H, which pass over the roll and thence down to a point below the under roll C⁵ and are there provided with down-hanging stems H', which pass through blocks J and are provided with springs H² below said blocks, adapted to draw the loops downward. By means of nuts H³, threaded on said stems and bearing on the blocks J, the downward movement of the roll C⁴ may be limited. The position of roll C⁴ is, however, determined automatically while in operation by eveners J', pivoted at their center to blocks J and connected to the swinging frames D and D' by making its ends forked and placing them over the pins J² upon the frames. With this

connection it will be seen that when the frames move toward or away from each other a vertical movement will be imparted to the blocks J and through them to the roll; also, that if the frames move independently or successively instead of simultaneously a movement will be given to said block J. All the movements thus given said roll C⁴ are such as to carry it into proper position to bear upon the stock as it passes the intermediate rolls.

The lower intermediate roll is also automatically moved by the swinging frames D by providing those frames with downhanging arms D¹⁰, which are pivotally connected by pins D¹¹, passing through slots D¹² in the side frames, with links D¹³, which are joined to and operate bell-cranks D¹⁴, pivoted at D¹⁵, said bell-cranks being flexibly united to blocks D¹⁶ upon the bolts C¹² and under springs C⁹.

For the purpose of driving the various feed-rolls any suitable mechanism may be used; but I prefer to take power therefor from the cylinder-shafts, and hence have provided upon said shafts worms K and K', and through such worms and worm-gears K² and K³, meshing with them, drive the vertical shafts K⁴ and K⁵. Said shaft K⁴ is furnished with two worms K⁶ and K⁷ and shaft K⁵ with two similar worms K⁸ and K⁹, and these worms mesh with gears K¹⁰, K¹¹, K¹², and K¹³ upon the swinging feed-roll shafts. The worm K also meshes with a worm-gear K¹⁴ and thereby drives a third or vertical shaft K¹⁵, arranged adjacent to the intermediate feed-rolls. This shaft is likewise provided with two worms K¹⁶ and K¹⁷, which mesh with gears K¹⁸ and K¹⁹ upon the shafts of said intermediate rolls. Of course all the worms and gears are of the proper size and pitch to produce the slow movement needed for the feed-rolls. If it is found necessary, the feed-rolls, or some of them, may be adjusted to allow the stock to slip, or they may be frictionally instead of positively driven.

In operating the machine if, for instance, the concave surface of work bent so as to form a single perfect arc extending from end to end is to be done the swinging frames are adjusted away from each other, as will be understood from Fig. 6, and locked in position, the upper swinging rolls and the pressure-roll being adjusted to the thickness of the work. If the convex surface of such work is to be operated upon, the swinging frames are moved toward each other and locked, as will be understood from Fig. 7, and the other adjustment made as just mentioned. For straight work the rolls are positioned as in Fig. 2; but if the work to be done departs at any point from a true circular line then the swinging frames are left free to swing, so the rolls may conform to the work, and this swinging movement is caused and its direction and extent are both controlled by the stock itself. When the upper of the several series of rolls are properly adjusted to the thickness of the

stock, all the feed-rolls may be left to automatically find their proper positions, or in the case of truly circular work they may be set and locked in position.

By the use of two cylinders I obtain a decided advantage over single-cylinder machines in that I am enabled to use a fine grade of paper upon the second cylinder and thus impart to the stock at one operation as smooth a surface as can be obtained by two operations upon the old machine; but it will be understood that I do not wish to be limited to the use of two cylinders except where my claims clearly require the presence of two.

While I have shown the feed-rolls as supported in such manner that they are movable through the arc of a circle concentric with the surface of the sandpaper-cylinder, it will be understood that I do not wish to be limited to that precise construction, as obviously some of the advantages attending my invention, particularly the increased sweep afforded the rolls and the ability to work upon the concave sides of stock having a bend of small radius, may be obtained by supporting them from centers located in planes lower than the top of the cylinder. It will be noted that the intermediate rolls are moved into their proper positions automatically and that such positions may freely change while the stock is moving through them.

I claim—

1. In a sandpapering-machine, the combination with the sandpaper-cylinder of feed-rolls movable through the arc of a circle concentric with the surface of the cylinder, substantially as specified.

2. In a sandpapering-machine, the combination with the sandpaper-cylinder of feed and pressure rolls movable through the arc of a circle concentric with the surface of the cylinder, substantially as specified.

3. In a sandpapering-machine, the combination with the sandpaper-cylinder of a pressure-roll movable through the arc of a circle concentric with the surface of the cylinder, substantially as specified.

4. In a sandpapering-machine, the combination with the sandpaper-cylinder of feed-rolls movable through the arc of a circle whose axis is located in a horizontal plane lying below the level of the acting side of the cylinder, substantially as specified.

5. The combination with the sandpaper-cylinder of a wood-polishing machine, of feed devices carried in frames swiveled upon the bearings of the cylinder-shaft, substantially as specified.

6. The combination in a sandpapering-machine, of two parallel sandpaper-cylinders and feed-rolls for moving the stock across such cylinders, said rolls being movable as to their positions to enable them to conform to the curvature of bent stock, substantially as specified.

7. The combination in a sandpapering-ma-

chine, of two parallel sandpaper-cylinders and feed-rolls for moving the stock across said cylinders and pressure-rolls for pressing the stock against the cylinders, all said rolls being movable as to their positions to enable them to conform to the curvature of the stock, substantially as specified.

8. The combination with two sandpaper-cylinders of feed-rolls located at the outer side of each cylinder and movable through arcs of circles concentric with the surfaces of the cylinders, and intermediate feed-rolls for conducting the stock from one cylinder to the other, substantially as specified.

9. The combination with two sandpaper-cylinders of feed-rolls located at the outer side of each cylinder and movable through arcs of circles concentric with the surfaces of the cylinders, and intermediate vertically-movable feed-rolls for conducting the stock from one cylinder to the other, substantially as specified.

10. The combination with the swinging feed-rolls at opposite sides of a sandpapering cylinder or cylinders, and their respective carrying-frames, of an independent counter-balance-weight for each pair of said rolls, and mechanical connections between said weights and the frames, substantially as specified.

11. The combination with the sandpaper-cylinders and the feed-rolls and their carrying-frames movable about the cylinders as set forth, of means for detachably locking the frames together, substantially as specified.

12. The combination with two sandpaper-cylinders of two pairs of feed-rolls movable in swinging supports, and means for locking such supports against movement, substantially as specified.

13. The combination with two sandpaper-cylinders of two pairs of feed-rolls mounted in swinging supports, means for uniting said supports so that both must move together, and means for locking them against movement, substantially as specified.

14. The combination with the swinging feed-roll supports, of the compound slides, the gears carried by the central members of the slides, the racks mounted on the side members, and the mechanical connections between said slides and the swinging supports, substantially as specified.

15. The combination with the swinging feed-roll supports, of the compound slides, the gears carried by the central members of the slides, the racks mounted on the side members, the mechanical connections be-

tween the swinging supports and the slide, and means for locking said connections so as to prevent movement by the supports, substantially as specified.

16. The combination with the swinging supports, the compound slide and connections between said supports and the side members of the slide, of a shaft carried by the central members of the slide and provided with gears meshing with racks upon the side members, and means for locking said shaft against turning, substantially as specified.

17. The combination with a sandpaper-cylinder of a feed-roll, a pressure-roll, adjustable slides in which both said rolls are journaled, each roll being also adjustable independently of the other roll, and swinging frames carrying said slides, substantially as specified.

18. The combination with the sandpaper-cylinders, of upper and lower feed-rolls mounted in supports swinging over the outer sides of the cylinders and upper and lower feed-rolls between the cylinders, all said lower rolls being supported upon springs, substantially as specified.

19. The combination with the upper intermediate feed-roll, of the swinging frames D and D' and the eveners pivotally joined to the frames, and also connected to and moving said roll, substantially as specified.

20. The combination of two cylinders, rolls swinging about each, and mechanism by which said rolls are swung together or independently at will, substantially as specified.

21. The combination with the cylinder of a sandpapering-machine, and feed-rolls swinging about the same, of worm-gearing driving said rolls and taking power from the cylinder-shaft, substantially as specified.

22. The combination with the cylinder of a sandpapering-machine, of a worm on the cylinder-shaft, a vertical shaft having a gear meshing with said worm and also having worms such as K⁶ and K⁷, and feed-rolls having gears meshing with said last-mentioned worms, substantially as specified.

23. The machine for sandpapering bent stock wherein are combined two parallel sandpaper-cylinders, feeding devices at the outer side of each cylinder, and intermediate feed-rolls changing their positions automatically in conformity to the curvature of the stock, substantially as specified.

JAMES L. PERRY.

Witnesses:

LEW. E. CURTIS,
EDW. S. EVARTS.