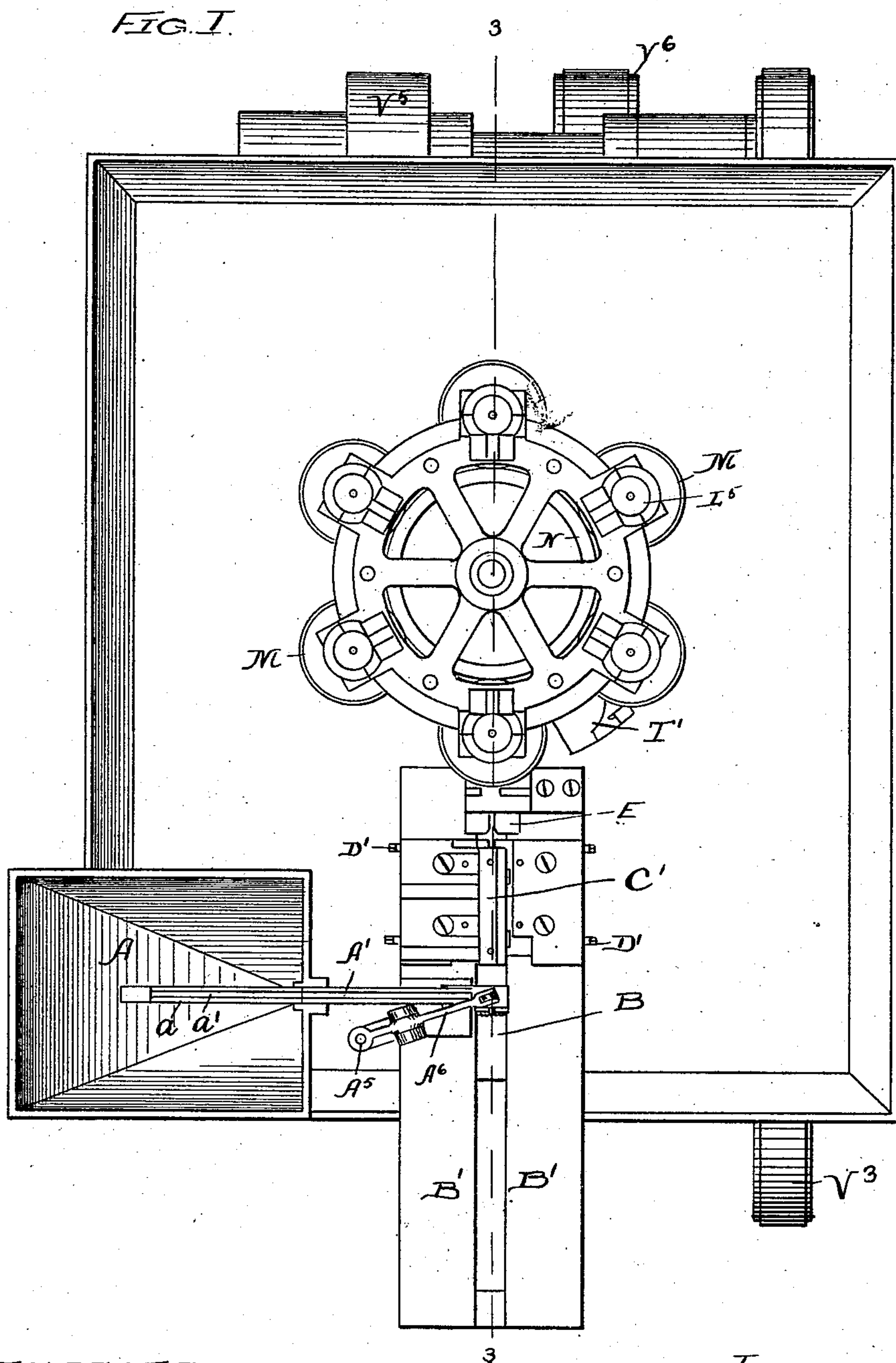


(No Model.)

9 Sheets—Sheet 1.

C. E. ROBERTS.
MACHINE FOR FINISHING SPOKE NIPPLES FOR BICYCLES.
No. 572,376. Patented Dec. 1, 1896.



WITNESSES:

Lew. C. Curtis
H. W. Munday,

INVENTOR:
CHARLES E. ROBERTS.

By Munday, Curtis & Adcock,
HIS ATTORNEYS.

(No Model.)

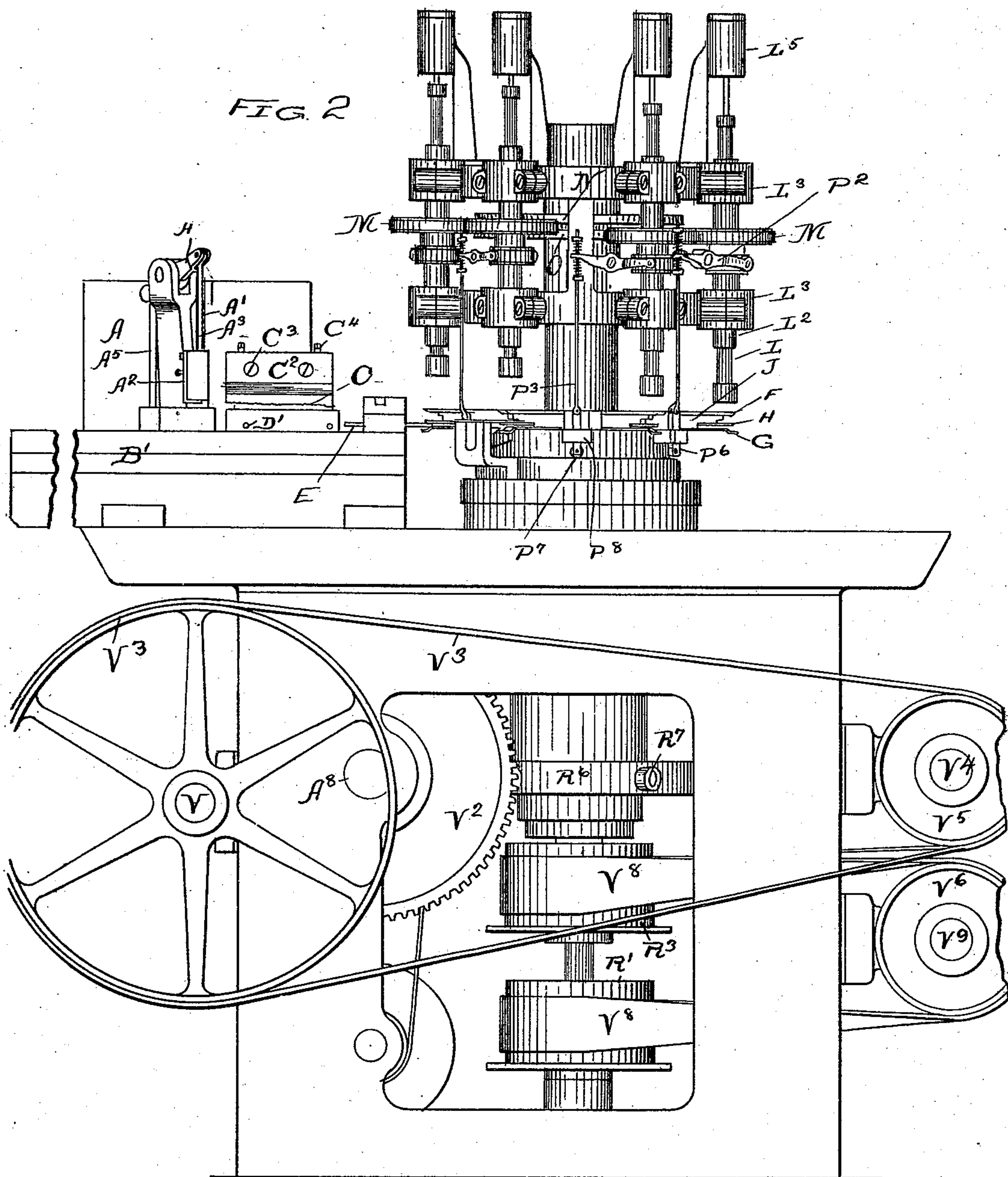
9 Sheets—Sheet 2.

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No. 572,376.

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WITNESSES:

Sec. C. Curtis
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INVENTOR:

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(No Model.)

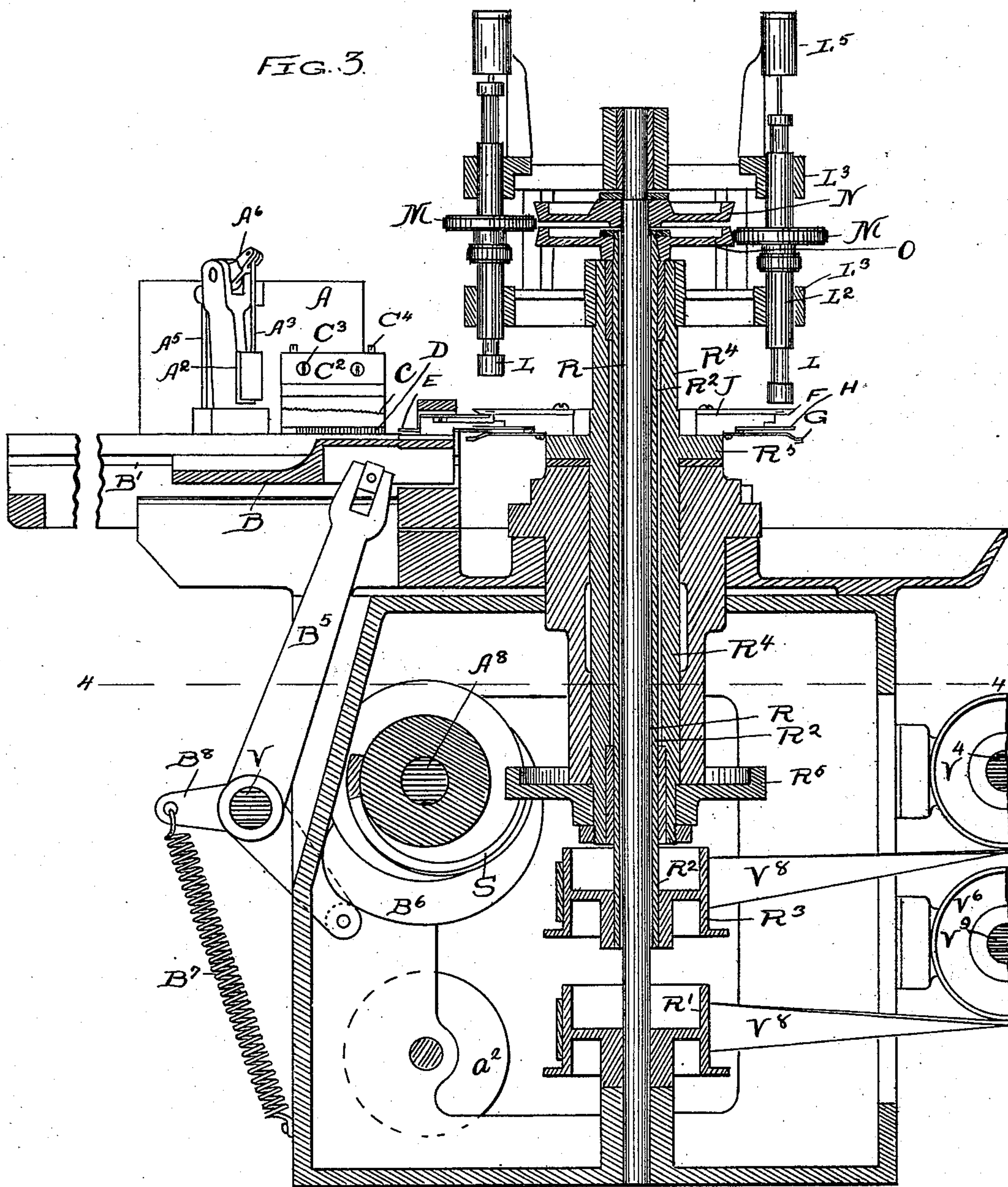
9 Sheets—Sheet 3.

C. E. ROBERTS.

MACHINE FOR FINISHING SPOKE NIPPLES FOR BICYCLES.

No. 572,376.

Patented Dec. 1, 1896.



WITNESSES:

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9 Sheets—Sheet 4.

C. E. ROBERTS.

MACHINE FOR FINISHING SPOKE NIPPLES FOR BICYCLES.

No. 572,376.

Patented Dec. 1, 1896.

FIG. 4.

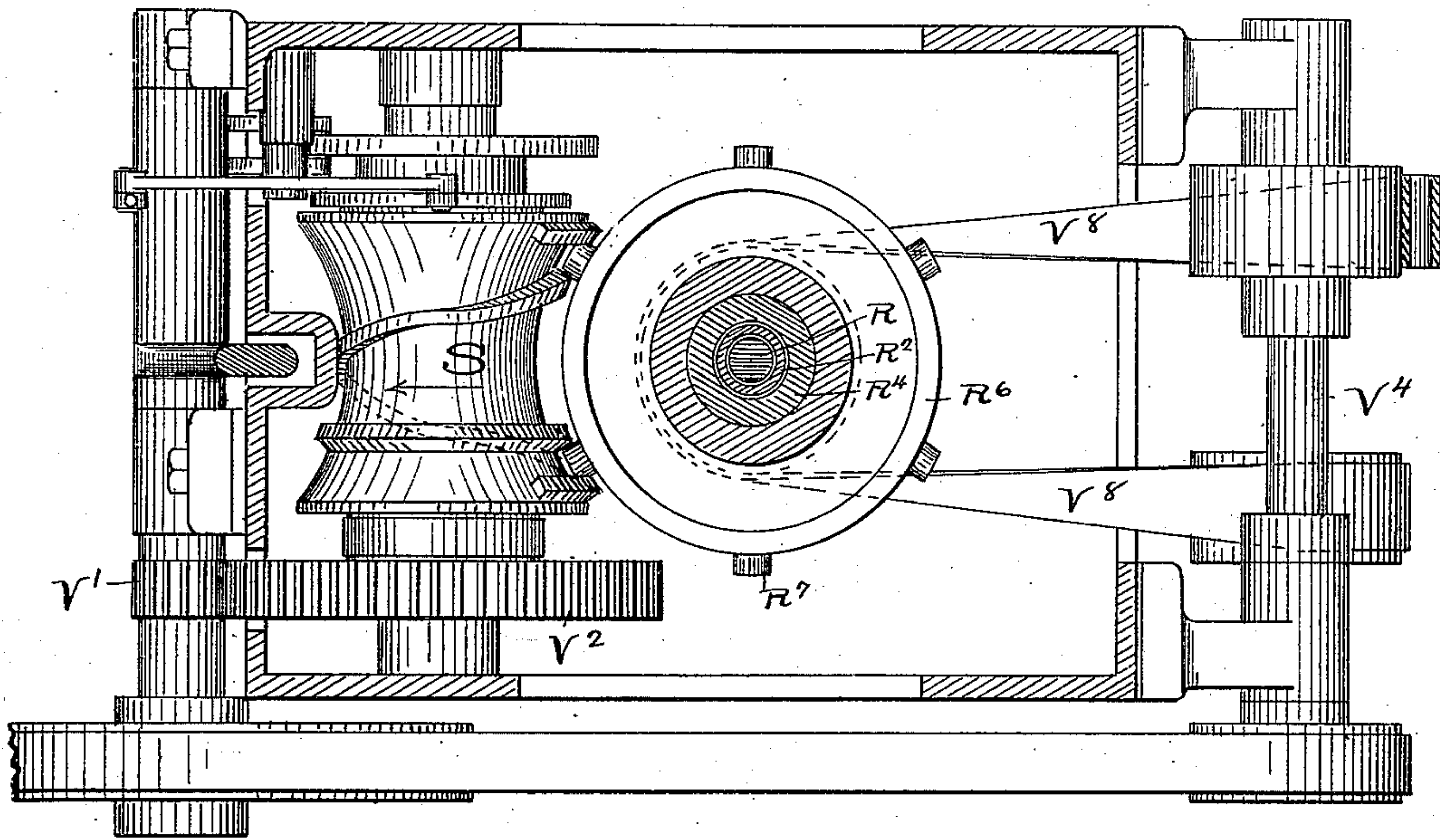


FIG. 5.

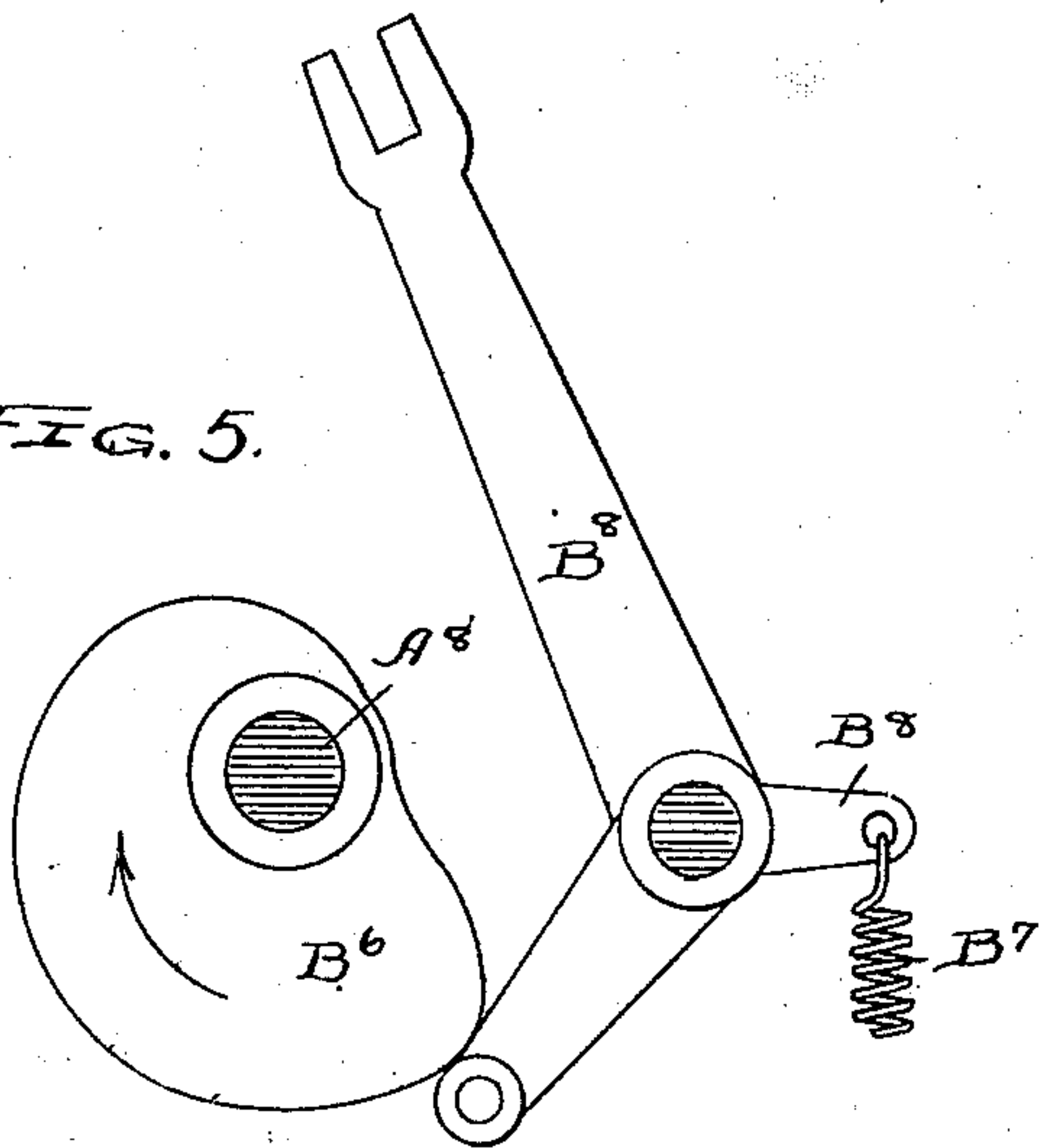
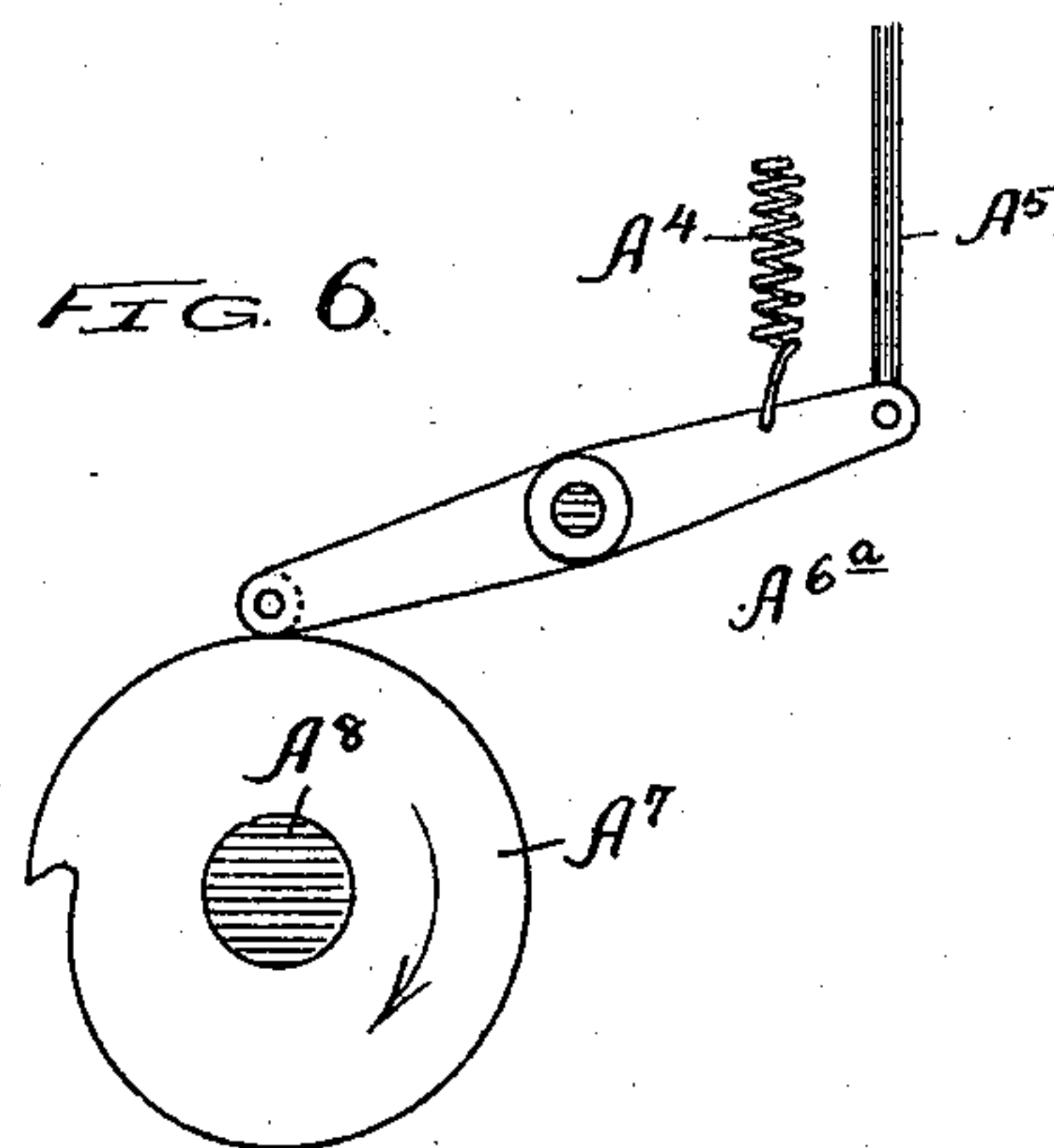


FIG. 6.



WITNESSES:

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INVENTOR:

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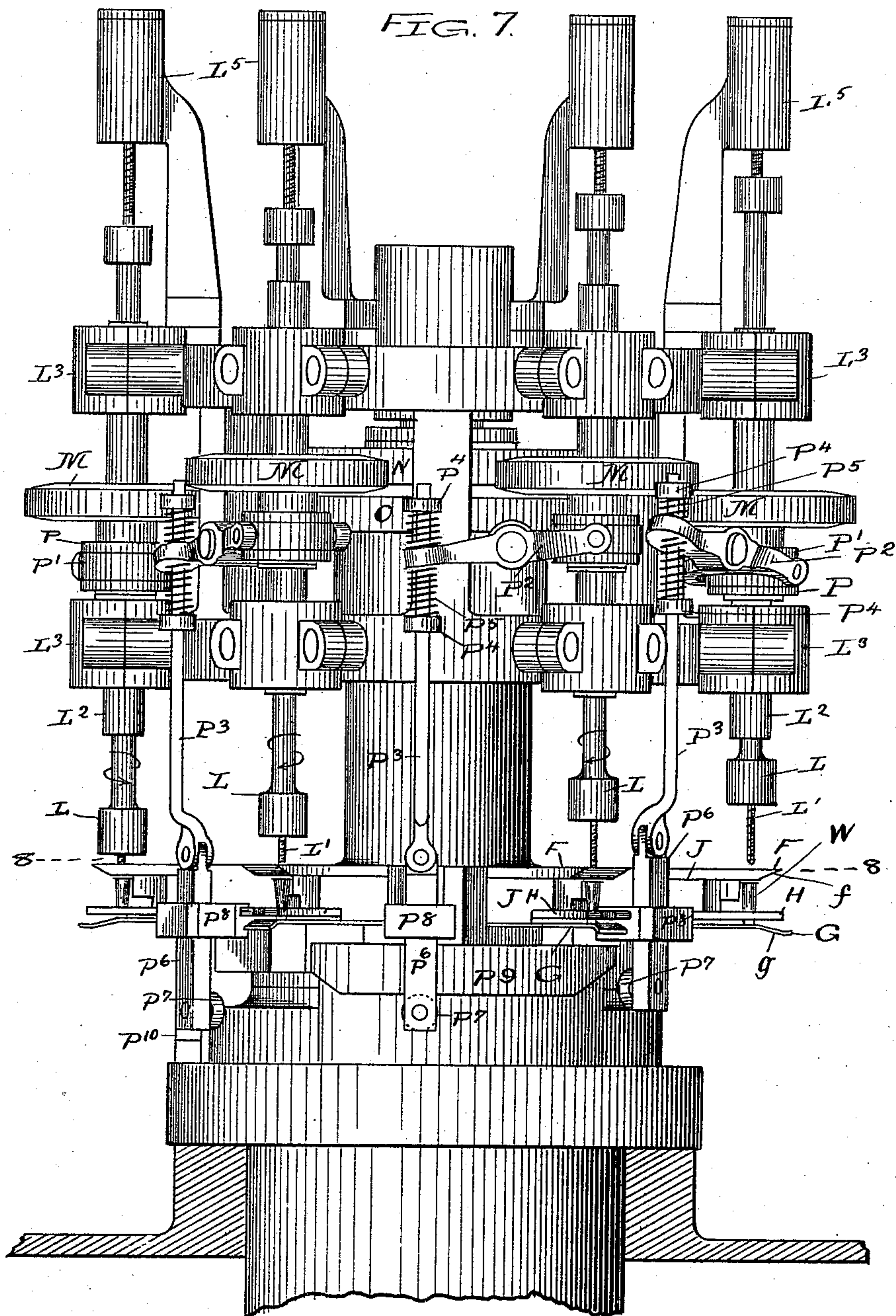
9 Sheets—Sheet 5.

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Patented Dec. 1, 1896.



WITNESSES:

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INVENTOR:

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(No Model.)

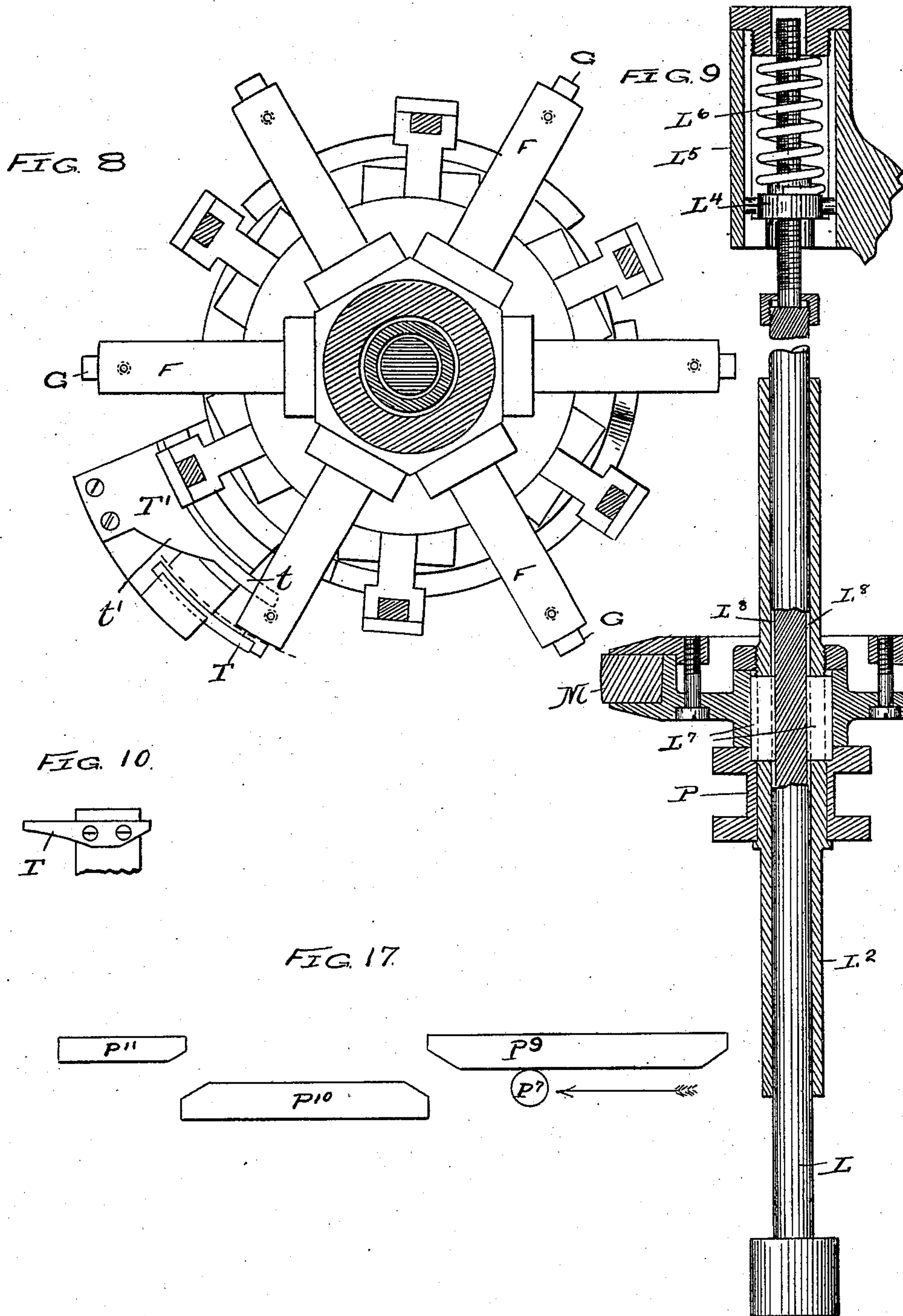
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C. E. ROBERTS.

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No. 572,376.

Patented Dec. 1, 1896.



WITNESSES:

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INVENTOR:

CHARLES E. ROBERTS

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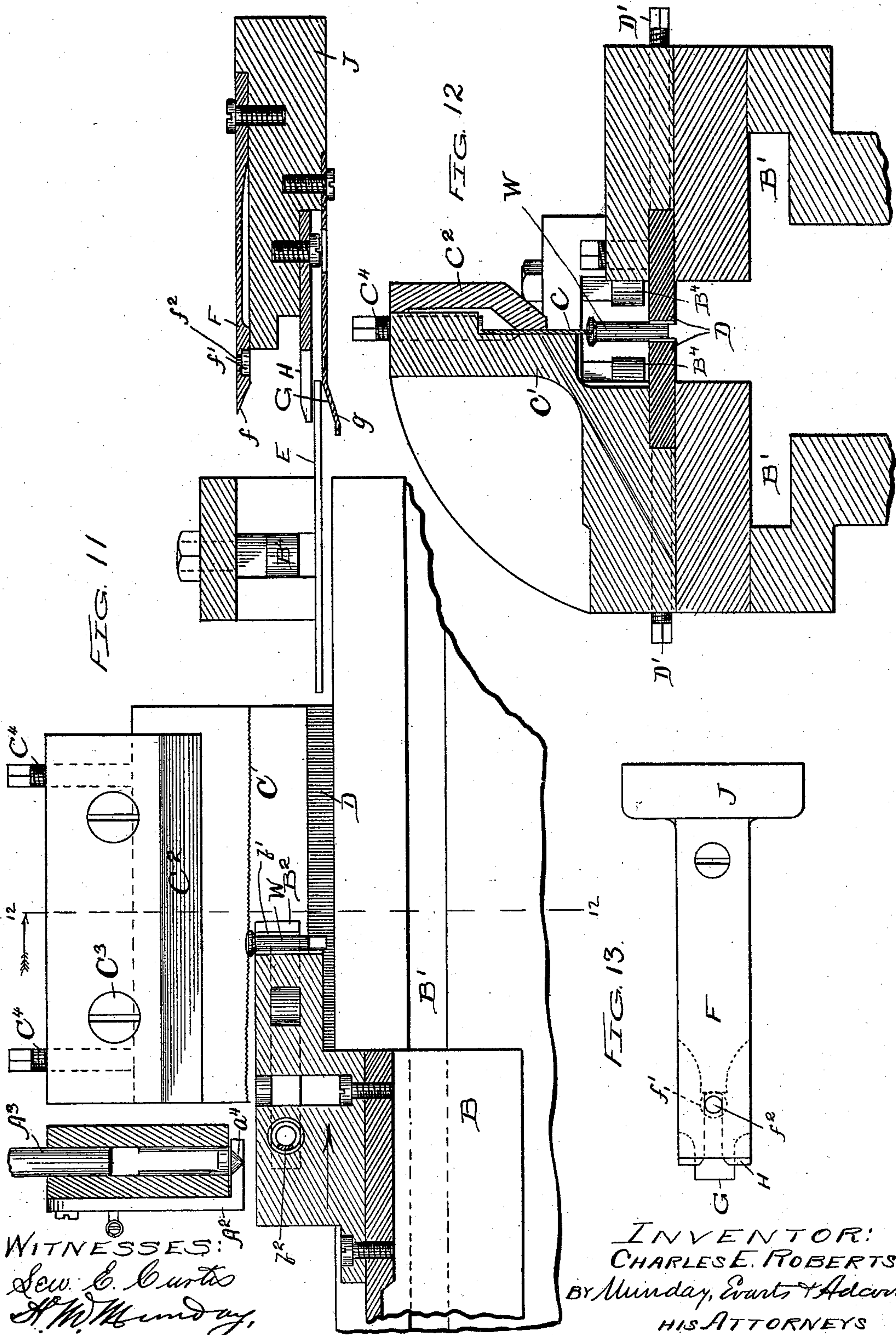
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C. E. ROBERTS.

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Patented Dec. 1, 1896.



WITNESSES:
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(No Model.)

9 Sheets—Sheet 8.

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MACHINE FOR FINISHING SPOKE NIPPLES FOR BICYCLES.

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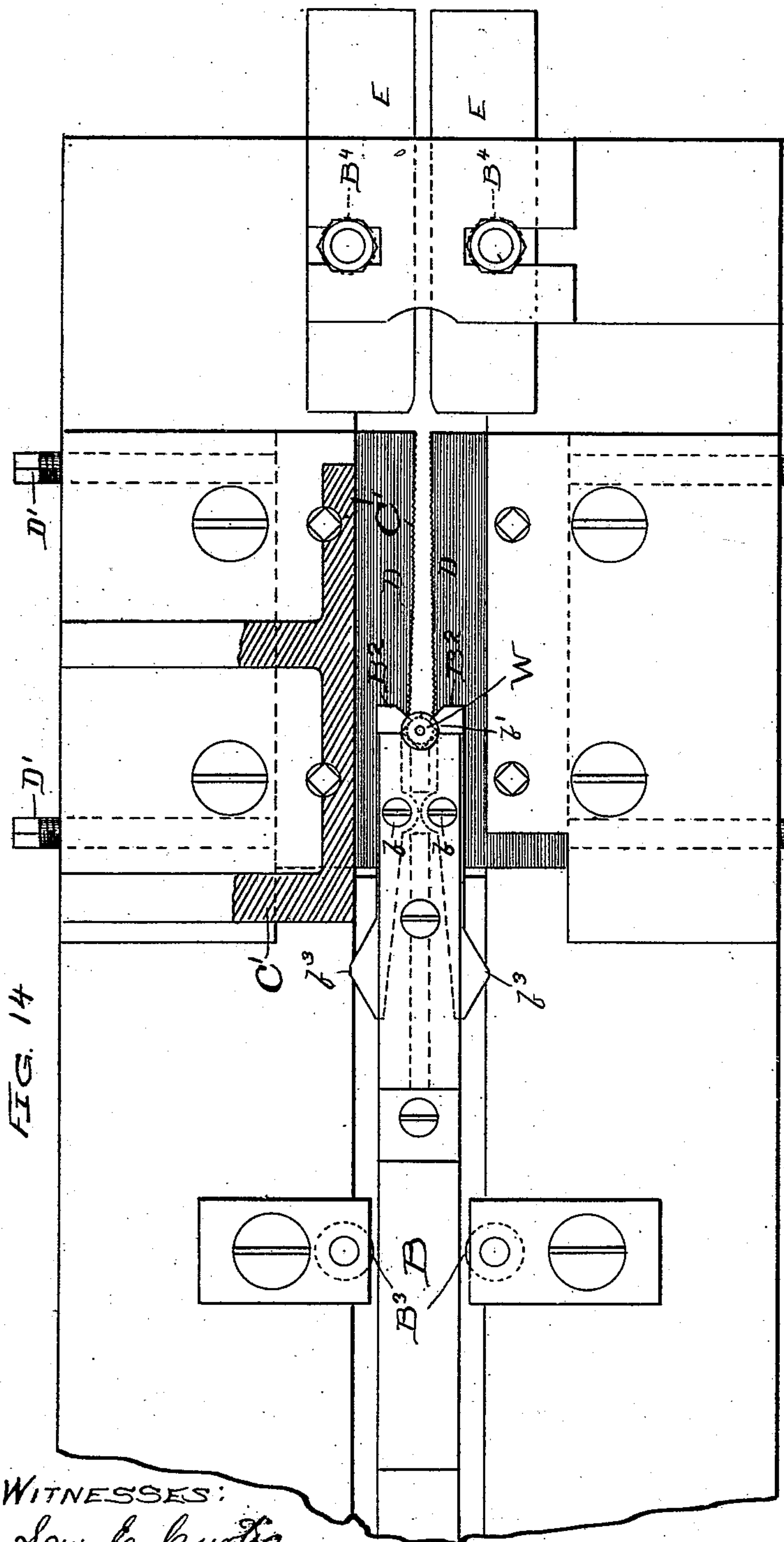


FIG. 14

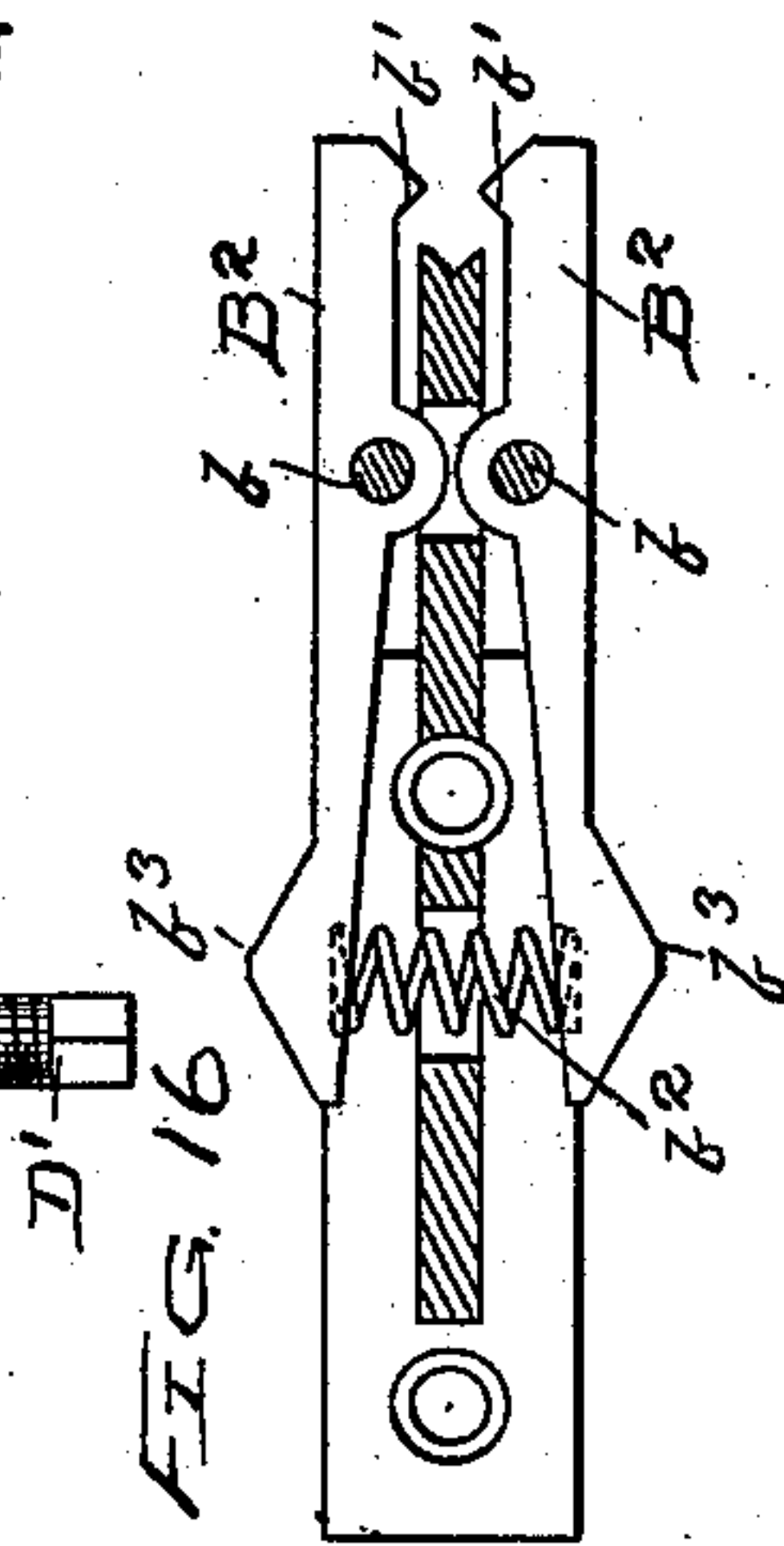


FIG. 16

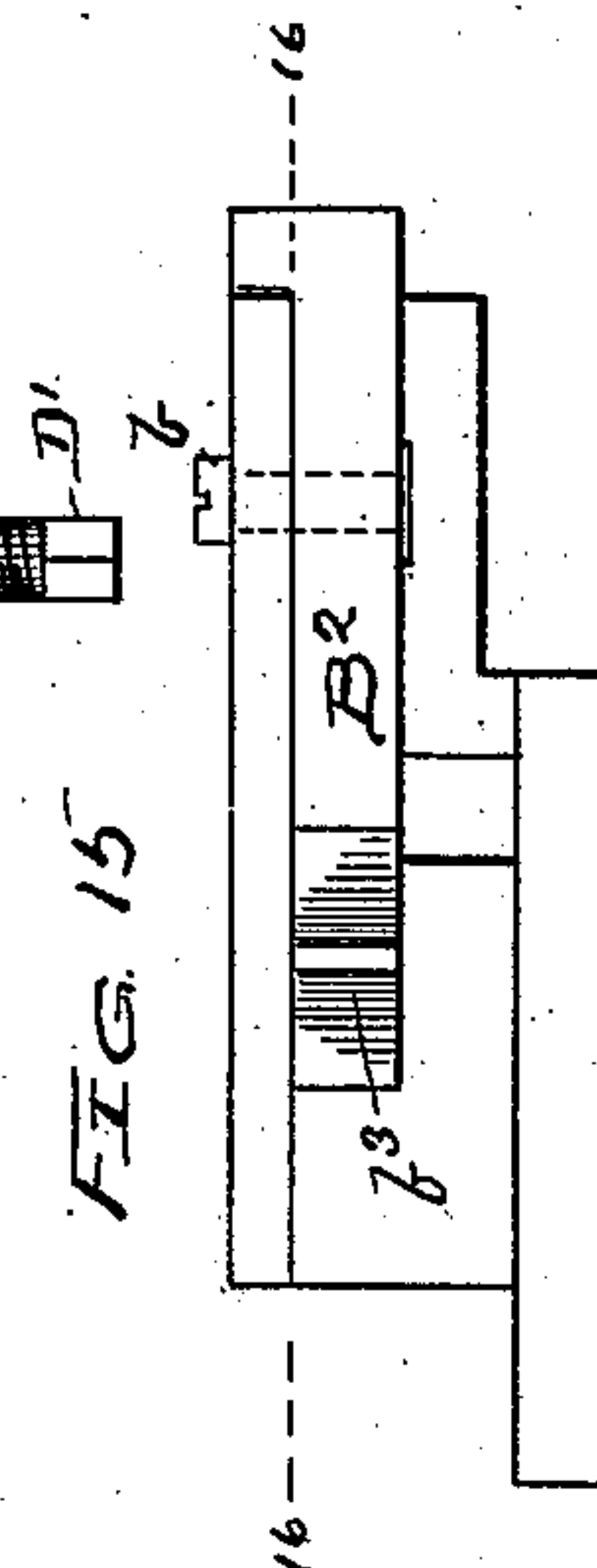


FIG. 15

WITNESSES:

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INVENTOR:

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(No Model.)

9 Sheets—Sheet 9.

C. E. ROBERTS.

MACHINE FOR FINISHING SPOKE NIPPLES FOR BICYCLES.

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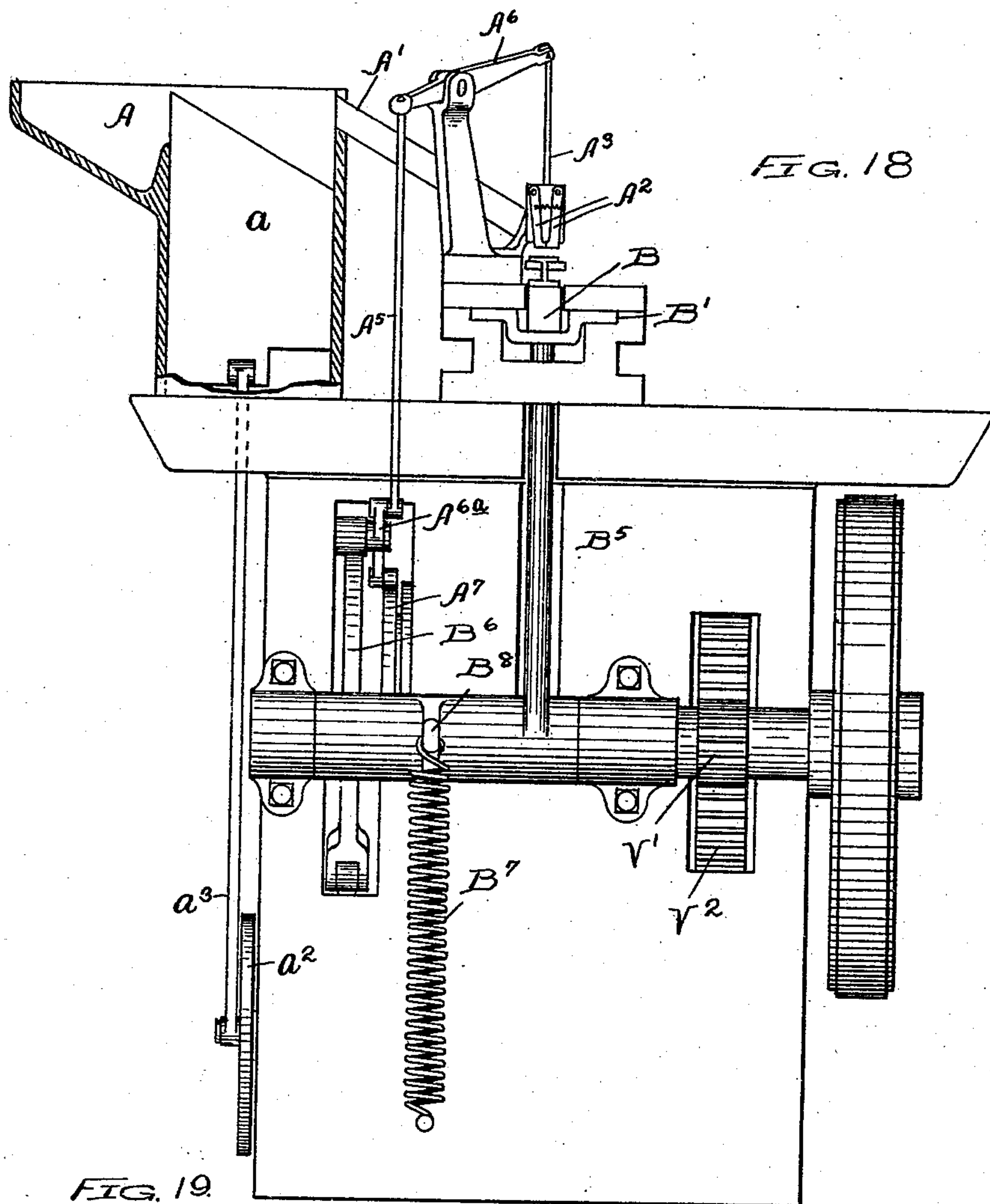


FIG. 19.

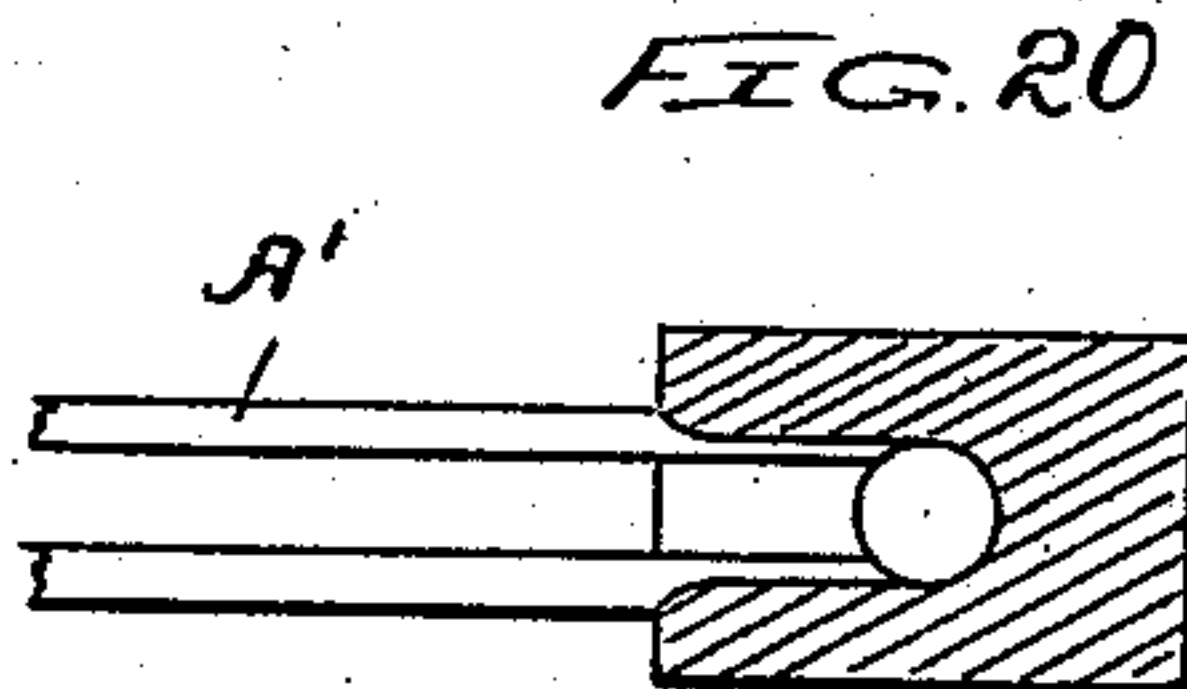
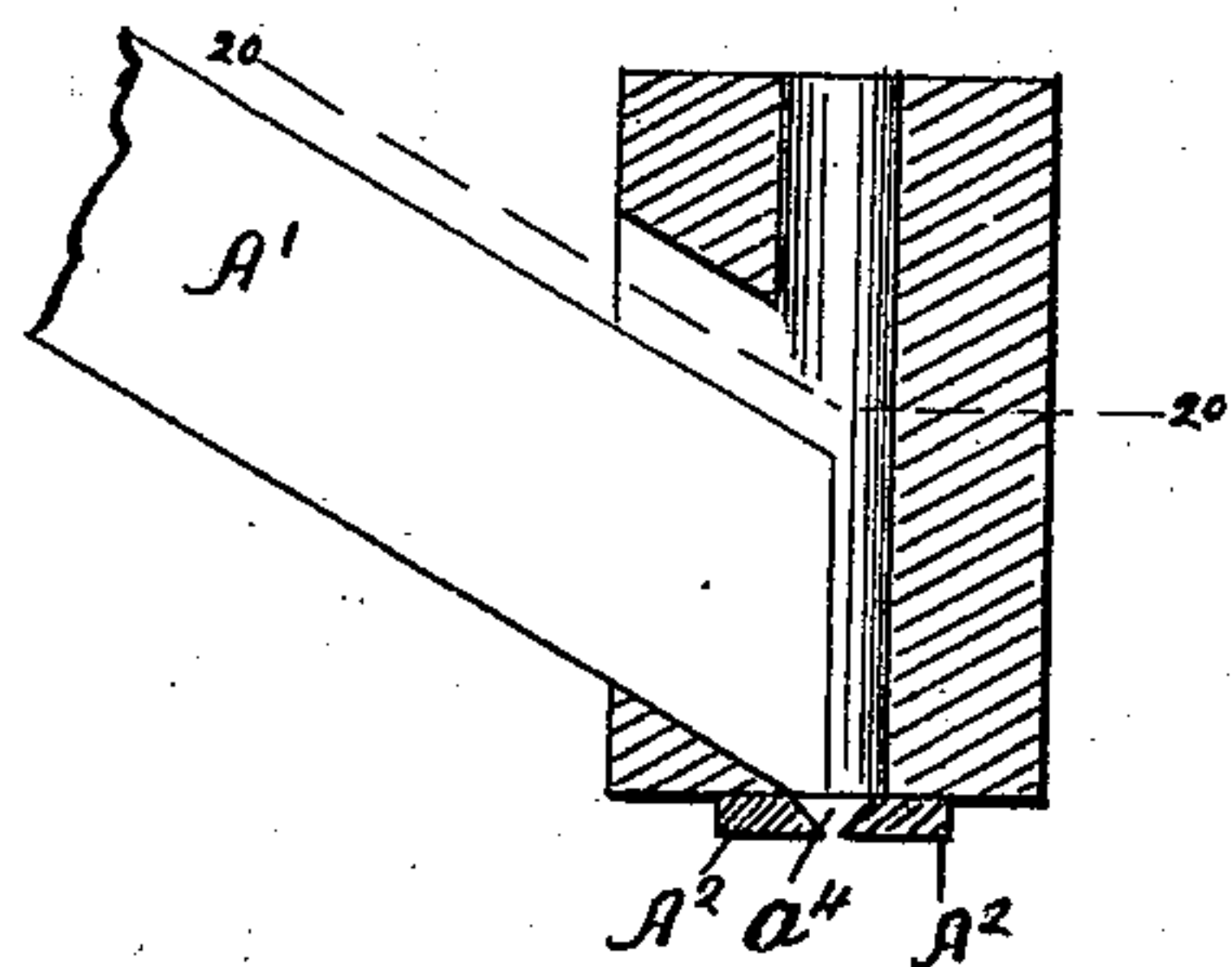


FIG. 20

WITNESSES:

Geo. E. Curtis
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INVENTOR:

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By Munday, Everts & Adcock.

HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES E. ROBERTS, OF OAK PARK, ILLINOIS.

MACHINE FOR FINISHING SPOKE-NIPPLES FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 572,376, dated December 1, 1896.

Application filed January 27, 1896. Serial No. 577,056. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ROBERTS, a citizen of the United States, residing in Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Finishing Spoke-Nipples for Bicycles, of which the following is a specification.

This invention is designed to cut the nick for the reception of the screw-driver in the heads of the nipples, to slab or flatten the body of the nipple upon opposite sides, so as to adapt it to be turned by a wrench, and to tap or thread the central bore of the nipple. These several operations have heretofore been performed in separate machines, but are now by my invention combined in one machine, which is wholly automatic in its action.

The principal feature of the invention is found in the means which I use for cutting the nick and for cutting or slabbing the sides. I employ for these operations stationary saws and a moving carriage adapted to carry the nipple across the teeth of the saws and to hold it rigidly while so moving, so that the saws will operate upon it. The saw employed for cutting the nick is placed in a vertical position centrally over the path of the nipple-blank, and is of course thin or narrow, as the nick is only a narrow slot. The saws which slab the sides are placed upon opposite sides of the path of the nipple with their teeth projecting toward each other, and are made thick enough so that the cutting edges of the teeth shall equal in height the height of the portion to be cut or slabbed. All the saws are placed at a slight angle to the line of movement of the nipple-blank, so that all the teeth therein may perform their share of the cutting. The saws are relatively arranged so that the upper or nick-cutting one may begin operation upon the nipple slightly in advance of those which cut the sides in order that the nick-cutting saw may assist in preventing the nipple from turning in the holder. I also lessen the danger of the blank turning by cutting the opposite sides thereof at the same time, one cutter thus neutralizing the pressure of the other.

A further feature of the invention is found in the combination, with the nicking and slabbing cutters, of a mechanism for tapping or

threading the nipples internally. This tapping mechanism receives the blank from the holder, which carries the nipple past those cutters and taps the central bore of the nipple before it is released from the machine. Suitable tapping mechanism for this purpose may be constructed in different ways, but I prefer to employ a turret having a plurality of holders and corresponding tools, which are presented in turn at the point where the nipples are discharged from the holder of the cutters. Some of these tapping-tools will be operating while others are receiving or discharging the nipples, and there is consequently no loss of time in the operation of the machine.

The nature of my invention will be more fully understood when considered in connection with the detailed description given below and the illustrations contained in the accompanying drawings, in which latter—

Figure 1 is a plan view of my invention; Fig. 2, a side elevation thereof; Fig. 3, a vertical section on the line 3 3 of Fig. 1. Fig. 4 is a horizontal section on the line 4 4 of Fig. 3. Fig. 5 shows the detail of the cam for operating the nipple-holder carrying the blank past the cutters. Fig. 6 shows a cam for operating the striker or driver of the feed mechanism. Fig. 7 is an enlarged elevation of the tapping-turret. Fig. 8 is a horizontal section on the line 8 8 of Fig. 7. Fig. 9 is an enlarged vertical section of one of the tool-carrying spindles of the turret. Fig. 10 shows the stationary guide or cam for releasing the nipples from the turret. Fig. 11 is a longitudinal vertical section of the nicking and slabbing mechanism and of one of the nipple-holders carried by the turret. Fig. 12 is a section on the line 12 12 of Fig. 11. Fig. 13 is a plan of one of the turret nipple-holders. Fig. 14 is a horizontal section of the slabbing-cutters. Fig. 15 is a side elevation of the nipple-holders for carrying the blank past the cutters. Fig. 16 is a section on the line 16 16 of Fig. 15. Fig. 17 is a diagram of the cams for moving the spindles of the turret. Fig. 18 is an end elevation of the machine, partly in section. Fig. 19 is a vertical section of the feed-chute and the slideway in which the driver moves in forcing the nipples

into the carrier by which it is moved past the saws, and Fig. 20 is a section on the line 20 20 of Fig. 19.

In said drawings, A represents a hopper 5 into which a mass of the nipples W are thrown, with a slotted assembling and positioning device a , having a rising-and-falling motion in the hopper, so as to agitate the body of nipples and insure their being automatically po- 10 sitioned in the slot of the assembler, said slot, which appears at a' , being of a familiar construction and adapted to admit the bodies or stems of the nipples, but too narrow to admit the heads, so that the nipples assume a ver- 15 tical position therein with their heads resting on the sides of the slot. For giving motion to this assembler the crank-wheel a^2 and lever a^3 may be employed. This assembler also acts to deliver the nipples which are 20 thus positioned in it to an inclined chute A' , which conducts them to a point immediately over the moving holder, hereinafter described, and whereby they are carried past the cutter and to the tapping mechanism. When the 25 nipple arrives at this point, it enters between two spring-arms A^2 , having feet between which the nipple enters and which support it over the holder. The proximate faces of the feet are cut away, as shown at a^4 , so that at 30 the proper time the nipple may be forced down into the holder by a descending driver or plunger A^3 , receiving power from a spring A^4 by means of a rod A^5 , a rocking lever A^6 , attached to the driver and to one end of the 35 rod, and a lever A^{6a} , pivoted at its center and attached to the rod at the other end of the latter and also attached to the spring. The movements of the driver are timed to take place when the clamping devices of the holder 40 are in position under it, and for this purpose I employ a cam A^7 upon the shaft A^8 , whereby the lever A^6 is controlled, and whereby the driver will be lifted at each operation by the spring. It will be understood that the arms 45 A^2 spread when the driver descends, so as to permit the nipple to pass into the holder, and that they are adapted to admit only a single nipple at a time.

The holder consists of a carriage B, moving 50 upon slideways B' and provided with a suitable device for clamping the nipples. The clamping device which is preferred by me consists of two opposing levers $B^2 B^3$, pivoted at b to the carriage and having jaws b' at 55 one end, whereby they may seize the nipples, and a spreading-spring b^2 , interposed between their other ends and causing the clamping action. The levers B^2 also carry double-faced laterally-projecting inclines b^3 , which coöperate with stationary rollers B^3 , located at 60 opposite sides and near one end of the path traveled by the levers in opening the jaws of the levers when the latter are in position to receive a nipple from the driver and with other like rollers B^4 , located at opposite sides 65 and near the other end of said path in opening the jaws when the nipples are to be dis-

charged or delivered to the tapping mechanism.

The holder is reciprocated by an elbow- 70 lever B^5 , controlled by a cam B^6 upon shaft A^8 , and a spring B^7 , attached to an arm B^8 upon the lever, said cam being adapted to produce a slight dwell or cessation of movement by the holder at the time the jaws of 75 the clamping-levers are under the driver, in order to give time for the reception of the nipple.

C is the nicking-saw. It is supported in an upright bracket C' by a clamping-plate 80 C^2 , secured to the bracket by the screws C^3 . The screws C^4 act upon the top edge of the saw and serve to hold it down to the proper plane for action. The slabbing-saws are shown at D D. They are inserted in recesses 85 in the bed of the machine and are adjusted toward the work by screws D' . As shown, the saw C is a thin blade, while the saws D are as thick as the portion of the nipple to be slabbed is high. I find that it is practicable 90 to perform the operations of nicking and slabbing the nipples by thus moving them over stationary saws or cutters, and by that method I am enabled to use mechanism very much 95 simpler, less expensive, and more durable than any previously used for performing the same operations. Of course any one of the saws may be used without the other or others.

The holder is also adapted to deliver the nipples after they have been operated upon 100 by the saws to the tapping mechanism. In order to enable them to do this, two companion guides E E are placed and stationarily secured at opposite sides of the path of the nipple between the saws and the tapping 105 mechanism and at such distance apart as will enable the slabbed or flattened portion of the nipple to enter between them and yet prevent the nipple from turning. These guides insure the presentation of the nipples to 110 the tapping mechanism both at the proper point and in the proper position, and they extend into close proximity to the slotted guide-plates of the turret-holders, as shown at Figs. 2 and 11. 115

Each of the holders carried by the turret consists of a top spring F, a bottom spring G, and the slotted guide-plate H. The top spring F has the following features: Its outer end is beveled off at f to enable the nipple to 120 lift it as it enters the holder. A socket f' is formed upon its under surface conforming in size and shape to the nipple-head, so that the spring may set down over the nipple and accurately center and hold it for the entrance 125 of the tap. It has an opening f^2 over the socket f' , through which the tap may enter the nipple from above. The bottom spring is bent downwardly at its outer end, as shown at g , so that said end may pass under the lower 130 end of the nipple and exert a lifting force upon it. The guide-plate H is slotted to conform to the slabbed part of the nipple and to hold the nipple against turning, and its

top is adapted to engage the shoulders formed upon the sides of the nipples by the slabbing, and thus sustain the nipple against the downthrust of the tap. All these parts are properly attached to the arm J of the turret, and when they come opposite the guides E the levers B², which carry the nipple from the feed and past the saws, also carry it into the embrace of the turret-holding devices and do not relinquish their control of it until the nipple is positioned with its head in the socket of the top spring and it feels the pressure of both springs F and G. By the time the nipple reaches this position the levers B² will have been opened by the rollers B⁴, so that when the levers are moved back they leave the nipple in the turret. The turret is momentarily stopped during this operation, and the levers B² are retracted without delay, so that they are out of the way when the motion of the turret is resumed.

The turret is provided with a series of holder-arms, such as that described, and above each arm is a tapping-spindle L, carrying a tap L' and supported in a sleeve L², the latter being carried in arms L³, radiating from the center of the turret. The sleeve is capable of a rising-and-falling movement in its bearings, and the spindle is also capable of an up-and-down movement in the sleeve, but is keyed thereto, so as to rotate with it. The spindle is also threaded at its upper end, and this threaded portion works in a nut L⁴, having a limited vertical motion in the box L⁵ and depressed by a spring L⁶. The keys which cause the rotation of the spindle are shown at L⁷, and they engage the longitudinal slots L⁸ in the spindle and are fast in the sleeve. The rotation of the spindle in one direction will, with the construction above described, cause the spindle to descend in any position of the sleeve, and its rotation in the other direction will cause it to rise, both these movements being regulated by the nut L⁴.

The spindles are rotated by means of the contact of the friction-wheels M, of which one is carried by each sleeve with the driving friction-wheels N and O, supported at the center of the turret, as explained later on, and driven in opposite directions, so that one will rotate the spindle in the proper direction for tapping and the other in the proper direction for withdrawing the tap, and also arranged at distances apart, so that when the wheels M are in position midway between the driving-wheels no rotary motion at all will be imparted to the spindles. For the purpose of moving the sleeves up and down to bring about contact of the wheels M with the driving-wheels and also to break such contact at proper times I employ the following devices with each spindle: Fast upon the spindle-sleeve is a grooved collar P, and in the groove of the collar is a loose-fitting ring P', which is attached by trunnions at opposite sides to the forked end of a horizontally-extending

lever P², pivoted stationarily upon the turret and encircling at its other end a vertical rod P³. Upon rod P³ are two collars P⁴, one above and one below the lever P², and between such collars and the lever are coiled springs P⁵, one spring being thus adapted to act in a downward and the other in an upward direction on the lever. The rod is pivotally joined at its lower end to a slide P⁶, carrying an antifriction-roller P⁷. The slide moves vertically in a bearing P⁸, stationary upon the turret. The series of rollers P⁷ thus connected to the spindle-sleeves encounter and are at all times controlled by three stationary cams P⁹ P¹⁰ P¹¹. (Shown in detail at Fig. 17 and partially appearing in Fig. 7.) The first of these, P⁹, under which one of the rollers is moving in Fig. 17, is adapted to force the roller, the slide, and the rod to their lowermost positions, and thus rock the corresponding lever P² in such manner as to lift the spindle-sleeve of that lever and bring about contact between the wheel M of the sleeve with the upper driving-wheel N, which rotates the spindle in such direction as to cause the tap to operate upon the nipple. The next cam, P¹⁰, lifts the roller to its uppermost position and rocks the lever in the opposite direction, and thus breaks the contact between wheel M and the driving-wheel N and carries the former against the lower driving-wheel O, which reverses the direction of the tap's rotation and causes it to draw out of the nipple. The third cam, P¹¹, is adapted to force the roller partially down from the position given by the preceding cam, and this brings the wheel M midway between the drivers N and O, in which position the spindle remains idle, and while it is thus controlled by cam P¹¹ the tapped nipple is ejected and replaced by a fresh one.

In the construction described, although the rollers P⁷ are positively operated both up and down by the cams, yet the springs P⁵ permit the spindle-sleeve to yield in either vertical direction whenever emergency requires, and the attendant may at such times raise and lower the sleeve instantly, so as to stop the rotation. In like manner the spindle may lift against the spring L⁶ whenever the tap encounters any unusual resistance. By means of these features very few breakages of the taps occur, notwithstanding their very small diameter.

The interior construction of the turret is shown particularly at Figs. 3 and 4 and is as follows: At the axis is a shaft R, driven by pulley R', and the upper driving friction-wheel N is fast to it. Surrounding this shaft is a sleeve R², to which the pulley R³ is attached and which carries the driving friction-wheel O. The shaft and sleeve are operated in opposite directions. Outside the sleeve R² is a second sleeve K⁴, having an intermediate and comparatively slow motion. This sleeve R⁴ supports the arms in which the tapping-spindles are carried and also the nipple-

holder arms. It is provided with a bearing in a stationary part of the machine and with a flange R^5 , which supports it vertically thereon. It receives its rotary movement 5 through the wheel R^6 , carried by it and having projecting studs R^7 , engaging the cam-drum S upon the shaft A^8 .

By the time the nipple has been tapped and the tap been withdrawn from it it will 10 have reached the neighborhood of a stationary cam T , which is so located relative to the under springs of the turret nipple-holders as to draw down said springs and relieve the nipples from their pressure. This renders 15 the ejection of the nipples from the holders an easy matter, and that is accomplished by a stationary device which I call an "ejector" and which is best shown at T' in Fig. 8. It is located between the cam T and the point 20 at which the nipples are received from the other mechanism, and consists of a curved arm t , adapted to set back of the body of the nipple, and a cam-surface t' , adapted to force the nipple outward, as shown.

25 It will be understood that the dwell given the turret-holders is coincident in point of time with the delivery to them of the nipple by the feed devices of the cutting mechanism.

The various parts of the machine are actuated as follows: The shaft A^8 , whereby the 30 nipple-feed is driven, receives power from a companion shaft V through the gears V' and V^2 , and said shaft V is driven by a belt V^3 from shaft V^4 . The shaft V^4 , shaft R , and 35 sleeve R^2 are all driven by a single belt V^8 , passing around the pulley V^5 on shaft V^4 , then around pulley R^3 on sleeve R^2 , then around pulley V^6 on shaft V^9 , then around pulley R' on shaft R , then around a pulley 40 (not shown) on shaft V^9 to the power-shaft. (Also not shown.) By this arrangement of belting the machine is driven and the shaft R and sleeve R^2 are rotated in opposite directions, as already explained, by the use of 45 a single belt. Two belts can be employed instead of the single one for this purpose, if preferred.

I claim—

50 1. The combination in a machine for finishing nipples for the spokes of bicycle-wheels, of mechanism for nicking the heads of the nipples, mechanism for slabbing or flattening the sides of their bodies, and mechanism for tapping them, substantially as specified.

55 2. The combination in a machine for finishing nipples for the spokes of bicycle-wheels, of mechanism for nicking the heads of the nipples, mechanism for slabbing or flattening the sides of their bodies, mechanism for tapping them, and mechanism for feeding the 60 nipples, substantially as specified.

65 3. The combination in a machine for finishing nipples for the spokes of bicycle-wheels, of mechanism for nicking the heads of the nipples, mechanism for slabbing or flattening the sides of their bodies, mechanism for tap-

ping them, a moving holder adapted to hold the nipple rigidly and also adapted to carry it past the nicking and slabbing devices, and mechanism for assembling, positioning and 70 delivering the nipples to said holder, substantially as specified.

4. The combination in a machine for finishing nipples for the spokes of bicycle-wheels, 75 of mechanism for nicking the heads of the nipples, mechanism for slabbing or flattening the sides of their bodies, mechanism for tapping them, and a moving holder adapted to hold the nipple rigidly and also adapted to carry it past the nicking and slabbing devices 80 to the tapping mechanism, substantially as specified.

5. The combination with nicking, slabbing and tapping mechanisms, of automatic mechanism for feeding the nipples to the machine, 85 and automatic mechanism for carrying the nipples past said nicking and slabbing mechanisms and delivering them to the tapping mechanism, substantially as specified.

6. The combination with nicking, slabbing, 90 and tapping mechanisms, of automatic mechanism for positioning, assembling and feeding the nipples to the machine, and automatic mechanism for carrying the nipples past said nicking and slabbing mechanisms and delivering them to the tapping mechanism, sub- 95 stantially as specified.

7. In a machine for nicking nipples and similar articles, a non-movable and station- 100 arily-located saw and means for holding the article to be nicked and moving it across the teeth of the saw in combination with means for delivering the nipples to said holding means, substantially as specified.

8. In a machine for finishing nipples and 105 similar articles, the opposing stationary saws $D D$, and means for holding the nipples and carrying them across the teeth of such saws in combination with means for delivering the nipples to said holding means, substantially 110 as specified.

9. In a machine for finishing nipples, the combination of a stationary nicking-saw, and opposing stationary slabbing-saws, with means for holding and carrying the nipples 115 across the teeth of such saws and means for delivering the nipples to said holding means, substantially as specified.

10. The combination with a stationary saw and a moving holder for rigidly holding a 120 nipple and carrying it across the teeth of the saw, of means for feeding the nipples into position over said holder, means for arresting the nipples at that position, and a device for forcing the nipples from that position into 125 the holder, substantially as specified.

11. The combination with a stationary saw and a moving holder for rigidly holding a nipple and carrying it across the teeth of the saw, of means for feeding the nipples into 130 position over said holder, a spring device for arresting the nipples at that position, and a

driver for forcing the nipple past said arresting device and into the holder, substantially as specified.

5 12. The combination with a stationary saw of a moving holder provided with spring-actuated clamping-levers B² B² adapted to seize and hold the nipple, and automatic devices for opening said levers to release the nipple, substantially as specified.

10 13. The combination with the saws and the moving holder having clamping devices whereby the nipple is seized and rigidly held while it is moved across the teeth of the saws, of the tapping mechanism provided with nipple-holding devices, said first-mentioned
15 holder being adapted to carry the nipple into the embrace of the holding devices of the tapping mechanism, substantially as specified.

14. In a machine for finishing nipples, a

moving holder adapted to rigidly hold the 20 nipple in a vertical position, and means for delivering the nipples singly to said holder, in combination with a stationary nicking-saw, located above the path through which the nipple is carried by said holder, and sta- 25 tionary slabbing-saws arranged at opposite sides of said path, substantially as specified.

15. The combination of a moving holder adapted to carry the nipple and to hold it rigidly and means for delivering the nipples 30 singly to said holder, with a stationary saw arranged in an inclined position in the path of the nipple, substantially as specified.

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Witnesses:

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