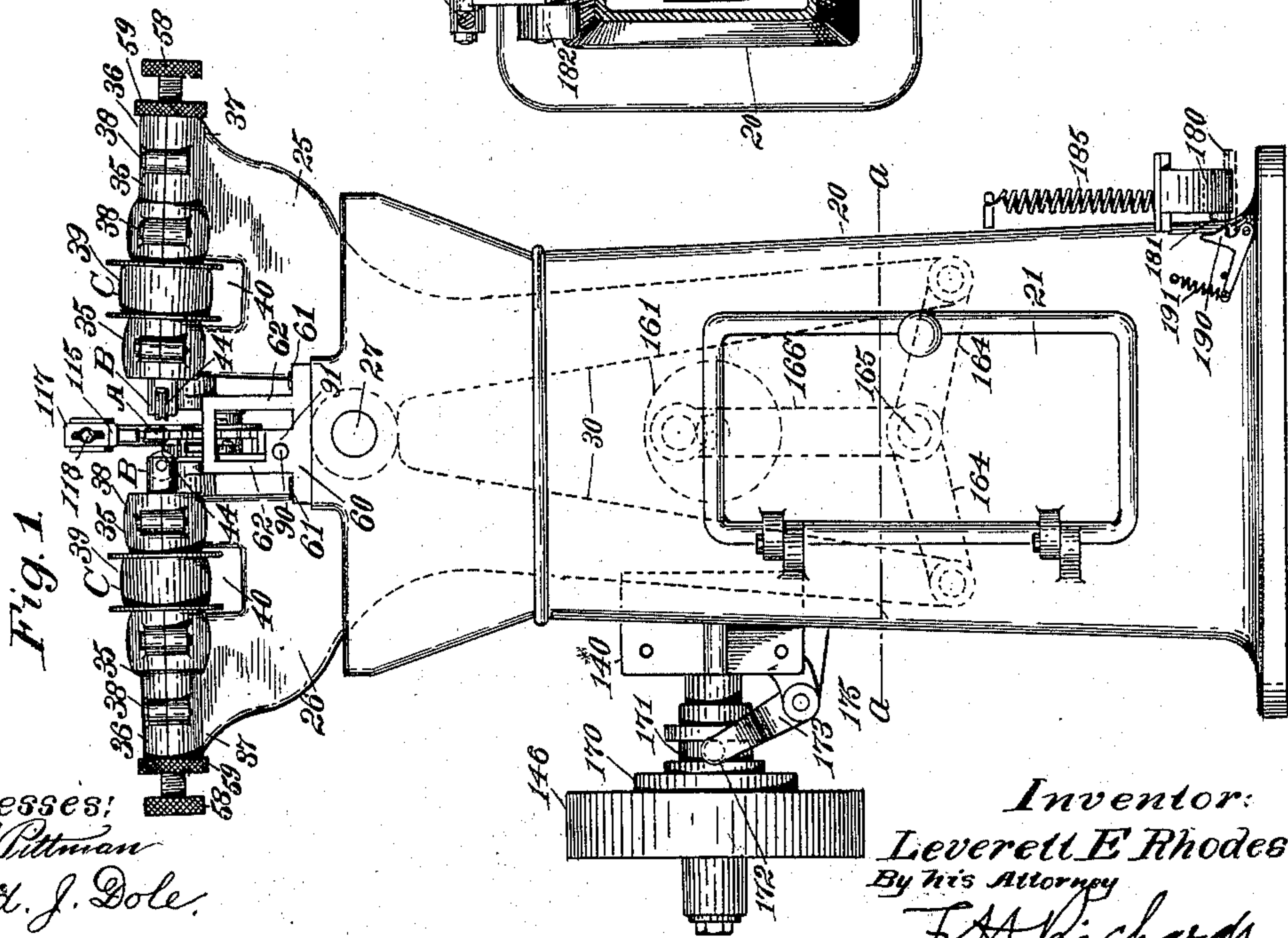
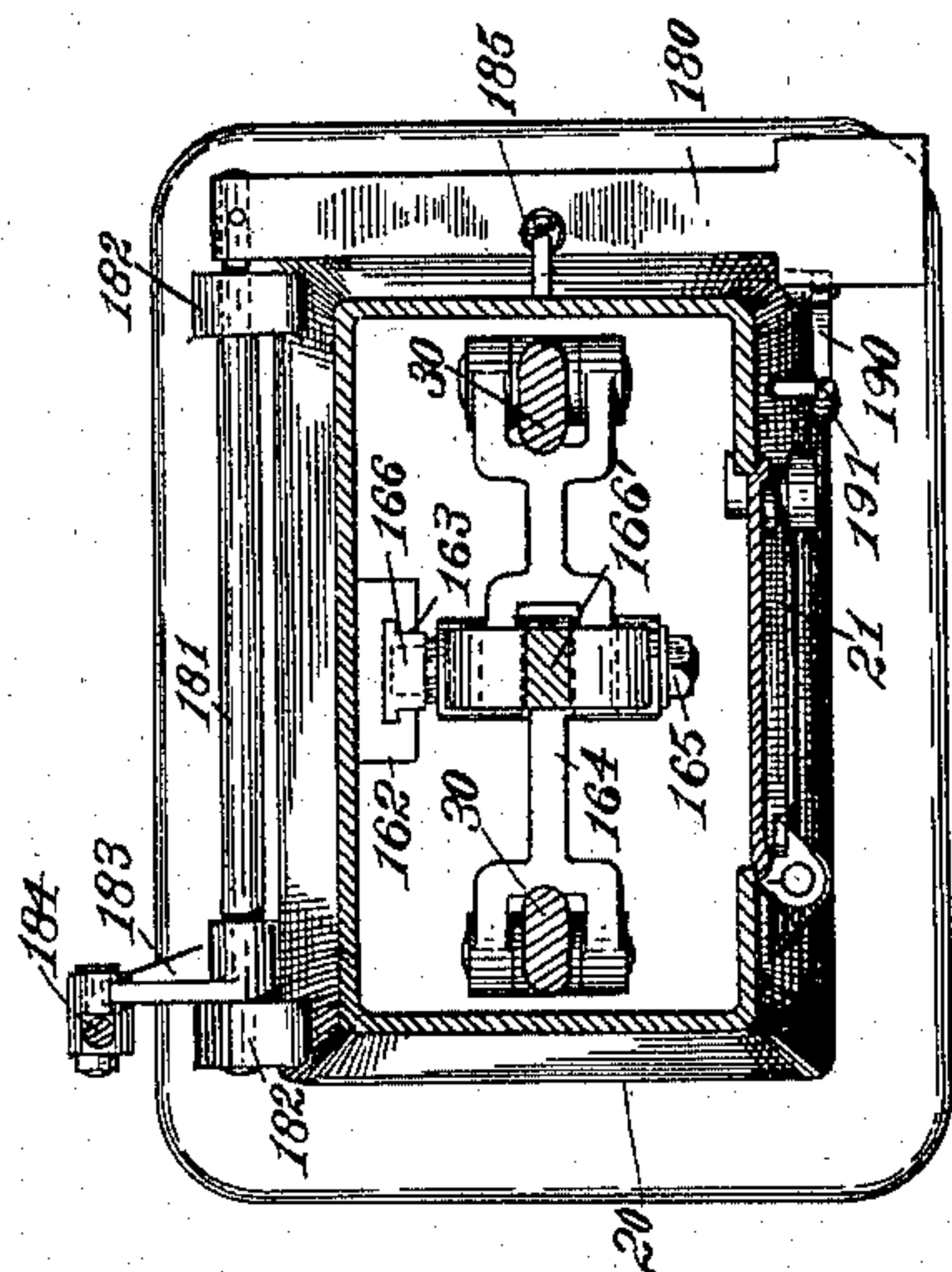
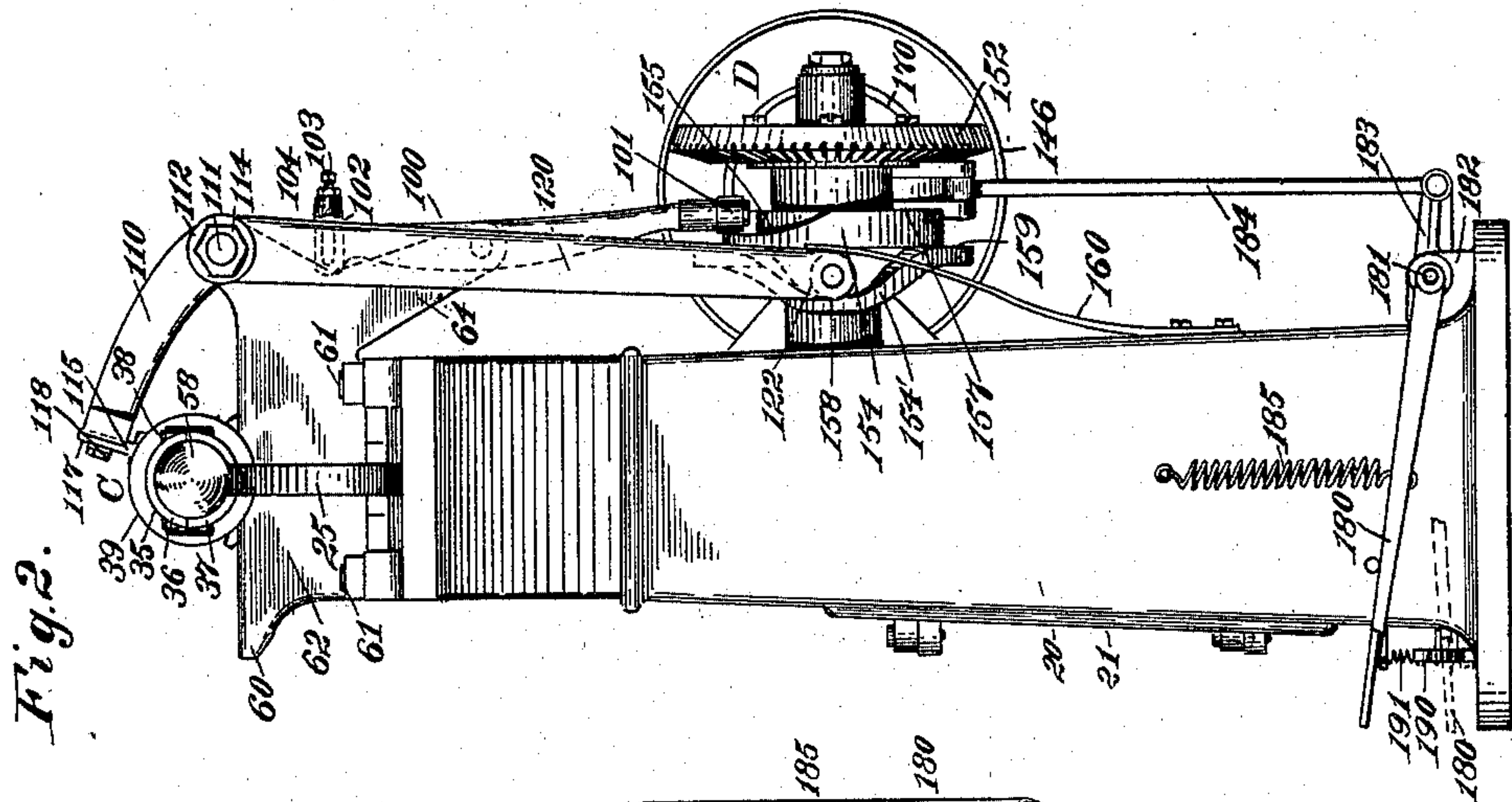



5 Sheets—Sheet 1.

No. 565,568.

Patented Aug. 11, 1896.



Witnesses: 
R. W. Pittman
Fred. J. Dole.

Inventor:
Leverett E Rhodes
By his Attorney
F. H. Richards.

(No Model.)

5 Sheets—Sheet 2.

L. E. RHODES.
RIVETING MACHINE.

No. 565,568.

Patented Aug. 11, 1896.

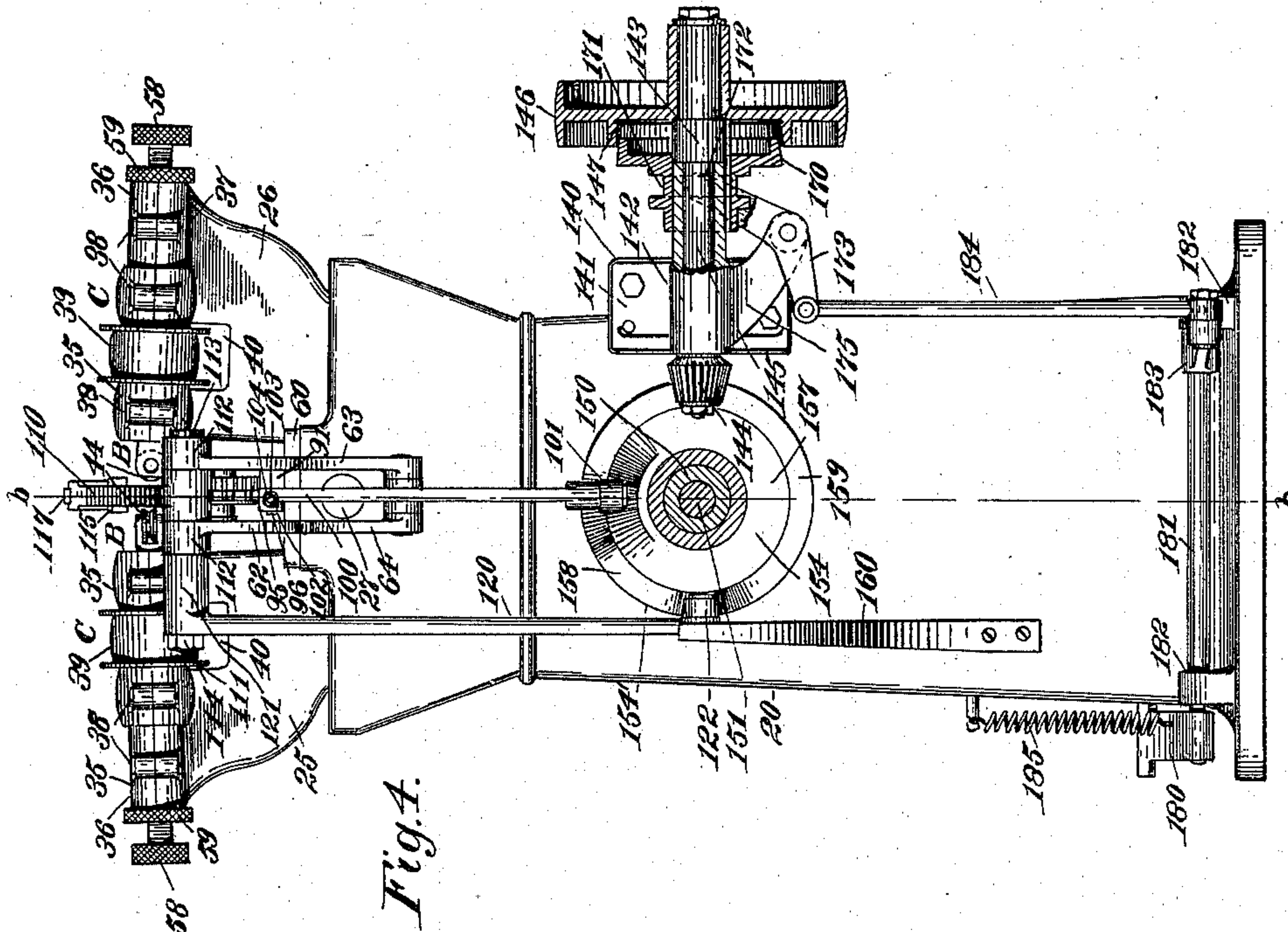


Fig. 4.

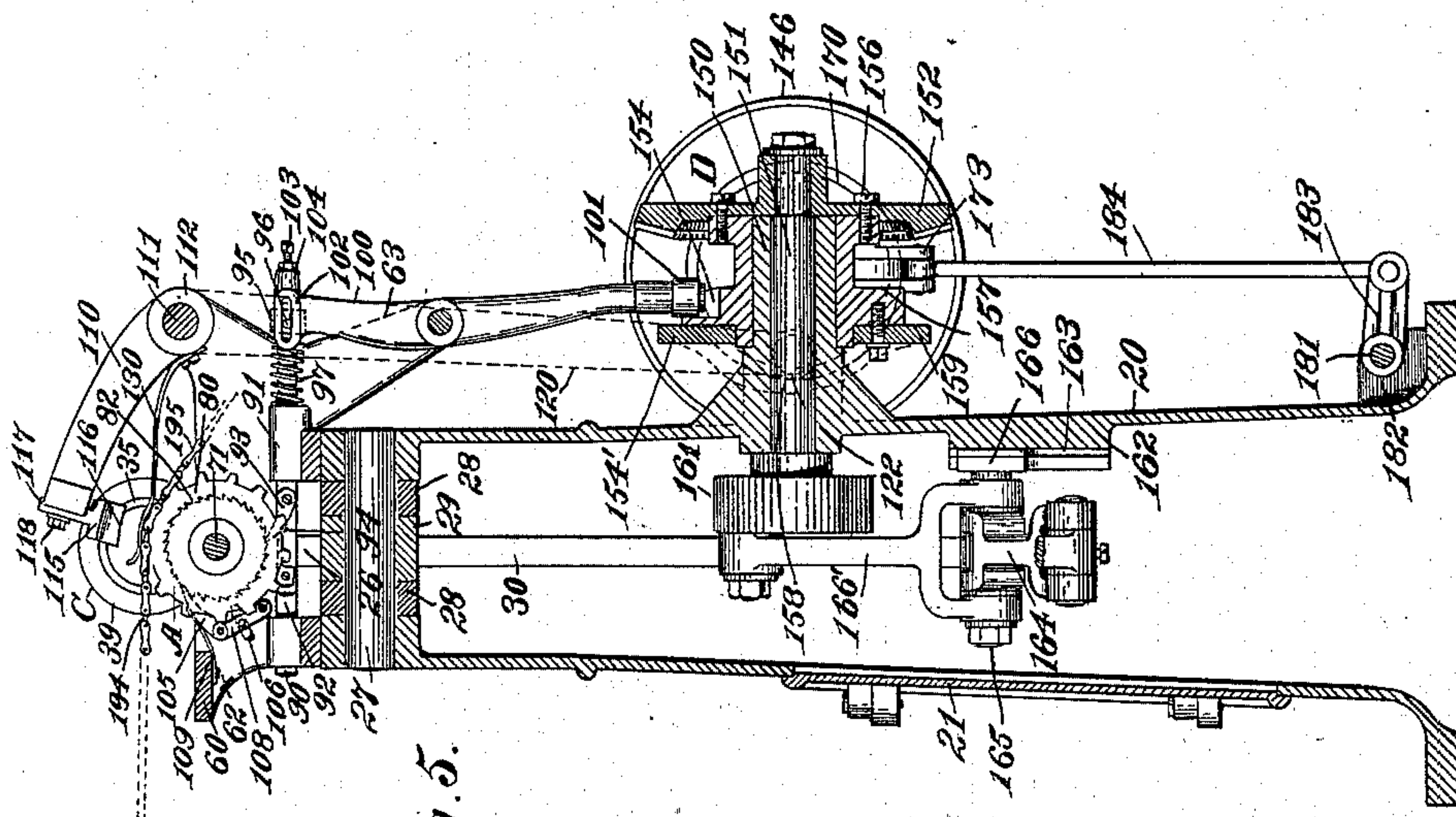


Fig. 5.

Witnesses:
R. W. Pittman
Fred. J. Dole.

Inventor:
Leverett E. Rhodes.
By his Attorney
F. W. Richard.

(No Model.)

5 Sheets—Sheet 3.

L. E. RHODES.
RIVETING MACHINE.

No. 565,568.

Patented Aug. 11, 1896.

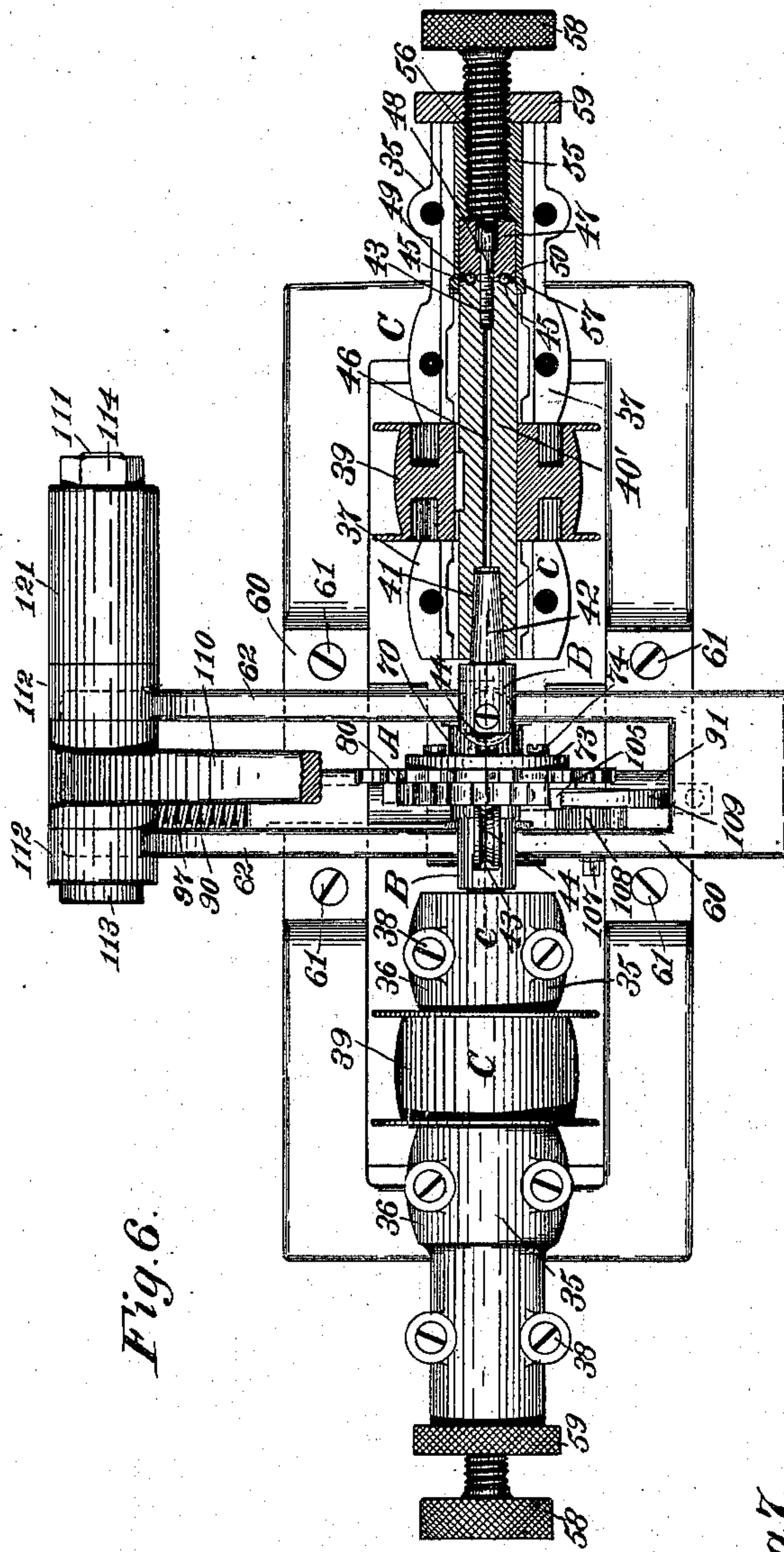


Fig. 6.

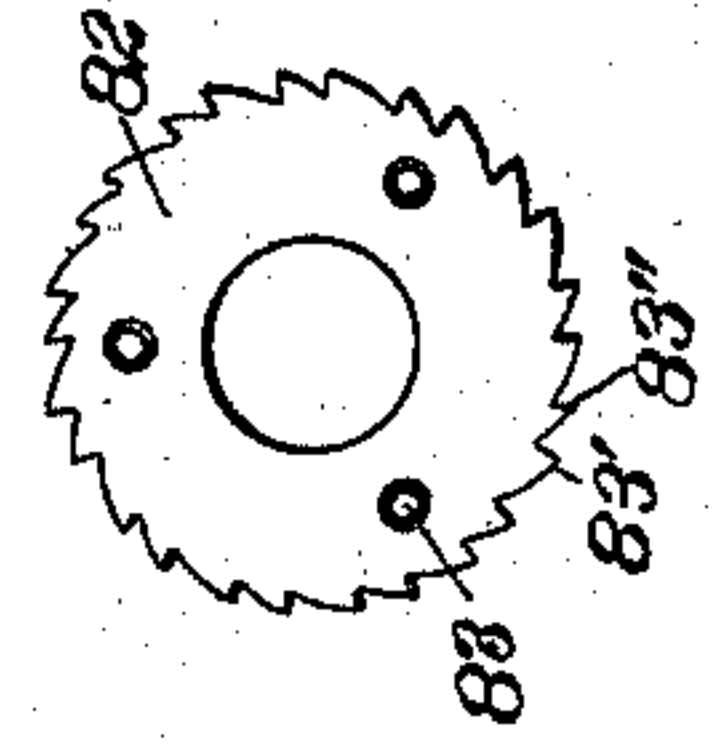
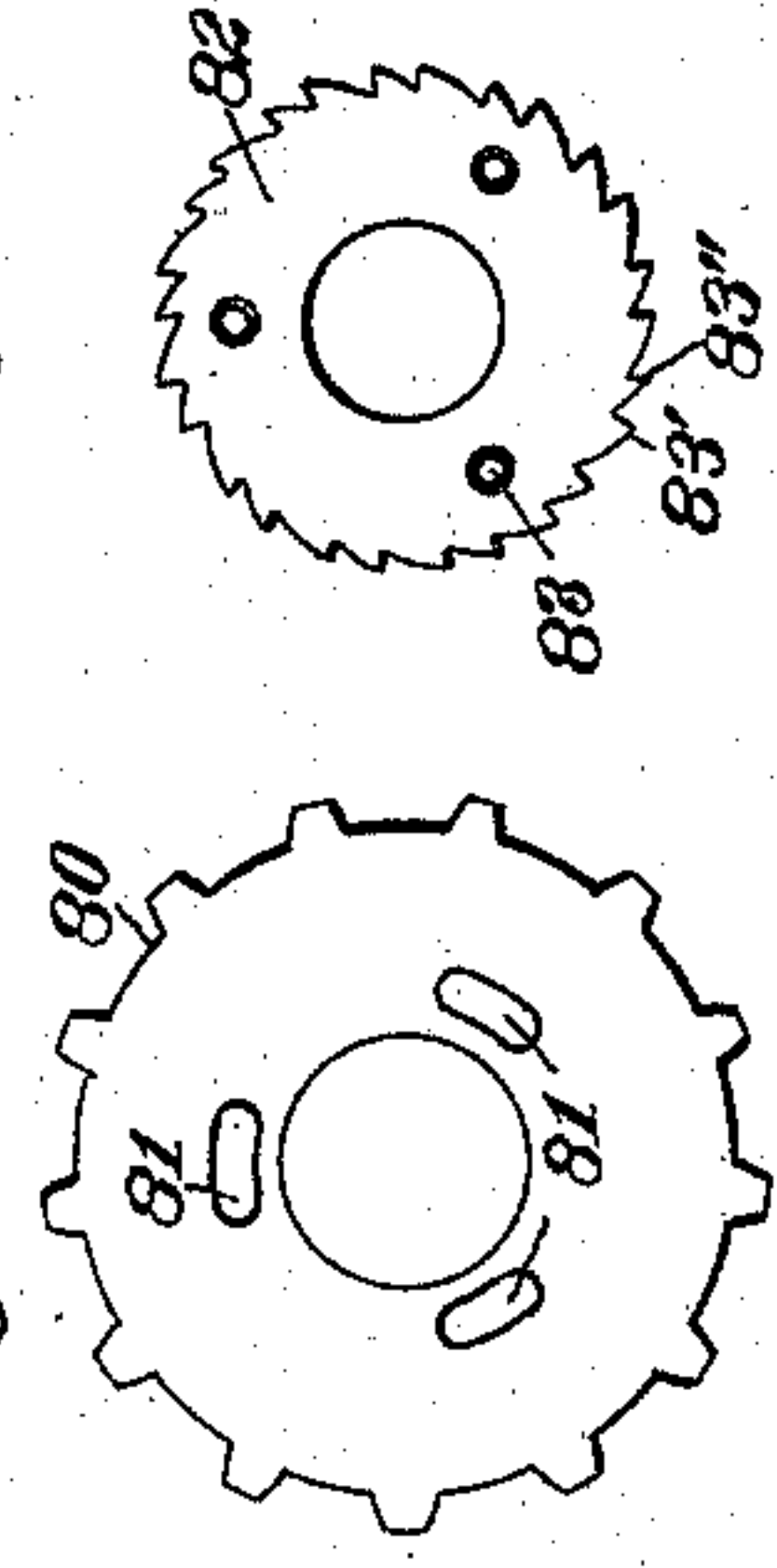
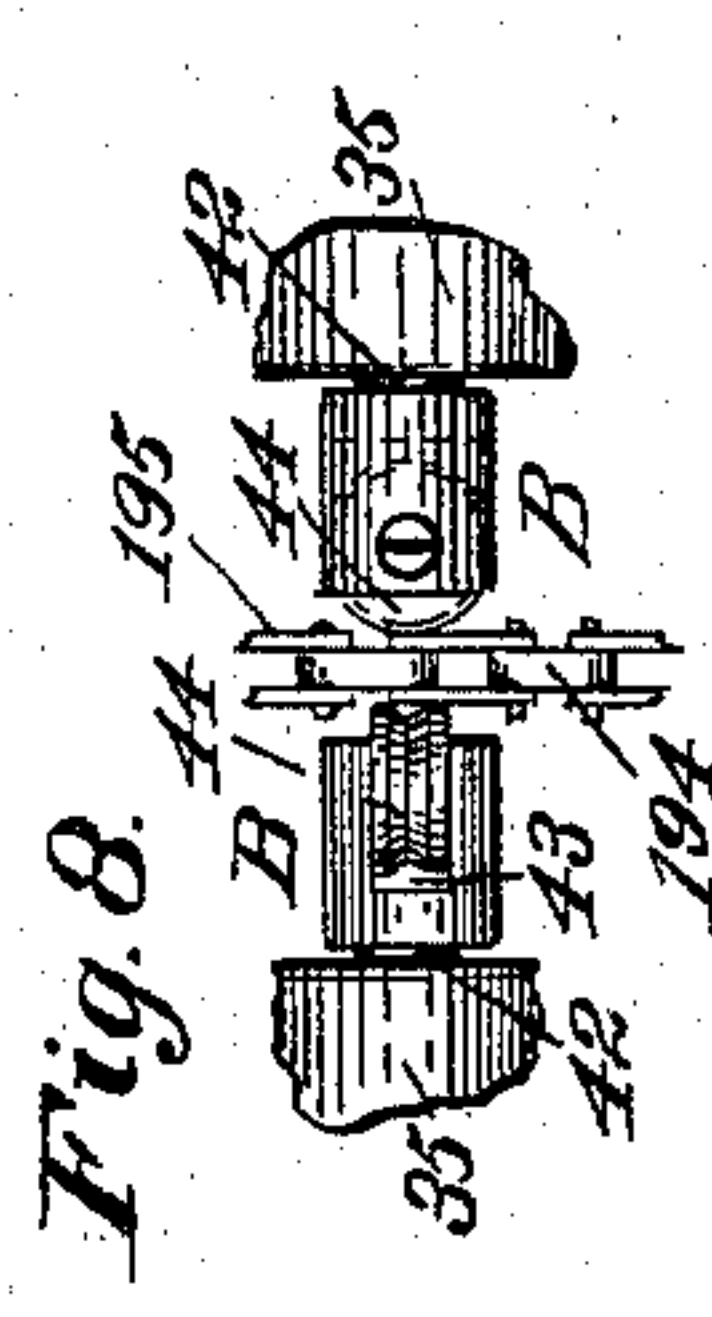
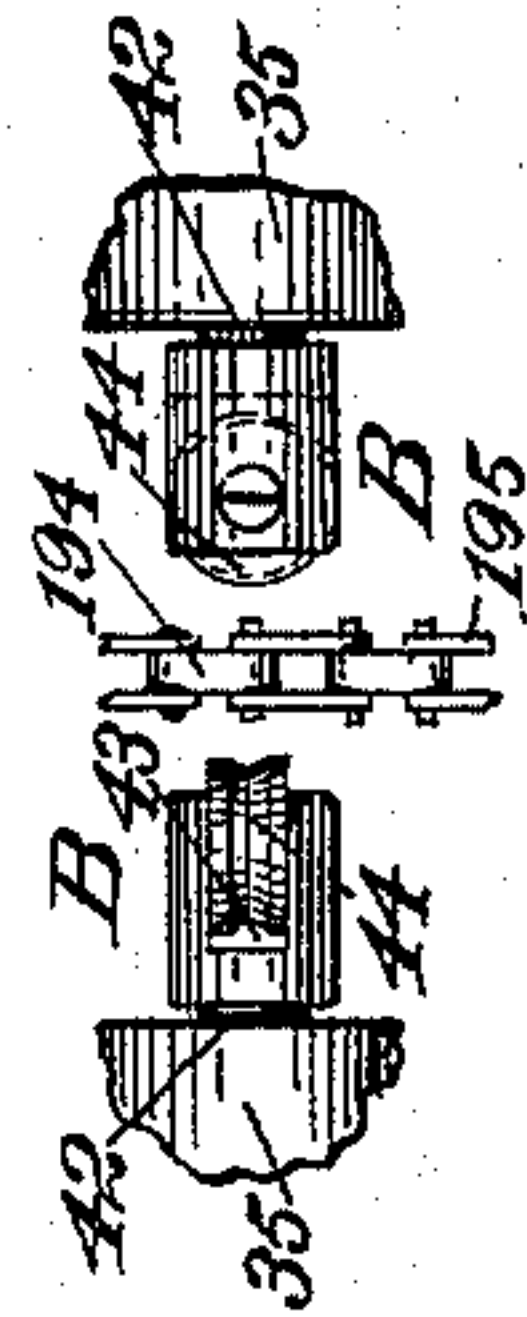
Fig. 11.

Fig. 10.

Fig. 9.

Fig. 7.

Fig. 8.



Witnesses:
R. W. Pittman
Fred. J. Dole.

Inventor:
Leverett E. Rhodes:
By his Attorney
J. A. Richards.

L. E. RHODES.
RIVETING MACHINE.

No. 565,568.

Patented Aug. 11, 1896.

Fig. 15.

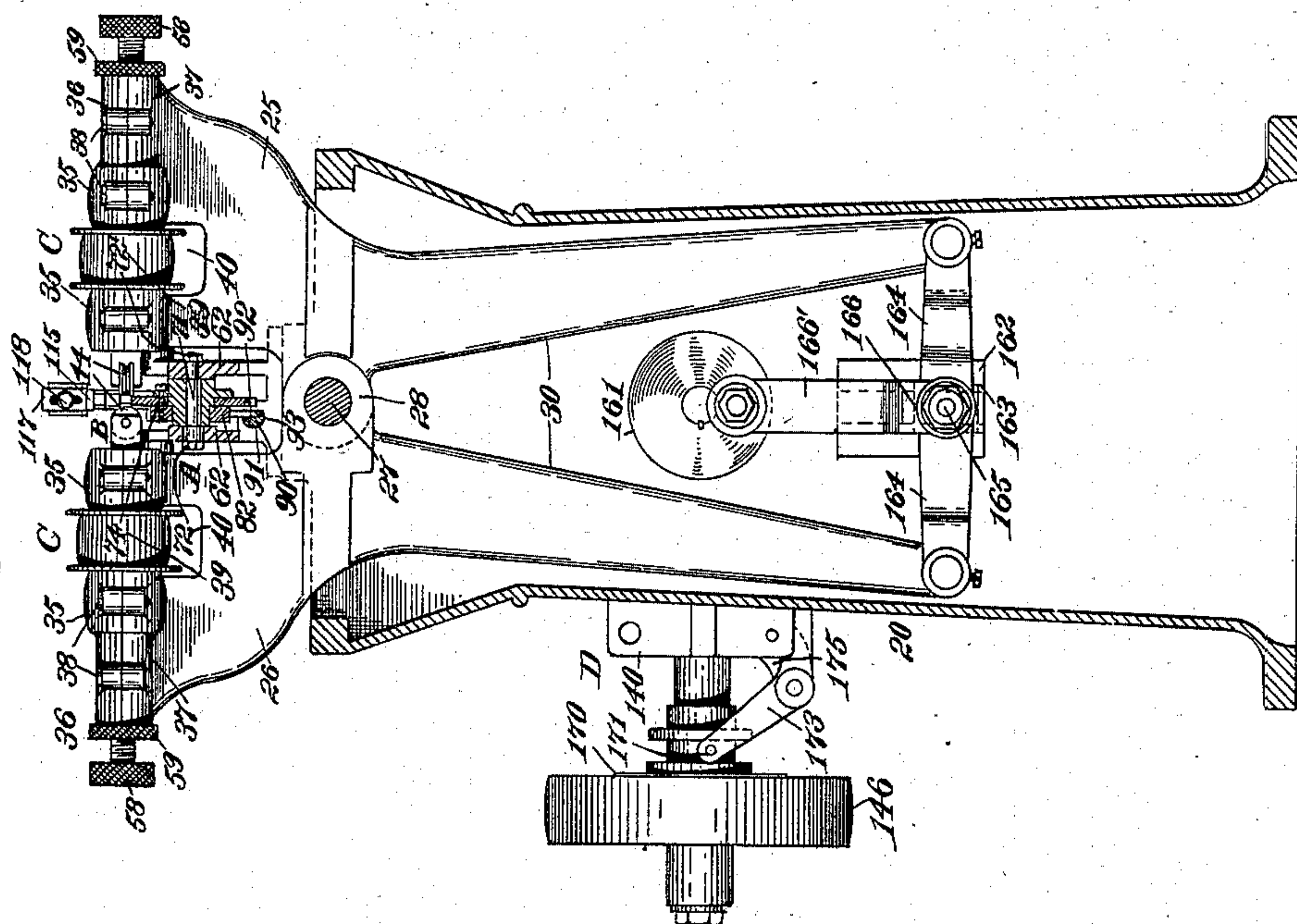
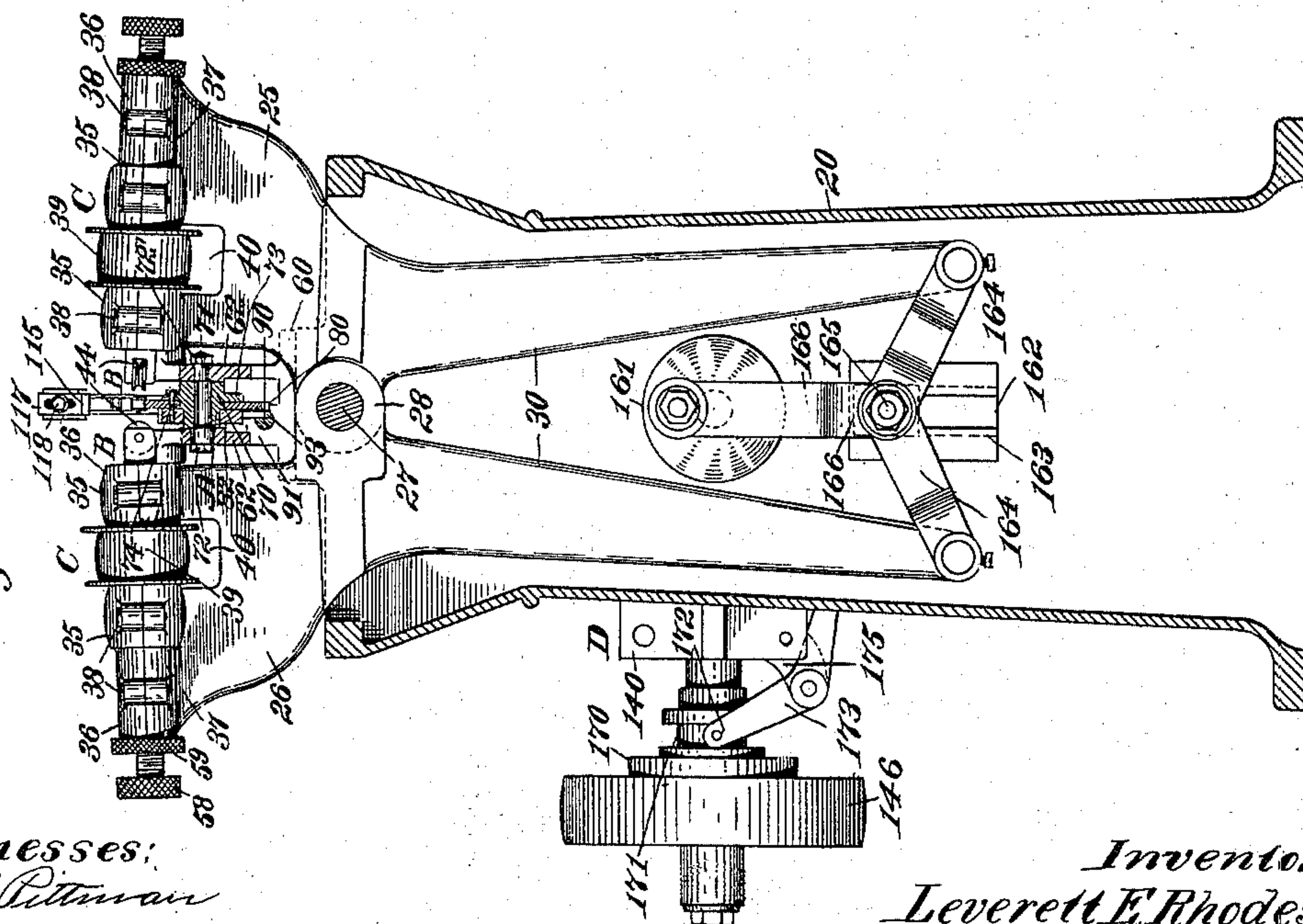


Fig. 14.



Witnesses:

R. W. Pittman

Fred. J. Dole.

Inventor:

Leverett E. Rhodes:

By his Attorney

F. H. Richards.

UNITED STATES PATENT OFFICE.

LEVERETT E. RHODES, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE
WATERBURY MACHINE COMPANY, OF WATERBURY, CONNECTICUT.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,568, dated August 11, 1896.

Application filed December 26, 1895. Serial No. 573,269. (No model.)

To all whom it may concern:

Be it known that I, LEVERETT E. RHODES, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

This invention relates to improvements in riveting-machines, more particularly designated as "chain-riveting" machines, and primarily adapted for heading the rivets of bicycle-chains; and the object of the invention is to provide an automatically-operable machine in which the chains to be operated on will be automatically fed through the machine and the rivets thereof effectively headed.

A further object of the invention is to provide a machine which will automatically head the rivets of bicycle-chains while the same are being continuously fed through the machine, regardless of the varying distances apart of the rivets thereof.

A further object of the invention is to provide a machine of this class which is simple in construction and effective in operation and not liable to get out of order.

In the drawings accompanying and forming part of this specification, Figure 1 is a front view of one form of my improved machine, parts thereof being shown in dotted lines. Fig. 2 is a right-hand end view thereof. Fig. 3 is a partly-sectional plan view taken in line *a a*, Fig. 1, parts thereof being shown in full lines. Fig. 4 is a rear view of the machine with a part of the power driving mechanism removed and part thereof in section. Fig. 5 is a vertical sectional view taken in line *b b*, Fig. 4, and shows part thereof in full lines. Fig. 6 is a top view of my machine on an enlarged scale, partly in section, and having the upper or gripping die removed. Fig. 7 is a detail view of the spinning-rolls in inoperative position. Fig. 8 is a similar view showing the same in position for heading the rivets. Fig. 9 is a vertical sectional view of the chain-feeding means. Fig. 10 is a detail view of the chain-feeding or sprocket wheel. Fig. 11 is a detail view of the ratchet-wheel for operating said sprocket-wheel. Fig. 12 is an enlarged partly-sectional

view taken in line *b b*, Fig. 4, of the upper portion of the machine and showing the gripping-die in inoperative position. Fig. 13 is a view similar to Fig. 12, but shows the gripping-die in position for clamping the chain. Fig. 14 is a front partly-sectional view of the machine and shows the spindle-carrying heads in inoperative position, together with a portion of the mechanism for operating the same; and Fig. 15 is a view similar to Fig. 14 and shows the spindle-carrying heads in operative position.

Similar characters designate like parts in all the figures of the drawings.

This riveting-machine—which may be used for heading the rivets of numerous articles, and also for various work of somewhat similar character, but which, however, is primarily adapted for heading the rivets of bicycle-chains, and which will, therefore, be described for the purposes herein in connection with such primary object—in the preferred form thereof herein shown and described embodies, in a general way, means (designated generally by A) for feeding and holding the chains in position to have the rivets thereof headed; means (designated in a general way by B) for heading the rivets of the chains when the same are fed through the machine; oscillatory means (designated in a general way by C) for carrying said heading means, and means (designated in a general way by D) for actuating said feeding and holding means and the oscillatory carrying means.

My improved riveting-machine consists, as a whole, in the preferred form thereof herein shown and described of a suitable supporting means—such as a base or supporting-frame—which, in the form shown, is in the nature of a casing 20, open at its upper end, and adapted to carry a portion of the operating mechanism in the interior thereof. This casing is provided with a suitable door 21, opening into the same, to permit access to the mechanism carried in the interior thereof.

The oscillatory means C for carrying the riveting or heading means B consists, in the form shown, of two heads 25 and 26, pivotally secured adjacent to the upper portion of the casing by means of a pivot-bolt 27, pro-

jecting through overlapping extensions 28 and 29 of said heads. Each of these heads has an arm or lever 30 extending downward into the casing 20, and by means of which
5 said heads will be oscillated by the actuating mechanism hereinafter described.

Secured to each oscillatory head are suitable journal-boxes 35 for carrying the riveter-chuck spindle and its adjusting mechanism, and these journal-boxes, (see Fig. 6,) in the form shown, are composed of two separable members 36 and 37, removably secured together by any suitable fastening means, such as screws 38.

15 Journaled for rotation in the journal-boxes 35 of each head is a chuck-carrying spindle having secured thereon a suitable driving-pulley 39, a suitable recess 40 being formed in the oscillatory head to permit said pulley
20 to be secured in position on the spindle. Each spindle has a tapering bore 41 at its inner end adapted to receive the tapering shank 42 of a chuck. These chucks may be of any well-known or desired construction adapted
25 to receive the riveters; but in view of the construction of riveters preferably used each chuck is herein shown having a suitable elongated recess 43.

The riveters may be of any suitable or well-known construction; but in the preferred form thereof, for the purpose hereof, are shown consisting of spinning-rolls 44, having their rotating faces so shaped or formed that when in position they will conform to the particular
35 shape of head that it is desired the rivet shall assume. In the construction shown, however, each spinning-roll 44 is preferably constructed of two members or rolls, the inner portion of each member or roll of a pair being concaved or grooved to afford spinning-surfaces
40 for heading the rivets of the chains, and when so constructed the rolls will form substantially a flat rounded rivet-head.

Although for the purposes of this specification the riveters are described as "spinning-rolls," and the spindles are set forth as "rotatable," it is obvious, however, that such construction or operation is not necessary, and does not constitute an essential part of
50 my invention, as the riveting operation may be performed by any suitable construction of riveters carried by the swinging heads on the oscillatory movement alone and without the rotating movement thereof.

55 Owing to the severe end thrust of the spindle suitable antifriction-bearings are provided for the ends thereof, and in the form shown each spindle has an annular groove or recess 45 in its outer end, whereby it forms
60 one member of the bearing, and also has an axial bore 46, having the wall thereof, adjacent to its outer end, threaded. This axial bore preferably extends through said spindle and opens into the tapering bore 41, whereby
65 a rod can be inserted to eject the chuck should the same become wedged too tightly in the spindle. A disk or block 47, forming

the other member of the bearing, is secured adjacent to the end of each spindle by any suitable fastening device—such as a screw 70 48—and has a suitable annular groove or recess 49 on its inner face, thereby forming, in connection with the annular groove or recess in the end of the spindle, a runway for the antifriction-balls 50 placed therein. It will be 75 understood, however, that any other suitable antifriction-bearings might be used, if desired. As one means for adjusting these spindles 40', and thereby the spinning-rolls 44 toward and from each other, a suitable 80 block 55, having an axially-threaded bore 56 and a recessed end 57, adapted to encircle the disk 47 and a portion of the spindle 40' and permit the rotation of the same relatively thereto, is clamped in the outer end of one 85 of the journal-boxes of each head. A suitable adjusting device 58 works in the threaded bore of the block 55 and engages the end of the block 47, whereby on the adjustment of said devices 58 the spindles 40', together with 90 their chucks and spinning-rolls, can be adjusted to any desired position to permit the rolls to engage the rivets of the chain. A check-nut 59 is disposed on each adjusting device at the outer end of the block 55 and 95 the journal-box, whereby the spindles can be held in their adjusted positions against accidental displacement.

A suitable supporting-frame 60, adapted to carry the chain feeding and holding mechanism A, is secured to the upper portion of the casing between the inner faces of the oscillatory heads 25 and 26 by suitable fastening devices—such as screws or bolts 61—and in a general way this frame 60 embodies two 100 parallel extending sides 62, having brackets or supporting extensions 63 and 64 (shown in this construction in the rear of the machine) for the purposes hereinafter described. It is obvious, however, that any suitable means 110 might be used in place of that described for carrying or supporting the feeding and holding mechanism.

The feeding and holding means A for the chains, in the preferred form thereof herein 115 shown and described, consists of a suitable rotatable member or hub 70, (see Fig. 9,) eccentrically and removably supported intermediate of the two sides 62 of the supporting-frame 60 and adjacent to and intermediate 120 of the spinning-rolls 44, and in the form shown this hub or member 70 is rotatably carried on an eccentric journal or axle 71, having differential diameters whereby the same can be inserted into its bearings in the sides 62 of 125 the supporting-frame, that part thereof having the smallest diameter fitting within a bearing of one side frame 62 and that part thereof having the largest diameter fitting within a bearing of the other side frame 62, 130 whereby the intermediate portion thereof extends through the hub or member 70, and on which said hub is rotatable.

By turning the head 72 of the journal or

axle the eccentrically-disposed hub mounted on said journal can be adjusted, together with the chain-feeding means carried thereby, and hereinafter described, into position to bring the rivets carried by the chain into alinement with the spinning-rolls or riveters. To illustrate, if the chain should be fed along with its contained rivets above or below the riveting-rolls, the eccentric would be turned to either lower or raise the feeding means sufficiently to bring the rivets into proper alinement with the said rolls. This hub or rotatable member 70 is preferably constructed of differential diameters in the nature of steps.

A suitable supporting-die, preferably in the nature of a feeding-wheel—such as a bicycle sprocket-wheel 80—having elongated slots 81 extending therethrough, whereby the same can be adjusted relatively to the hub, is removably secured to that portion of the hub having the largest diameter. The means for imparting motion to said feeding-wheel consists, in the form shown, of a suitable ratchet-wheel 82, having irregularly spaced or divided teeth 83' and 83'' of alternately short and long lengths. This ratchet-wheel 82 is secured on that portion of the hub having the smallest diameter, and in parallelism with the sprocket-wheel.

As a means of securing the feeding-wheel and the ratchet-wheel to the hub, said hub is shown provided with an annular flange 73, having apertures extending therethrough. Suitable fastening devices (herein shown in the nature of screws 74) extend through said flange-apertures, and through the elongated slots 81 of the sprocket-wheel, and their outer ends engage threaded apertures 83 in the ratchet-wheel, whereby said sprocket-wheel and ratchet-wheel are firmly and rigidly held on the hub for rotation therewith.

One means for actuating the sprocket-wheel 80 consists of a sliding rod 90, having a flat face 92, mounted in bearings 91, formed on the supporting-frame 60. A pawl 93 is pivotally secured to said slide-rod 90, and is caused to engage the teeth of the ratchet-wheel 82 by means of a suitable spring 94, also secured to said slide-rod. This rod is provided at its outer end in the rear of the machine with a stop or elongated head 95, having a laterally-projecting stud 96 for the purpose hereinafter set forth. A coiled spring 97 encircles said rod intermediate of said stop or head and one of the bearings 91.

A suitable actuating-lever 100 (hereinafter designated as the "feed-actuating lever") is pivoted adjacent to the end of the supporting extension 63 of the supporting-frame 60, and is provided adjacent to its lower end with a suitable antifriction-roller 101, adapted to be engaged by a cam (hereinafter described) for operating said feed-actuating lever. The upper end of the lever is provided with an elongated slotted head 102, adapted to work on the stud or pin 96 of the slide-rod, whereby, on the operation of the feed-actuating lever

100 in one direction, said slide-rod 90 will be actuated against the tension of its spring 97 to turn the ratchet-wheel 82, by means of the pawl 93, one tooth, said slide-rod 90 being actuated in the opposite direction by the spiral spring 97, to permit the engagement of said pawl 93 with the next succeeding tooth of the ratchet-wheel. As a means for regulating the throw or movement of said lever 100, and thereby regulating the movement of said slide-rod 90, the upper end of the lever 100 is provided with a threaded aperture adapted to receive a threaded adjusting-screw 103, the inner end of which engages the stud or pin 96 of the slide-rod, and thereby limits the movement of the slotted end of the lever relatively to the stud or pin of the rod, a suitable check-nut 104 being provided for securing the adjusting-screw against movement.

As a means for preventing the backward rotation of the ratchet-wheel 82, a suitable adjustable pawl is secured to the supporting-frame, and in the construction thereof shown the supporting-frame is provided with an arc-shaped slot 106, through which a clamping-bolt 107 extends. (See Fig. 6.) The inner end of this bolt 107 engages a pawl-carrying arm 108, pivotally secured to the supporting-frame 60, whereby said arm can be clamped in any desired position relatively to said arc-shaped slot. Pivotally secured to the upper end of this pawl-carrying arm 108 is a pawl 105, adapted to engage the teeth of the ratchet, a suitable spring 109 being secured to the frame and engaging said pawl 105 to press the same into engagement with the ratchet-wheel 82, whereby the backward movement of said ratchet-wheel is prevented.

In the construction shown the sprocket-wheel constitutes, to a certain extent, not only a feeding device but also a lower or holding die, and one means for gripping or clamping the chain in position on such lower die consists, in the preferred form shown, of an oscillatory gripping-die-carrying arm 110, having one end thereof keyed or otherwise secured to a shaft 111, mounted in suitable journal-bearings 112 of the supporting-frame 60, and having its die-supporting end projecting into position immediately above the sprocket-wheel, and preferably bifurcated to receive the shank of the gripping-die.

The gripping-die 115, in the form shown, is provided with a concaved gripping-face 116 and a shank 117, having an aperture extending therethrough, and is secured to the end of the supporting-arm by means of a bolt 118, extending through said aperture and into said arm. It will be understood, however, that any suitably formed or shaped gripping-die might be used, according to the construction of the chains or articles placed in the machine, to have the rivets thereof headed.

The shaft 111 extends beyond the bearings 112 at one side thereof, and has keyed or secured thereon in any desired way one end of a downwardly-extending lever 120, said lever

being provided with a sleeve 121, adapted to receive said shaft 111. In order to secure the shaft against longitudinal displacement, one end thereof is provided with a suitable head 113, and the opposite end is adapted to receive a clamping-nut 114. The lower end of this lever 120—which will be hereinafter designated as the “gripping-die-actuating lever”—is provided with an antifriction-roller 122, adapted to be engaged by a cam, in the manner hereinafter set forth, for operating said gripping-die-actuating lever, and thereby operating the gripping-die 115 by means of its carrying-arm 110, to clamp and release the chain, respectively.

As a means for firmly holding the chains in engagement with the sprocket-wheel, a suitable spring 130 has one end thereof secured to the gripping-die-carrying arm 110 and has its other end in position to press said chain on to the sprocket-wheel.

The means D, for actuating the chain feeding and holding means A and the oscillatory heads, consists, in the preferred form thereof herein shown and described, of suitable driving mechanism embodying cams operatively engaging the lower ends of the levers 100 and 120, and suitable toggle-levers operatively connected with the driving mechanism and with the downwardly-extending arms 30 of the oscillatory heads.

In the preferred construction of driving mechanism herein shown a suitable bracket 140 is bolted, in the preferred construction of the machine, at any suitable place on the rear side of the casing 20, and comprises a bracket-plate 141 and a sleeve 142, (see Fig. 4,) adapted to receive a driving-shaft 143 of differential diameters, having a driving-pulley 146 loose thereon. The inner end of this driving-shaft carries a beveled pinion 144, adapted to mesh with the beveled gear hereinafter described. That portion of the shaft 143 having the largest diameter, as 145, abuts against the free end of the sleeve 142 and is substantially of the same diameter as said sleeve, for the purpose hereinafter set forth.

Secured to the casing 20, substantially at right angles to the rotating shaft 143, is a tubular bracket 150, in the nature of an axle, adapted to receive a driven shaft 151, carrying at its outer end a suitable beveled gear 152, engaging with the beveled pinion 144 on the driving-shaft 143.

Rotatably secured on the tubular bracket 150 is a cam-wheel 154. This cam-wheel is secured to the beveled gear 152 by any suitable means, such as by screws or bolts 156, and has a depressed portion 155 and a cam-face 157, adapted to engage the antifriction-roller 101 of the lever 100. Secured in any desired way to this cam-wheel 154 for rotation therewith is a second cam 154', having a depressed portion 158 and a cam-face 159, adapted to engage the antifriction-roller 122 of the lever 120. It will be understood, however, that these cams might be secured to the beveled

gear and to each other in any other suitable way, or that the cam-faces thereof might be constructed on one wheel, if desired. A spring 160 is secured to the casing and has its free end in engagement with the lower end of the lever 120, to thereby press said lever into engagement with said cam 154'.

Secured to the inner end of the driven shaft 151, which, in the construction shown, extends through the casing 20, is a suitable crank-wheel 161. Secured to the inner wall of the casing 20 is a block 162, having a guide-way therein, (shown in the nature of a T-shaped way 163, Fig. 3.)

Pivotally secured to the lower ends of the arms 30 of the oscillatory heads 25 and 26 are suitable toggle-levers 164, having their inner ends pivotally secured together by means of a pivot-bolt 165, having one of its ends secured to a T-shaped block 166, working in the way 163 of the fixed block 162. A suitable crank-arm 166' connects the crank-wheel 161 with the pivotal ends of the toggle-levers 164, whereby on the rotation of said crank-wheel said toggle-levers will be actuated and the spindle-carrying heads 25 and 26 oscillated in a manner obvious from the foregoing description.

As one means for throwing the actuating mechanism into and out of operation a suitable clutch device is provided. In the form shown thereof the power driving-wheel 146, which is loose on the driving-shaft, is provided with a tapering or cone-shaped recess 147, and is adapted to be engaged by a cone-clutch 170, which is keyed to the enlarged portion 145 of the driving-shaft and is loose on the sleeve 142 of the bracket, which is of substantially the same character as said enlarged portion of the shaft and is slidingly adjustable thereof. This cone-clutch is provided with a grooved hub 171, adapted to receive the studs 172, projecting from the bifurcated end of a bell-crank lever 173, which lever is pivotally secured to an extending arm 175 of the bracket 140. Secured to the casing is a suitable treadle mechanism, which in the form shown comprises a suitable treadle 180, in position to be actuated by the operator from the front of the machine and having its rear end secured to a shaft 181, carried in suitable bearings 182. A link 183 connects this shaft with a vertical lever 184, which has its upper end secured to said bell-crank lever 173. A suitable spiral spring 185 has one of its ends secured to the casing and its other end secured to said treadle for holding the treadle in its inoperative position. On the downward movement of the treadle the cone-clutch 170 will operatively engage the power driving-wheel 146, and thereby receive motion from said wheel and rotate the shaft 145 to impart motion to the actuating mechanism.

A suitable fastening device is secured to the casing adjacent to the treadle for holding said treadle in its operative position and in the

form shown comprises a latch 190, having a spring 191 secured to one end thereof, the other end of the spring being secured to the casing.

5 In the use of my machine for operation on ordinary bicycle-chains, which chains usually comprise body-links 194 and plate-links 195, (see Figs. 7 and 8,) one end of a length of chain is placed in position on the feeding or
10 sprocket wheel 80 to permit the sprockets of the wheel to project between the body-links, the chain being held in position by the spring 130. The treadle is then depressed and held in such position by the latch 190, whereby the
15 friction-clutch is put in operation and power imparted from the driving-wheel to the beveled gear 152, whereby on the rotation of the cams 154 and 154' the feed-wheel-actuating lever 100, which in its inoperative position
20 rests within the depressed portion 155 of the cam 154, is forced outwardly and engaged by the cam-face 157 of the cam, thereby operating the slide-rod and its pawl 93 to rotate the ratchet-wheel 82 one tooth, and thereby
25 the sprocket-wheel, to bring the rivets of the link into position to be headed. On the continued rotation of said cam-wheel the gripping-die-actuating lever 120, which in its inoperative position rests in the depressed portion 158 of the cam 154', is engaged by the
30 cam-face 159 and forced outwardly against its spring 160, whereby the gripping-die arm 110 is oscillated into position to permit the die 115 thereof to clamp or grip the chain on the sprocket-wheel, said sprocket-wheel being
35 prevented from slipping by the pawl 105, and said gripping-die being rigidly held in position by the continued engagement of the cam-face 159 with the lever 120 throughout the entire
40 spinning operation of the rolls 44. On the continued rotation of the cam-wheel shaft 151 the crank-wheel 161 actuates the toggle-levers 164, to spread the levers 30 of the oscillatory heads, whereby said heads are oscillated into position to have the spinning-rolls
45 44 operatively engage one of the rivets of a link, said spinning-rolls being preferably rotated in opposite directions, to thereby prevent movement of the chain in either direction. On the continued rotation of the cam-wheel shaft 151 and the crank-wheel 161 the spinning-rolls—after the completion of the rivet-head—are moved by means of the oscillatory heads away from said rivet. The
50 gripping-die 115 is then carried out of position to clamp the chain, and the slide-rod 90, by means of its spring 97, moved into position, to permit the pawl 93 thereof to engage another tooth of the ratchet-wheel 82, to thereby
60 turn the ratchet-wheel 82 and its sprocket-wheel to carry the chain forward one rivet, when the end of the feed-wheel-actuating lever 100 is next engaged by the cam-face 157.

In bicycle-chains as ordinarily constructed
65 two pairs of plate-links 195 have their ends secured to the ends of one body-link 194, so

that the distance between the rivets of the body-links is relatively small, compared with the distance between the rivets of the plate-links. Hence, in machines as heretofore constructed, it has been necessary, after the chain
70 has been run once through the machine, to reverse the chain and run it through a second time, in order to thoroughly head all the rivets thereof. In this construction, however—owing to the varying lengths of the teeth 83' and 83'' of the ratchet-wheel 82—this reversal of the chain is unnecessary, as the teeth are so arranged (see Fig. 11) that they will
75 carry the sprocket-chain forward a distance sufficient to have each rivet thereof headed—that is to say, by having long and short teeth the sprocket-wheel will have movements of varying lengths, and the chain will be carried forward a long or short distance to correspond
80 with the distance between the rivets of the plate and body links.

It is preferred to move both of the spindle-carrying heads, as described; but this is not essential, inasmuch as the machine will be
90 operative if only one is moved and the other is stationary.

By having the feed-wheel and ratchet-wheel removable from the hub different forms of feed and ratchet wheels can be substituted
95 therefor to accord with the different constructions of chains, and by having the hub 70 removable some other suitable form of lower gripping-die can be substituted therefor.

Having described my invention, I claim— 100

1. In a machine of the class specified, the combination of means for carrying and supporting work having rivets to be headed, and means for imparting thereto intermittent movements of relatively varying lengths; of
105 rivet-heading devices located on each side of the path of the work; and means for actuating said devices.

2. The combination with riveting-heads, of a chain-feeding mechanism disposed between said heads; and automatic means for imparting movements of relatively varying lengths to said mechanism. 110

3. In a machine of the class specified, the combination with means for carrying and supporting the work, and for imparting thereto movements of relatively varying lengths; of oscillatory swaging devices; and mechanism for actuating the carrying and supporting and swaging devices. 115

4. The combination of means for carrying and supporting a chain carrying rivets to be headed; mechanism for imparting to said means movements of relatively varying lengths; oscillatory means for heading the rivets; and mechanism for actuating said carrying and supporting means and said oscillatory means. 120

5. The combination with riveting-heads, of a sprocket-wheel for supporting and carrying
125 a chain having rivets to be headed; a ratchet-wheel having teeth of relatively varying

lengths; a pawl engaging said ratchet-wheel; and mechanism for automatically actuating said pawl.

6. In a riveting-machine, the combination with a device for carrying and supporting work having rivets to be headed; and means for imparting to said device relatively varying movements; of a clamp; heading mechanism; and mechanism for actuating the clamp and heading mechanism.

7. In a riveting-machine, the combination of rotative means for carrying and supporting work having rivets to be headed, and means for imparting alternately short and long movements thereto; oscillatory means for clamping said work in position; oscillatory means for heading said rivet; and mechanism for actuating each of said means.

8. The combination of intermittently-rotative means for carrying and supporting work having rivets to be headed, and means for imparting alternately short and long movements thereto; intermittently-oscillatory means for clamping said rivet in position; heading mechanism for said rivets, and embodying an intermittently-oscillatory and continuously-rotative device; and mechanism for actuating each of said parts.

9. In a riveting-machine, the combination with an adjustable device for carrying and supporting work having a rivet to be headed; and mechanism for imparting to said device relatively varying movements; of means for holding the rivet in position; means for heading said rivet; and suitable actuating mechanism.

10. In a riveting-machine, the combination with a rotative device for carrying and supporting work having a rivet to be headed; an eccentric for adjusting said device; means for holding the rivet in position; oscillatory headers; and suitable actuating mechanism.

11. In a riveting-machine, the combination of intermittently-rotative means for carrying and supporting work having a rivet to be headed; an eccentric for adjusting said means; an oscillatory clamp for securing the work in position; rotative and adjustable heading devices; means for supporting and oscillating said devices; and actuating mechanism.

12. A feeding device consisting of a supporting means, a rotative hub eccentrically mounted thereon, for adjustment; a sprocket-wheel mounted on said hub; and a ratchet-wheel also mounted on said hub.

13. A feeding device consisting of an adjustable supporting means; a sprocket-wheel mounted thereon; and a ratchet-wheel also mounted on said supporting means and having teeth of relatively varying lengths and operative to impart relatively varying movements to the sprocket-wheel.

14. In a feeding device for a riveting-machine, the combination of supporting means, a rotative hub, eccentrically mounted thereon, for adjustment; a sprocket-wheel mounted

on said hub, and rotatable therewith; and a ratchet-wheel also mounted on said hub, and in operative engagement with said sprocket-wheel, and having teeth of alternately short and long lengths.

15. The combination of means for carrying and supporting work having rivets to be headed; rotative means having alternately short and long teeth, for imparting to said supporting and carrying means curvilinear movements of relatively varying lengths; means for heading said rivets; and means for actuating said carrying and supporting means and said rivet-heading means consecutively and intermittently.

16. The combination of supporting means; a sprocket-wheel rotatively supported thereon; a ratchet-wheel also supported thereon and having teeth of alternately short and long lengths adapted to impart relatively varying movements to said sprocket-wheel; a slide-rod mounted on said supporting means and carrying a pawl engaging the teeth of said ratchet-wheel; means for actuating said slide-rod in one direction, to thereby operate said ratchet-wheel and thereby the sprocket-wheel; and a spring for returning said slide-rod to its normal inoperative position.

17. The combination of supporting means, a rotatable hub, eccentrically supported thereon, for adjustment; a sprocket-wheel supported on said hub; a ratchet-wheel also supported on said hub; a spring-actuated slide-rod mounted on said supporting means, and carrying a spring-actuated pawl engaging the teeth of said ratchet-wheel; and means for actuating said slide-rod, to operate said ratchet-wheel and thereby the sprocket-wheel.

18. The combination with oscillatory heads, each having an extended arm or lever, of a crank-shaft located between said arms; a toggle for actuating said arms; a link connecting the toggle with the crank-shaft; and a guide for said link.

19. In a riveting-machine, the combination of a support-frame; having means carrying a rotatable hub eccentrically thereon for adjustment; a sprocket-wheel mounted on said hub; a ratchet-wheel in operative engagement with said sprocket-wheel and also mounted on said hub, and having teeth of relatively varying lengths; a spring-actuated slide-rod mounted on said frame, and carrying a pawl for operating said ratchet-wheel and thereby the sprocket-wheel; an oscillatory arm pivoted to said supporting-frame, and adapted to carry a gripping-die; a feed-actuating lever pivoted to said supporting-frame, and having its upper end in engagement with the slide-rod; a gripping-die-actuating lever also pivoted to said frame, and having its upper end in operative engagement with the gripping-die lever; and mechanism for operating said feed and gripping-die levers.

20. In a riveting-machine, the combination of a supporting-frame, having means carry-

ing a sprocket-wheel, a ratchet-wheel in operative engagement with the sprocket-wheel; a spring-actuated slide-rod mounted on said frame, and carrying a pawl for actuating said ratchet-wheel and thereby the sprocket-wheel; a feed-actuating lever pivoted to said frame, and having its upper end in engagement with said slide-rod; an oscillatory gripping-die-carrying arm mounted on said frame, and adapted to carry a gripping-die; a gripping-die-actuating lever pivoted to said frame, and having its upper end in operative engagement with the oscillatory arm; and mechanism for actuating said feed and gripping-die actuating levers.

21. In a riveting-machine, the combination of a supporting-frame, having means carrying a sprocket-wheel, a ratchet-wheel in operative engagement with the sprocket-wheel; means for actuating said ratchet-wheel and thereby the sprocket-wheel; an oscillatory arm adapted to carry a gripping-die, also mounted on said frame; a spring in position to engage the sprocket-wheel for holding the rivet in position to be headed; and means for actuating said oscillatory arm.

22. In a riveting-machine, the combination of a supporting-frame; having means carrying a hub eccentrically mounted thereon for adjustment; a sprocket-wheel removably mounted on said hub; a ratchet-wheel also removably mounted on said hub, and in operative engagement with the sprocket-wheel, and having teeth of relatively varying lengths; a spring-actuated slide-rod mounted on said frame, and carrying a spring-actuated pawl for actuating said ratchet-wheel and thereby the sprocket-wheel; a feed-actuating lever pivoted to said frame, and having its upper end in engagement with said slide-rod, and carrying means for regulating the movement of said lever, and thereby the movement of said slide-rod; a gripping-die-carrying arm mounted on said frame, and adapted to carry a gripping-die; a gripping-die-actuating lever pivoted to said frame, and having its upper end in operative engagement with the gripping-die-carrying arm; a spring secured to said lever, and adapted to engage the sprocket-wheel, to hold the rivet in position to be headed; a spring-actuated pawl adjustably secured to said frame for preventing the return movement of said ratchet-wheel; and mechanism embodying cams, for actuating said feed and gripping-die actuating levers.

23. In a riveting-machine, the combination of a base; a pair of oscillatory heads carrying riveting devices pivotally secured to said base, and having downwardly-extending levers; toggle-levers connected to said downwardly-extending levers; work-feeding means having a differential movement located intermediate of said heads; and mechanism for actuating the toggle-levers and work-feeding means.

24. In a riveting-machine, the combination

of a base, a pair of oscillatory heads carrying riveting devices pivotally secured thereto, and having downward-extending levers; toggle-levers pivoted to said downwardly-extending levers; a sprocket-wheel supported on said base; a ratchet-wheel also supported on said base, and in operative engagement with said sprocket-wheel; a spring-actuated slide-rod mounted on said base, and carrying a pawl for actuating said ratchet-wheel and thereby the sprocket-wheel; and mechanism for actuating said slide-rod and toggle-levers, to thereby rotate said sprocket-wheel and oscillate said heads.

25. In a riveting-machine, the combination of a supporting-frame, a pair of oscillatory heads pivotally secured thereto, and adapted to carry spinning-rolls, and having downwardly-extending levers; toggle-levers pivoted to said downwardly-extending levers; an eccentrically-adjustable hub mounted on said supporting-frame; a sprocket-wheel mounted on said hub; a ratchet-wheel also mounted on said hub, and in operative engagement with said sprocket-wheel, and having teeth of relatively varying lengths; spring-actuated slide-rod mounted on said frame; a lever pivoted to said frame, and having its upper end in engagement with said slide-rod; and mechanism for actuating said lever and said toggle-levers, for operating the sprocket-wheel and oscillatory heads.

26. A chuck-carrying spindle having an annular groove in its outer end; a block also having an annular groove, and forming, with the groove of the spindle, a runway for the reception of antifriction-balls; a member having a threaded bore and having a recessed end inclosing said block and a part of said spindle; and an adjusting-screw engaging the threads of said member, and having its inner end engaging said block for adjusting said spindle.

27. In a riveting-machine, the combination of a supporting-frame; a pair of oscillatory heads pivotally secured thereto, and adapted to carry riveters, and having downwardly-extending levers; toggle-levers pivoted to said downwardly-extending levers; rivet-feeding mechanism supported on said frame; a feed-actuating lever pivoted to said frame for actuating said feed mechanism; a gripping-die-carrying arm also supported on said frame, a gripping-die-actuating lever pivoted to said frame, and in operative engagement with the carrying-arm; and driving mechanism supported on said frame, and comprising a driving-shaft carrying a pinion; a driven shaft carrying a gear in mesh with said pinion; cam members rotatable with said gear for operating the feed and gripping-die actuating levers; and a crank-wheel on said driven shaft in operative engagement with the toggle-levers, to thereby oscillate said riveter-carrying heads.

28. In a riveting-machine, the combination of a supporting-frame, a pair of oscillatory

heads pivotally secured thereto, and adapted to carry riveters, and having downwardly-extending levers; toggle-levers pivoted to said downwardly-extending levers; rivet-feeding mechanism supported on said frame; a feed-actuating lever pivoted to said frame for actuating said feed mechanism; a gripping-die-carrying arm also supported on said frame, a gripping-die-actuating lever pivoted to said frame, and in operative engagement with said die-carrying arm; and driving mechanism supported on said frame, and comprising a driving-shaft carrying a pinion; a driving-wheel loose on said shaft; clutch mechanism in position to engage said driving-wheel; treadle mechanism for operatively engaging said clutch mechanism; a driven shaft supported on said frame; a gear thereon in mesh with said pinion; cam members in operative engagement with said gear, and rotatable therewith for operating the feed and gripping-die actuating levers; and a crank-wheel on said driven shaft in operative engagement with the toggle-levers, to thereby oscillate said riveter-carrying heads.

29. In a machine of the class specified, the combination of a pair of riveters, one of which is movable toward and from the other on a fixed axis; an automatically-operable feeding and holding mechanism intermediate of said pair of riveters, and constructed to feed a chain or other article between said riveters, to simultaneously present the opposite ends of its rivets to the action of said riveters, and to hold said chain or article firmly while its rivets are being headed, said mechanism including two holders, one of which is supported for oscillatory movement toward and from the other holder.

30. The combination with automatic means for intermittingly advancing a chain carrying rivets to be headed, of a clamp; and means for intermittingly actuating said clamp.

LEVERETT E. RHODES.

Witnesses:

FRED. J. DOLE,
R. W. PITTMAN.