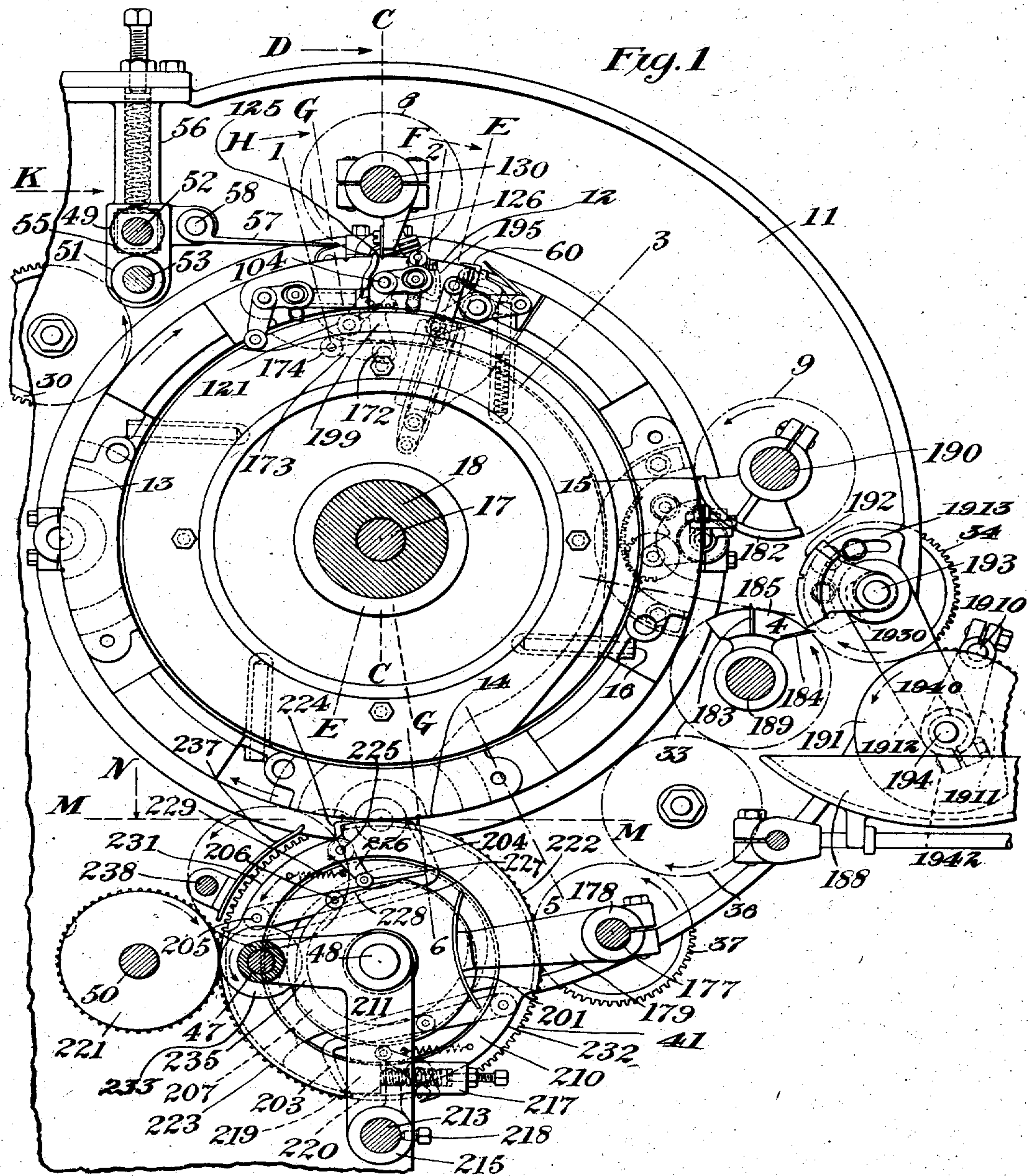


C. F. SMITH.  
PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 1.



Witnesses:

Chas. W. LaRue  
Geo. L. Shepard

Inventor:

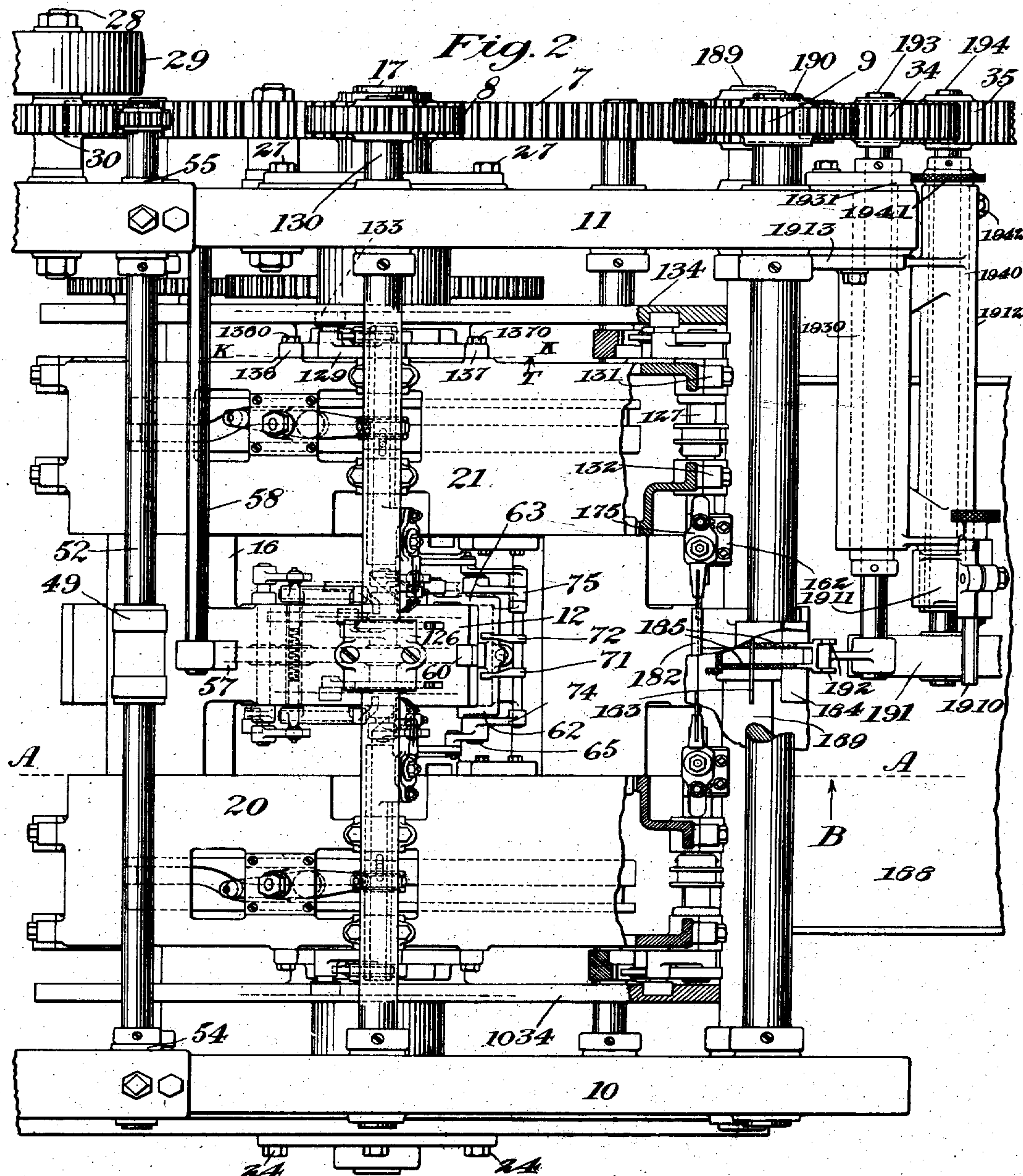
Charles F. Smith  
by Wilbur M. Stone  
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PAPER BAG MACHINE.

APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 2.



Witnesses:

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PAPER BAG MACHINE.  
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13 SHEETS—SHEET 3.

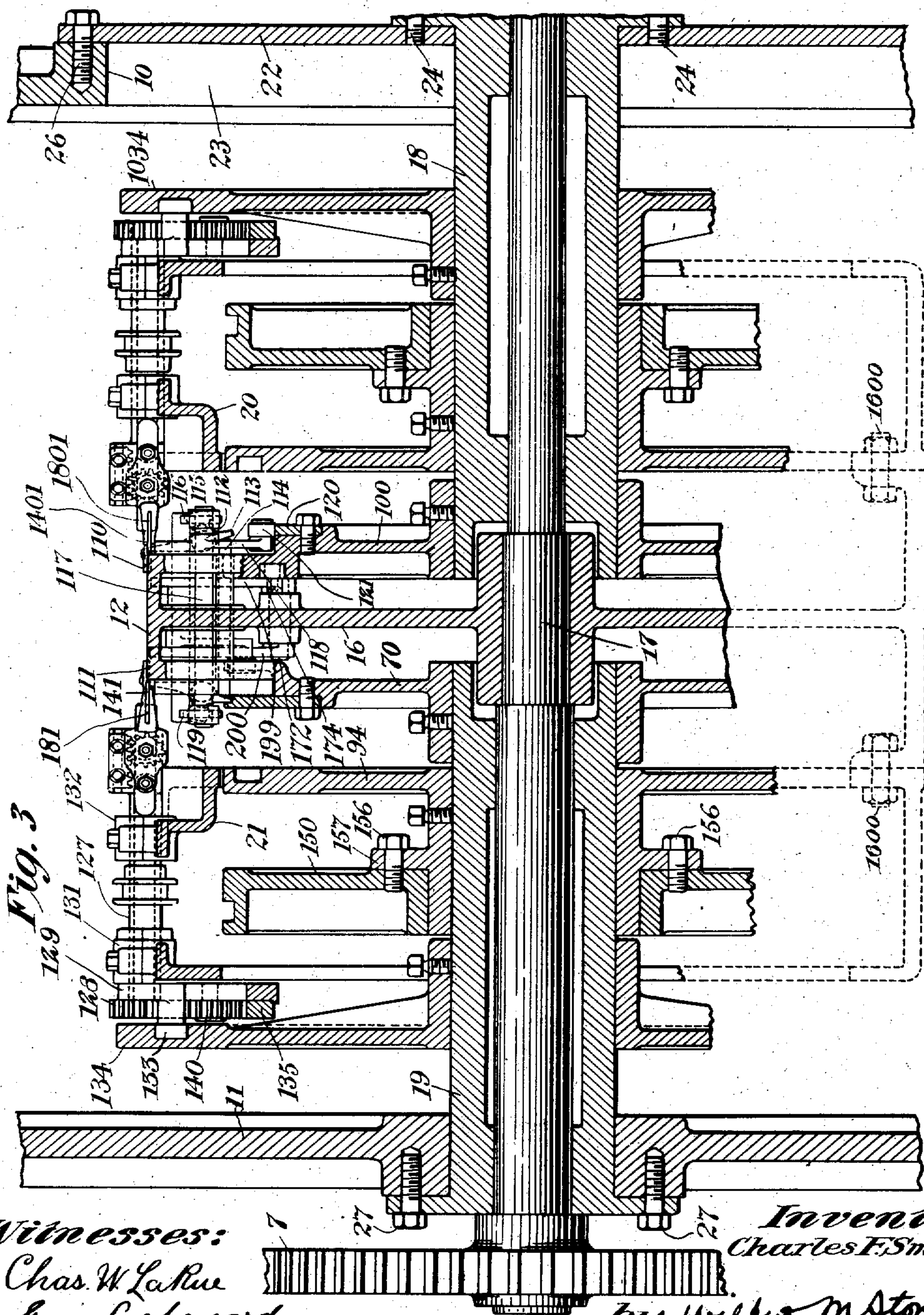


Fig. 3

Witnesses:  
Chas. W. LaRue  
Geo. Liepenard

Inventor:  
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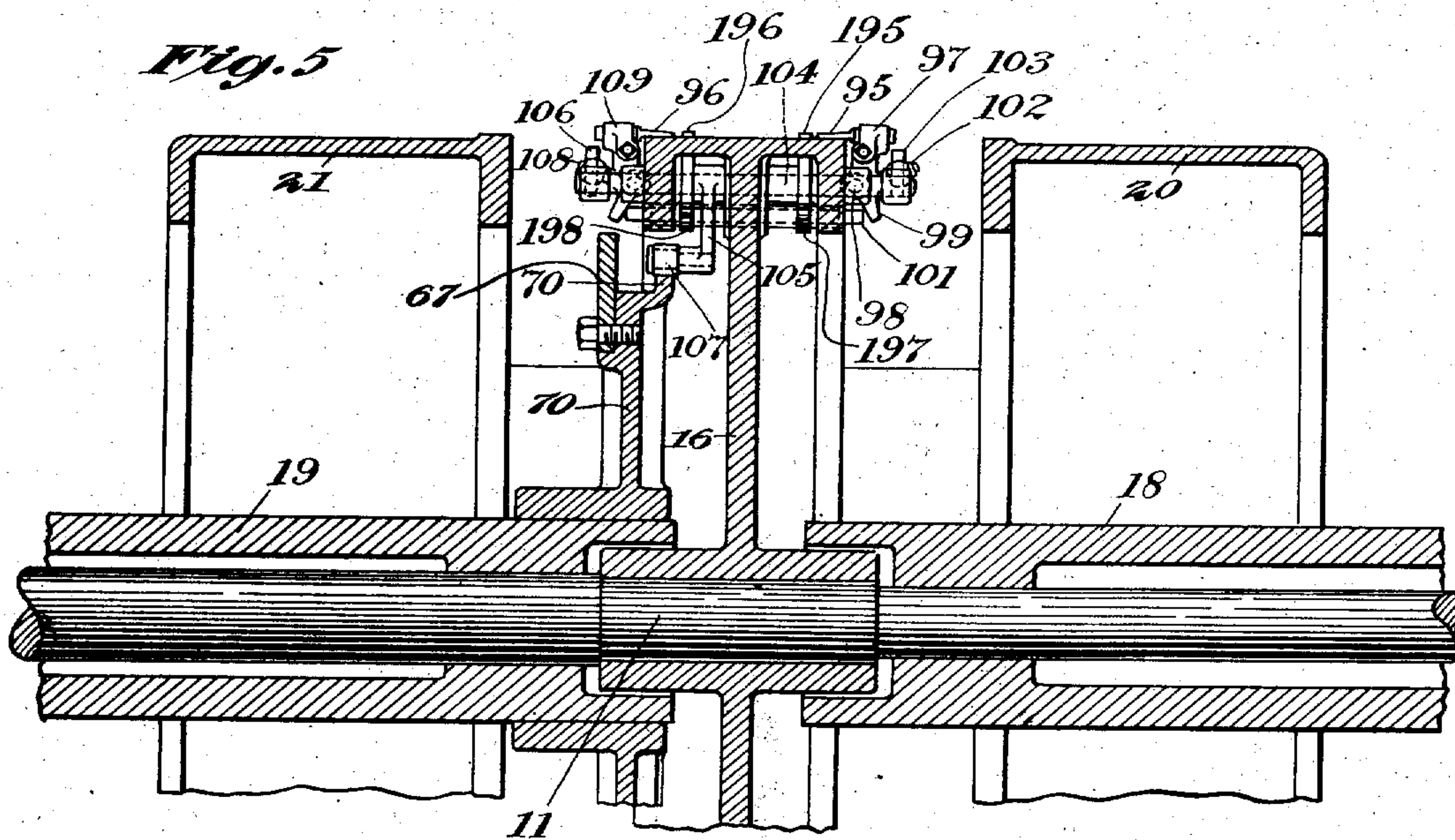
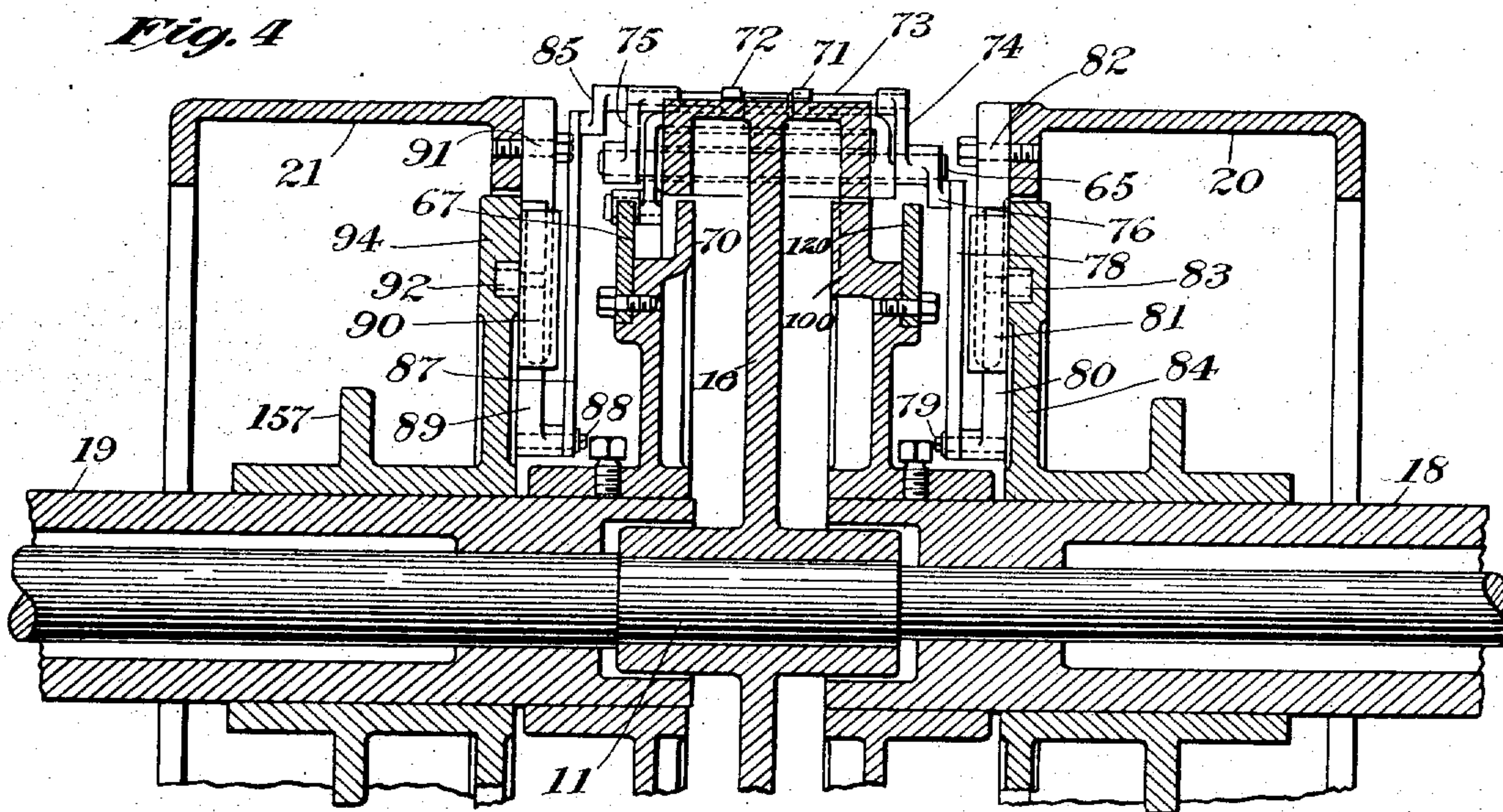


No. 864,435.

PATENTED AUG. 27, 1907.

C. F. SMITH.  
PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 4.



*Witnesses:*

*Chas. W. LaRue*  
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*Inventor:*

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PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 5.

Fig. 6

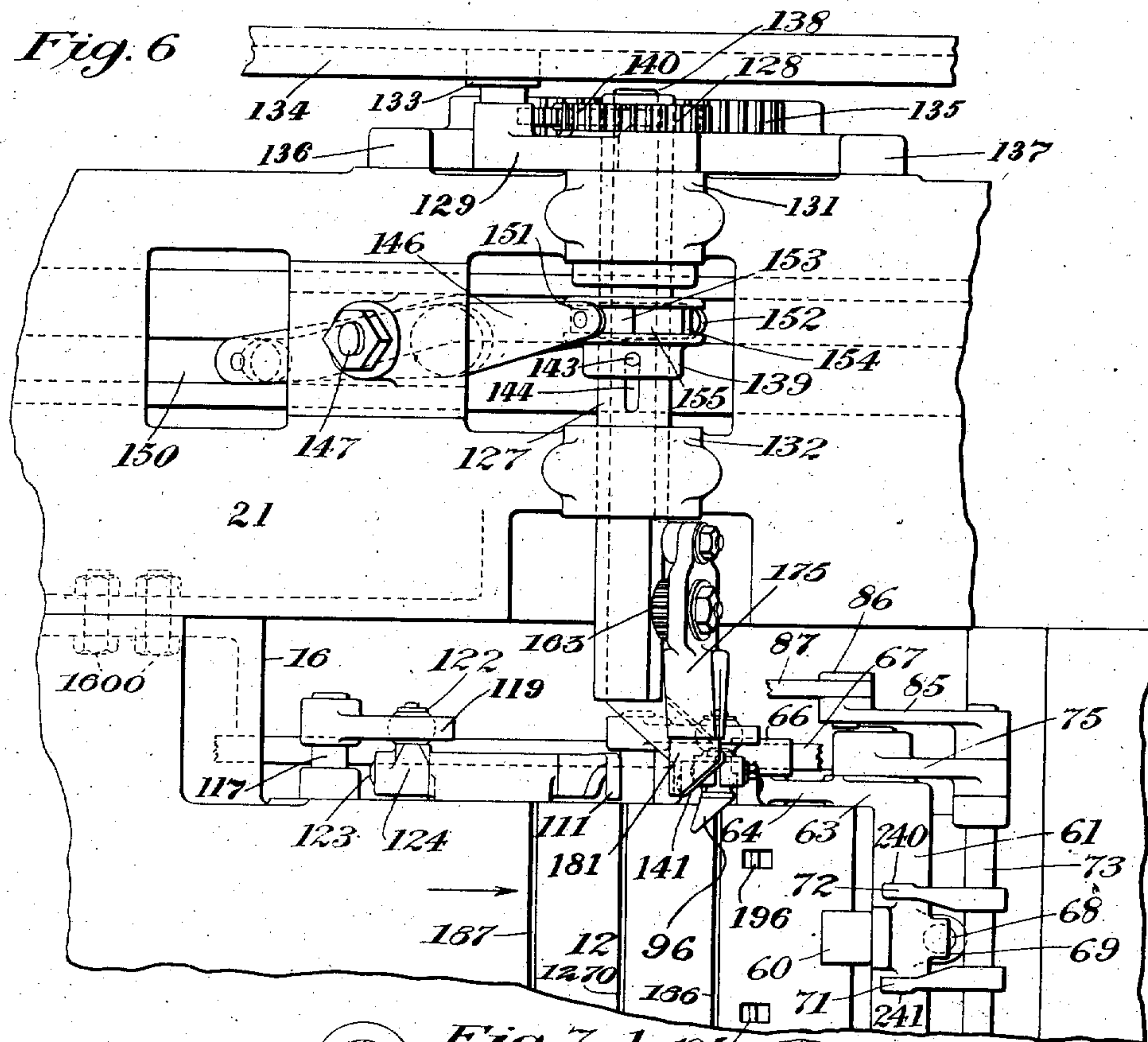
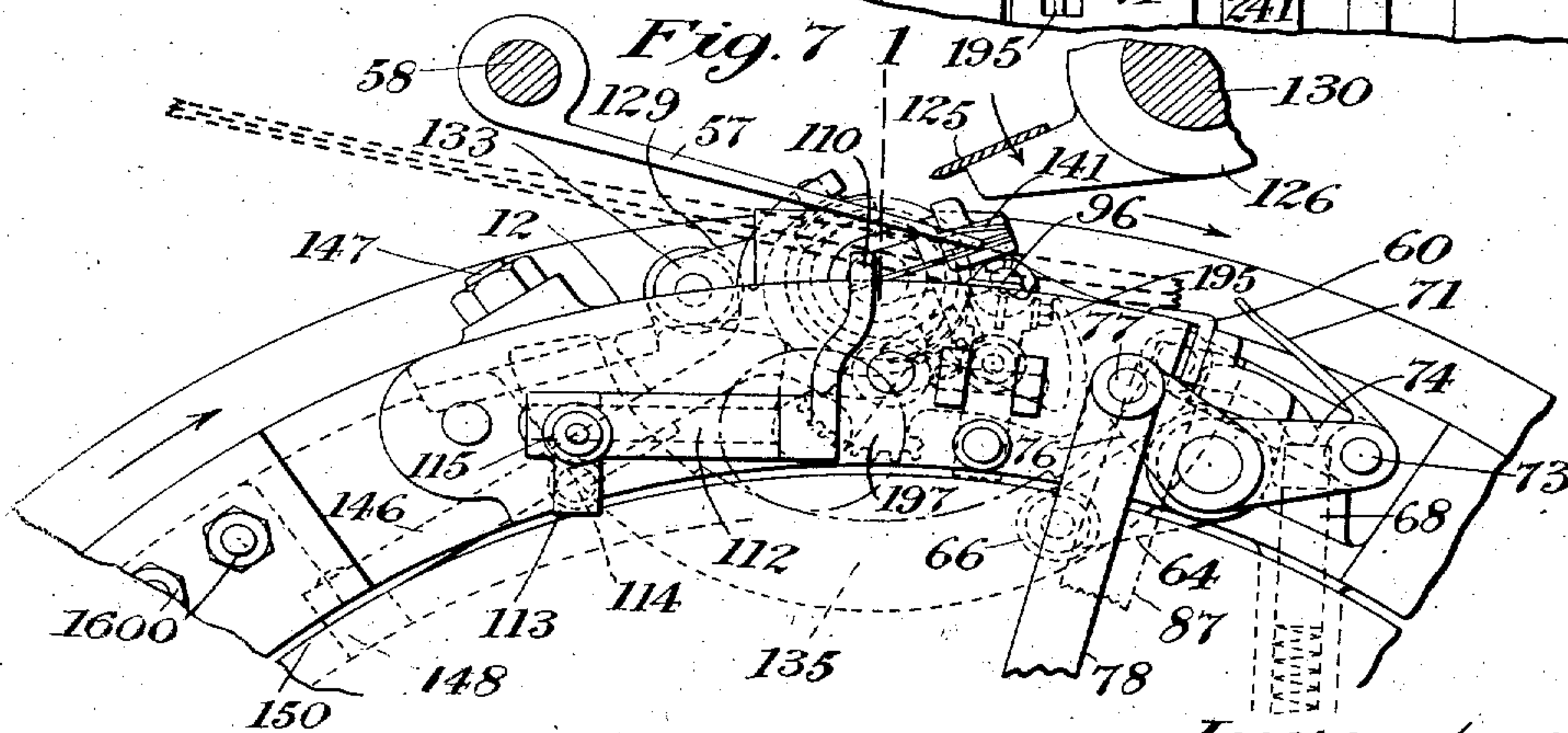


Fig. 7



Witnesses:

Chas W. Latue  
Geo. L. Fenard

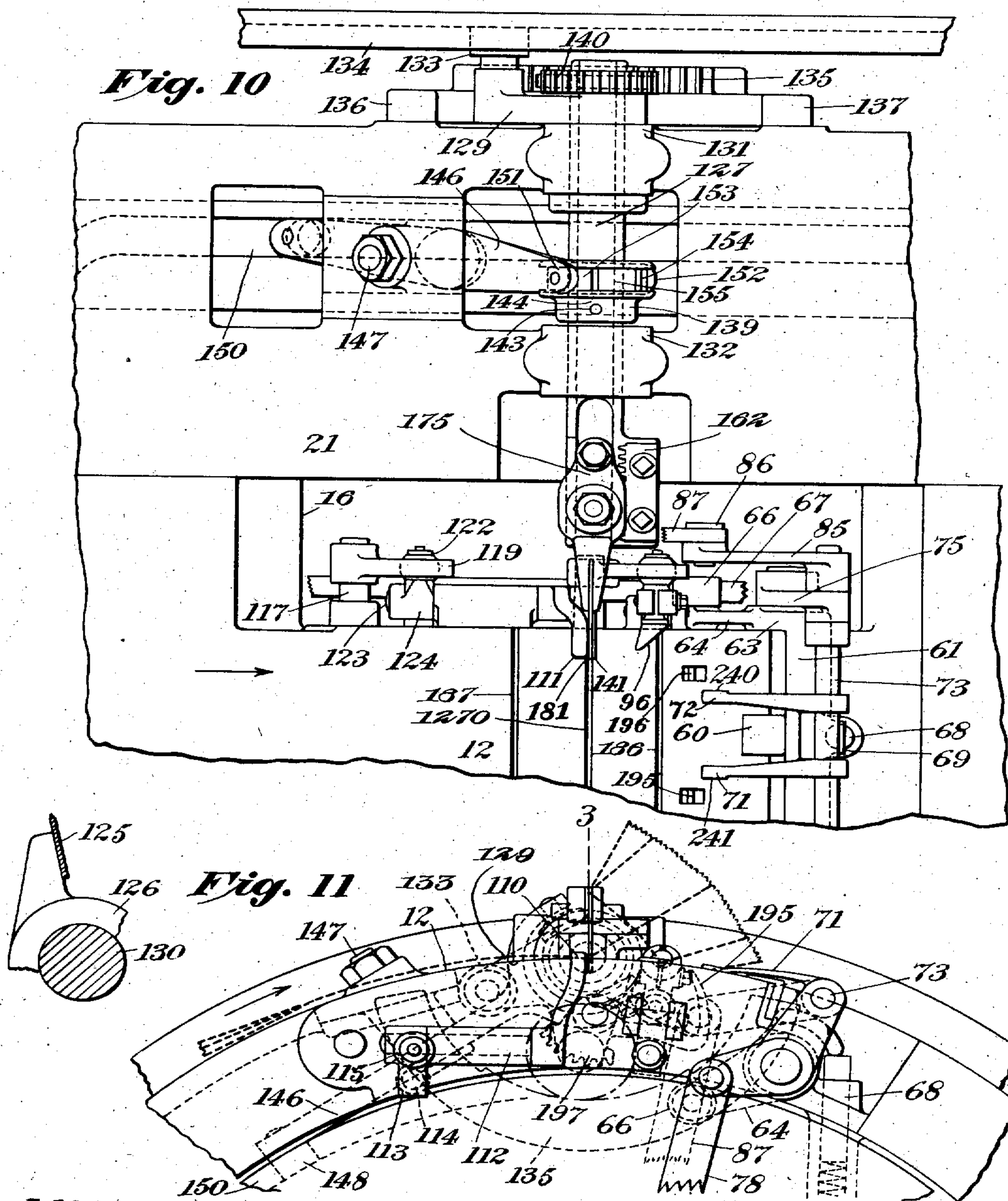
Inventor:

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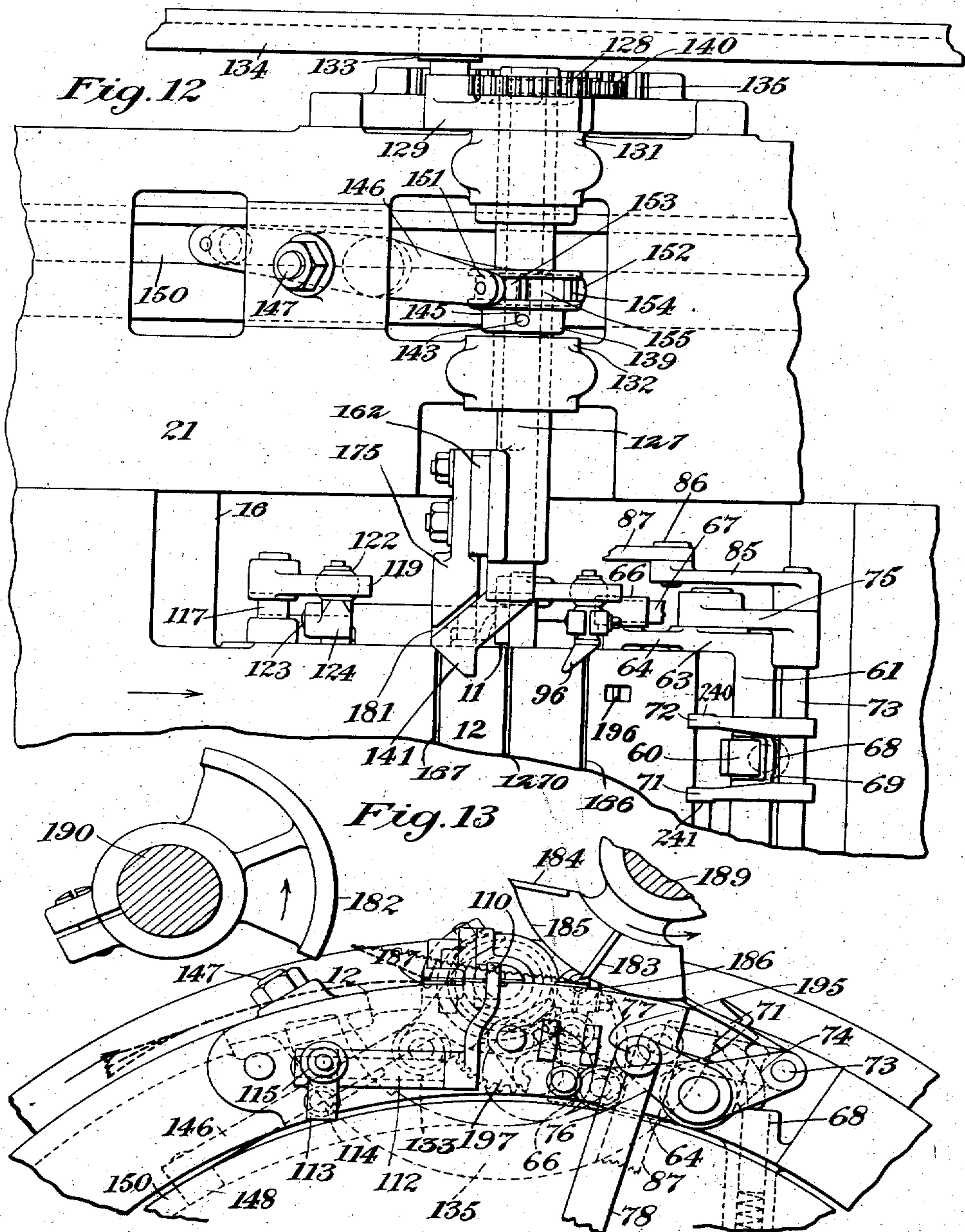
C. F. SMITH.  
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APPLICATION FILED JAN. 22, 1906.



**Witnesses:**  
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Witnesses:

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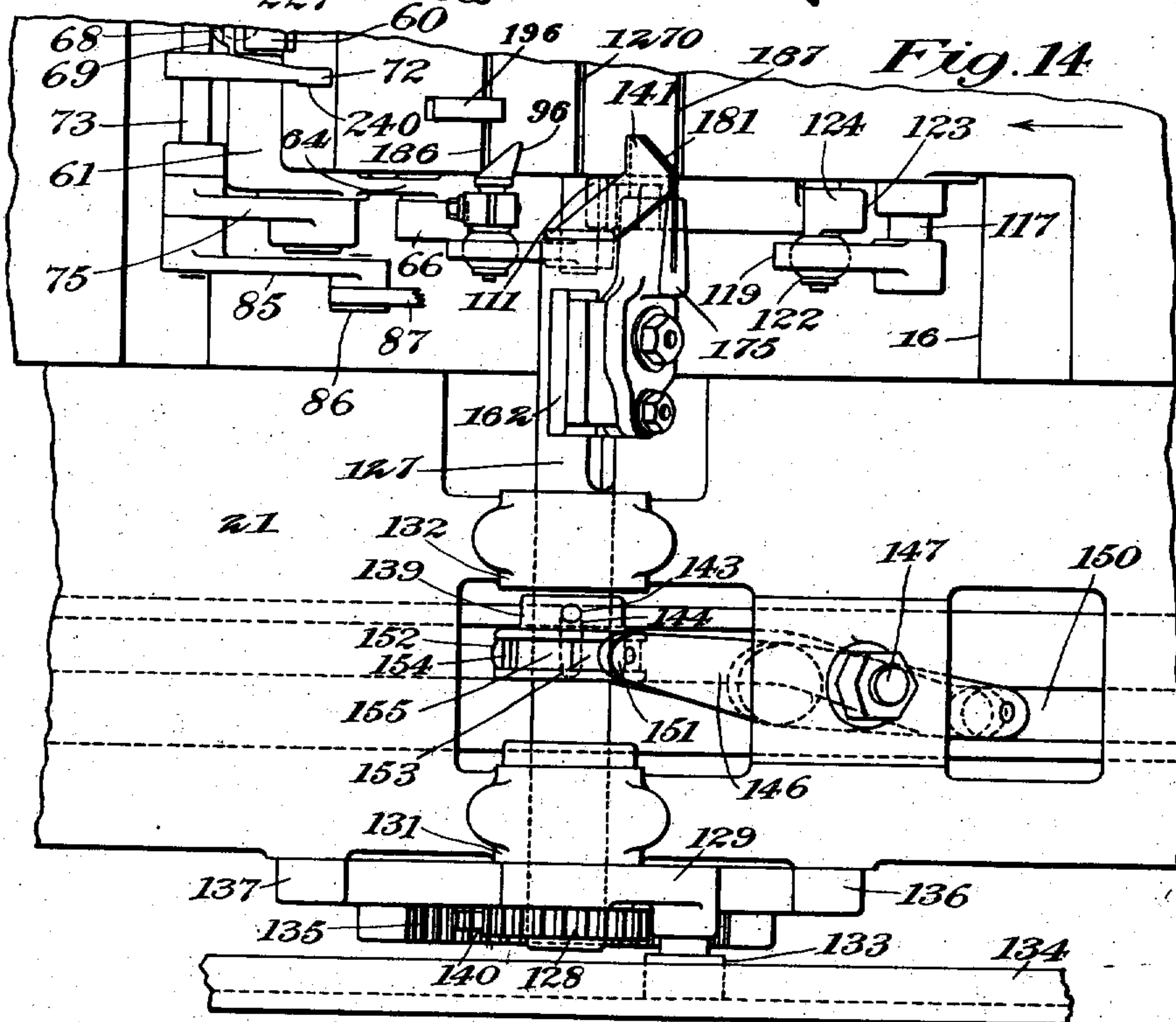
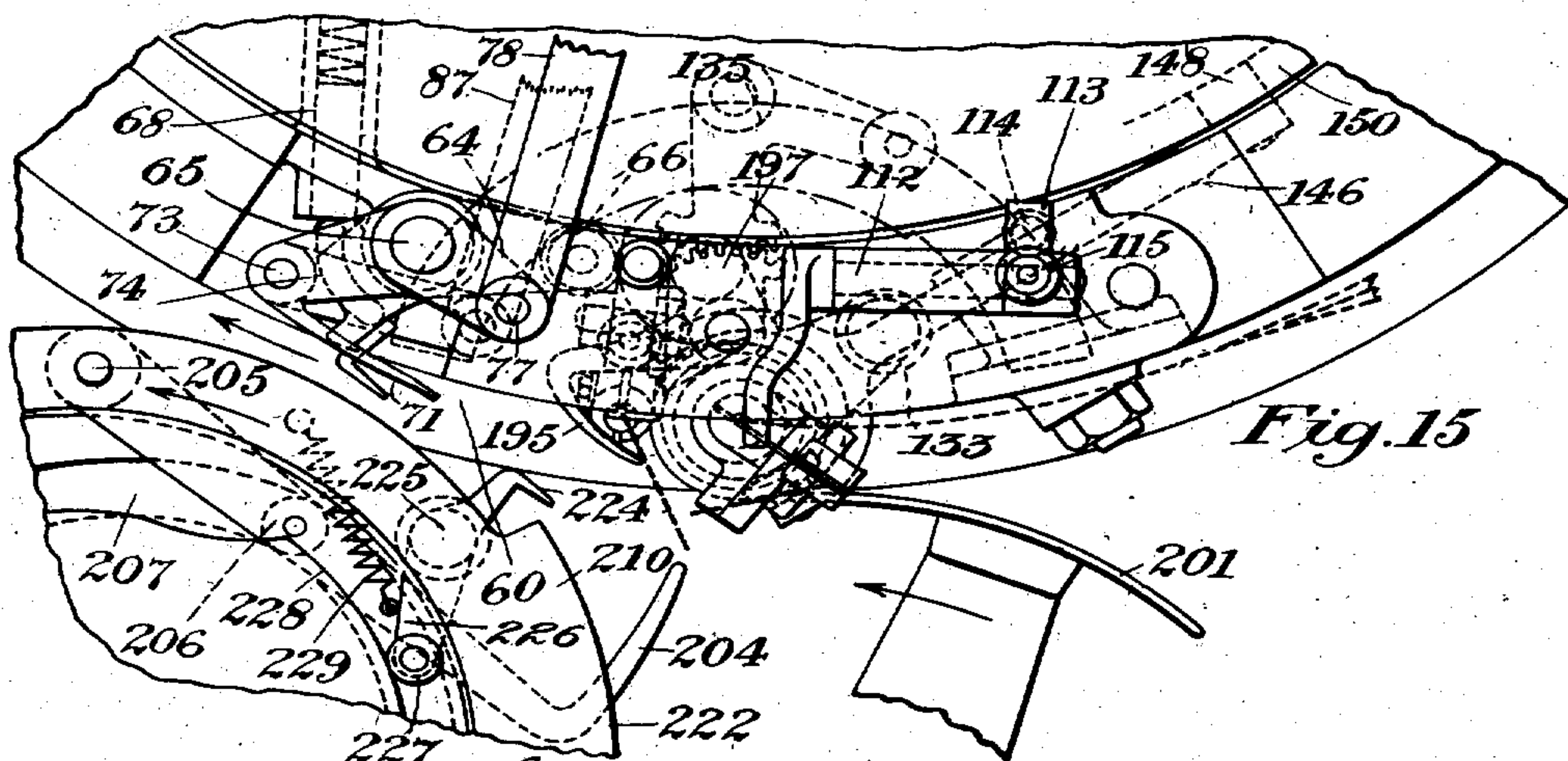
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C. F. SMITH.  
PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 9.

**Witnesses:**

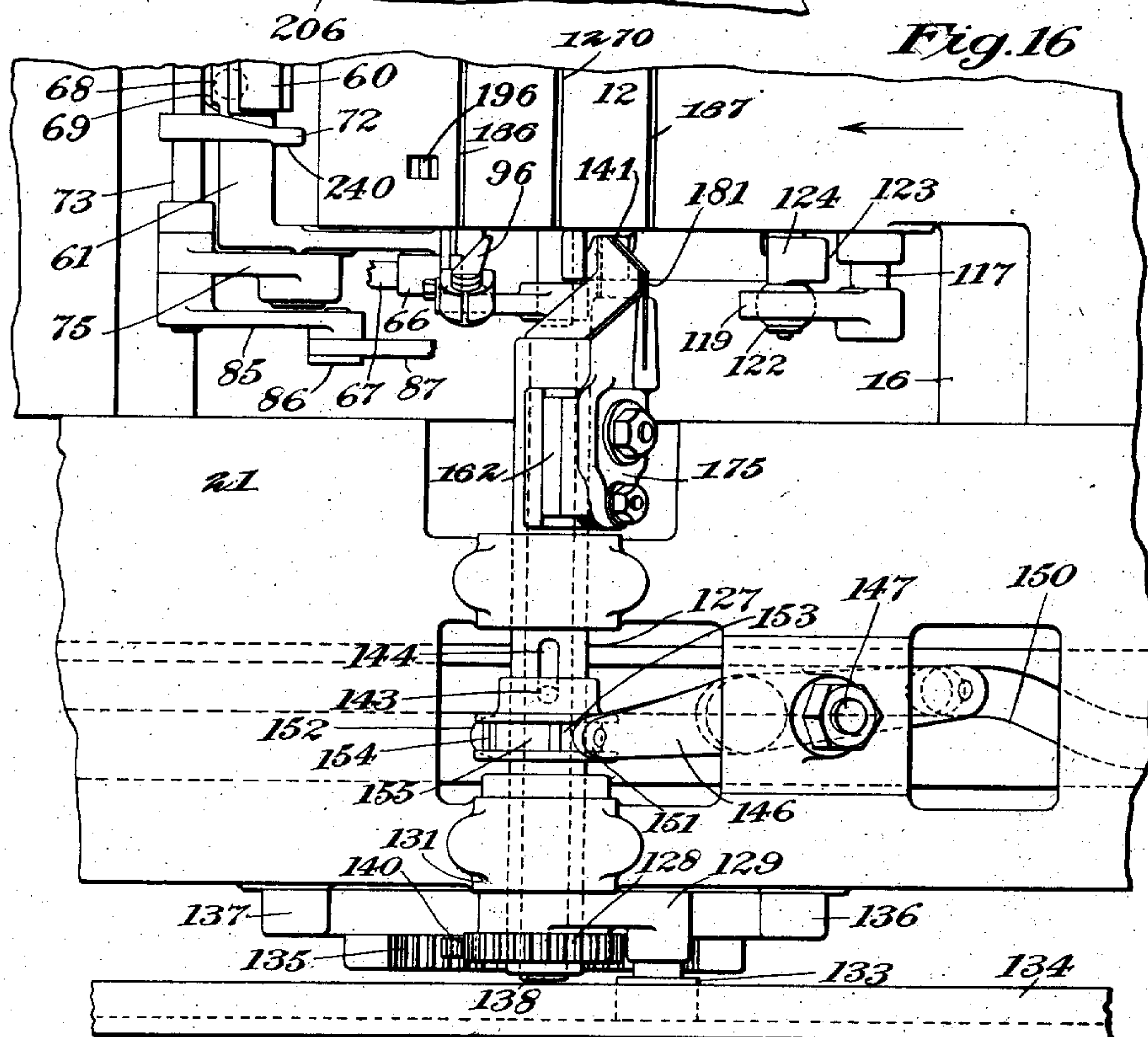
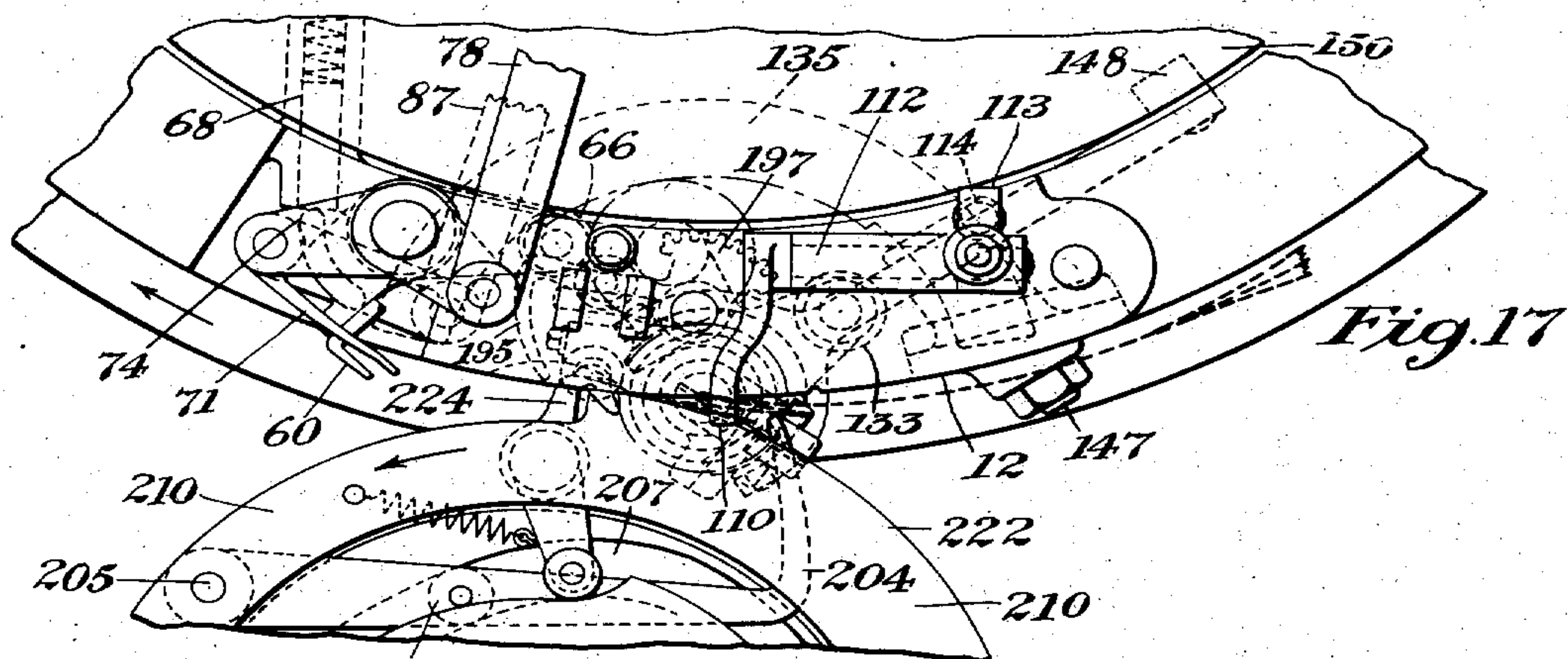
Chas. W. LaRue  
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PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 10.



Witnesses:

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Geo. L. Shepard

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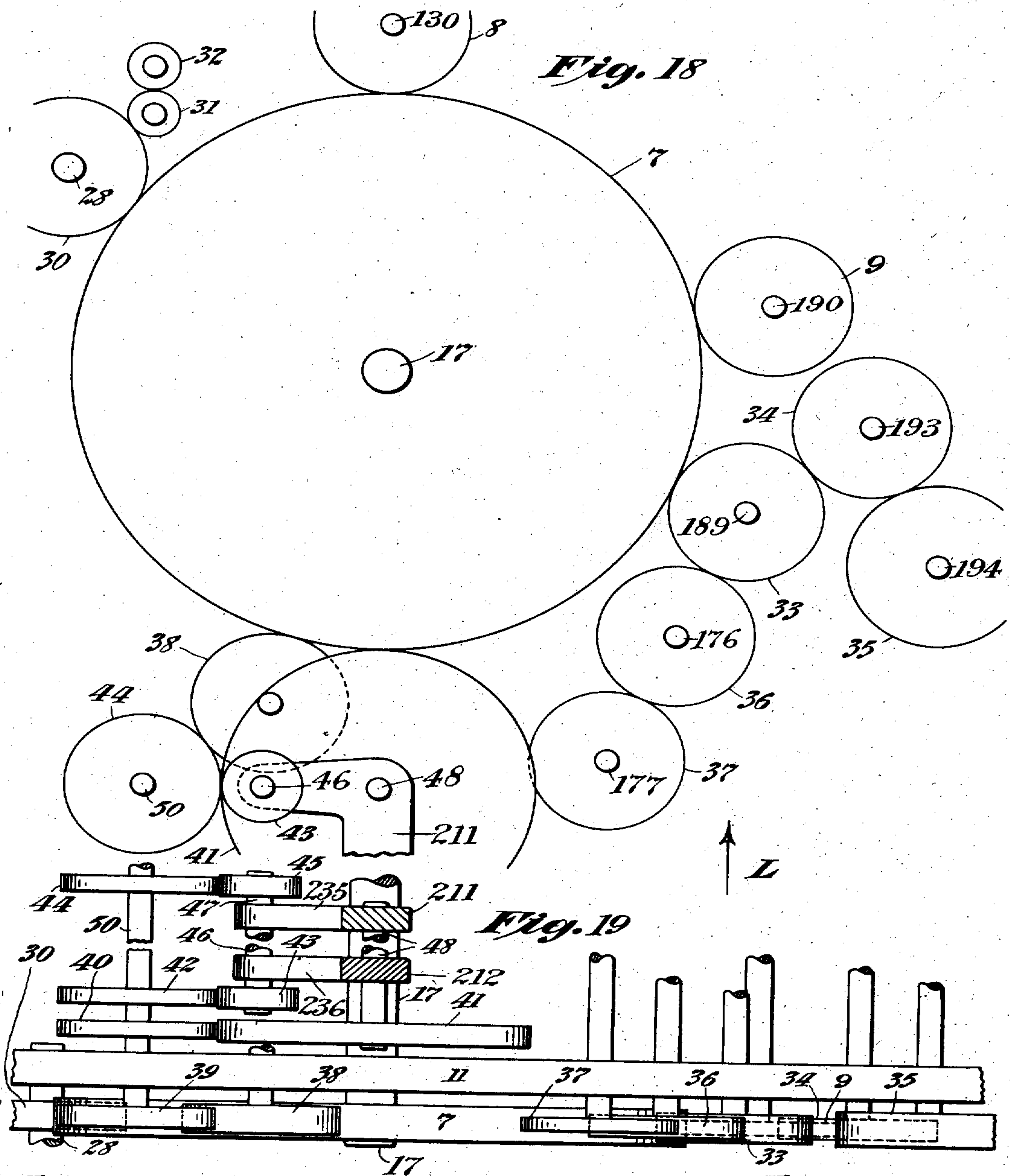


No. 864,435.

PATENTED AUG. 27, 1907.

C. F. SMITH.  
PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 11.



Witnesses:

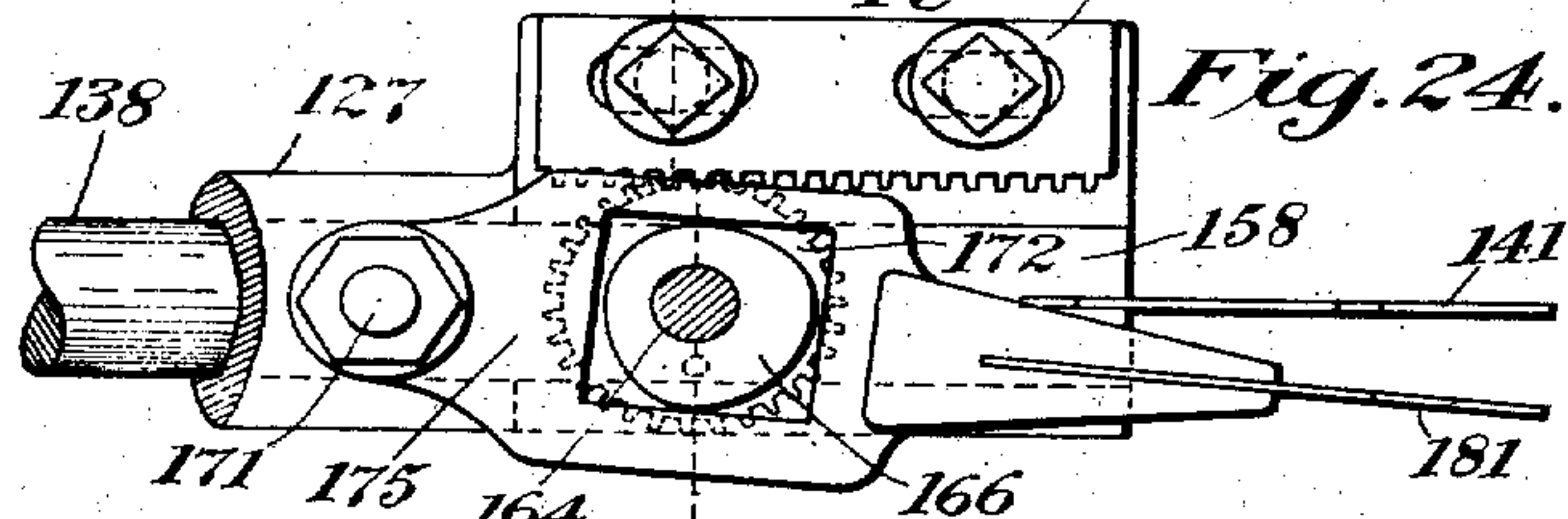
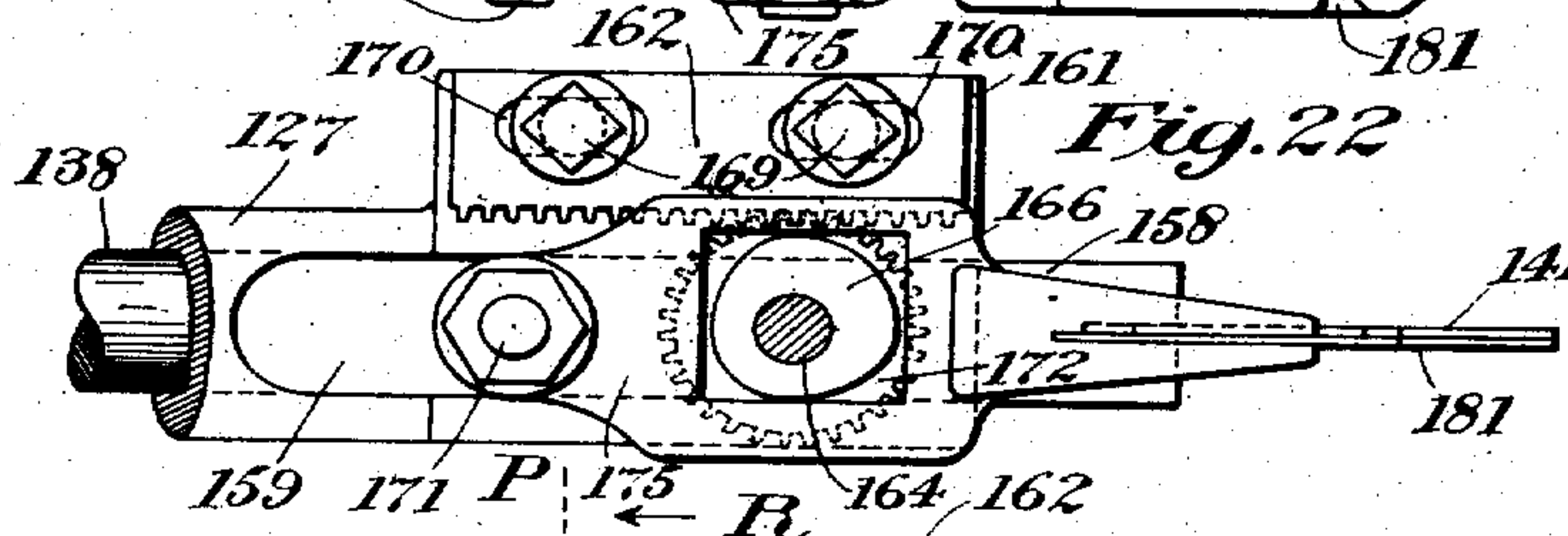
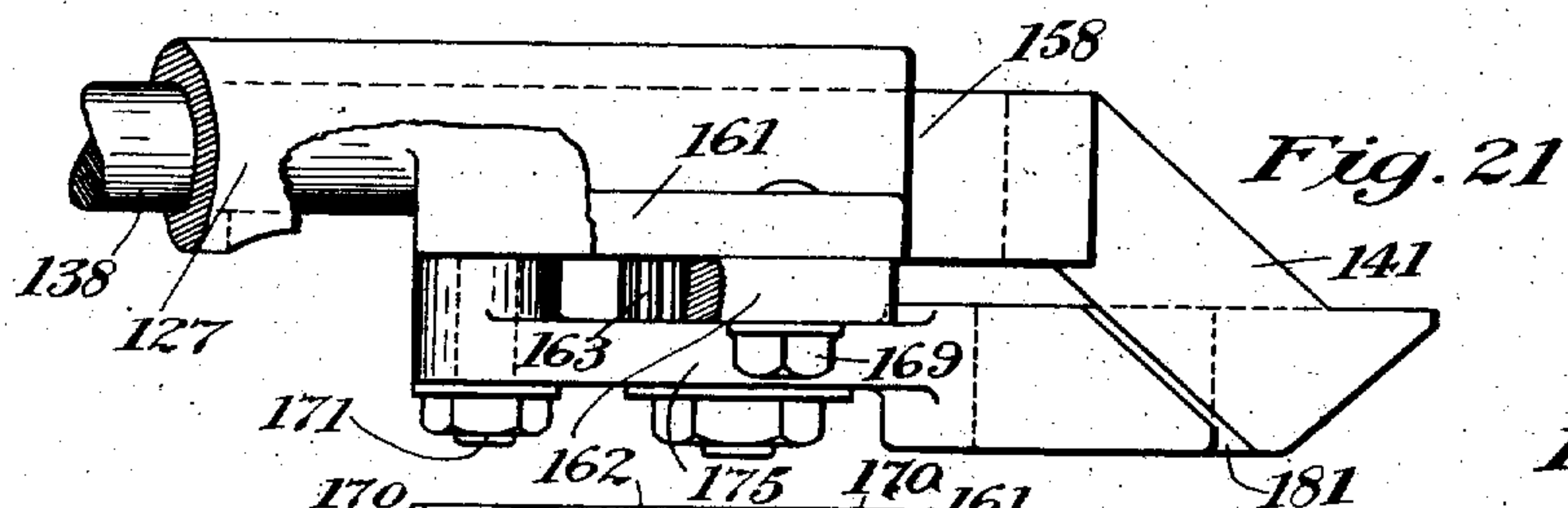
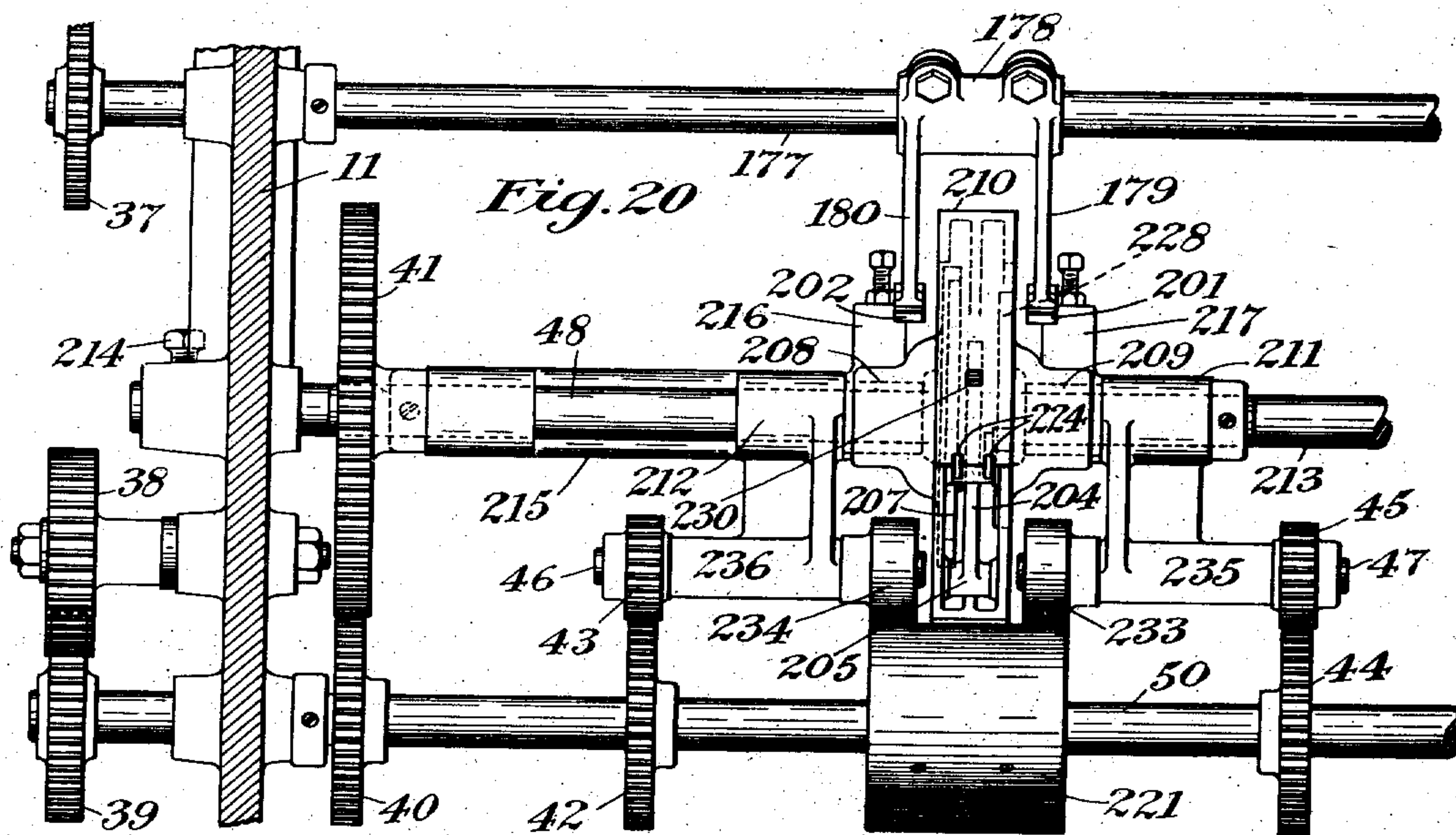
Chas. W. LaRue  
Geo. Lefebvre

Inventor:

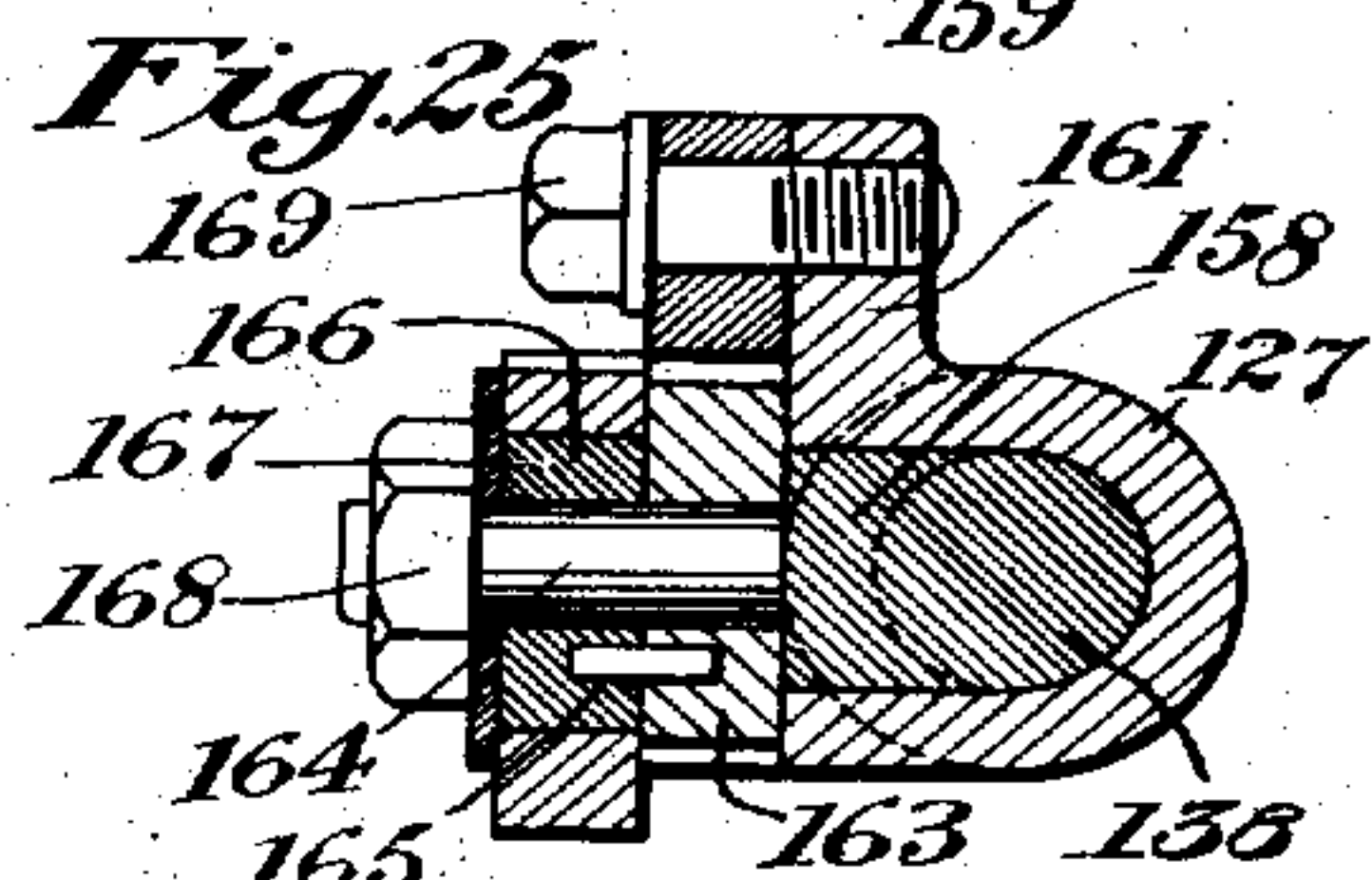
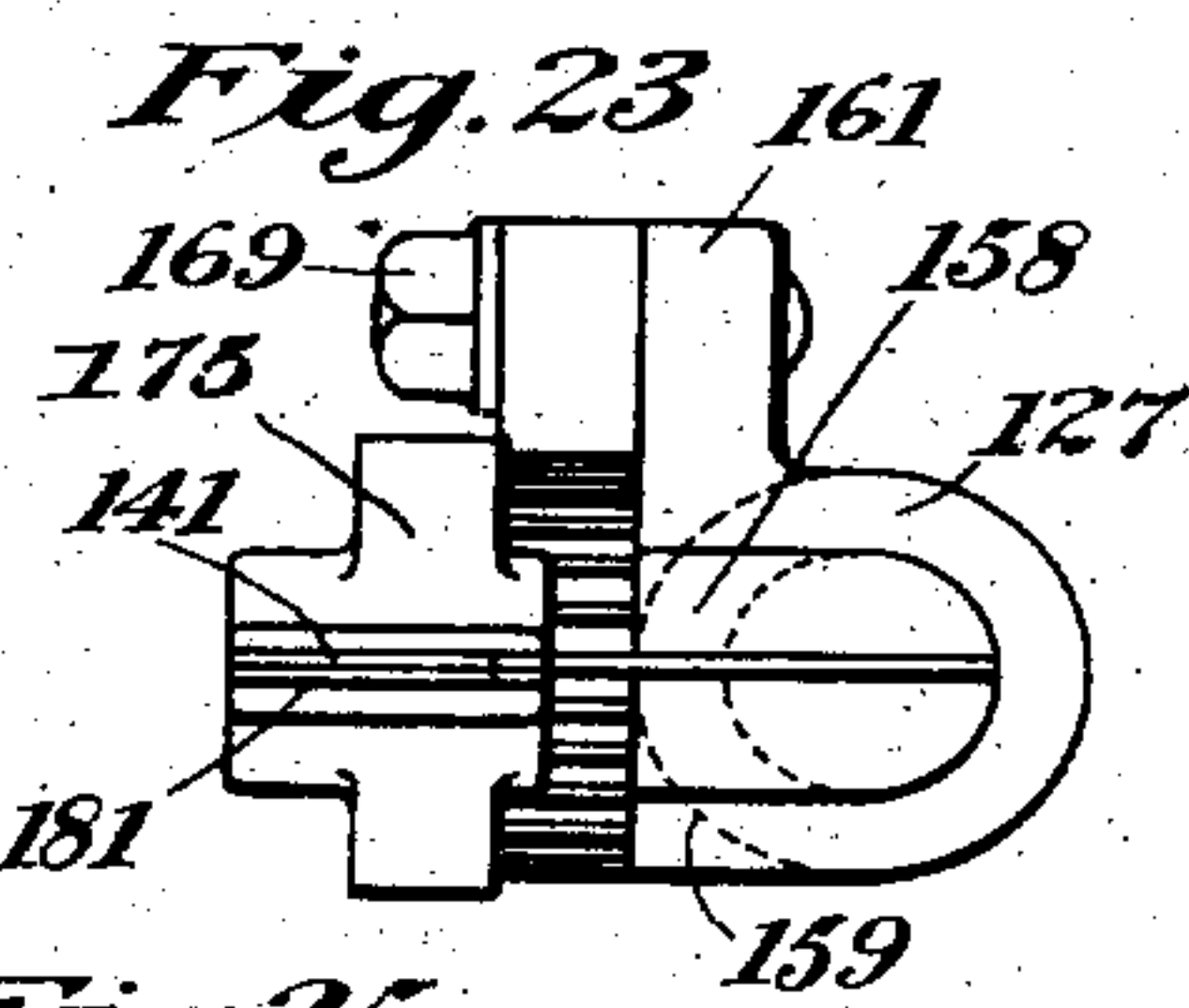
Charles F. Smith  
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PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 12.



Witnesses:  
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Inventor:  
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C. F. SMITH.  
PAPER BAG MACHINE.  
APPLICATION FILED JAN. 22, 1906.

13 SHEETS—SHEET 13.

Fig. 26.

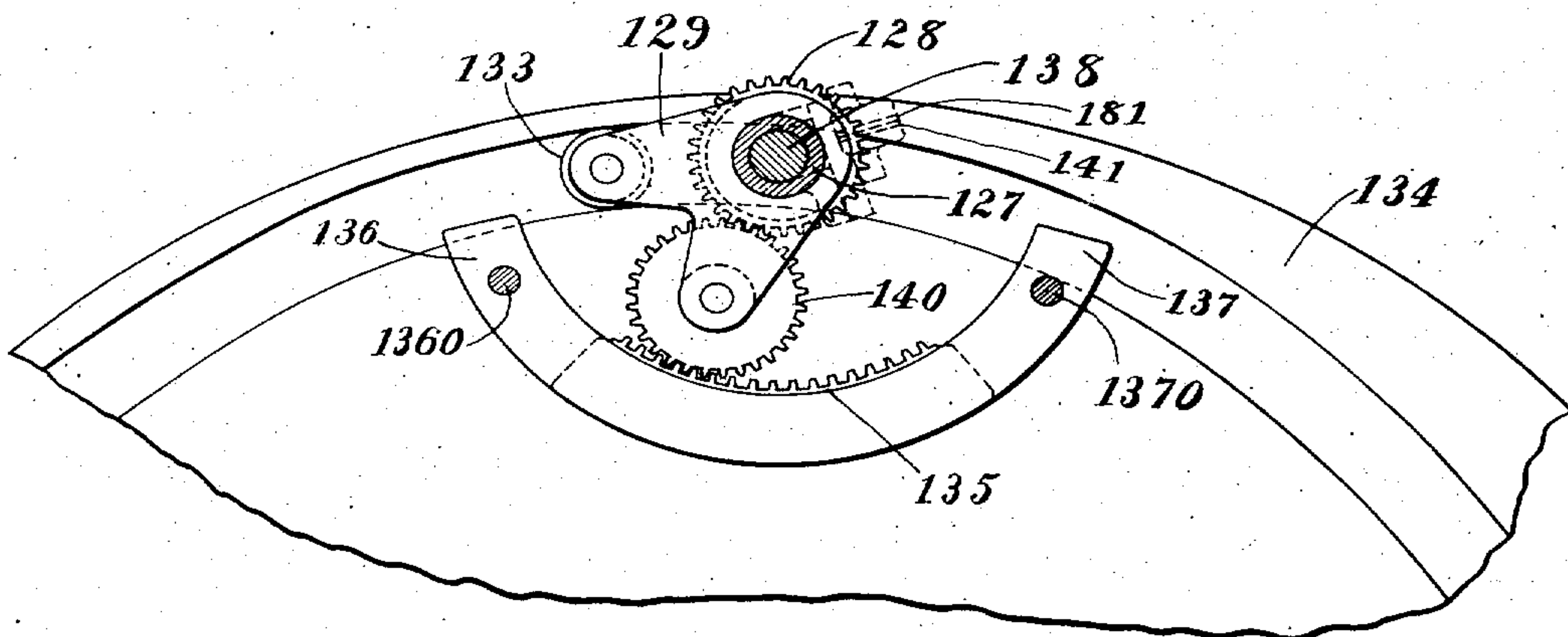
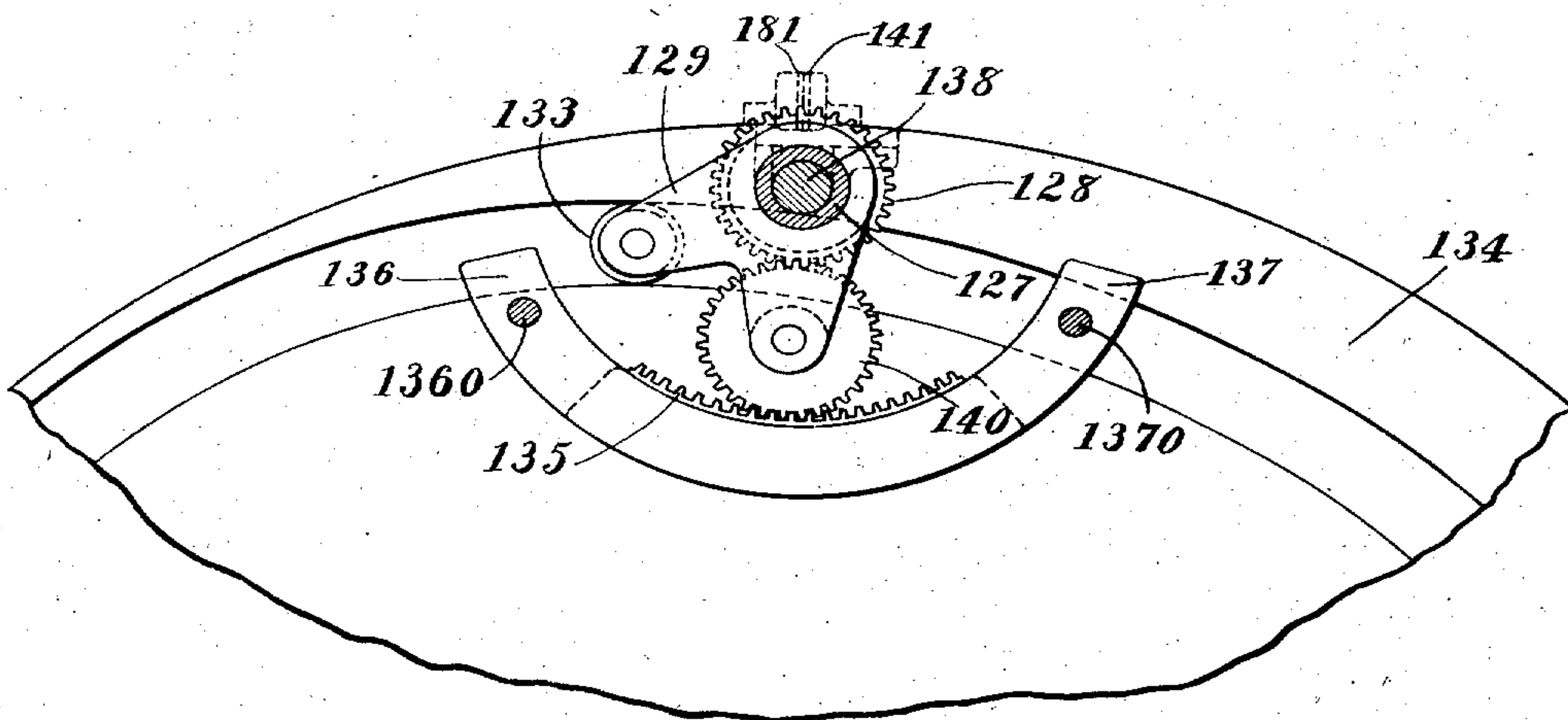


Fig. 27.



Witnesses:

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A. E. Clark

Inventor:

Charles F. Smith  
by Wilbur M. Stone  
Attorney.



# UNITED STATES PATENT OFFICE.

CHARLES F. SMITH, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO CONTINENTAL PAPER BAG COMPANY, OF RUMFORD FALLS, MAINE, A CORPORATION OF MAINE.

## PAPER-BAG MACHINE.

No. 864,435.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed January 22, 1906. Serial No. 297,206.

To all whom it may concern:

Be it known that I, CHARLES F. SMITH, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to paper-bag machines and directly to that class of such machines as are provided for making square-bottom paper-bags from tubular blanks having an inwardly folded tuck in each side thereof.

My improvements relate particularly to those parts of such a paper-bag machine as are provided to open out one end of the tubular blank and to fold the same into the well-known diamond form and then to fold over thereon the rear and front flaps of the diamond to complete the bag-bottom.

In the drawings accompanying this specification is illustrated one form of a paper-bag machine embodying my improvements and therein

Figure 1 is a sectional side elevation on line A—A of Fig. 2 and looking in the direction of arrow B therein. Fig. 2 is a plan view corresponding with Fig. 1. Fig. 3 is a sectional elevation on line C—C of Fig. 1 looking in the direction of arrow D. Fig. 4 is a sectional elevation on line E—E of Fig. 1 looking in the direction of arrow F. Fig. 5 is a sectional elevation on line G—G of Fig. 1 looking in the direction of arrow H. Figs. 6 to 17 both inclusive are a series of six pairs of partial plans and elevations respectively, to an enlarged scale, illustrating successive steps in the operation of my improved machine. The relative positions of the parts in Figs. 6 and 7 is that in which those parts will be when line 1 of Fig. 7 coincides with line 1 of Fig. 1. The positions of Figs. 8 and 9 in like manner correspond with that of line 2 of Fig. 1; Figs. 10 and 11 with line 3; Figs. 12 and 13 with line 4; Figs. 14 and 15 with line 5; Figs. 16 and 17 with line 6. The plan views of Figs. 6, 8, 10, 12, 14 and 16 are all taken looking toward the axis of rotation of the folding-beds. Fig. 18 is a diagrammatic side elevation, from the same point of view as Fig. 1, showing the gear trains of the machine. Fig. 19 is a diagrammatic plan view looking in the direction of arrow L in Fig. 18. Fig. 20 is a sectional plan on line M—M of Fig. 1, looking in the direction of arrow N therein. Fig. 21 is a plan view on an enlarged scale of one of the turn-over-grippers. Fig. 22 is a side elevation corresponding with the plan of Fig. 21 and showing the grippers closed. Fig. 23 is an end view thereof. Fig. 24 is a side elevation similar to that of Fig. 22 but with the grippers open. Fig. 25 is a section on line P—P of Fig. 24 and looking in the direction of arrow R therein. Figs. 26 and 27 are sectional elevations of the

mechanism for oscillating one of the turn-over-grippers. The sections are taken on line K—K of Fig. 2 and looking in the direction of arrow T. The relative position of the parts in Fig. 26, is the same as the position of those parts in Figs. 8 and 9, and corresponds with position 2 of Fig. 1. The relative position of the parts in Fig. 27, is the same as the position of those parts in Figs. 10 and 11, and corresponds with position 3 of Fig. 1.

The forming of the tucked-paper tubing and severing it into bag-blanks being no part of my present invention, I have provided no means therefor. It is therefore assumed that suitable bag-blanks having an inwardly folded tuck in each side thereof are provided and delivered to the machine one at a time at the required intervals.

*General construction.*—The machine of the present improvement comprises a plurality of curved folding-beds equally spaced on a common carrier and revoluble in one circle about a common axis. Each folding-bed is provided with diamond-folding means revoluble therewith whereby the maximum time is afforded the several operations in the formation of the diamond fold and high speed of operation thereby attained. Each folding-bed is also provided with its own front flap-folder whereby a further increase of speed of operation is attained. The rear flap-folding is performed by two successively operating constantly rotating folders so positioned and operable as to be effective at the high speed of the diamond-folding mechanism.

The parts and mechanisms of the present improvement are mounted in suitable side-frames 10, 11. The folding-beds, which are shown as four in number, 12, 13, 14 and 15, are mounted upon and may be formed integral with revoluble carrier 16. Said carrier is fixed upon shaft 17 which shaft in turn is rotatably mounted in sleeves 18, 19, inreaching from and fast to side frames 10, 11 respectively. Sleeve 18 is attached to side frame 10 (Fig. 3) through the intermediary frame or plate 22, whereby upon the removal of said plate an opening 23 in the side frame is exposed for the removal without disassembling, of sleeve 18 and the mechanism mounted thereon and of shaft 17 and the mechanism mounted thereon. Sleeve 18 is attached to plate 22 by means of bolts 24 and plate 22 is attached to frame 10 by means of bolts 26. Sleeve 19 is attached directly to side frame 11 by means of bolts 27. Attached by means of bolts as 1600, (Figs. 6 and 7) to opposite sides of carrier 16 and revolving therewith are cylindrical frames 20, 21 for carrying the diamond-folding and other mechanisms. On sleeves 18, 19 are mounted several fixed cams for operating the several mechanisms revolving with carrier 16.

*Driving mechanism.*—Upon stud 28 projecting out-



wardly from side-frame 11 is revolubly mounted pulley 29 and to which is fixed gear 30 (Figs. 2, 18 and 19). Power may be communicated to pulley 29 by the usual belt. Gear 30 meshes with and drives folding-bed-carrier gear 7 and lower feed-roll gear 31. Said gear 31 meshes with and drives upper feed-roll gear 32. Arranged in suitable positions about carrier gear 7 and meshing therewith are, first, main-transverse-creaser gear 8 located directly above gear 7; ironer gear 9 at the right side thereof, Fig. 18 and lower down is intermediate gear 33, while below gear 7 is intermediate gear 38. Gear 33 meshes with and drives paste-transfer gear 34 and which in turn meshes with and drives paste-pot gear 35. Said gear 33 also drives rear-flap-folder gear 37 through idle gear 36 on stud 176. Intermediate gear 38 meshes into gear 39 fixed on shaft 50 together with gears 40, 42 and 44. In Fig. 18 gear 39 is hidden by gears 40, 42 and 44. Gear 40 meshes into gear 41 on delivery-cylinder shaft 48. Gear 42 meshes into gear 43 on right hand supplemental-delivery-roll shaft 46, and gear 44 meshes into gear 45 on left hand supplemental-delivery-roll shaft 47.

**Blank feeding mechanism.**—The bag-blanks are fed to the machine by means of a pair of rolls 49, 51, (Figs. 1 and 2) fixed to shafts 52, 53 respectively and which shafts are revolubly mounted in suitable bearings in side-frames 10, 11. The bearings for upper shaft 52 may be in vertically sliding boxes, 54, 55 and which boxes are urged downwardly to cause the proper engagement of rolls 49, 51, by means of springs as 56. After passing from between said rolls the bag-blank is directed to its seat on the folding-bed by means of guide-finger 57. Said finger is fast on rod 58 inreaching from one of the side frames as 11.

**Diamond-folding mechanism.**—Under this general title I will describe the folding-beds, front and side-clips thereon, supplemental-front-fingers and main-transverse-fold-clips and their respective operating means. Also main-transverse-fold creaser and the turn-over-grippers and their respective operating means. Those parts of the diamond-folding mechanisms pertaining to the folding-beds, 12, 13, 14 and 15 and to carrier 16 are as follows. As the folding-beds with their appurtenances are all alike a description of one will suffice for all. Folding-bed 12 has a working face conforming to the periphery of a cylinder concentric with axial shaft 17. At the forward end of said folding-bed is the usual front-clip 60, Figs. 1, 2, 4, 6 and 7. Said clip 60 is fast to and carried by yoke-frame 61 rotatably mounted at 62, 63 at opposite sides of the folding-bed on shaft 65. Said yoke-frame 61 has an inwardly-reaching arm 64 carrying roll 66 for engagement with cam 67. Said cam 67 is bolted to side-clip cam 70 fixed on the inner end of sleeve 19. Front-clip 60 is urged to grip the leading end of the bag-blank to the folding-bed, and roll 66 is urged to engagement with its cam, by means of the impingement of spring-actuated plunger 68 against horn 69 on yoke-frame 61. For preventing tearing of the forward end of the bag-blank during the formation of the diamond-fold I employ supplemental-front-fingers 71, 72. These fingers are fast to rock-shaft 73 mounted for oscillation about its own axis in the free ends of arms 74, 75. Said arms 74, 75 are fixed to shaft 65 for

oscillation about the axis thereof. Arm 74 has an oppositely reaching member 76 the free end of which is pivoted at 77 to link 78. At its lower end said link is pivoted at 79 to slide 80 mounted in guide 81 bolted at 82 to, and revolving with cylindrical-frame 20, Fig. 4. Said slide 80 is provided with a roll 83 for engagement with cam 84 fixed on sleeve 18. By the means just described arms 74, 75 and shaft 73 may be caused to oscillate toward and away from the folding-bed and fingers 71, 72 moved into and out of the mouth of the bag-blank. On that end of shaft 73 adjacent to arm 75 is fixed arm 85. At its free end said arm is pivoted at 86 to link 87. At its lower end said link is pivoted at 88 to slide 89 mounted in guide 90 bolted at 91 to and revolving with cylindrical-frame 21. Said slide 89 is provided with a roll 92 for engagement with cam 94 fixed on sleeve 19. By the means just described shaft 73 may be caused to oscillate about its own axis to move fingers 71, 72 down onto and up from the lower ply of the forward end of a bag-blank on the folding-bed, in co-action with the movement of the fingers into and out of the mouth of the bag-blank.

The folding-beds are provided with the usual side-clips as 95, 96 on folding-bed 12, Figs. 5 and 6, and as these clips are all alike I will describe in detail only one. Side-clip 95 comprises an arm 97 pivotally-mounted at 98 on the side of and below the face of its respective folding-bed 12 and mounted in the upper end of said side-clip is the paper engaging portion 99 thereof. Arm 97 has a downwardly-extending portion 99 for engagement with spring-actuated plunger 101. Arm 97 is also provided with a roll 102 for engagement with slotted lever 103 fast on rock-shaft 104 pivotally mounted under the folding-bed. Arm 105 and lever 106 are also fixed on said shaft. Arm 105 projects inwardly and carries on its free end roll 107 for engagement with fixed cam 70 on sleeve 19. Roll 107 and clip 95 are urged to their respective work by spring-actuated plunger 101. Side-clip 96 is mounted similarly to clip 95 and is actuated from rock-shaft 104 through lever 106 in engagement with roll 108 on arm 109 in which said clip 96 is mounted. Each of the folding-beds is also provided with a pair of main-transverse-fold clips, 110, 111 as to folding-bed 12, Figs. 1, 2, 3, 6 and 7 situated rearwardly, in the direction of travel of the folding-bed, of the side-clips. As these transverse-fold-clips are all alike I will describe only one. Clip 110 is fixed to shaft 112 pivotally-mounted on the side of and below the face of folding-bed 12. Said shaft 112 has a downwardly-extending arm 113 fixed thereto for engagement with spring-actuated plunger 114. Said arm 113 is also provided with a roll 115 for engagement with slotted lever 116. Said lever 116 is fast to rock-shaft 117 pivotally-mounted under the folding-bed. Arm 118 and lever 119 are also fixed to shaft 117. Arm 118 projects inwardly and carries on its free end roll 121 for engagement with cam 120 bolted to cam 100 fixed on sleeve 18. On the opposite side of folding-bed 12 arm 119 for actuating clip 111 through roll 122 on arm 124 fixed to shaft 123 is clearly shown in Fig. 6.

For forming the main-transverse-crease in the bag-blank and on which crease the rear portion or the diamond is folded over, creaser 125 is provided. Said creaser is mounted above the path of the folding-beds



and is fixed on clamp-hub 126 which is in turn fixed to shaft 130, Figs. 1, 2 and 7. Each folding-bed may be provided with a groove thereacross, as 1270 in folding-bed 12, for cooperation with main-transverse-creaser 125. A turn-over-gripper for the diamond-fold is disposed on each side of each of the folding-beds and said grippers are mounted on cylindrical-frames 20, 21 respectively for revolution with their respective folding-beds about shaft 17. As all of the turn-over-grippers on the right hand side of the machine are alike and those on the other side are left hand duplicates thereof the description of one pair of grippers will suffice for all. One of said turn-over grippers may be found illustrated in detail in Figs. 21 to 25 inclusive and in its relation to the rest of the machine in Figs. 1, 2, 3, 26 and 27 and in the step views Figs. 6 to 17 inclusive. Mounted for rotation in bearings 131, 132 on cylindrical-frame 21 is tubular shaft or gripper carrier 127. At its outboard end said shaft has fixed thereon gear 128 and between said gear and bearing 131, arm 129 is mounted for free rotation on said tubular shaft 127. Arm 129 is provided at its free end with two ears; on one thereof is rotatably mounted roll 133 for engagement with cam 134 fixed on sleeve 19, and on the other thereof is rotatably mounted pinion 140. Internal segmental gear 135 is provided with offset ears 136, 137 through which by means of bolts 1360, 1370 (Fig. 8) it is attached to frame 21. Pinion 140, on one ear of arm 129 meshes on the one side with internal gear 135 and on the other side with gear 128 on tubular shaft 127. By these means when movement in a clockwise direction is imparted to arm 129 by the engagement of its roll 133 with cam 134, a largely increased movement in an anti-clockwise direction is imparted to gear 128 and tubular shaft or gripper carrier 127, and vice versa. The dotted positions of gripper blades 141, 181 in Figs. 26 and 27 relative to the positions of arm 129 respectively, clearly show this increased movement.

Mounted for endwise reciprocation within tubular shaft 127 is gripper shaft 138. To the inboard enlarged end 158 of said shaft is fixed gripper-blade 141. Sliding freely on tubular shaft 127, between bearings 131 and 132 is sleeve 139. Passing through the opposite walls of sleeve 139 and through shaft 138 is pin 143. Tubular shaft 127 is provided with opposite slots 144, 145 to permit movement of pin 143 endwise in said tubular shaft whereby endwise movement of sleeve 139 on the outside of tubular shaft 127 is transmitted to gripper shaft 138 within said tubular shaft. Endwise movement is transmitted to sleeve 139 and thence to shaft 138 from cam 150 by means of lever 146. Said lever is pivoted at 147 in frame 21 and carries at one end thereof roll 148 for engagement with said cam and at the other end thereof is provided with yoke-arms 151, 152 for engagement through dogs 153, 154 with groove 155 in sleeve 139. Cam 150 is a fixed cam and is bolted at 156 to flange 157 on the hub of cam 94 fixed to sleeve 19 (Fig. 3). The enlarged inboard end 158 of gripper shaft 138 projects through slot 159 in one side of tubular shaft 127. To flange 161 on said enlarged end of tubular shaft 127 rack-bar 162 is bolted by means of bolts 169. The teeth of rack-bar 162 are engaged by the teeth of pinion 163 turning freely on stud 164 projecting sidewise from end 158 of shaft 138. Endwise

adjustment of said rack-bar is permitted by slots 170 therein. Fastened to pinion 163 by pin 165 and turning with said pinion on stud 164 is cam 166. Said cam and pinion are prevented from endwise movement on said pin by the usual washer 167 and nut 168. Pivoted at 171 near the rear end of enlarged part 158 of gripper-shaft 138 is gripper-arm 175. About midway its length said gripper-arm is perforated by a rectangular slot 172 for engagement with cam 166. In the free end of said gripper-arm is fixed gripper-blade 181 for coaction with gripper-blade 141 fixed in shaft 138. Cam 166 coacts with the upper and lower faces (Figs. 22, 24 and 25) of slot 172 to oscillate arm 175 and blade 181 toward and away from blade 141, as said cam is rotated by means of its pinion 163, as shaft 138 is reciprocated axially in tubular shaft 127.

*Ironing mechanism.*—Figs. 1, 2 and 13. Fixed on shaft 190 for revolution therewith is ironing roll or segment 182. Said roll or segment is geared to revolve at the same surface speed as the folding-beds and is provided for successive coaction with said folding-beds to roll down and flatten the previously formed diamond fold of the bag-blank.

*Flap folding mechanism.*—Under this general title I will describe the creasing and pasting device, the front-flap-lifters, the rear-flap-folders and the rear-flap-retaining finger. The usual pasting segment 185, provided with creaser-blades 183, 184 is fixed to shaft 189 for revolution therewith (Figs. 1, 2 and 13). Said pasting-segment is geared to revolve at the same surface speed as the folding-beds. Creaser-blade 183 coacts with grooves in the folding-beds, each respectively, as groove 186 in folding-bed 12, to form the crease on which the front-flap of the diamond is to be turned over. Creaser-blade 184 coacts with other grooves in the folding-beds, each respectively, as groove 187 in folding-bed 12 to form the crease on which the rear-flap of the diamond is to be turned over. The usual paste-pot 188 is supported on the frame of the machine by some convenient means, and by means of a paste-wheel 191 on shaft 194 in said pot and transfer segment 192 on shaft 193 paste is delivered to paste-segment 185. Paste-wheel 191 and transfer segment 192 have their shafts 193, 194 mounted in eccentric sleeves 1930, 1940, all respectively, in swing frame 1912. Said frame may be adjusted by means of slotted segment 1913 bolted to frame 11 to vary the depth of engagement of wheel 191 with the paste in pot 188. Also by means of eccentric sleeve 1930 and its slotted segment 1931 the position of transfer segment 192 relative to pasting segment 182 may be varied. Also by means of knurled collar 1941 on eccentric sleeve 1940 said sleeve may be turned to vary the position of paste wheel 191 relative to transfer segment 192. Sleeve 1940 may be secured against turning by means of clamp bolt 1942. A scraper 1910 supported in arm 1911 is provided for wheel 191.

Pivotaly mounted in revoluble carrier 16 beneath each folding-bed is a front-flap-lifter or folder, preferably comprising one or more L-shaped lifter-arms. In the present embodiment two such lifter-arms are shown under each folding-bed as arms 195, 196 mounted to turn freely on side-clip rock-shaft 104 under folding-bed 12 (Figs. 1, 2, 5, 6, 7, 14, 15, 16, 17). Said front-flap-lifter is provided to lift and partly fold up the front-flap of the diamond-fold, after creaser-blade 183 has



performed its function, and to assist the entrance of the diamond-folded bag-blank with its partly folded front-flap into the bite of folding-roll 210 with the folding-bed, to complete the folding of said front-flap. Each

5 of said L-shaped arms is provided with a segment-gear extending from its pivotal shaft toward shaft 17 of carrier 16, as for instance segment-gear 197 of lifter-arm 195. For actuating said front-flap-lifters, segment-gears in engagement with the corresponding segment-gears of the lifter-arms, are provided. Said actuating  
10 segment-gears are fixed in pairs on shafts respectively in carrier 16 and one of each pair of said segment-gears is provided with an arm bearing a roll for engagement with cam 100 fixed to the inner end of sleeve 18 (Figs. 1, 3, 5 and 15). The specific segment-gear for engagement  
15 with segment-gear 197 of lifter-arm 195 is shown at 199, and that for engagement with segment-gear 198, of lifter-arm 196, at 200. Segment-gears 199 and 200 are fixed to shaft 172 pivoted in the web of carrier 16. Segment-gear 199 has a rearwardly-reaching arm 173, carrying roll 174 for engagement with cam 100, whereby  
20 through the two pairs of said segment-gears, lifter-arms 195, 196 may be oscillated about shaft 104 and their free ends thrust up through apertures provided therefor in folding-bed 12.  
25

Fixed to shaft 177 and which shaft makes one revolution for each passing folding-bed on revoluble carrier 16, is bracket 178 having arms 179, 180 (Figs. 1, 15 and 20). These arms have fixed to the free ends thereof respectively rear-flap-folders 201, 202. These folders are  
30 blade-like members having their faces curved substantially concentric with shaft 177 about which they rotate. Arms 179, 180 are separated sufficiently to pass on opposite sides respectively, in their revolution, of delivery-cylinder 210 (Figs. 1 and 20). Also said arms  
35 179, 180 are of such length that flap-folders 201, 202 have a path of revolution adjacent to the path of revolution of the folding-beds and the gearing for driving said flap-folders is so proportioned that they travel at a linear speed considerably in excess of the linear speed of  
40 the folding-beds. Furthermore the grooves of cams 134, 1034 of the actuating means for oscillating the turn-over-grippers are of such contour that just prior to reaching the point of engagement of rear-flap-folders 201, 202  
45 with the bag-blank, said turn-over-grippers are caused to start on their return strokes from the position of Fig. 13, and to lift up the rear portion of the diamond-fold to the position of Fig. 15, whereby access for said flap-folders behind or under the rear flap of the diamond is  
50 assured.

Pivotally mounted and revolving with delivery-cylinder 210 are one or more rear-flap retaining-fingers. In the present instance two are shown 203, 204. The diameter of delivery-cylinder 210 is one half the  
55 diameter of carrier 16 measured from face to face of two opposite folding-beds on said carrier and therefore the mechanisms on said delivery-cylinder are in duplicate to properly coact with the quadruple set of folding-beds. As said rear-flap retaining-fingers and  
60 their operative mechanisms are duplicates of each other the description of one will suffice for both. Finger 204 is an L shaped member pivoted at 205 in said delivery-cylinder, and has pivoted thereon roll 206 for engagement with cam 207 fixed on the inreaching  
65 sleeve 208 of rocking bracket 215. By these means as

delivery-cylinder 210 revolves in an anti-clockwise direction the free operative end of said finger 204 is caused to swing outwardly therefrom through opening, 230 in said cylinder (Fig. 15) for engagement with the partly-folded rear-flap to insure the folding of said rear-flap before and therefore under the front-flap. 70

*Delivery mechanism.*—Delivery-cylinder 210, already referred to in connection with the description of the rear-flap retaining-fingers, is a relatively narrow cylinder fixed to shaft 48. Said shaft is pivotally mounted in the free ends of upstanding arms 211, 212 of rocking-bracket 215. Said bracket turns freely on shaft 213 and which shaft is supported in side-frames 10, 11 and is secured against turning therein by set screw 214. Also mounted upon said shaft are two spring-boxes 80 216, 217 and which boxes are secured against turning thereon by set screws as 218. Rocking-bracket 215 is provided with two ears, as 219, against which the springs, as 220, of spring-boxes 216, 217 impinge, to urge delivery-cylinder 210 in said bracket to engagement with delivery-roll 221 on shaft 50. Said shaft 50 is pivotally mounted in side-frames 10, 11. Delivery-cylinder 210 is provided with two folding or ironing-beds 222, 223 diametrically disposed thereon and each of said folding or ironing-beds is provided with a front-clip as clip 224 of bed 222. Said clip is preferably bifurcated (Fig. 20) and is pivoted at 225, and has an inwardly reaching arm 226 carrying roll 227 for engagement with cam 228. Said roll is urged to engagement with its cam and clip 224 to its work, by the usual spring 229. Cam 228 is fixed on sleeve 209 of rocking-bracket 210. 85 90 95

To supplement the work of delivery-cylinder 210 and to maintain that cylinder in proper relation to delivery-roll 221 when the cut-away portions 231, 232 are opposite said roll 221 supplemental rolls 233, 234 are provided. These rolls are fixed on the inner ends of shafts 47, 46 turning in arms 235, 236, all respectively, of rocking-bracket 215. Said supplemental-rolls are driven as hereinbefore described. A guide-plate 237 supported on stud 238 inreaching from frame 11, is provided to guide the finished paper-bag as it is carried on delivery-cylinder 210 into the bite between said cylinder and rolls 233, 234 and delivery-roll 221, and thence out of the machine. 100 105 110

*Operation.*—The operation of my improved paper-bag machine is as follows: The machine being started, a suitable tubular bag-blank, having an inwardly folded tuck in each side thereof is thrust, in proper time, into the bite of rolls 49, 51 and thereby fed forwardly in the direction of arrow K (Fig. 1) under finger 57 onto one of the rotating folding-beds as 12. Thereupon front-clip 60 swings down onto and grips the lower ply of the mouth of the bag-blank to the folding-bed and side-clips 95, 96 swing inwardly and grip the lower plies of the respective side-tucks to the folding-bed (Figs. 6 and 7). Then creaser-blade 125 revolves into coaction with groove 1270 in folding-bed 12 and forms the main-transverse-crease in the bag-blank and thereby temporarily holds the blank down onto the folding-bed. While thus held, transverse-fold-clips 110, 111 close onto the blank and grip all of the plies thereof to the folding-bed. This holding down of the bag-blank by said transverse-fold-clips causes the upper-ply of the mouth of the bag-blank to spring upwardly from the 115 120 125 130



folding-bed thus positioning said blank for the gripping of the upper plies of the side-tucks respectively thereof by the turnover-grippers and whereby the engagement of said turnover-grippers at the proper distance from said transverse-crease is assured. Thereupon said turnover-grippers 141, 181 on the one side and 1401, 1801 on the other side move inwardly over the folding-bed and grip the respective upper plies of the side tucks (Figs. 8, 9 and 26). It is further to be noted that it is the non-oscillatable members 141 and 1401 of the turn-over grippers that enter the side tucks respectively and that the oscillatable members 181 and 1801 close down onto the face of the bag-blank to grip it against said non-oscillatable members of the turnover-grippers. By this arrangement when said turnover-grippers release their hold on the completed diamond-fold the non-oscillatable members of said grippers withdraw from the side-tucks respectively, in the plane of those side tucks, whereby any disarrangement of the diamond-fold is avoided. At the same time supplemental-front-fingers 71, 72 have started to move into the mouth of the bag-blank. Continuing their inward and then downward movement said fingers 71, 72 grip the bag-blank to the folding-bed just inside or rearward of the position occupied by the front-clip and opposite those points where the diamond-fold commences. During this time the turn-over-grippers are moving in an anti-clockwise direction about their respective axes as 138 and the parts are in the positions shown in Figs. 10, 11 and 27, and the diamond-fold has reached the box-shaped stage of its formation. Said turnover-grippers continue their anti-clockwise rotation until their blades are substantially parallel with the folding-bed, and the diamond-fold completed. Just prior to the completion of the diamond-fold transverse-fold-clips 110, 111 withdraw from engagement with the bag-blank. Turn-over-grippers 141, 181 and 1401, 1801 still retain their hold on the bag-blank and supplemental-front-fingers 71, 72 are withdrawn from the mouth of the blank. Said blank now passes under ironer 182 (Figs. 12 and 13) and thence under paster-segment 185, and creaser-blades 183, 184 therein form the front and rear-flap creases respectively in the bag-blank. Front-clip 60 rises and frees the front-flap just prior to the engagement of creaser 183 with the bag-blank. The turn-over-grippers now rise from the folding-bed and rotate on their axes a short distance in a clockwise direction thereby lifting the rear-flap for engagement with rear-flap-folders 201, 202. At the same time lifter-arm 195 swings outwardly from the folding-bed and folds over the front-flap slightly more than 90 degrees from the folding-bed. In the meantime rear-flap-folders 201, 202 revolving at a linear speed considerably greater than that at which the bag-blank is traveling, overtake and turn inwardly toward the folding-bed the rear-flap and fold it under the front-flap (Figs. 14 and 15). Just before said rear-flap-folders have finished their engagement with the rear-flap, one of the rear-flap retaining-fingers as 204 in delivery-cylinder 210 passes upwardly (Fig. 15) between rear-flap-folders 201, 202 and takes possession of said rear-flap, holding it up against the body of the diamond-fold until the front-flap has passed into engagement with one of the folding-beds as 222 on delivery-cylinder 210. Thereby said front-flap is folded up and over the rear-flap. During this operation of the rear-flap-retaining-

finger, the turn-over-grippers, still maintaining their lifted positions of Figs. 14, 15, release their grip on the bag-blank and withdraw from engagement therewith. In this releasing operation of said turn-over-grippers the oscillatable members 181, 1801 thereof lift from engagement with the bag-blank and non-oscillatable members 141, 1401 withdraw in opposite directions in the plane of the bag-blank, carrying the now opened members 181, 1801 with them, Figs. 16, 17, all without disarranging the folded blank. The leading end of the now completely-folded bag-bottom then passes into the bite of delivery-cylinder 210 and the folding-bed; front clip 224 of folding- or ironing-bed 222 of delivery-cylinder 210 grips said leading end of the bag to said bed 222, and side-clips 95, 96 release their hold on the bag. Said completely-folded bag is then ironed or pressed as it passes between folding-beds 12 and 222 and is then carried downwardly on delivery-cylinder 210 under guide-plate 237 and between delivery-cylinder 210 and supplemental rolls 233, 234 on the one side and delivery-roll 221 on the other side and thence out of the machine.

I claim:

1. The combination in a paper-bag machine of a folding-bed, a turn-over-gripper mounted for oscillation and reciprocation on an axis fixed relative to the folding-bed, a gripper-blade fixed on the turn-over-gripper, a second gripper-blade pivotally mounted on the turn-over-gripper, means for oscillating the pivoted gripper-blade toward and away from the fixed gripper-blade, and means for oscillating and means for reciprocating the turn-over-gripper. 90
2. In a paper-bag machine, the combination of a tubular shaft, means for oscillating said shaft, a turn-over-gripper slidably mounted therein, means to slide said turn-over-gripper, a gripper-blade fixed on the turn-over-gripper, a second gripper-blade pivotally mounted on the turn-over-gripper and means carried on the tubular shaft for coaction with means carried on the turn-over-gripper to swing the pivoted gripper-blade toward and away from the fixed gripper-blade. 95
3. The combination in a paper-bag machine of a gripper-carrier, means to oscillate the same, a turn-over-gripper slidably mounted thereon, means to reciprocate the turn-over-gripper relative thereto, a gripper-blade fixed on the turn-over-gripper, a second gripper-blade pivoted on the turn-over-gripper, a rack mounted on the gripper-carrier, a pinion mounted on the turn-over-gripper for engagement with the rack and a cam fixed to the pinion for oscillating the pivoted gripper-blade relative to the fixed gripper-blade. 100
4. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, a pair of oppositely disposed turn-over-grippers mounted for oscillation and reciprocation on axes fixed relative to the folding-bed, means for oscillating the turn-over-grippers and means for reciprocating said grippers in and out relative to the folding-bed, a blade fixed in each of the turn-over-grippers, a blade pivoted in each of said turn-over-grippers and means for oscillating the pivoted blades toward and away from the fixed blades respectively. 105
5. In a paper-bag machine, the combination of a folding-bed, means for holding a bag-blank thereon, means for forming the diamond fold on the bag-blank, a lifter-arm mounted below the face of the folding-bed and means for moving said arm outwardly through an aperture in said folding-bed to fold over the front flap of the diamond fold. 110
6. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, means for forming the diamond fold on the bag-blank, a front-flap-lifter mounted below the face of the folding-bed and means for actuating the front-flap-lifter to lift and turn over the front flap of the diamond fold toward the body of the bag-blank. 115
7. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, means for forming the diamond fold on the bag-blank, a front-flap-lifter pivotally mounted below the face of the folding-bed and means for 120



swinging the front-flap-lifter upwardly through an aperture in the folding-bed to lift and turn over the front-flap of the diamond fold toward the body of the bag-blank.

- 5 8. The combination of a revoluble folding-bed, means for holding a bag-blank thereon and means for forming the diamond fold on the bag-blank, a front-flap-folder under the folding-bed, means for moving the front-flap-folder upwardly through an aperture in the folding-bed to turn over the front-flap of the diamond fold, a rear-flap-folder and means for actuating the same, a delivery-cylinder, a finger carried in the delivery-cylinder for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folder and until the front-flap has been folded over the rear-flap, and means for actuating the finger.
- 10 9. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, a pair of oppositely disposed turn-over-grippers, means for actuating them for forming the diamond fold, a rear-flap-folder, means for actuating the same and means for actuating the turn-over-grippers for lifting the rear portion of the diamond fold for presenting the rear-flap thereof for the operation thereon of the rear-flap-folder.
- 15 10. The combination of a revoluble folding-bed, means for holding a bag-blank thereon and means for forming the diamond fold on the bag-blank, a rear-flap-folder, means for actuating the same, means for folding the front-flap, a retaining-finger revolubly mounted and actuated for coaction with the rear-flap-folder for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folder.
- 20 11. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, means for forming the dia-

mond fold on the bag-blank, a front-flap-folder under the folding-bed, means to move the front-flap-folder upwardly through an aperture in the folding-bed to turn over the front-flap of the diamond fold, a pair of rear-flap-folders mounted for revolution about an axis parallel with the axis of revolution of the folding-bed, means to revolve said rear-flap-folders, a delivery-cylinder mounted for revolution on an axis parallel with the axis of revolution of the folding-bed, and said delivery-cylinder disposed partially within the circle of revolution of the rear-flap-folders and between said folders, a retaining-finger carried in the delivery-cylinder and movable outwardly therefrom for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folders and means for actuating said retaining-finger.

12. The combination of a folding-bed, means for holding a bag-blank thereon, a pair of oppositely disposed turn-over-grippers, means for actuating them for forming the diamond fold, a front-flap-folder mounted below the face of the folding-bed and means for actuating the same, a rear-flap-folder, means for actuating the same, and means for actuating the turn-over-grippers to lift the rear portion of the diamond fold for engagement with the rear-flap-folder, all combined and operating together substantially as described.

Signed this 20th day of January, nineteen hundred and six (1906) in the presence of two subscribing witnesses.

CHARLES F. SMITH.

Witnesses:

OTTO SCHEIBENER,  
JNO. J. MURRAY.

Disclaimer in Letters Patent No. 864,435

### DISCLAIMER.

864,435.—Charles F. Smith, Bridgeport, Conn. PAPER-BAG MACHINE. Patent dated August 27, 1907. Disclaimer filed December 2, 1908, by the assignee.

Enters this disclaimer—

“To that claim in said Letters Patent, which is claim 6 of said Letters Patent, and is in the following words:

“6. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, means for forming the diamond fold on the bag-blank, a front-flap-lifter mounted below the face of the folding-bed and means for actuating the front-flap-lifter to lift and turn over the front flap of the diamond fold toward the body of the bag-blank.” [Official Gazette, December 15, 1908.]

swinging the front-flap-lifter upwardly through an aperture in the folding-bed to lift and turn over the front-flap of the diamond fold toward the body of the bag-blank.

- 5 8. The combination of a revoluble folding-bed, means for holding a bag-blank thereon and means for forming the diamond fold on the bag-blank, a front-flap-folder under the folding-bed, means for moving the front-flap-folder upwardly through an aperture in the folding-bed to turn over the front-flap of the diamond fold, a rear-flap-folder and means for actuating the same, a delivery-cylinder, a finger carried in the delivery-cylinder for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folder and until the front-flap has been folded over the rear-flap, and means for actuating the finger.
- 10 9. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, a pair of oppositely disposed turn-over-grippers, means for actuating them for forming the diamond fold, a rear-flap-folder, means for actuating the same and means for actuating the turn-over-grippers for lifting the rear portion of the diamond fold for presenting the rear-flap thereof for the operation thereon of the rear-flap-folder.
- 15 10. The combination of a revoluble folding-bed, means for holding a bag-blank thereon and means for forming the diamond fold on the bag-blank, a rear-flap-folder, means for actuating the same, means for folding the front-flap, a retaining-finger revolubly mounted and actuated for coaction with the rear-flap-folder for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folder.
- 20 11. The combination of a revoluble folding-bed, means for holding a bag-blank thereon, means for forming the dia-
- 25
- 30

mond fold on the bag-blank, a front-flap-folder under the folding-bed, means to move the front-flap-folder upwardly through an aperture in the folding-bed to turn over the front-flap of the diamond fold, a pair of rear-flap-folders mounted for revolution about an axis parallel with the axis of revolution of the folding-bed, means to revolve said rear-flap-folders, a delivery-cylinder mounted for revolution on an axis parallel with the axis of revolution of the folding-bed, and said delivery-cylinder disposed partially within the circle of revolution of the rear-flap-folders and between said folders, a retaining-finger carried in the delivery-cylinder and movable outwardly therefrom for holding the rear-flap down after said rear-flap has been folded by the rear-flap-folders and means for actuating said retaining-finger.

12. The combination of a folding-bed, means for holding a bag-blank thereon, a pair of oppositely disposed turn-over-grippers, means for actuating them for forming the diamond fold, a front-flap-folder mounted below the face of the folding-bed and means for actuating the same, a rear-flap-folder, means for actuating the same, and means for actuating the turn-over-grippers to lift the rear portion of the diamond fold for engagement with the rear-flap-folder, all combined and operating together substantially as described.

Signed this 20th day of January, nineteen hundred and six (1906) in the presence of two subscribing witnesses.

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