B. VON PHILP.

CONTINUOUS PRINTING PRESS.

APPLICATION FILED DEC. 30, 1908.

**955,196.**

**Patented Apr. 19, 1910.**

11 SHEETS—SHEET 1.

Fig. 2

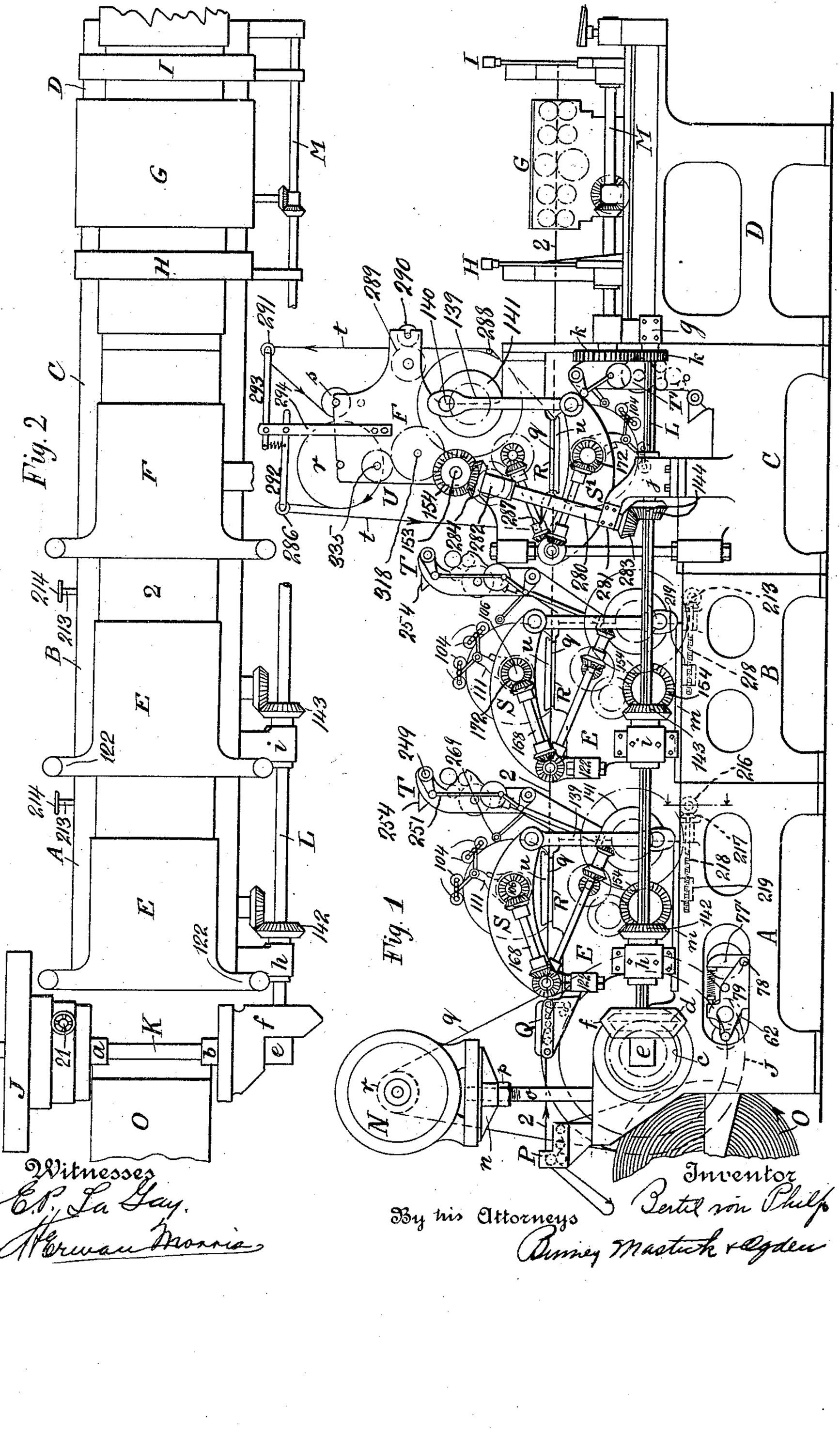


Fig. 1

Witnesses

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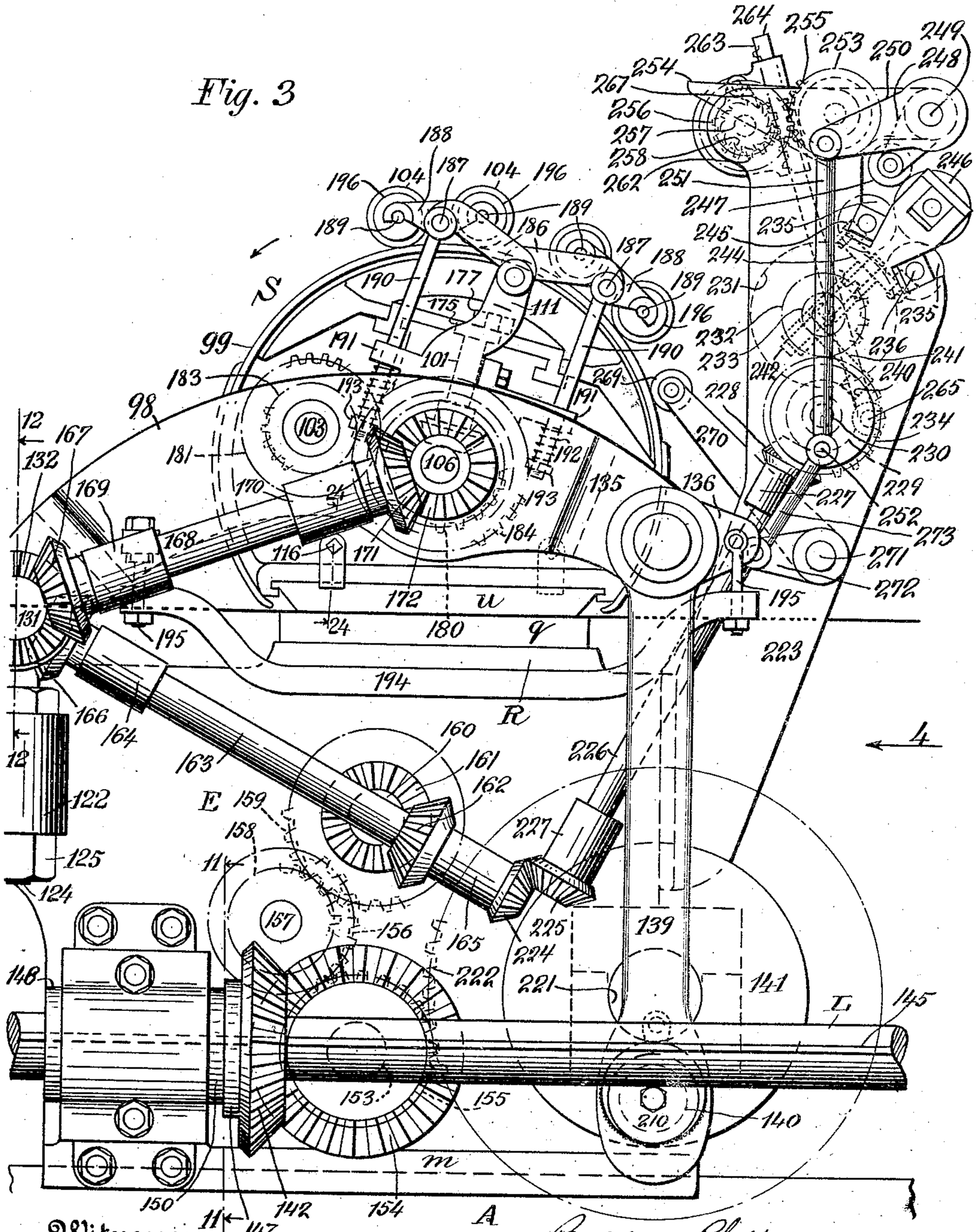
11 SHEETS—SHEET 2.

*Fig. 3*




Witnesses

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11 SHEETS—SHEET 3.

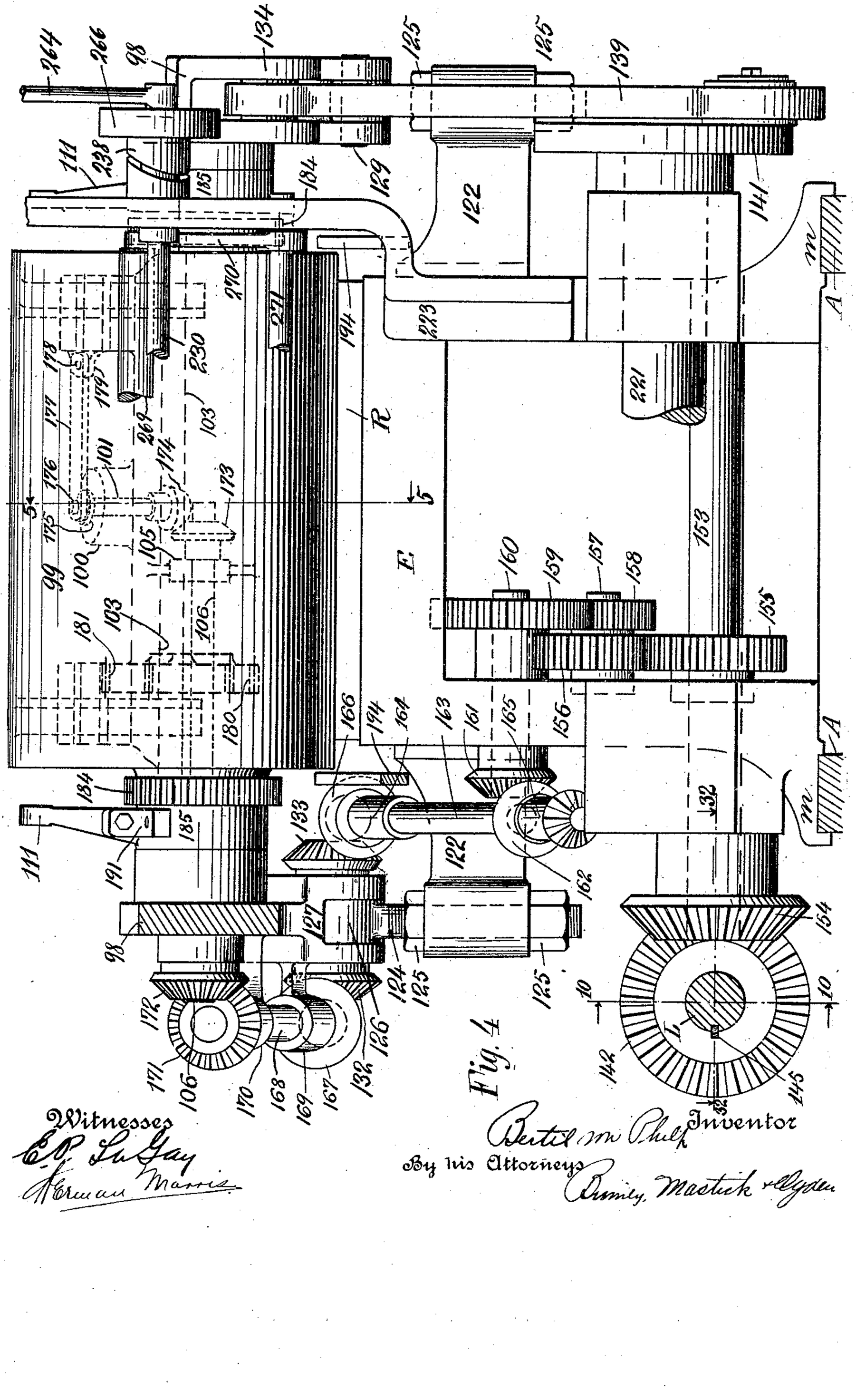


Fig. 4.

Witnesses

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11 SHEETS—SHEET 4.

Fig. 5

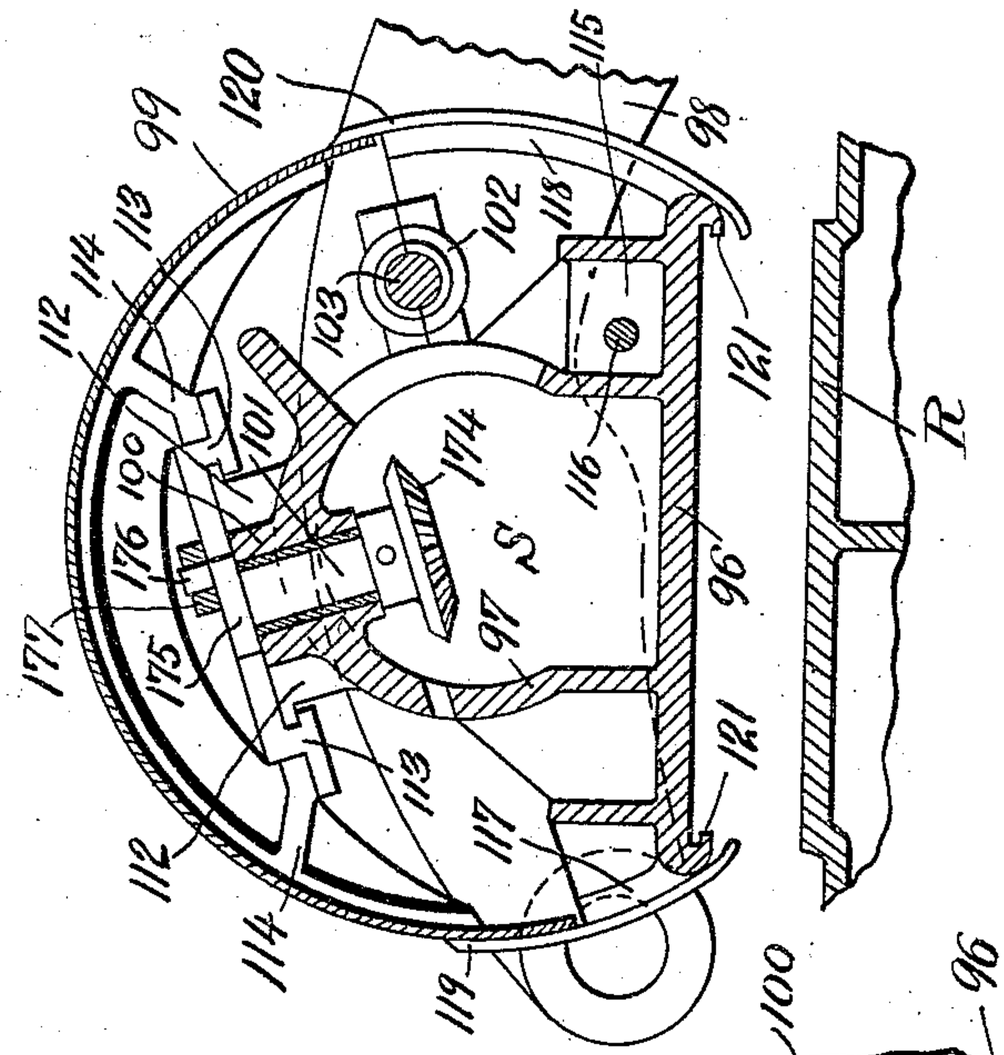
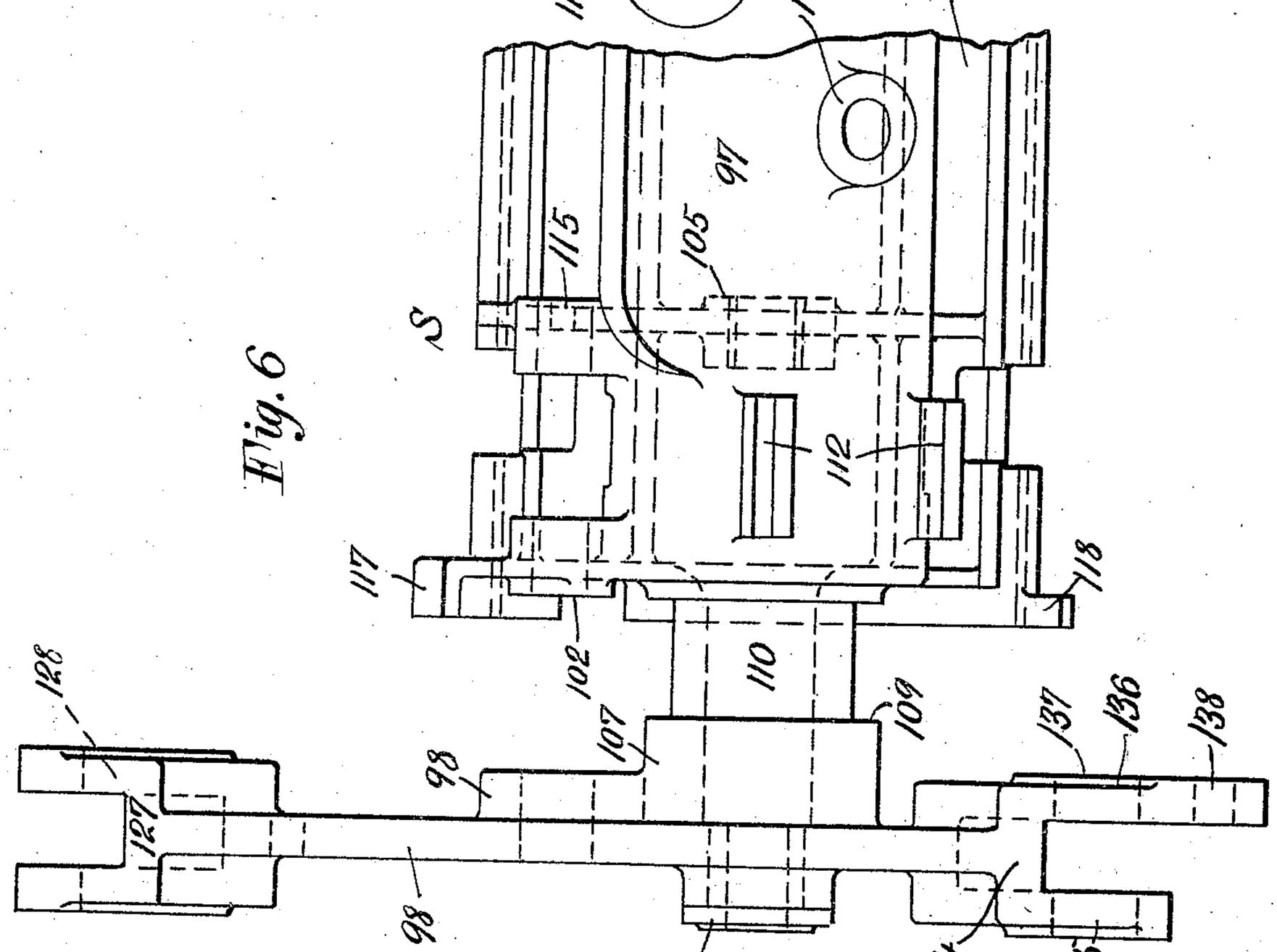



Fig. 6

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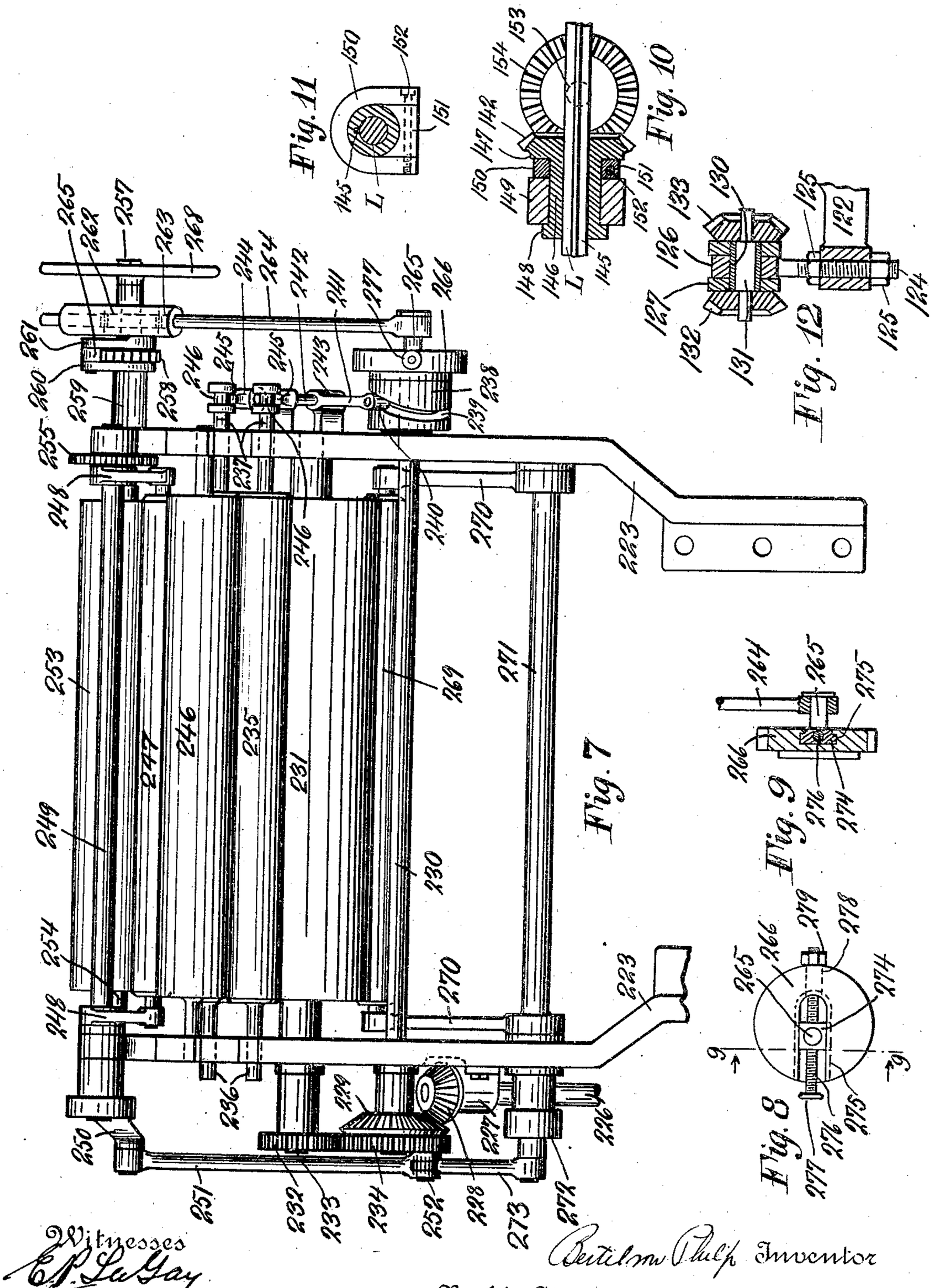


Fig. 7




Fig. 11




Fig. 10







Fig. 12




Fig. 9




Fig. 8

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APPLICATION FILED DEC. 30, 1908.

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Fig. 13

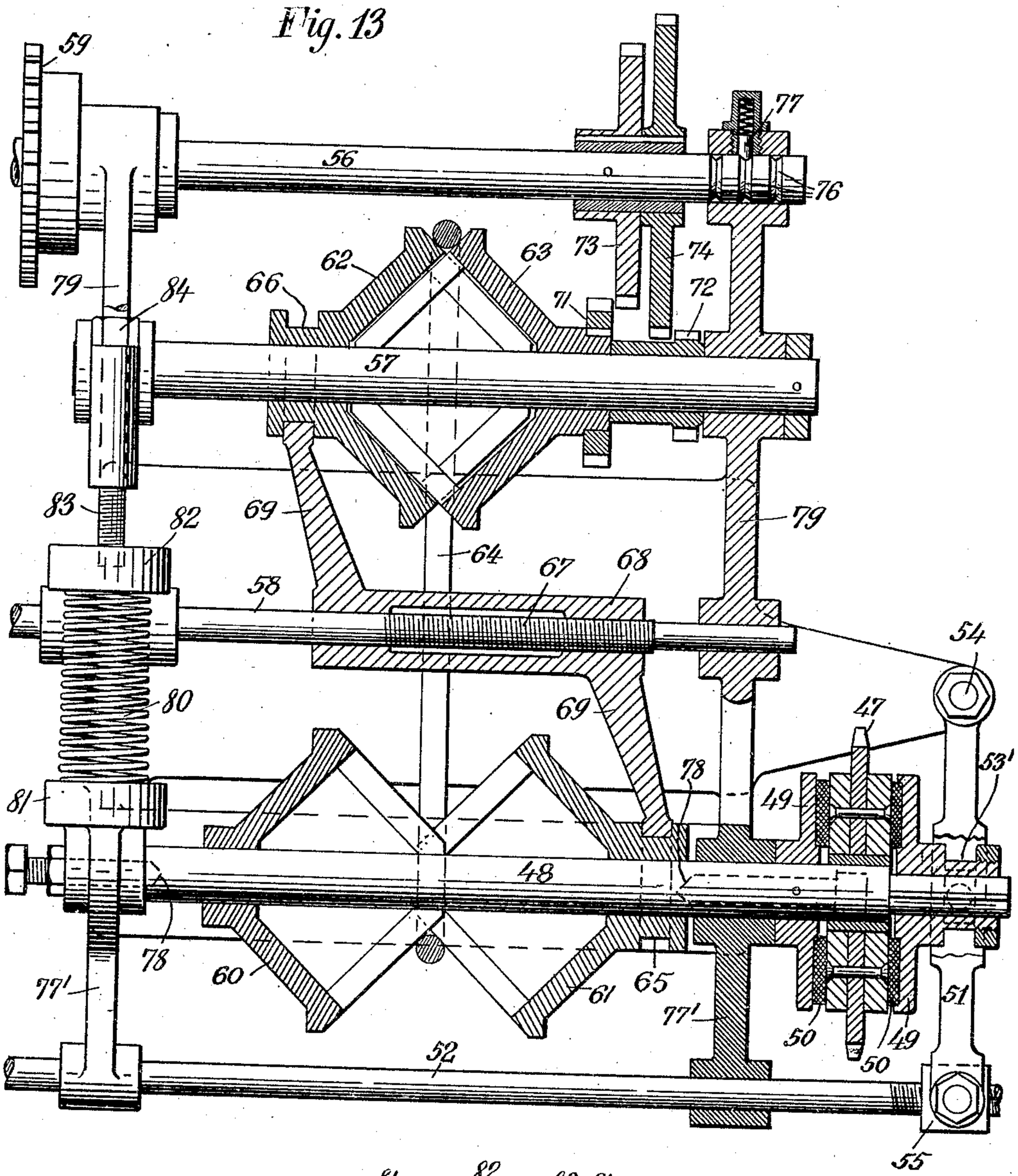
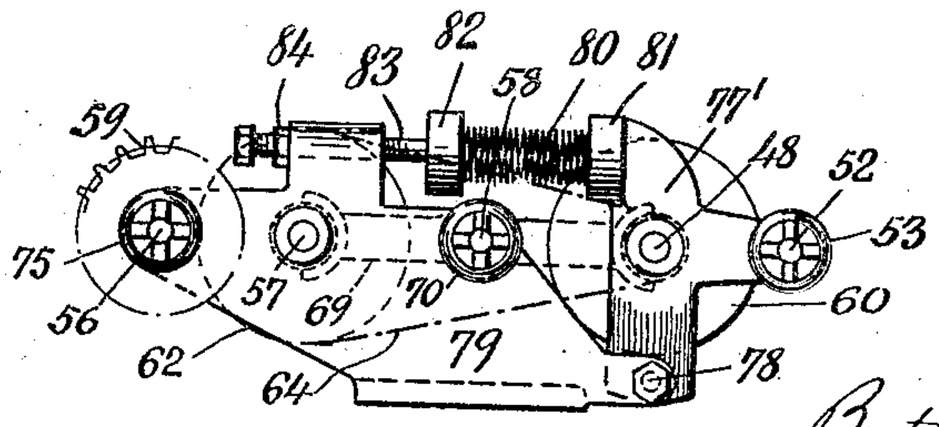



Fig. 14

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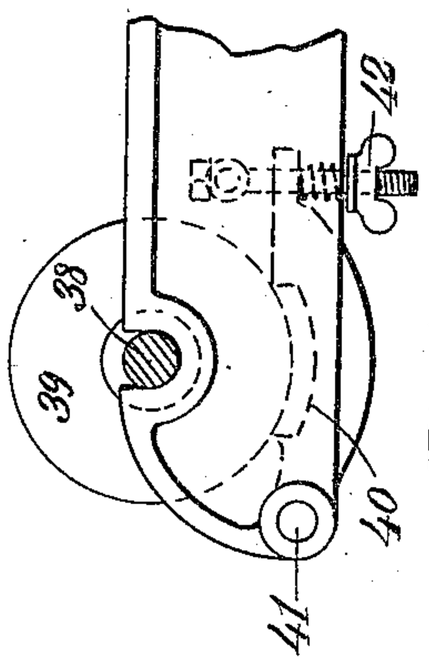

Fig. 17

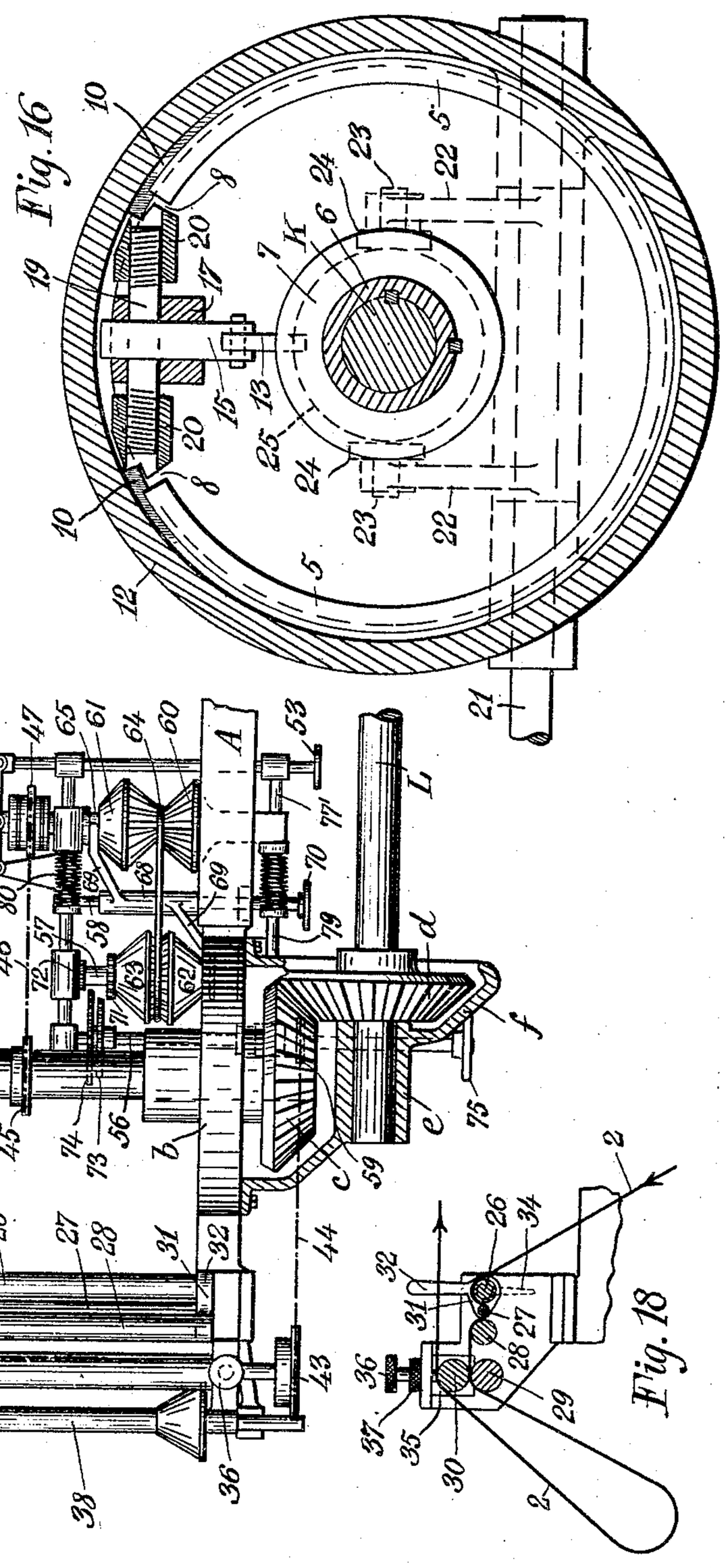

Fig. 16



Fig. 15



Fig. 18

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Patented Apr. 19, 1910.

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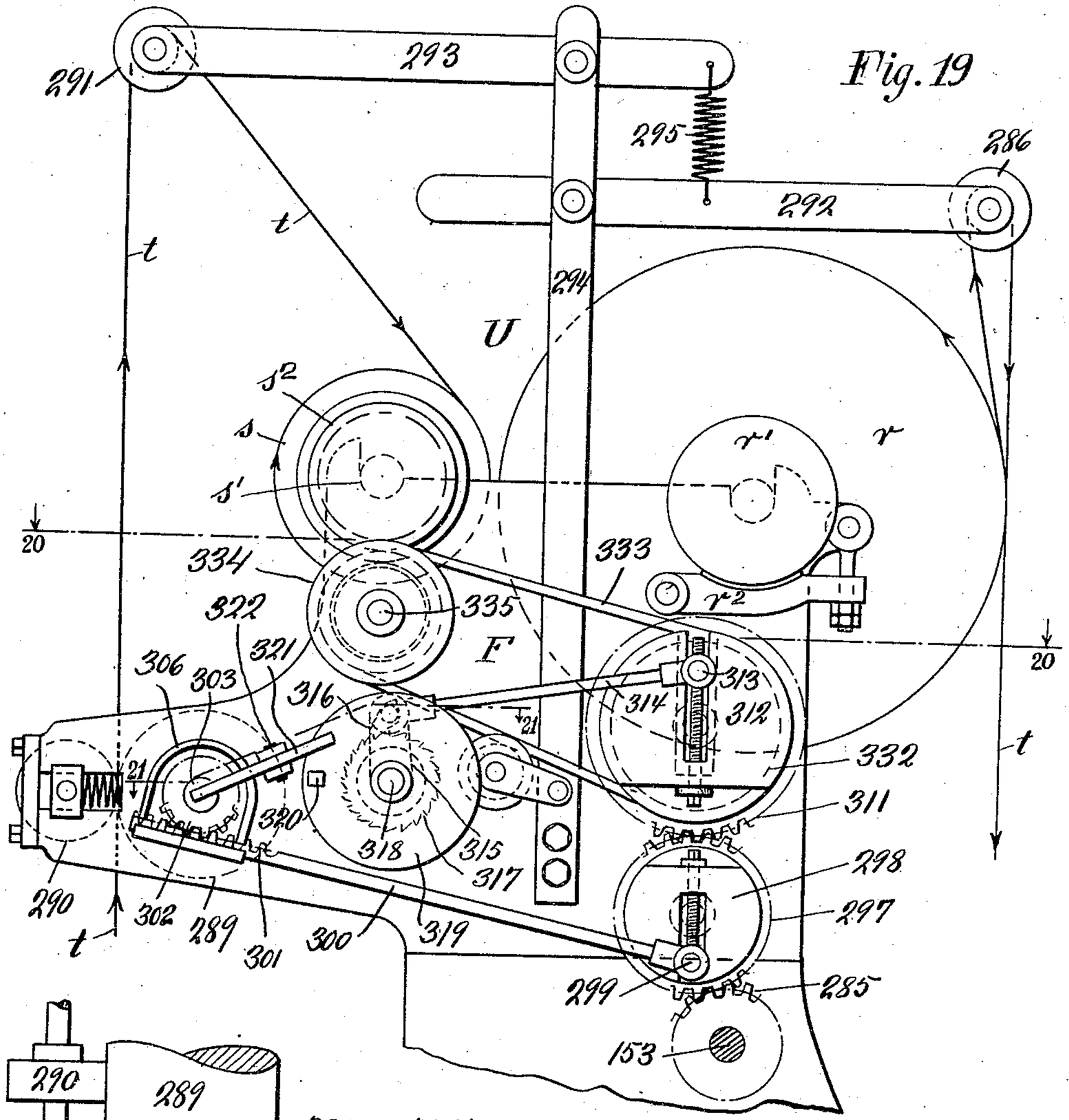
Fig. 19



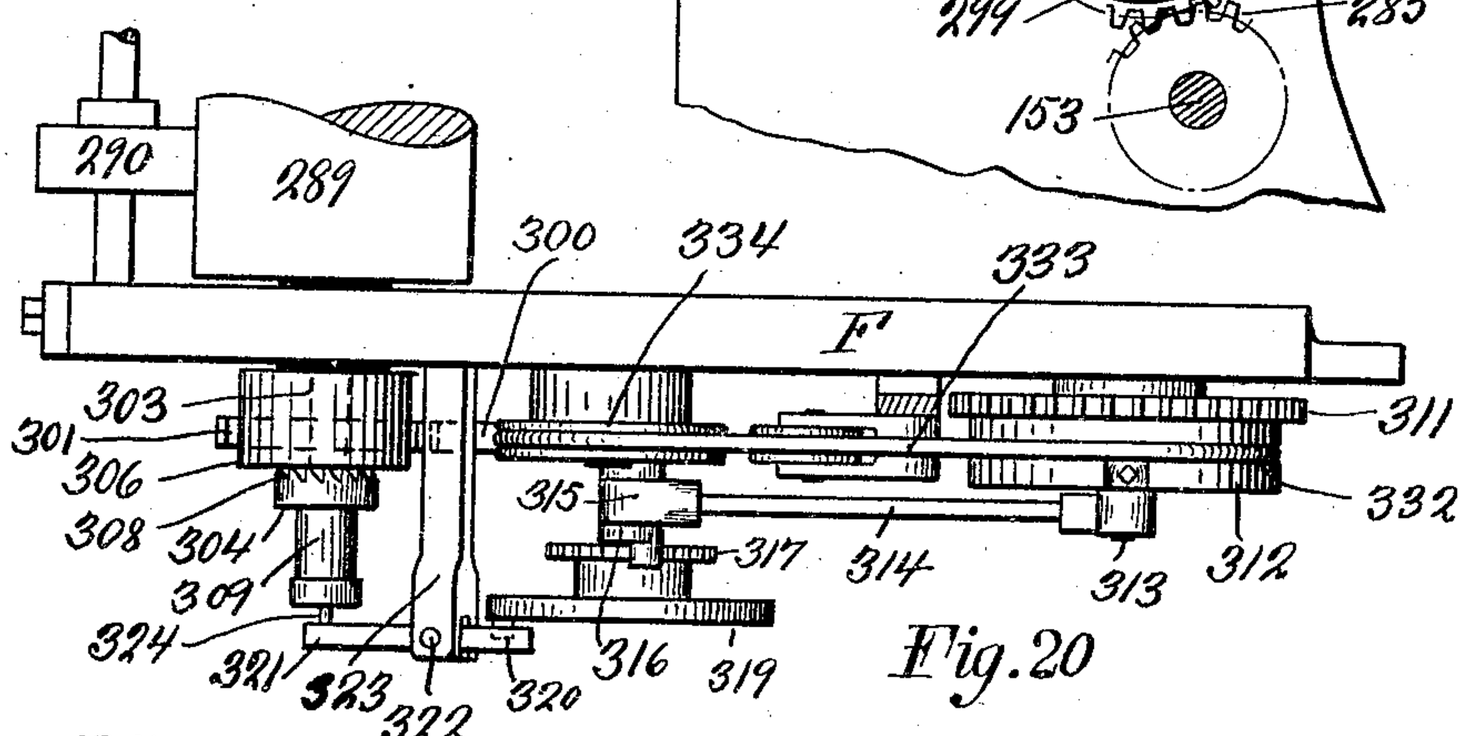




Fig. 20

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Patented Apr. 19, 1910.

11 SHEETS—SHEET 9.

Fig. 21

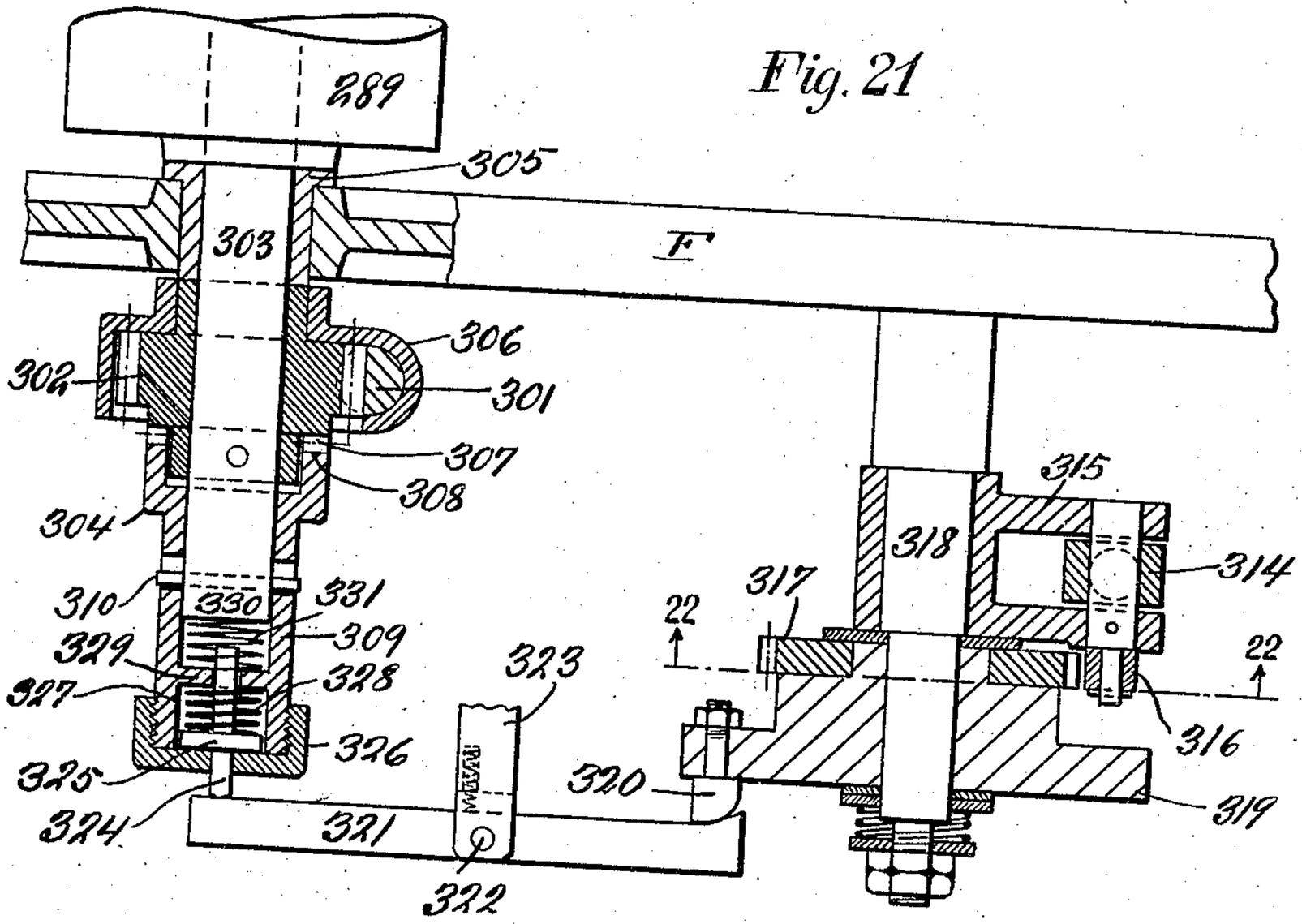
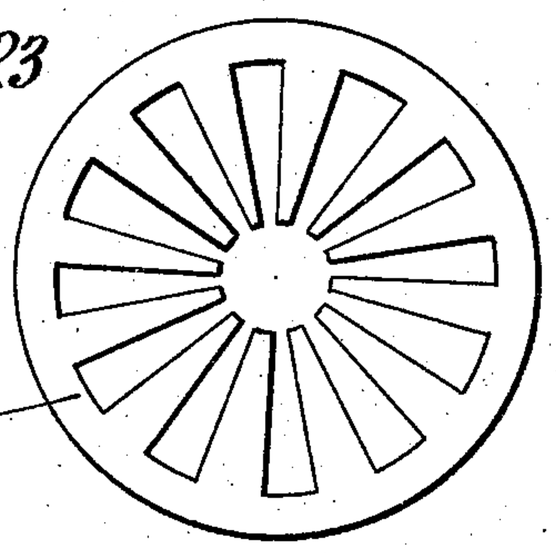



Fig. 23



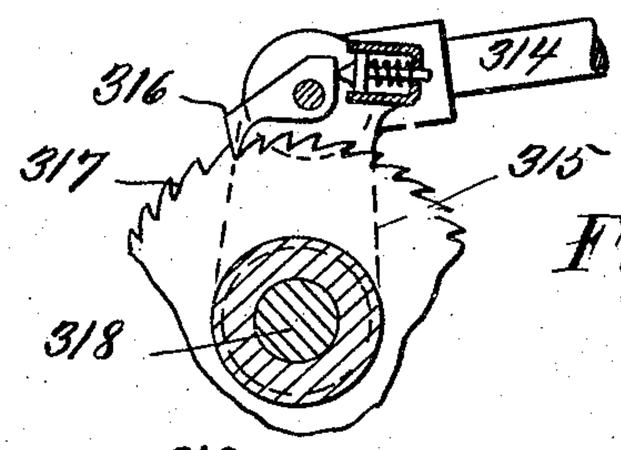




Fig. 22

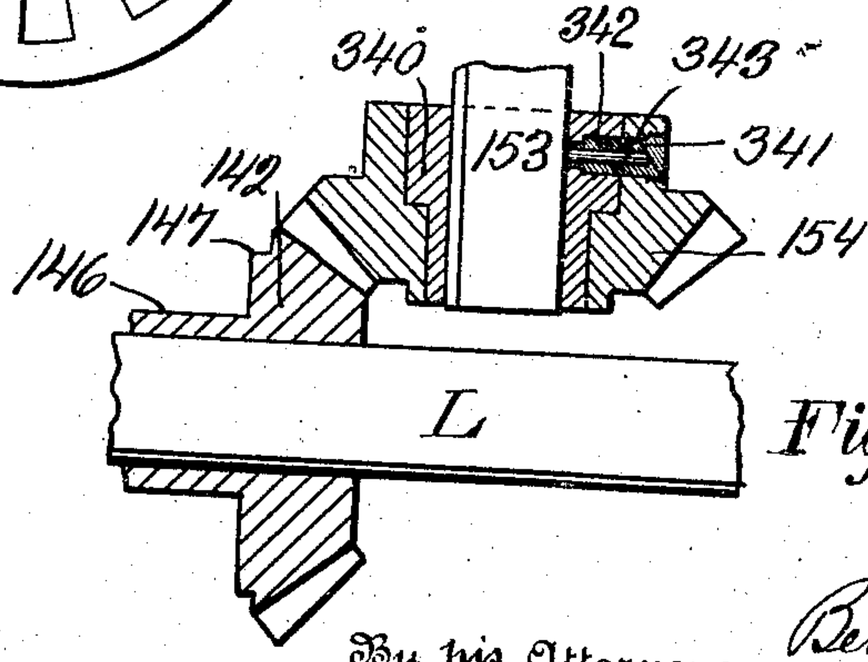



Fig. 32

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CONTINUOUS PRINTING PRESS.

APPLICATION FILED DEC. 30, 1908.

Patented Apr. 19, 1910.

11 SHEETS—SHEET 10.

Fig. 24

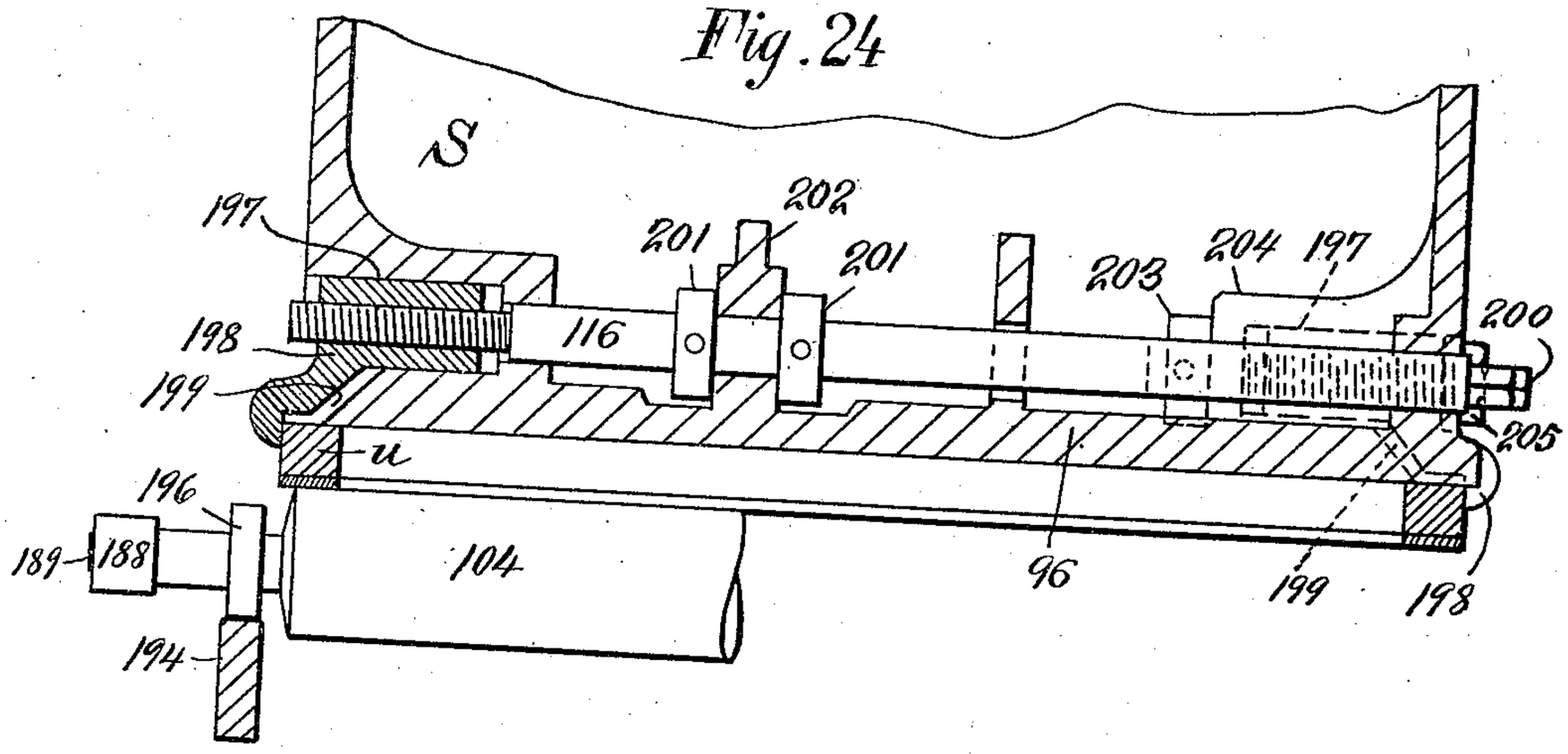



Fig. 25

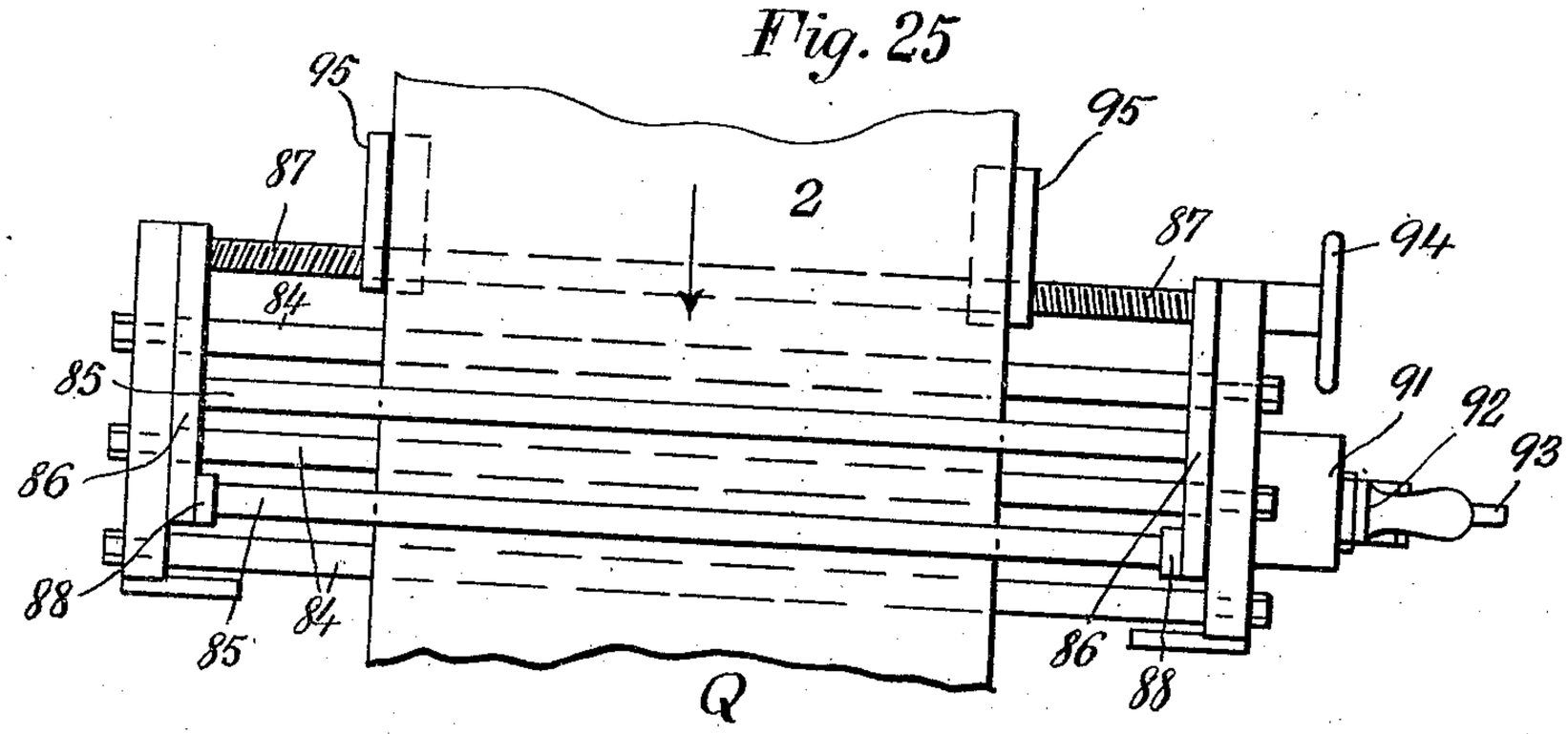



Fig. 26

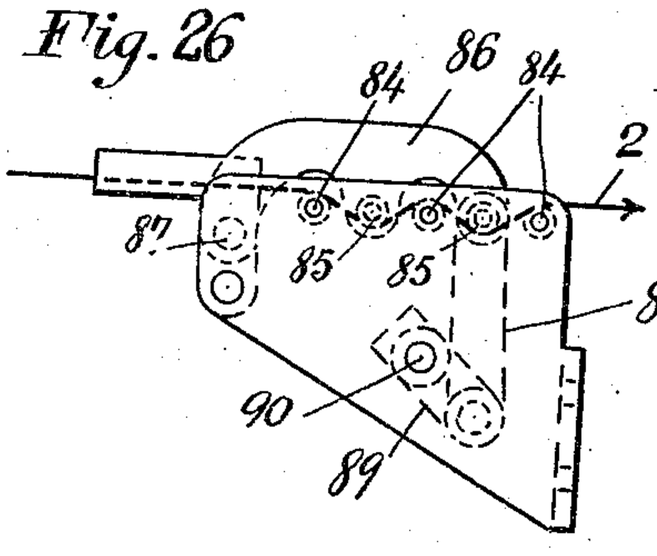



Fig. 27

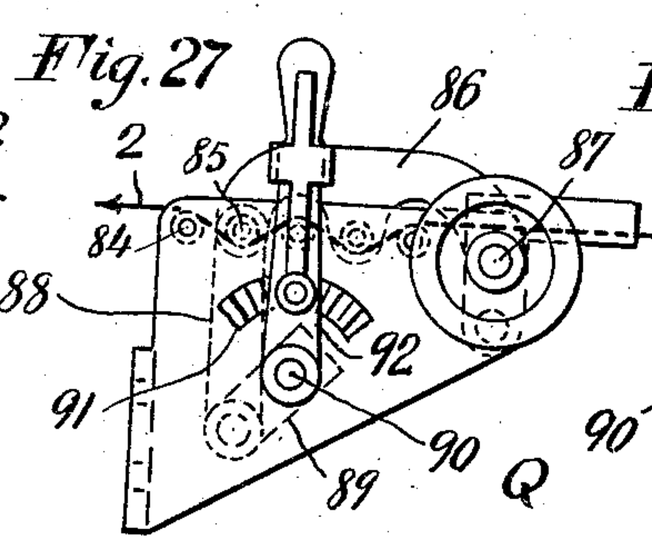
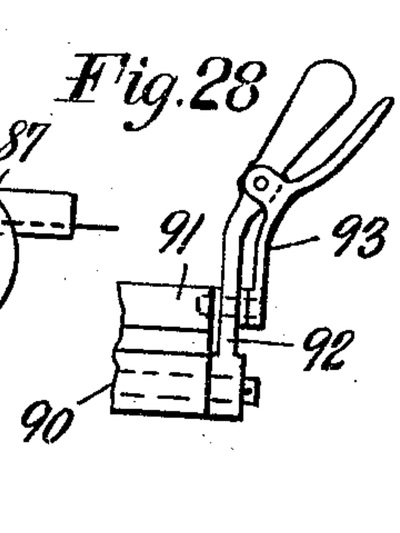



Fig. 28




Witnesses

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955,196.

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11 SHEETS—SHEET 11

Fig. 30

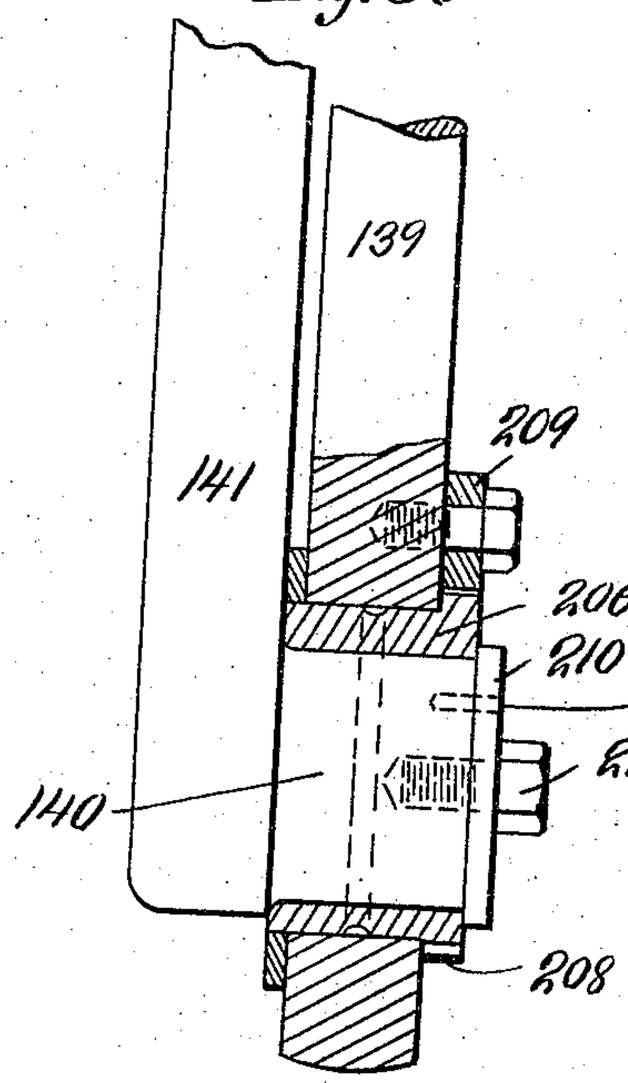
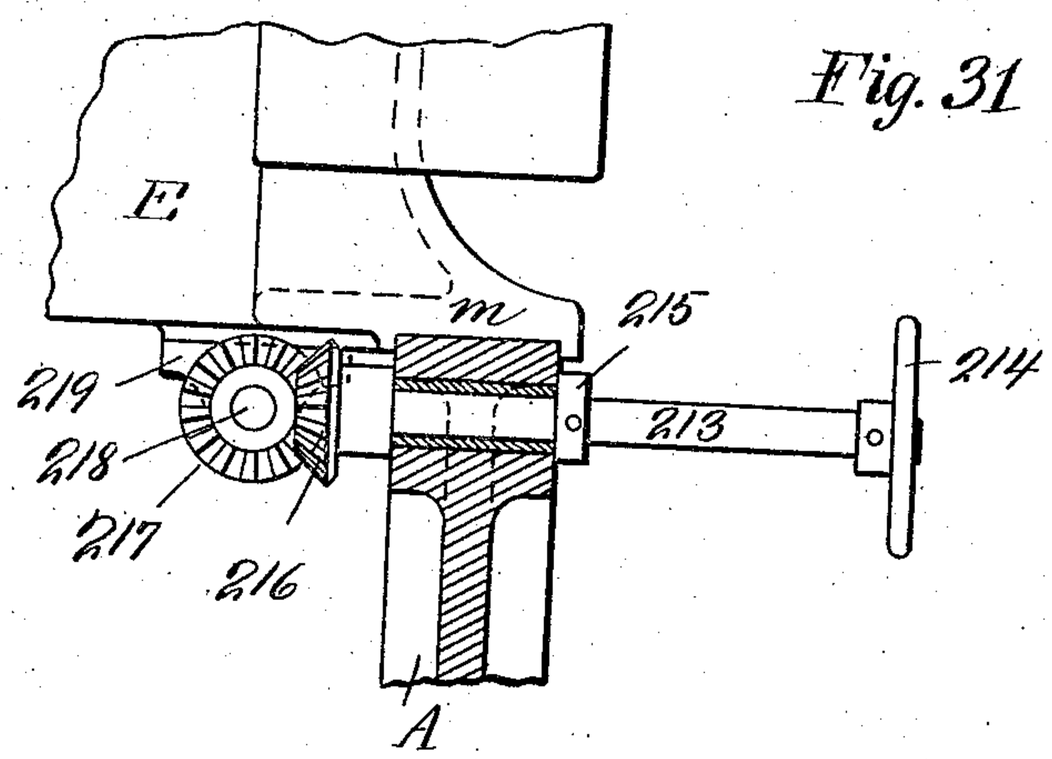



Fig. 29




Fig. 31




Witnesses

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# UNITED STATES PATENT OFFICE.

BERTIL VON PHILP, OF NEW YORK, N. Y., ASSIGNOR TO CASIMIR VON PHILP, OF BETHLEHEM, PENNSYLVANIA.

## CONTINUOUS PRINTING PRESS.

955,196. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed December 30, 1908. Serial No. 469,919.

*To all whom it may concern:*

Be it known that I, BERTIL VON PHILP, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Continuous Printing Presses, of which the following is a specification, accompanied by drawings.

This invention relates to continuous printing machines or presses, and more particularly to that class of machines known as bed and platen presses.

The objects of the invention are to enable the web or paper to be printed on both sides simultaneously in one or several colors, from a plurality of heads or form carriers, the number of colors depending upon the number of heads or form carriers in use; to enable the heads or form carriers to be adjusted longitudinally of the machine and enable the chases to be adjusted transversely of the machine to form a perfect register, and to afford provision for using as many units in the machine as desired, each unit having a head or form carrier. The entire machine is built upon the unit system, so that it may be added to or subtracted from at any time by coupling or uncoupling the units, without disturbing the operative connections of the press, and without making any unusual changes in the apparatus.

According to this invention the web is supplied from a roll at one end of the press and the finished product printed, sheared, perforated, slit, punched, etc., is delivered complete at the other end of the press.

Further objects of the invention will hereinafter appear and the invention consists of the machine substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a diagrammatic side elevation of a machine embodying the invention, comprising three printing units and additional end units for completing the operations; Fig. 2 is a diagrammatic top plan view of Fig. 1; Fig. 3 is a side elevation on enlarged scale of one of the printing units; Fig. 4 is an end elevation partly broken away of Fig. 3 looking in the direction of the arrow 4; Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 4, looking in the direction of the arrows; Fig. 6 is a top plan view partly broken away of the form carrier casting; Fig. 7 is an end elevation of the inking device looking in the direction of the arrow 4, Fig. 3; Fig. 8 is a detail face view of the crank disk shown in Fig. 7; Fig. 9 is a vertical sectional view on the line 9—9 of Fig. 8; Fig. 10 is a detail sectional view on the line 10—10 of Fig. 4, looking in the direction of the arrows; Fig. 11 is a detail sectional view on the line 11—11 of Fig. 3, looking in the direction of the arrows; Fig. 12 is a detail sectional view on the line 12—12 of Fig. 3 looking in the direction of the arrows; Fig. 13 is an enlarged plan view partly in section, of the unwinding speed regulator shown in side view in Fig. 14; Fig. 14 is a side elevation of the speed regulator; Fig. 15 is a top plan view partly in horizontal section of the driving end of the press; Fig. 16 is an enlarged detail sectional elevation of the clutch and brake mechanism on the line 16—16 of Fig. 15, looking in the direction of the arrows; Fig. 17 is an enlarged detail elevation partly in section on the line 17—17 of Fig. 15, looking in the direction of the arrows; Fig. 18 is a sectional detail elevation on the line 8—8 of Fig. 15; Fig. 19 is an enlarged detail elevation of the offset device; Fig. 20 is a top plan view on the line 20—20 of Fig. 19, looking in the direction of the arrows; Fig. 21 is an enlarged detail view in horizontal section on the line 21—21 of Fig. 19, looking in the direction of the arrows; Fig. 22 is a detail sectional elevation on the line 22—22 of Fig. 21; Fig. 23 is a detail end view of one of the spools of the speed regulator shown in Fig. 13; Fig. 24 is a detail enlarged transverse sectional view on the line 24—24 of Fig. 3 of the device for adjusting the chase transversely; Fig. 25 is a top plan view of the paper tension device shown in Fig. 1; Fig. 26 is an end view taken from the left of Fig. 25; Fig. 27 is an end view taken from the right of Fig. 25; Fig. 28 is a detail view of the lever shown at the right of Fig. 25; Fig. 29 is an enlarged detail side view of the connecting rod shown in Fig. 3; Fig. 30 is a vertical sectional view on the line 30—30 of Fig. 29; and Fig. 31 is an enlarged detail sectional view on the line 31—31 of Fig. 1. Fig. 32 is a detail sectional view on line 32—32 of Fig. 4.

Referring to the drawings, A represents the bed of the driving end unit of the press, carrying one upper print section; B represents the bed of an intermediate unit, also carrying an upper print section; C represents the bed of an intermediate unit carrying an under-print section with offset paper device, and D represents the bed of the end feeding and finishing section. The printing sections for units A and B are carried upon the frames E which are longitudinally adjustable upon their beds. The printing section and offset device for unit C are mounted upon the frame F which forms part of the bed. The paper feeding mechanism G and cross perforating or punching, and cut-off mechanisms H and I are carried by the bed D and are shown diagrammatically, as they specifically form no part of the present invention, the details of the feeding mechanism being covered by the co-pending application of C. von Philp, Serial No. 443,780, filed June 10, 1908.

Power is supplied to the press from the driving pulley J on the driving shaft K. This pulley also constitutes a fly-wheel, and suitable clutch mechanism is provided, illustrated in detail in Fig. 15, for connecting and disconnecting the driving pulley from the shaft K and for applying a brake to the driving shaft. The shaft K is supported in the bearings *a* and *b* and is provided with bevel gear *c* meshing with the bevel gear *d* on the line shaft L which extends longitudinally of the units and is supported in the bearing *e* at one end in the housing *f*, and in the bearing *g* at the other end on the section D. The bearings *h*, *i*, and *j* are provided on the respective units A, B and C for the line-shaft L, and the construction is such that power is supplied to the various sections from said line-shaft and the units may be added to or substracted from the assembled press to provide the desired number of units. The sides of the bearings *h* and *i* are in the form of removable caps suitably bolted to the structure, and the bearing *j* is removable from the bed C. The bearing *g* also has a removable cap, and the housing *f* may be removed from the bed A so that different lengths of line-shaft L may be provided for different numbers of units.

Another line-shaft M is provided for the unit D driven from the line-shaft L by means of the gears *k*. The longitudinally adjustable frames E are provided with feet *m* sliding upon the beds A and B and any suitable means are provided for adjusting these frames longitudinally.

N represents a suitable motor for supplying power for the press. In this instance, the motor is mounted upon the frame *n* carried by the column *o*. The upper end of the column *o* is screw threaded and provided with a lock-nut *p*, so that the frame *n* may be adjusted vertically on the column, to tighten the driving belt *q* connecting the pulley *r* on the motor with the driving pulley J.

O represents the roll of paper and P is the paper straightening device to which the paper first passes, shown in detail in Fig. 18. From thence the paper passes to the paper tension device Q, shown in detail in Figs. 25 to 28 inclusive. The frames E and F are provided with the platens R having the tympan beds *v*, over which the paper passes in a straight line, the paper being indicated by the numeral 2. The form carriers S for the upper print sections are similar to the form carrier S′ for the under print section, and inking devices T are provided for the upper print sections, while a suitable inking device T′ is indicated in Fig. 1 for the under print section. The construction of the inking device T′ is substantially the same as the inking devices T, except that the ink is fed upwardly instead of downwardly. The upper portion of the frame F on unit C is provided with the offset paper device U having the unwinding roll *r′* and the rewinding roll *s* for the offset paper *t*.

The paper is printed on the upper side by the form carriers S of the upper print sections and printed on the under side by the form carrier S′ of the under print section. The offset paper device is provided for protecting the printed paper as an impression is being taken in the under print section. The chases *u* of the printing sections are transversely adjustable in their form carriers and the details of the devices for adjusting the chases are shown in Fig. 24. By reason of the fact that the printing sections are longitudinally adjustable, while the chases are transversely adjustable, accurate register may be obtained.

*Driving connections.*—The driving shaft K is shouldered at 3 and the driving pulley J and its bushing 4 turn loosely on the reduced portion of the shaft. Turning with the shaft K is a mutilated wheel 5 on the hub 6 of which slides the grooved sleeve 7. The sleeve 7 turns with the hub 6 by means of a feather. The wheel 5, as shown, is cut away at the points 8 in its periphery and friction straps 9 and 10 are carried on the periphery of the wheel. The strap 9 cooperates with the internal flange 11 on the pulley J, while the strap 10 coöperates with the housing 12 connected to the frame of the unit A. The strap 9 and flange 11 form clutch members for connecting the pulley J to the shaft K, while the strap 10 and housing 12 form a brake for the shaft K. Means are provided for pressing one or the other of the straps 9 and 10 outwardly and as shown, the sleeve 7 is provided with a bar 13 having links 14 and 15 pivoted thereon at

one end. The interior of the mutilated wheel 5 is provided with the lugs 16 and 17, provided with screw threaded rods 18 and 19 passing transversely therethrough. Each rod is provided with screw threads at the ends, one end being right handed and the other left handed, and the ends of the rods are provided with nuts 20 adapted to travel on the rods when said rods are turned about their longitudinal axes. The screw threads on one rod are the reverse of those on the other rod, so that when the rods are rotated in the same direction about their longitudinal axes, the nuts 20 on one rod will travel outwardly, while the nuts on the other rod will travel inwardly. The ends of the straps 9 and 10 abut against these pairs of nuts 20 and the links 14 and 15 are connected to the rods 18 and 19, so that movement of the sleeve 7 longitudinally on the hub 6 will rock the links 14 and 15 and rotate the rods 18 and 19. When one pair of nuts 20 on the rod 18 move outwardly to expand the band 9, the other pair of nuts on the rod 19 move inwardly to loosen the band 10. In this way the driving pulley J may be connected to the shaft K and the brake released, or else power is thrown off and the brake applied. For moving the sleeve 7 a rock-shaft 21 is provided extending through the housing 12 and having arms 22 within the housing pivotally connected to the stems 23 of blocks 24 which engage the groove 25 in the sleeve 7.

The paper 2 passes from roll O through the paper straightening device. The paper passes over the roller 26 and then under the small roller 27, thence over the roller 28 and between the feed roller 29 and pressure roller 30. This paper is then looped and passed over the pressure roller 30 to the tension device Q. The roller 27 is pivoted to the arms 31 which turn about the axis of the roller 26 and the handles 32 are provided for rocking the arms 31. One end of the roller 26 is provided with the lock-nut 33 having the handle 34 for clamping the arms 31 in a given position to suit the varying thickness of paper. The pressure roll 30 is pivoted to the blocks 35 which are movable vertically by means of the adjusting screws 36 provided with the lock-nuts 37. The paper roll 38 is provided with a pulley 39 at one end, and a brake shoe 40 pivoted at 41 is adapted to be pressed against the pulley 39 by means of the thumb screw 42 to retard the unwinding of the paper.

The feed roll 29 is provided with a sprocket 43 and driven by the chain 44 indirectly from the shaft K. Suitable means are provided, however, between the shaft K and the chain 44 for varying the speed of the feed roll 29, as desired.

The details of the speed controller are shown in Fig. 13. The shaft K is provided with a sprocket 45 connected by a chain 46 with a sprocket 47 which is loose on the counter-shaft 48. At each side of the sprocket 47 are provided friction members 49 having frictional surfaces 50 of any suitable material adapted to be pressed against the sprocket 47 by means of the lever 51 and rotary rod 52 provided with the hand wheels 53 at each end for turning the rod. The members 49 are feathered to the shaft 48 to turn therewith, but may slide thereon, and the hub of one member is grooved at 53′ to receive projecting portions of the lever 51 which is pivoted at 54 at one end. The other end of the lever 51 is pivoted to the nut 55 on the rod 52, so that rotation of the rod 52 causes the nut 55 to travel in one direction or the other and release or clutch the sprocket 47.

Carried in suitable bearings in the frame of the machine are the shafts 56, 57 and 58. The driven shaft 56 is provided with the sprocket 59 to which the chain 44 is connected and power is transmitted from the counter-shaft 48 to the shaft 56 by a variable speed mechanism. The shaft 48 is provided with the telescoping cone pulleys 60 and 61, while the shaft 57 is provided with telescoping cone pulleys 62 and 63. A belt 64 lies within the grooves formed by the telescoping pulleys and means are provided for separating one pair of pulleys at the same time that the other pair of pulleys are forced together, thereby varying the speed ratio between the shafts 48 and 51, owing to the variable diameters of the pulleys. The hub of pulley 61 is provided with a groove 65 and the hub of pulley 62 is provided with a groove 66. The intermediate shaft 58 is provided with a screw threaded portion 67 carrying a sleeve 68 provided with arms 69 entering the grooves 65 and 66. Means are provided as a hand wheel 70 for turning the shaft 58 to cause the sleeve 68 to travel in one direction or the other, thereby separating one pair of pulleys and closing the other pair. The hub of pulley 63 is provided with a gear 71 and the shaft 57 is provided with a smaller gear 72. The shaft 56 is provided with gears 73 and 74 adapted to be slid into mesh with gears 71 and 72 to vary the speed ratio between the shafts 56 and 57. The shaft 56 is slidably mounted in its bearings and is provided with a hand wheel 75 at one end for operating the same. At the other end the shaft is provided with the grooves 76 adapted to receive the spring pressed pin 77 to hold the shaft in any given position either with the gears 73 and 74 out of mesh with either one of the gears 71 or 72; or else with one of the gears 73, 74 in mesh with gear 71 or 72.

The frame 77′ carrying the bearings for the shaft 48 is pivoted at 78 to the frame 79 carrying the bearings for the shafts 56, 57 and 58, and between these two frames is

provided compression springs 80, one at each side, compressed between the blocks 81 and 82 and normally tending to force frame 77′ away from the frame 79 and thereby acting as a belt tightener for the belt 64. The block 82 is carried upon the screw threaded rod 83 provided with a lock-nut 84 for adjusting the tension on its spring.

In the operation of the speed controller it is obvious that by varying the diameters inversely of the telescoping pulleys the speed of the shaft 57 may be varied. Further control of the speed is obtained by means of the sliding gears which provide for two speeds between shafts 56 and 57. By this construction any desired speed may be imparted to the feed roll 29. In starting the driving connections it is preferable to first engage the desired gears 71 and 73 or 72 and 74, while the speed controller is at rest and then throw in the clutch members for the sprocket 47, thus preventing the possibility of stripping the gears. If the speed controller is in operation variations in speed may be obtained by varying the diameters of the telescoping pulleys.

*Paper tension.*—The paper tension device is shown in detail in Figs. 25 to 28 inclusive. The paper passes over the rollers 84 pivoted in the brackets on the frame of unit A. The paper passes under the vertically adjustable rollers 85 which are pivoted to the swinging arms 86 which in turn are pivoted on the transverse rod 87. Loosely pivoted at the opposite ends of the arms 86 are the links 88. Pivoted to the lower ends of the links 88 are the arms 89, which in turn are pivoted on a transverse rock shaft 90. On the outside of one of the brackets 86 is a toothed segment 91, and a hand lever 92 is secured fast to the outer end of rock shaft 90 and provided with a latch 93 adapted to coöperate with the toothed segment 91. By rocking the lever 92 and rock shaft 90, the arms 89 are rocked, thus adjusting the links 88 vertically and thus adjusting the vertical position of the arms 86, so that more or less tension is brought to bear upon the paper in passing underneath the rollers 85. The arms 86 may be maintained in any desired position with a given tension upon the paper by means of the latch 93 and segment 91. The rod 87 is preferably screw threaded and provided with a hand wheel 94 at one end and paper guides 95 for guiding the paper. By turning the wheel 94 the distance between the guides may be varied.

*Printing heads.*—The form carriers S and S′ for each of the printing heads are in the form of castings shown in detail in Figs. 5 and 6, and are substantially the same for each of the units A, B and C. The form carrier is a casting comprising the base 96, the semi-cylindrical body portion 97 and the arms 98 at each end adapted to be pivoted to the frame of the unit. The arms 98 are connected to the body 97 by the hollow portions 107 having the shoulders 109 and reduced portions 110 about which are pivoted the arms 111 for the inking rollers 104. The base 96 carries the chase *u*, and the body 97 supports the inking plate 99 and the operative connections for the printing head. The base, body and arms of the form carrier are preferably cast in one piece, although this is not essential. The body 97 is provided with the boss 100 which forms a bearing for the shaft 101 for imparting a transverse reciprocating motion to the inking plate 99. The body 97 is also provided with a boss 102 forming a bearing for the shaft 103 which supplies power to rotate the inking roller arms 111, thereby carrying the inking rollers 104 bodily around the form carrier at the same time that the inking plate 99 is being transversely reciprocated. In one end of the body 97 is provided a boss 105 forming a bearing for the shaft 106 which also passes through the hollow connecting portion 107 between the arm 98 and body of the casting. Said shaft 106 has a bearing in the boss 108 at the outside of the arm 98. The body 97 of the casting is also provided with guides 112 for supporting the carriage 113 having the arms 114 connected to the inking plate 99. Through the web 115 on the casting is provided an aperture for the shaft 116 for adjusting the chase transversely of the form carrier. The body 97 has the short web 117 curving upwardly and the longer web 118 also curving upwardly and forming supports for the inking roller tracks 119 and 120 of the inking plate 99. The under side of the base 96 of the casting is provided with flanges 121 for holding the chase *u*.

The frame E is provided with the brackets 122 at each side having bosses through which pass the I-bolts 124 provided with the lock-nuts 125 for adjusting the height of the I-bolts. The eyes 126 of the bolts 122 form bearings for pivotally mounting the form carriers on the frame. The rear ends of the arms 98 of the form carriers are provided with forks 127 having apertures 128 to receive the pivot pins. One arm 98 is pivoted to the bolt 124 by means of the pin 129. The other arm 98 is pivoted on a hollow sleeve 130 through which passes a short shaft 131 having bevel gears 132 and 133 at the ends. The outer ends of the arms 98 are provided with forks 134 having short and long sides 135 and 136 provided with apertures 137. The long side 136 is also provided with an aperture 138. Pivoted to the forks 134 are the connecting rods 139 adjustably connected to the crank pin 140 on the crank disk 141, for vertically reciprocating the form carriers.

The line-shaft L is provided with the bevel gears 142, 143 and 144 for transmitting power to the operative connections of the printing heads. These bevel gears are adapted to rotate with the shaft L but slide thereon by means of the spline 145, so that the connections for any printing head may be disconnected as desired. The bevel gears 142 and 143 are constructed in substantially the same manner and are each provided with a hub 146 having the shoulders 147 and 148. Between the bearing 149 and shoulder 147 is arranged the removable U-shaped washer 150 having a block 151 adapted to be secured therein by means of a suitable bolt 152. In order to disconnect either one of the gears 142 or 143 from the train of driving connections, the washer 150 is removed, and placed between the shoulder 148 and bearing 149 after the hub and gear have been slid longitudinally on the shaft L to permit this adjustment to be made.

The description of the connections for unit A will likewise apply to unit B and will substantially apply to unit C, except for the changes hereinafter described. The transverse shaft 153 is provided with a bevel gear 154 at one end meshing with the gear 142. This shaft has suitable bearings in the frame and is provided with a gear 155 meshing with the gear 156 on a stud 157. Said stud has a pinion 158 meshing with the gear 159 on a short shaft 160. The other end of shaft 160 is provided with a bevel gear 161 meshing with the bevel gear 162 on the inclined shaft 163 which is supported in suitable bearings 164 and 165. The other end of the inclined shaft 163 is provided with a bevel gear 166 meshing with the bevel gear 133 on the short shaft 131. The other bevel gear 132 on this short shaft meshes with the bevel gear 167 on the inclined shaft 168 which is supported in bearings 169 and 170. The inclined shaft 168 is provided with a bevel gear 171 meshing with the bevel gear 172 on the shaft 106 which passes into the form carrier and transmits power to the device for reciprocating the inking plate and to the devices for bodily revolving the inking rollers. On the shaft 106 is provided the bevel gear 173 meshing with the bevel gear 174 on the shaft 101 which is supported in the bearing 100. The upper end of shaft 101 is provided with a crank disk 175 having a crank pin 176 to which is pivoted the connecting rod 177, the other end of said rod being pivoted at 178 to an ear 179 on the under side of the inking plate 99, whereby rotation of the crank disk 175 reciprocates the connecting rod 177 and slides the inking plate 99 on the guides 112. On the same shaft 106 with gear 173 is a gear 180 meshing with the gear 181 on another shaft 103 extending through the form carrier and supported in the bearings 102 in each end of said form carrier. The shaft 103 is provided at each end outside of the form carrier with gears 183 meshing with gears 184 on the hubs 185 of the pivoted arms 111. At the outer ends of arms 111 are pivoted the levers 186 and to these levers at 187 are pivoted the carriages 188, the axles 189 of which extend transversely across the inking plate and are provided with the inking rollers 104.

The outer ends of the levers 186 have pivoted thereto the spring pressed rods 190 which pass through the lugs 191 on the arms 111 and have springs 192 compressed between said lugs 191 and the nuts 193, whereby pressure is maintained between the inking rollers and the inking plate throughout the travel of the rollers. Guide bars 194 are suspended from each side of the form carrier by bolts 195 forming tracks below the chase *u* upon which the guide rollers 196 travel as the inking rollers pass across the chase. The outer gears of the shaft 106 revolve the gears 184 and with them the hubs 185 and arms 111 carrying the inking rollers, thereby revolving the inking rollers continually around the form carrier over the inking plate and over the type in the chase.

Fig. 24 shows the details of the device for adjusting the chase transversely. The sides of the form carrier S are provided with recesses 197 in which are located clamps 198 bearing upon the ends of the chase. Clearance spaces 199 are provided between the clamps and the base 96 of the form carrier, so that a slight adjustment may be made of the clamps 198. In order that the clamps may be adjusted from the same side of the form carrier, one long screw rod 116 and one short rod 200 are provided, passing through the clamps so that by turning the rods the clamps will be moved in or out to adjust the chase. The long rod 116 is provided with the collars 201 at each side of the bearing 202 to prevent longitudinal movement of the rod. The short rod 200 is provided with a collar 203 adjacent the bearing 204. The clamp 198 is loose on the short shaft 200 and said shaft is screw threaded to receive the nut 205. In order to adjust the clamp 198 by means of the short shaft, the end of the shaft 200 is held tight and the nut 205 is turned to force the clamp inward. In order to move the clamp on the short shaft outward, the nut 205 is loosened and by moving the other clamp 198 inward, the entire chase and clamps are moved transversely.

In order to adjust the connecting rod 139 on the crank pin 140, an eccentric sleeve 206 is provided on the crank pin having spanner holes 207 and a toothed exterior 208. A toothed clamp 209 on the connecting rod 139 is adapted to hold the eccentric sleeve 206 in any desired position. A washer 210 holds

the eccentric sleeve on the crank pin by means of the bolt 211, and a pin 212 prevents the washer 210 from turning.

In order to adjust the frames E on the beds A and B, shafts 213 are provided having bearings in the beds and provided with hand wheels 214, collars 215 and bevel gears 216 meshing with bevel gears 217, on the screw shafts 218 extending longitudinally of the machine. Traveling nuts 219 are provided on the screw shafts 218 and connected to the frames E, so that by turning the hand wheel 214 the longitudinal position of a frame may be adjusted.

For driving the crank disk 141 the shaft 221 of said disk is provided with a gear 222 meshing with the gear 155, as shown in Fig. 3. The shaft 221 is shown broken away in Fig. 4, it being understood that the gear 222 would appear in front of gear 155 in said figure.

*Inking device.*—For supporting the operative parts of the inking device, two brackets 223 are provided secured to the frame of one of the units and the inking devices for each of the units A, B and C are substantially the same except that for unit C the inking device is reversed or upside down. The shaft 163 is provided with a bevel gear 224 at one end meshing with the bevel 225 on the inclined shaft 226 which is supported in the bearings 227 and is provided with another bevel gear 228 at its upper end meshing with the bevel gear 229 on the transverse power shaft 230 which is supported in bearings in the brackets 223. The power shaft 230 supplies power for the various operative connections of the inking device. The inking-drum 231 is supported in bearings in the brackets 223 and is driven by means of a pinion 232 connected to the trunnion 233 and meshing with the gear 234 on the shaft 230. The vibrator-rollers 235 are provided with trunnions 236 and 237 carried in bearings on the brackets 223, and means are provided for vibrating said rollers transversely across the inking-drum as the drum is rotated. The drum imparts rotation to the vibrator-rollers 236 by frictional contact therewith. The shaft 230 is provided at one end with the cam 238 having the groove 239 in which the pin 240 operates carried at one end of the rocker-arm 241, which is connected to the rock-shaft 242, the ends of which rock-shaft are supported in the bearings 243 connected to the bracket 223. The upper end of the rock-shaft 242 is provided with a cross-arm 244 having pivoted blocks 245 engaging the grooved ends 246 of the trunnions 237 of the vibrating-rollers 235, so that the sidewise movement of the rocker-arm 241 will rock the rock-shaft 242 in its bearings and swing the arm 244 to vibrate the rollers.

The pressure-roll 246 is supported in bearings in the brackets 223 and bears upon the vibrating-rolls 235 and is driven by frictional contact therewith. The weight of the pressure-roll 246 provides sufficient frictional contact with the vibrator-rolls 235. The ductor-roller 247 is carried in the arms 248 connected to the transverse shaft 249 carried in bearings in the brackets 223 and provided at one end with a crank-arm 250 connected by the connecting rod 251 to the crank pin 252 on the gear 234, so that rotation of the shaft 230 and gear 234 will vibrate the ductor-roller 247 between the fountain-roll 253 and pressure-roll 246, thereby transferring ink from the fountain-roll to the pressure-roll.

The fountain-roll 253 is supported in bearings in the sides of the ink-fountain 254, and one of its trunnions is provided with the gear 255 meshing with the gear 256 on the short shaft 257 which is provided with the ratchet wheel 258 fast thereto. The sleeve 259 at one side of the ratchet wheel supports the shaft 257 and between the sleeve and the ratchet wheel is an arm 260 loose on the shaft. At the other side of the ratchet wheel is an arm 261 loose on the shaft and carrying on its hub a gear 262 meshing with the rack 263 on the rack-bar 264 connected to the crank-pin 265 on the crank-disk 266 on the end of the power-shaft 230. Pivoted between the arms 260 and 261 is the pawl 267 adapted to engage the ratchet-wheel 258 on the downward stroke of the rack-bar 264 and thus advances the fountain-roll step by step. The end of the shaft 257 is provided with a hand wheel 268 for turning the fountain-roll by hand, if desired.

The brayer-roll 269 is carried on the brayer-arms 270 secured to the brayer-shaft 271 carried in bearings in the brackets 223 provided at one end with a crank-arm 272 connected by the rod 273 to the crank-pin 252 on the gear 234, whereby rotation of the shaft 230 and gear 234 vibrates the brayer-arms 270 and with them the brayer-roll 269 between the inking-drum 231 and inking-plate 99.

The crank-pin 265 on the crank-disk 266 for actuating the fountain-roll 253 is preferably radially adjustable in order to vary the throw of the rack-bar 264. As shown, the crank-pin 265 is carried on the sliding block 274, sliding in grooves 275 in the crank disk 266. A screw threaded rod 276 passes through the block 275 and is provided with a hand-wheel 277 at one end and a shouldered end 278 having a nut 279.

The operative connections for the inking head and inking device of unit C are substantially the same as those for units A and B except for the necessary mechanical changes, because of the fact that units A and B are upper print sections and unit C is an

under print section. In Fig. 1 it will be seen that the gear 154 of unit C corresponding to gears 154 of units A and B, is indirectly connected to the bevel gear 144 on line-shaft L by means of the inclined-shaft 280 carried in the separable bearing 281 and the bearing 282. The shaft 280 is provided with the bevel gears 283 and 284 meshing with the bevel gears 144 and 154 respectively. The transverse shaft 153 carrying the bevel gear 154 of unit C is provided with bearings in the frame F of the offset paper device.

*Offset device.*—Behind the gear 154 of unit C, is a gear 285 on shaft 153 from which power is taken for actuating the connections of the offset paper device. The paper roll *r* from which the paper *t* is unwound and the paper roll *s* upon which the paper is wound are both supported in suitable bearings in the frame F. The paper passes from the roll *r* over the tension-roller 286, thence over the guide-roller 287, between the chase and tympan bed, thence over the guide-roller 288, between the feed-drum 289 and pressure-roller 290, thence over the tension-roller 291 and thence to the winding roll *s*. The tension-rollers 286 and 291 are carried on arms 292 and 293 pivoted to the upright 294 carried upon the frame F. A tension spring 295 connecting the short end 296 of one arm with the longer end of the other arm, normally tends to elevate the outer ends of the tension arms and apply tension to the paper *t*.

The gear 297 meshes with the gear 285 and is provided with a crank-disk 298 having an adjustable crank pin 299 to which is connected the rack-bar 300 having the rack 301 meshing with the pinion 302 loose on the shaft 303 of the feed-drum 289. A collar 304 pinned to the shaft 303 holds the pinion 302 against the sleeve 305. The rack and pinion are provided with a suitable housing 306 open at one side to expose the teeth 307 on the outer face of the pinion 302 which in effect forms a toothed clutch member adapted to coöperate with the teeth 308 on the sliding sleeve 309, which forms the other clutch member, said sleeve being pinned to the shaft 303 by the pin 310, which is adapted to permit the slight longitudinal movement of the sleeve 309. When said sleeve 309 is forced into engagement with the pinion 302, the upward stroke of the rack bar 300 will rotate the shaft 303 and feed-drum 289 in the proper direction to rewind the paper *t*. The teeth 307 and 308 are so disposed and have the proper pitch to cause the pinion 302 to run idle on the return stroke of the rack-bar.

The gear 298 meshes with another gear 311 having a crank disk 312 provided with an adjustable crank-pin 313 connected by a connecting rod 314 with the arm 315 carrying a pawl 316 coöperating with the ratchet-wheel 317 on the shaft 318. Connected to the ratchet-wheel 317 is a disk 319 provided with a cam 320 coöperating with a pivoted lever 321 pivoted at 322 to the bracket 323. The outer end of said lever is adapted to bear upon the spring pressed pin 324 having a collar 325 beneath the cap 326 on the end of the sleeve 309. In the recess 327 in the sleeve 309 is a compression-spring 328 between the shoulder 329 and collar 325. The pin 324 extends loosely through the shoulder 329 and between said shoulder and the end 330 of the shaft 303 is another compression-spring 331 which is weaker than the spring 328. The spring 328 normally forces the toe of the pin 324 outwardly beyond the cap 326 and when the cam 320 forces the outer end of the lever 321 inwardly, the pin 324 is carried inwardly against the pressure of the spring 328, thereby forcing the sleeve 309 longitudinally of the shaft 303 and overcoming the pressure of the spring 331, thus cushioning the engagement of the teeth 307 and 308. The function of the light spring 331 is to return the sleeve 309 to its outermost position with the teeth 307 and 308 of the clutch members disengaged. By varying the throw of the crank-pin 299 the amount of feed may be varied, and by varying the throw of the crank-pin 313 the rate of feed may be varied.

In order to drive the rewinding-roller *s* the crank-disk 312 is provided with the groove 332 for receiving the belt 333 which also engages the grooved pulley 334 on the shaft 335. The end of the rewinding roller shaft *s'* is also provided with a grooved pulley $s^2$ which is frictionally driven by the same belt 333 which drives the grooved pulley 334, thereby driving the rewinding roller *s* in the proper direction to rewind the paper. The unwinding roller *r* is preferably provided with a brake-disk *r'* and the brake-shoe $r^2$ for regulating the unwinding of the paper.

In Fig. 32 details of a device for automatically disconnecting any one of the units is shown in case any part of the mechanism becomes jammed, due to dropping of the type for instance. The gear 154 on transverse shaft 153 is mounted on a sleeve 340 splined to the shaft. Two shear sleeves 341 and 342 are set into the hub of the gear and the sleeve 340, and inclose a shear pin 343 of less strength than the gear teeth, so that said pin 343 will shear off before the teeth will strip, thus disconnecting gear 154 from its sleeve and shaft.

I do not herein claim anything disclosed and claimed in the following applications: Serial No. 487,763, filed April 3, 1909, for offset devices for printing presses; Serial No. 487,764, filed April 3, 1909, for a speed controller; and Serial No. 487,765, filed April 3, 1909, for an inking device.

I claim and desire to obtain by Letters Patent the following:

1. In a bed and platen printing press of the character described, the combination of interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds.

2. In a bed and platen printing press of the character described, the combination of end units and interchangeable intermediate upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds.

3. In a bed and platen printing press of the character described, the combination of a driving unit, a finishing unit, and intermediate interchangeable upper print units, each unit having a separate bed and a frame thereon, the frames of the said upper print units being longitudinally adjustable on said beds.

4. In a bed and platen printing press of the character described, the combination of end units, an intermediate under print unit, and interchangeable intermediate upper print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds.

5. In a bed and platen printing press of the character described, the combination of a driving unit, a finishing unit, and intermediate interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds.

6. In a bed and platen printing press of the character described, the combination of end units, intermediate interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds, and means for driving the operative connections of said units from a source of power.

7. In a bed and platen printing press of the character described, the combination of a driving unit and finishing unit, intermediate interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds, a source of power, a line shaft connected to be driven from said source of power, and means for operating said units from said line shaft.

8. In a bed and platen printing press of the character described, the combination of interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds, a common source of power for operating said units, a revolving line shaft extending longitudinally of said units, and adjustable connections between said line shaft and said units.

9. In a bed and platen printing press of the character described, the combination of a plurality of upper and under print units, each having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds, printing heads carried by said frames adapted to print in the same plane, and means for transversely adjusting the type beds of said heads.

10. In a bed and platen printing press of the character described, the combination of interchangeable upper and under print units, each unit having a separate bed and a frame thereon, the frames of the upper print units being longitudinally adjustable on said beds, and pivoted form carriers carried by said frames.

11. In a printing press of the character described, a printing head provided with a form carrier having a body portion and side arms adapted to be pivoted to the frame of the press, a chase carried by the form carrier, and vertical links connected to the outer ends of said arms beyond the edges of the chase, thereby affording a space for the removal of the chase transversely from the form carrier without interference with said links.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses; December 23rd 1908.

BERTIL VON PHILP.

Witnesses:
E. VAN ZANDT,
E. P. LA GAN.