Dec. 19, 1939. C. S. CRAFTS 2,183,739

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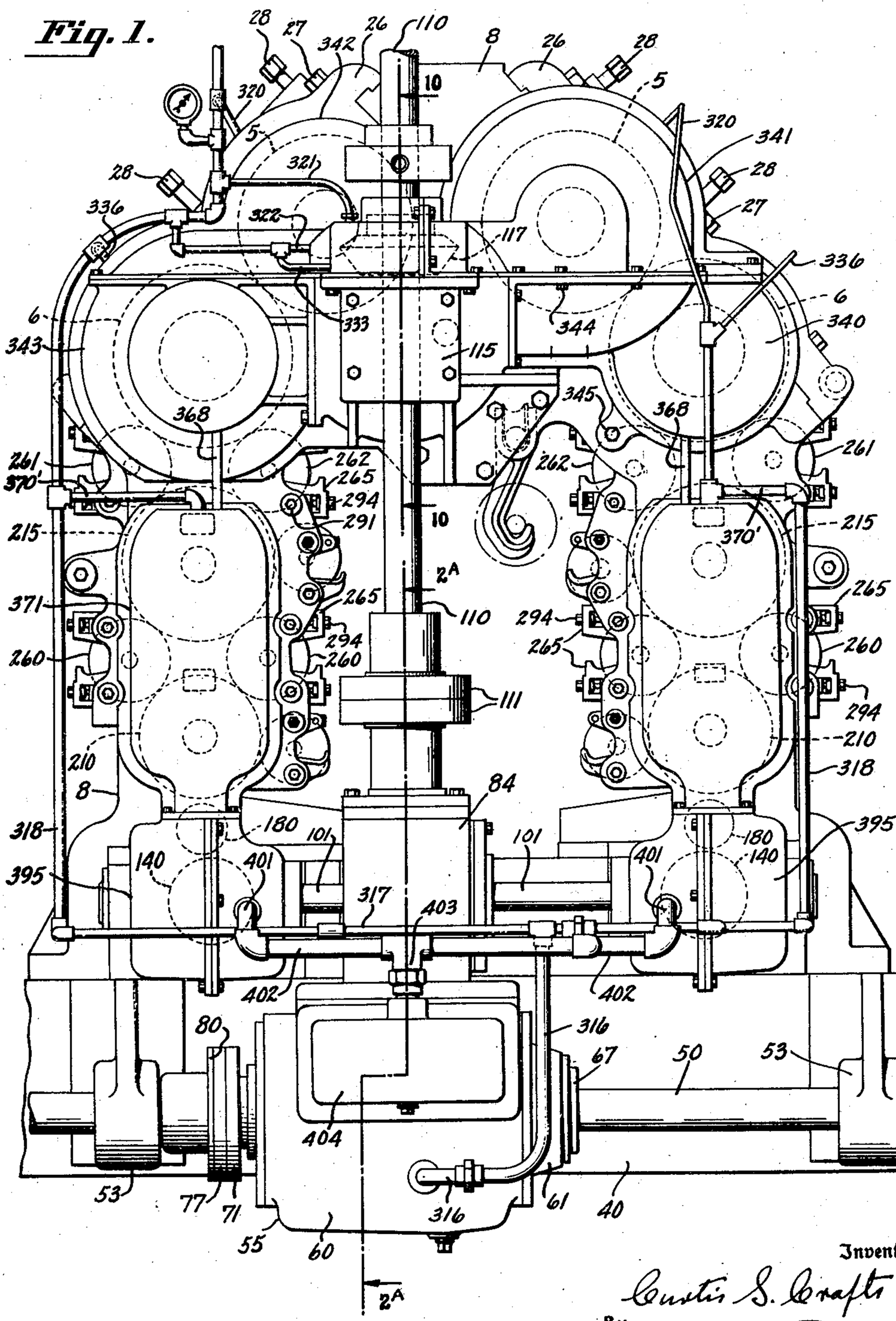
Original Filed Sept. 15, 1933 12 Sheets-Sheet 1

Fig. 1.



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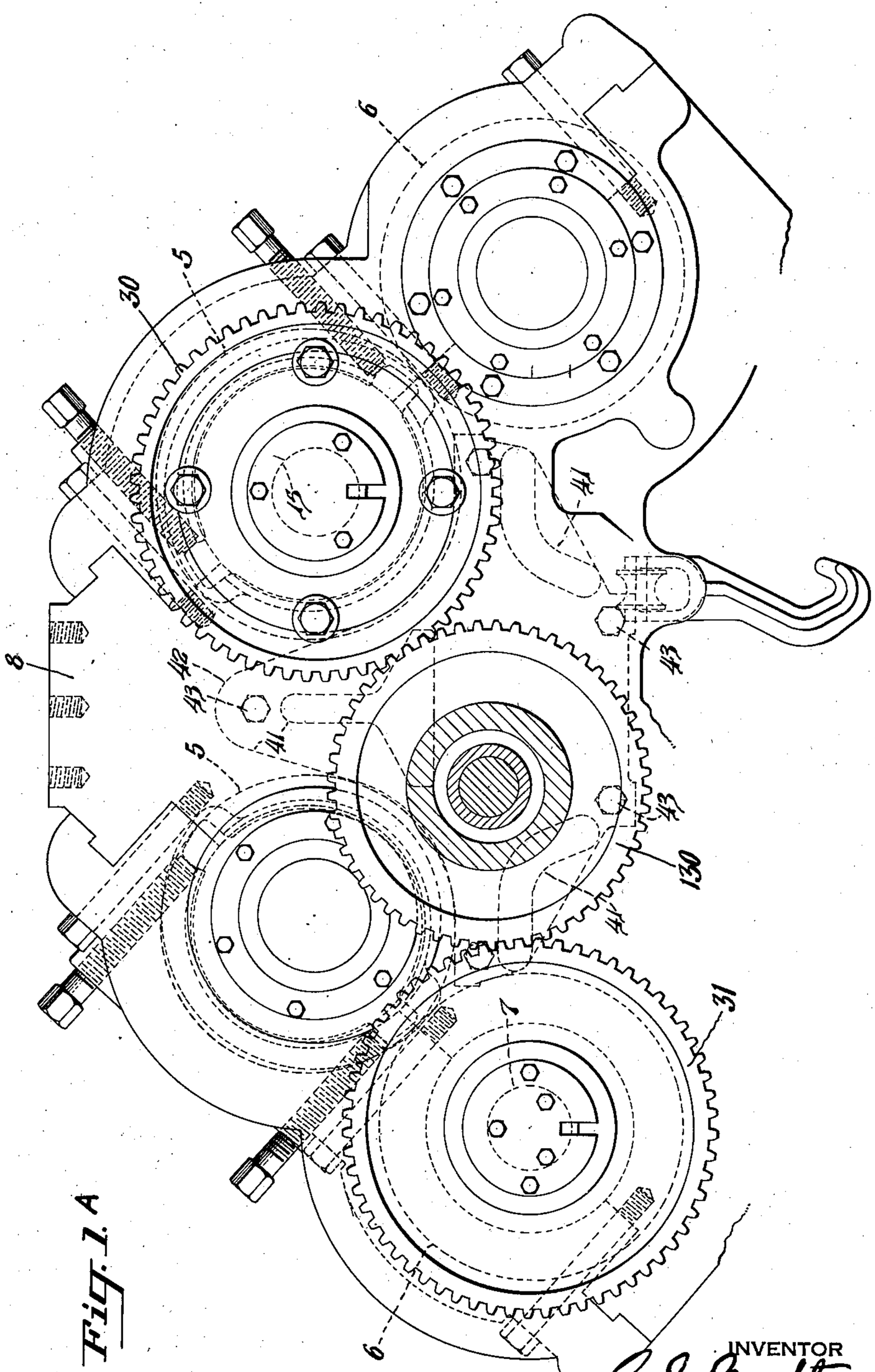

Fig. 1. A

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Fig. 2

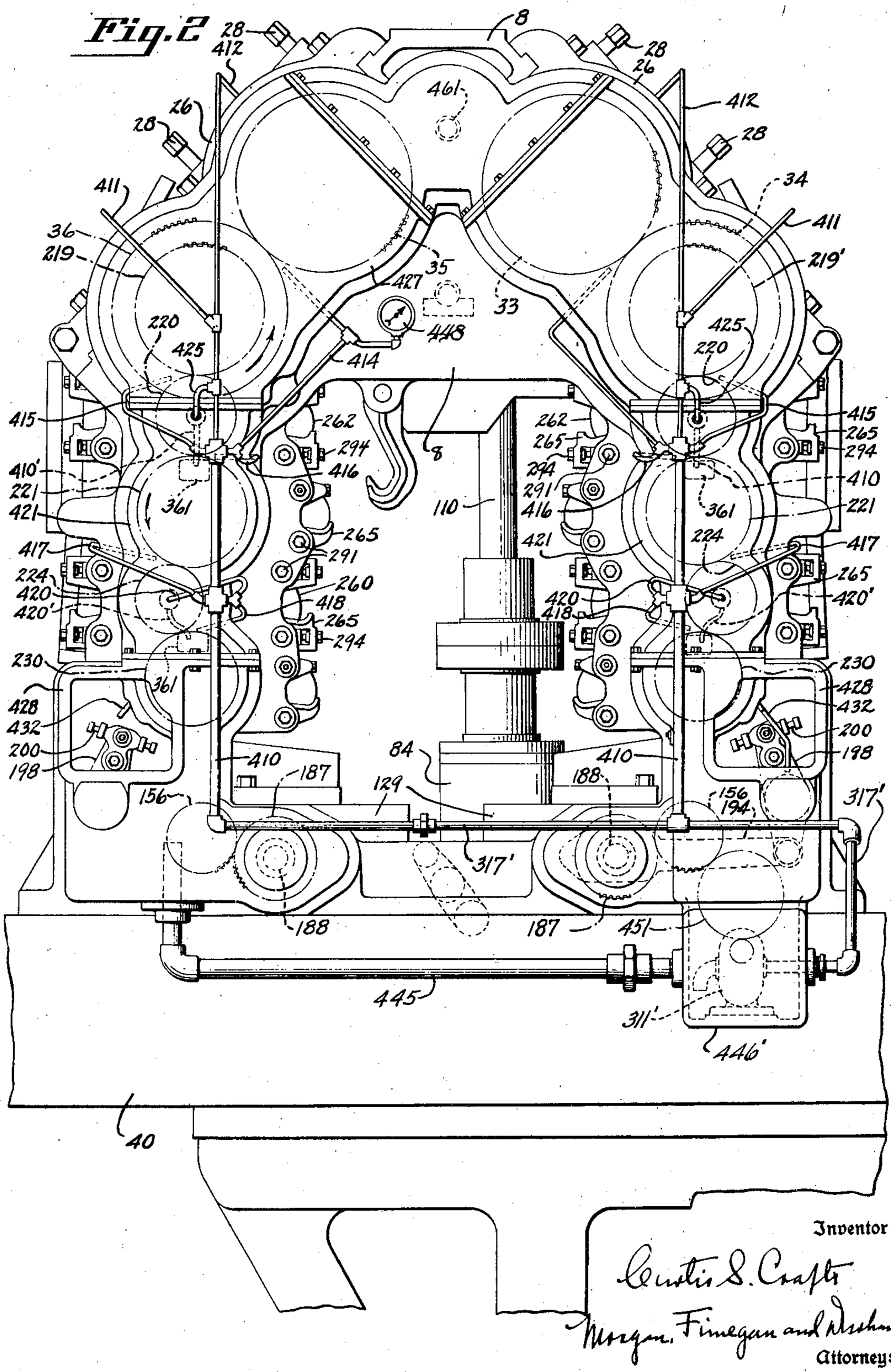

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Fig. 2.A

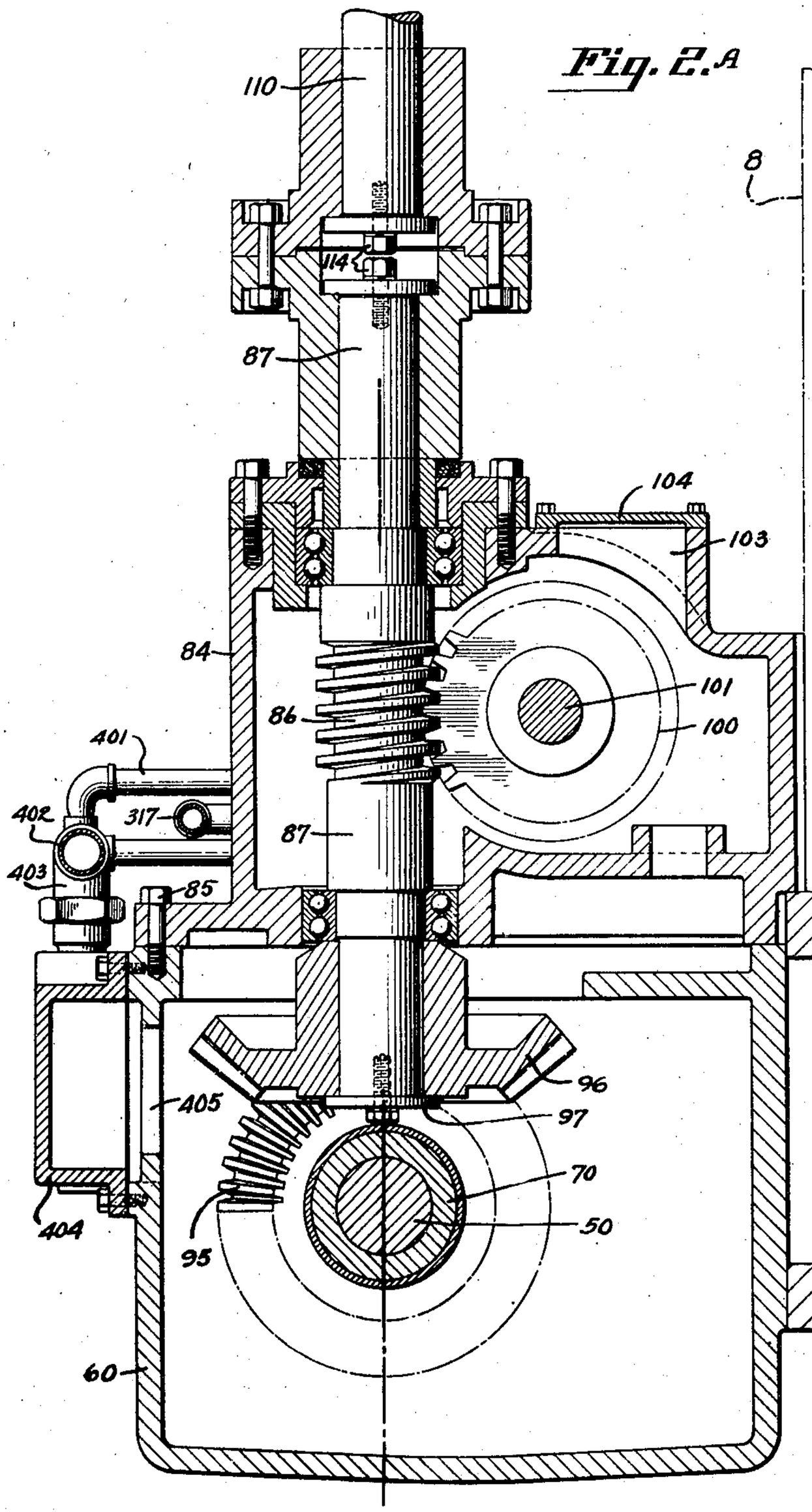

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Fig. 4.

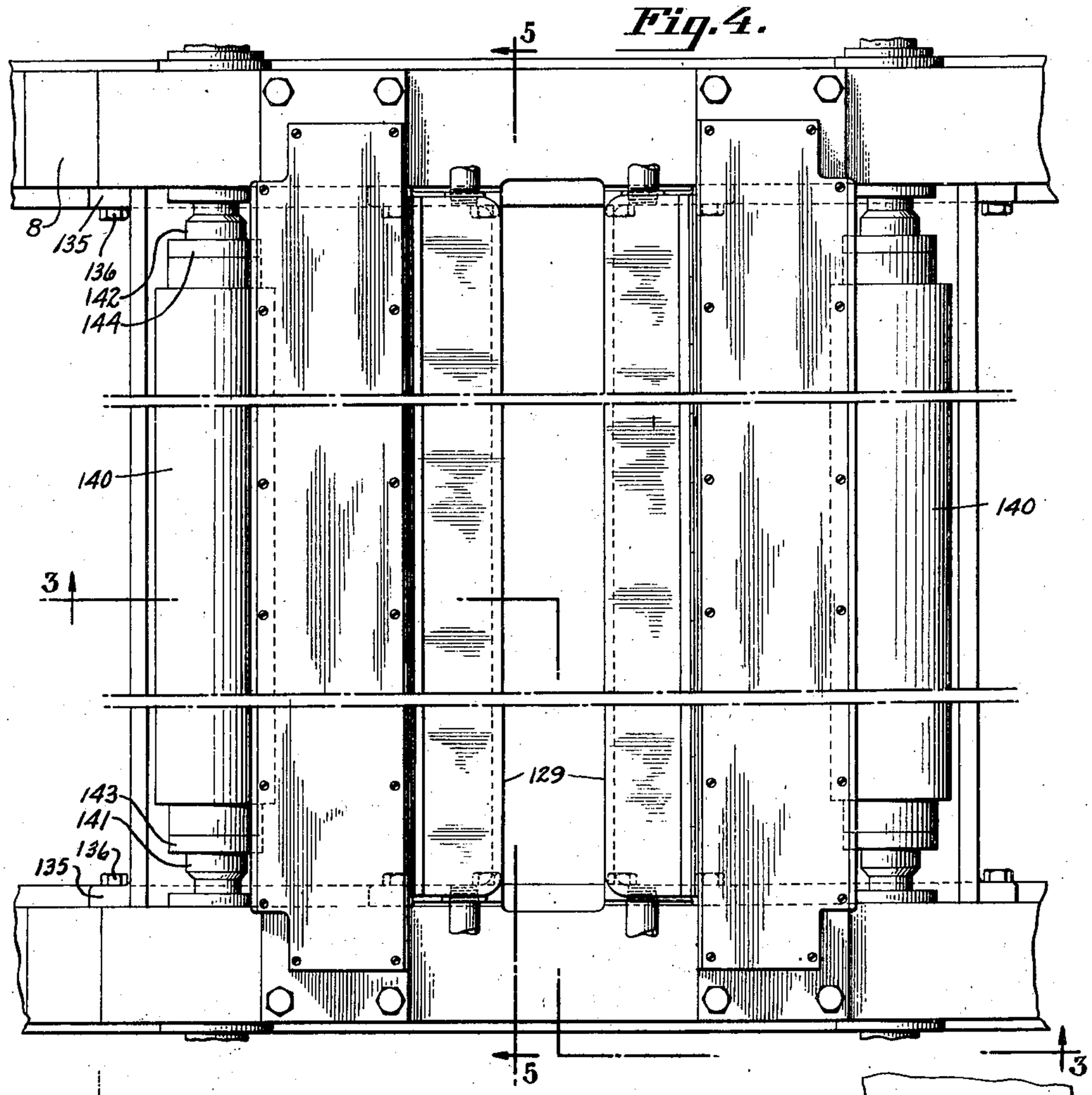
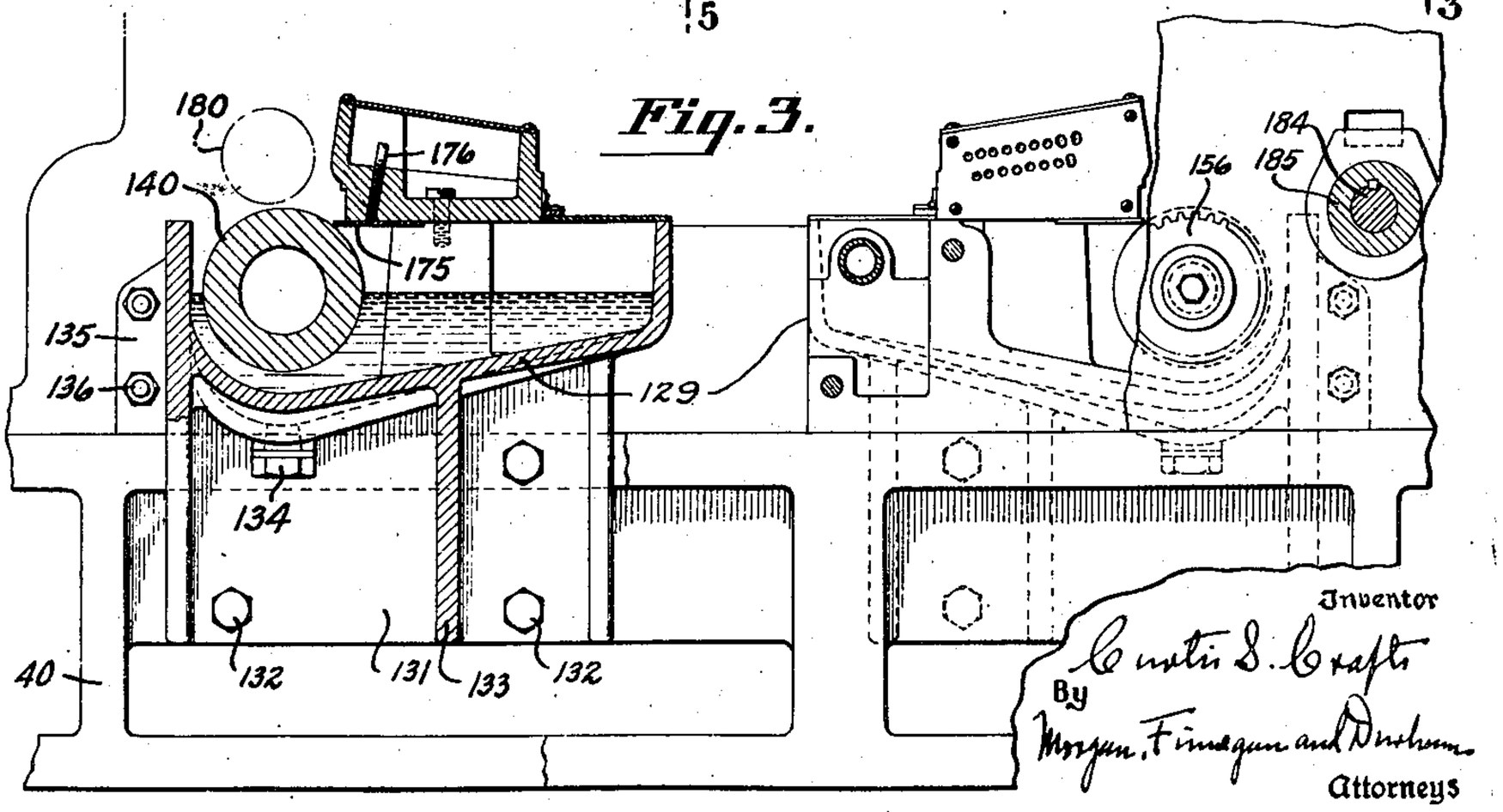


Fig. 3.



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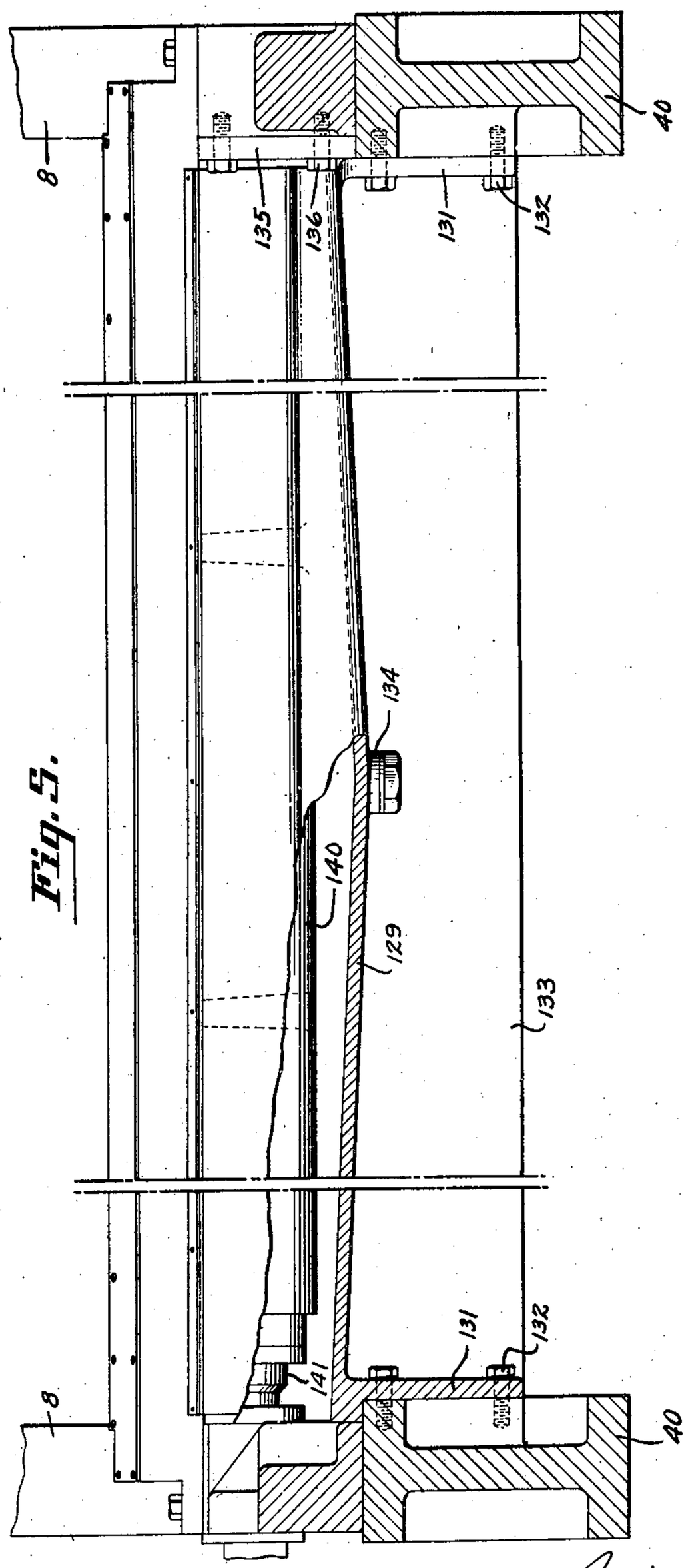

Fig. 5.

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Fig. 6.

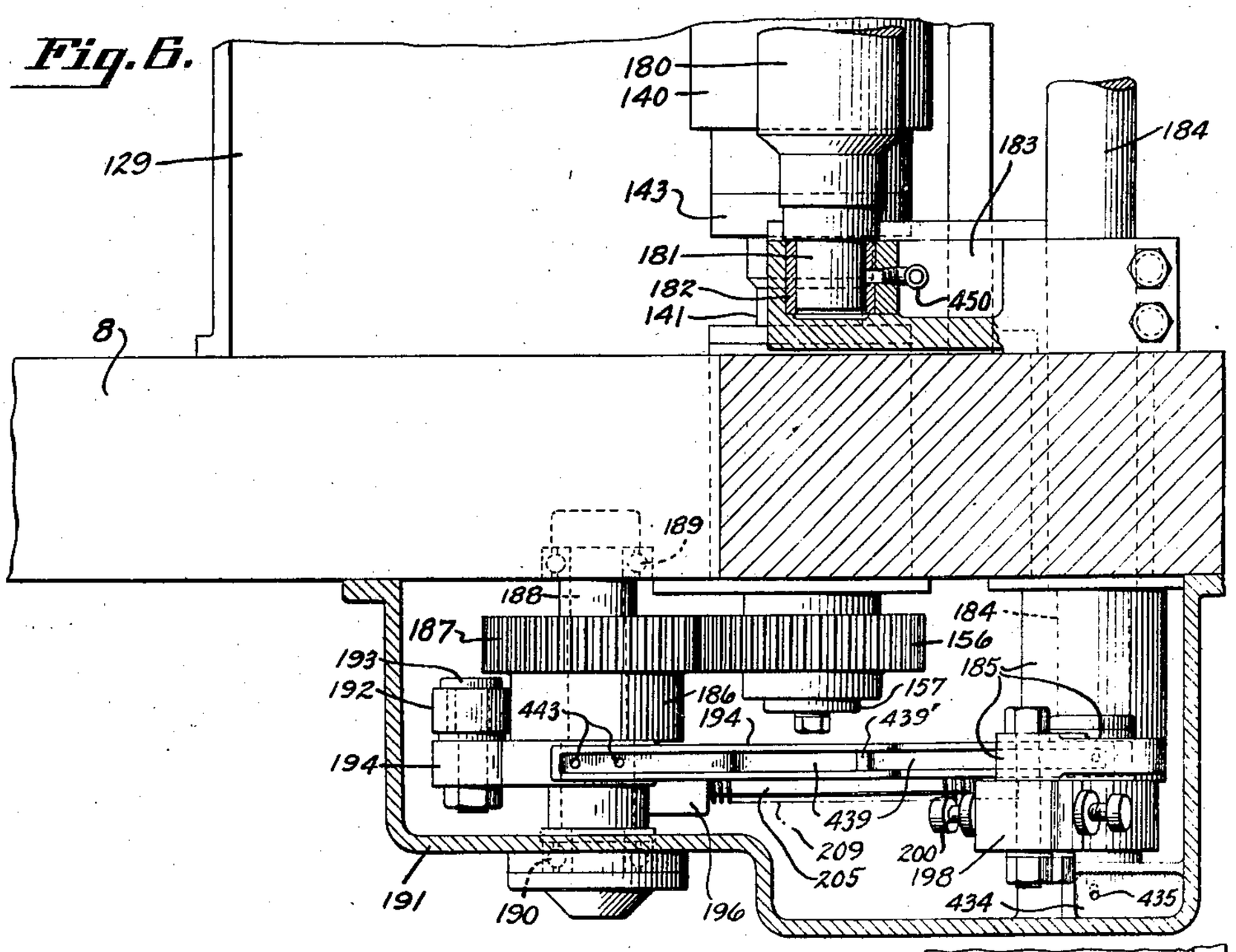

Fig. 7.

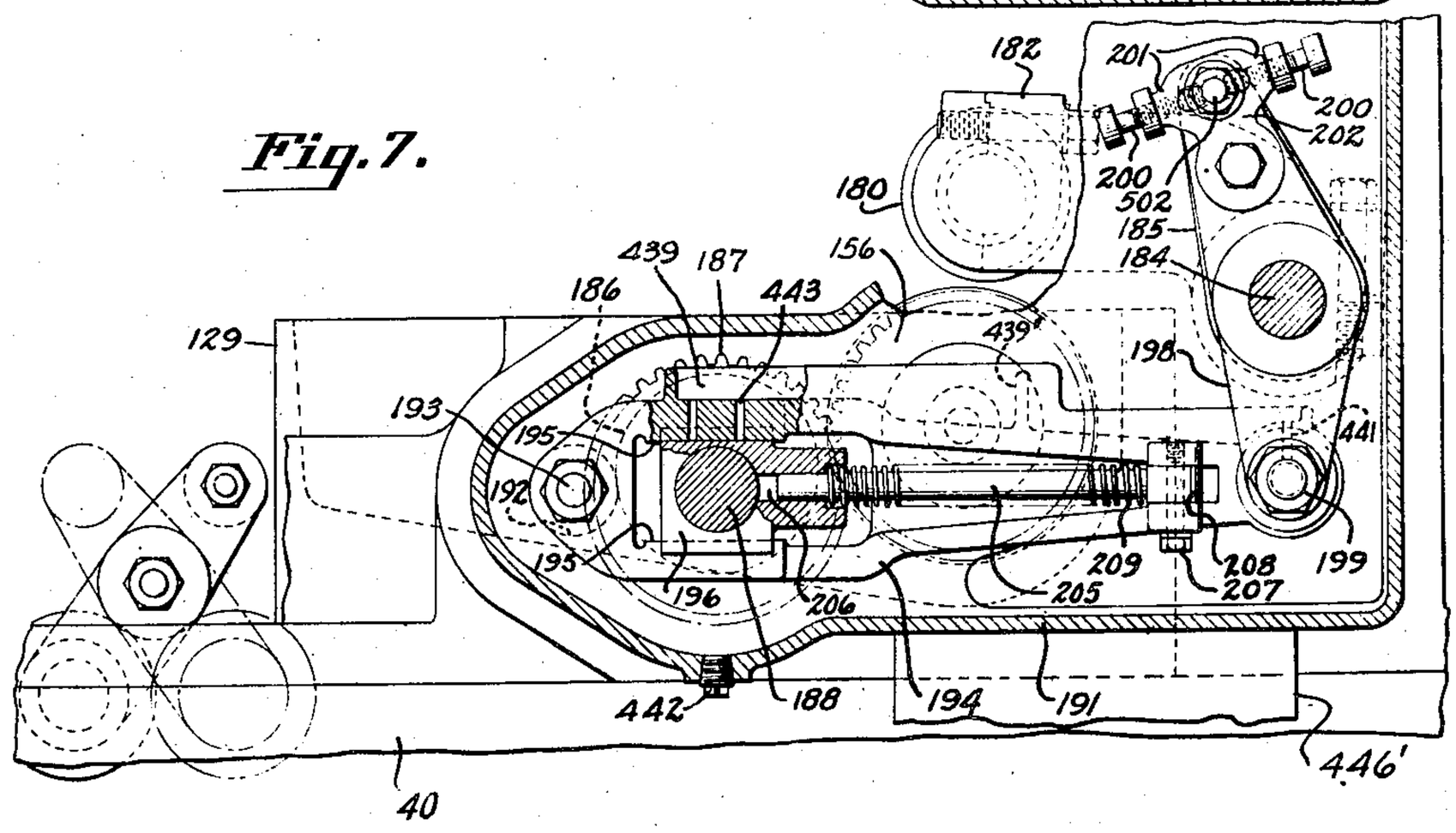

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Fig. 8.

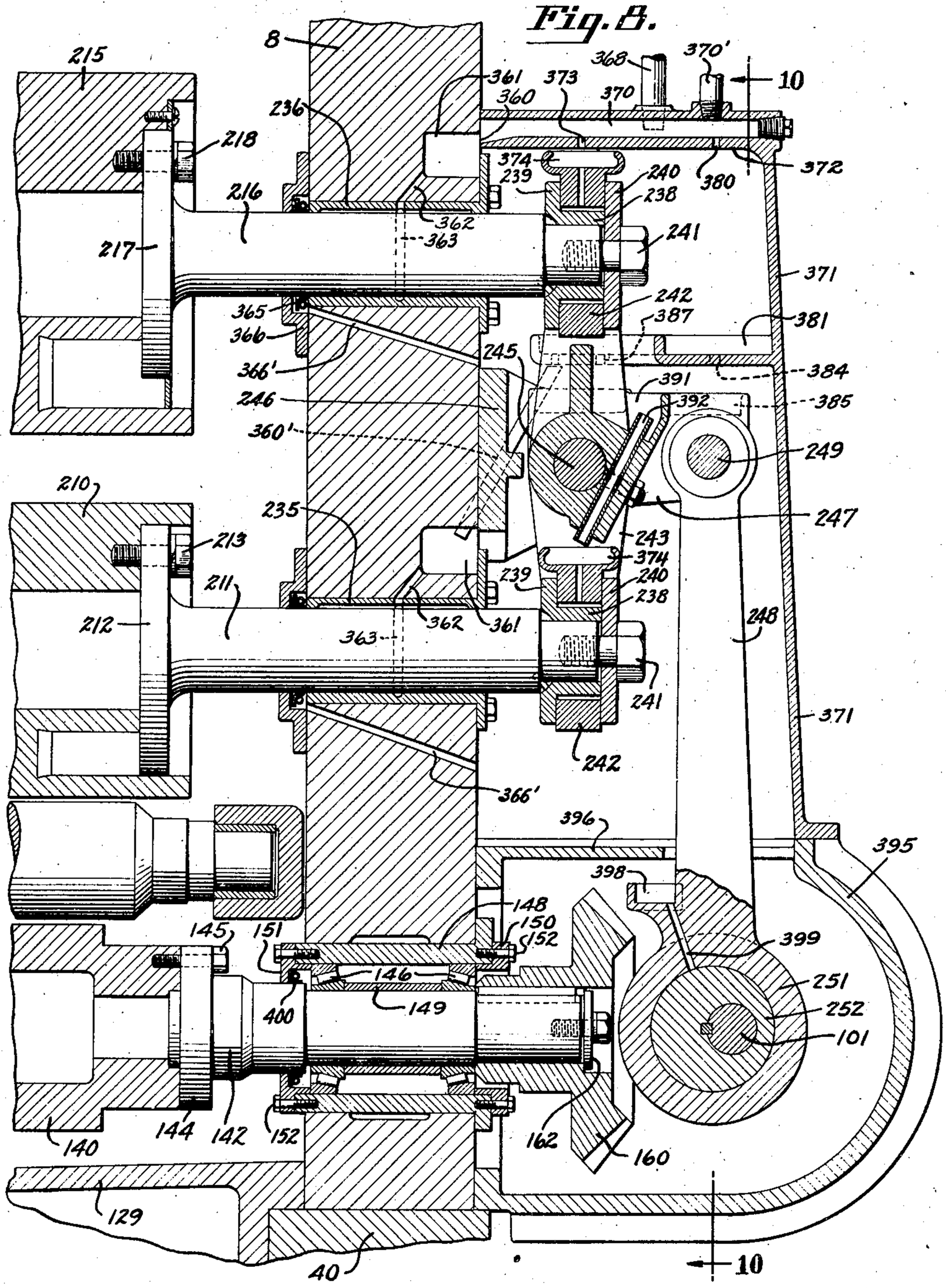

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Fig. 9.

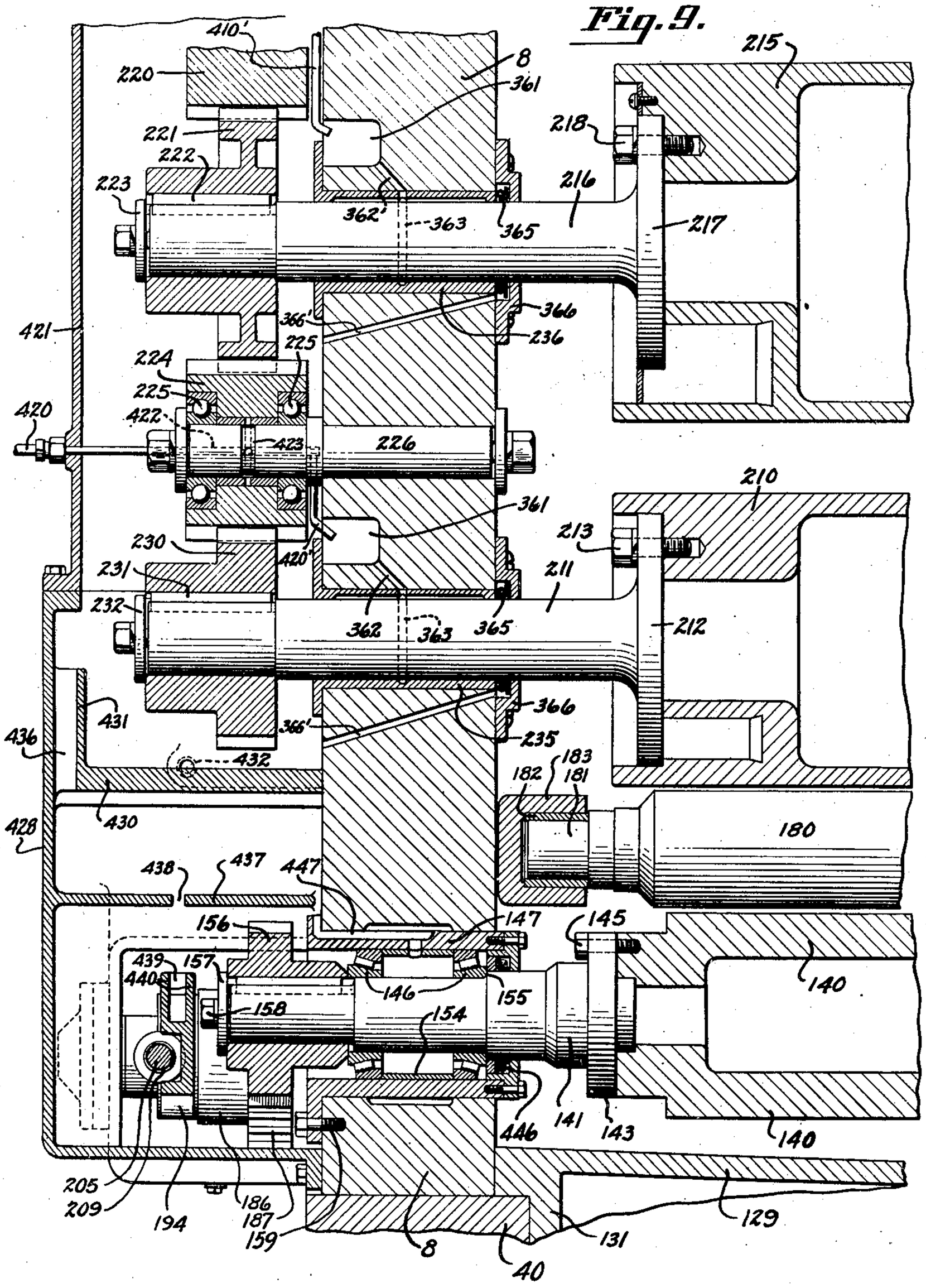

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Fig. 10.

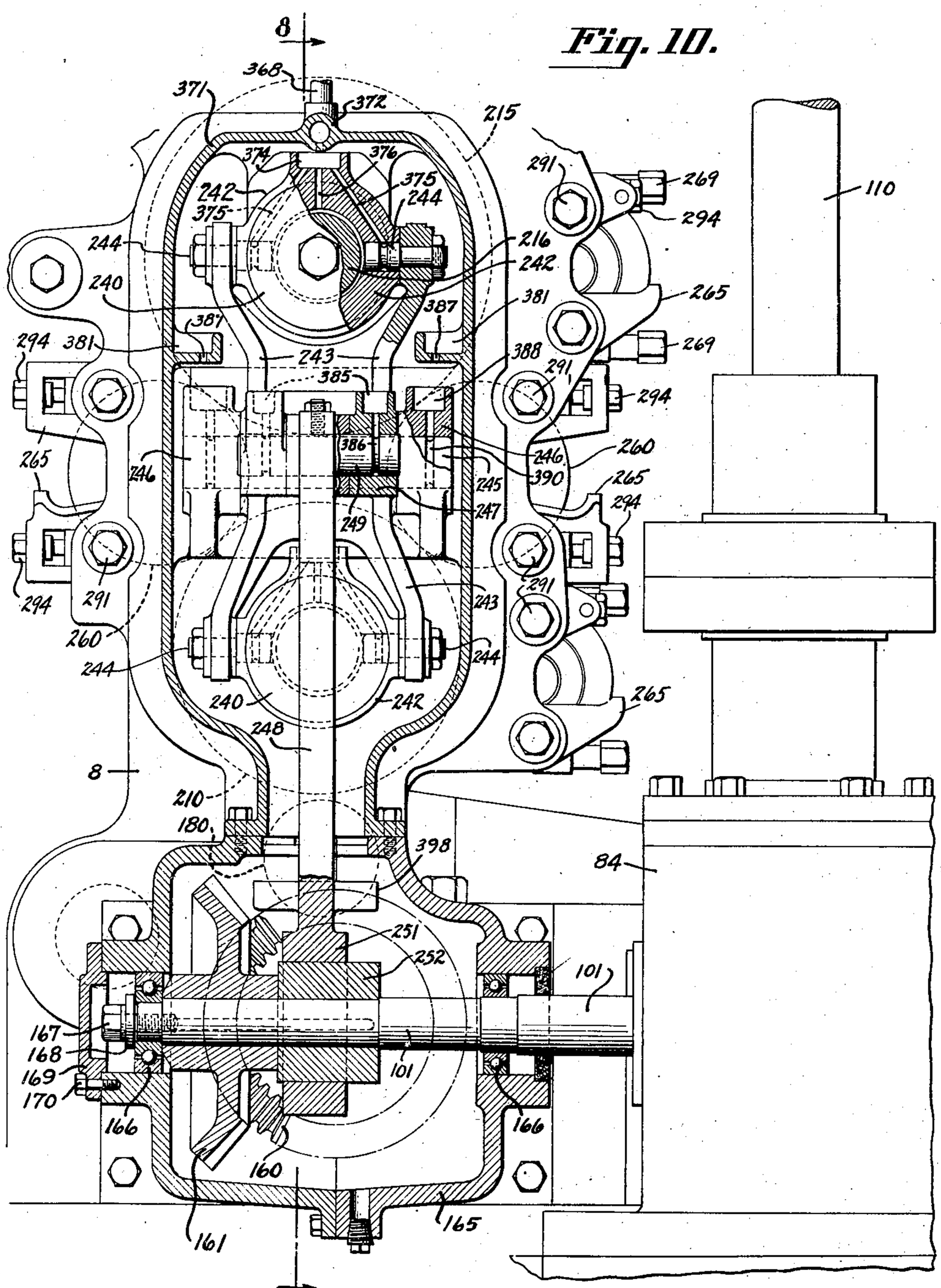

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Fig. 12.

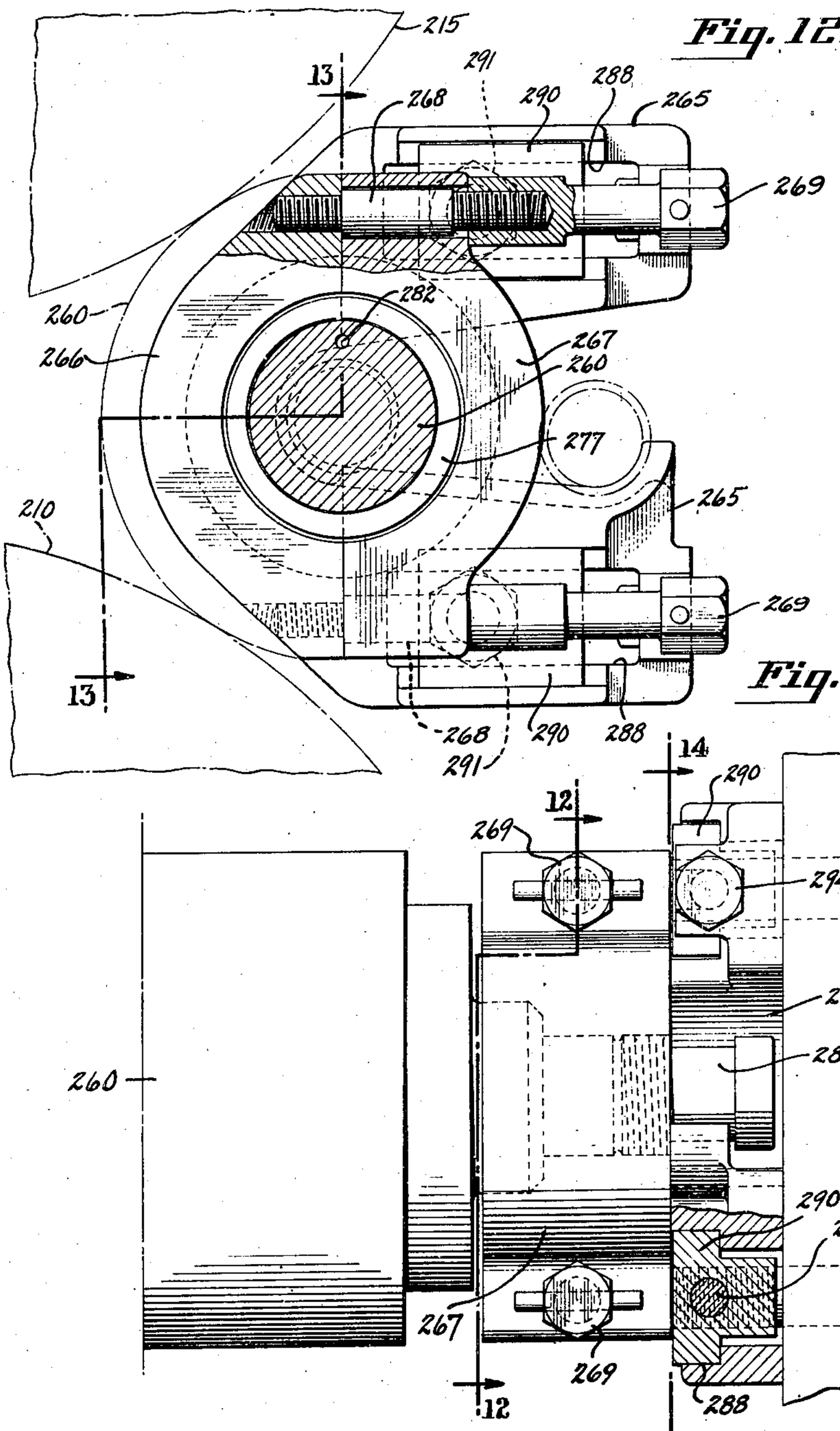

Fig. 11.

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Fig. 13.

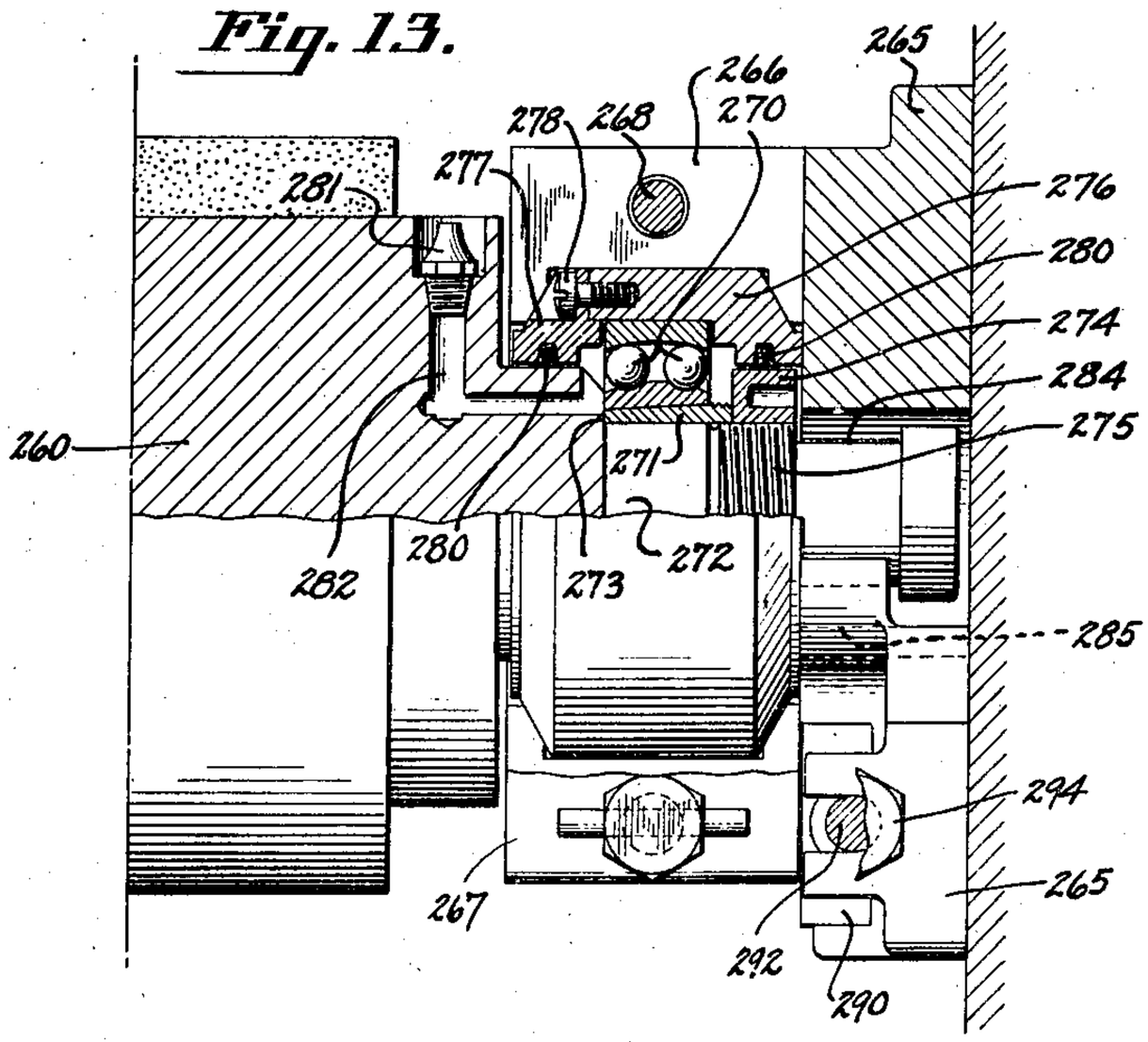
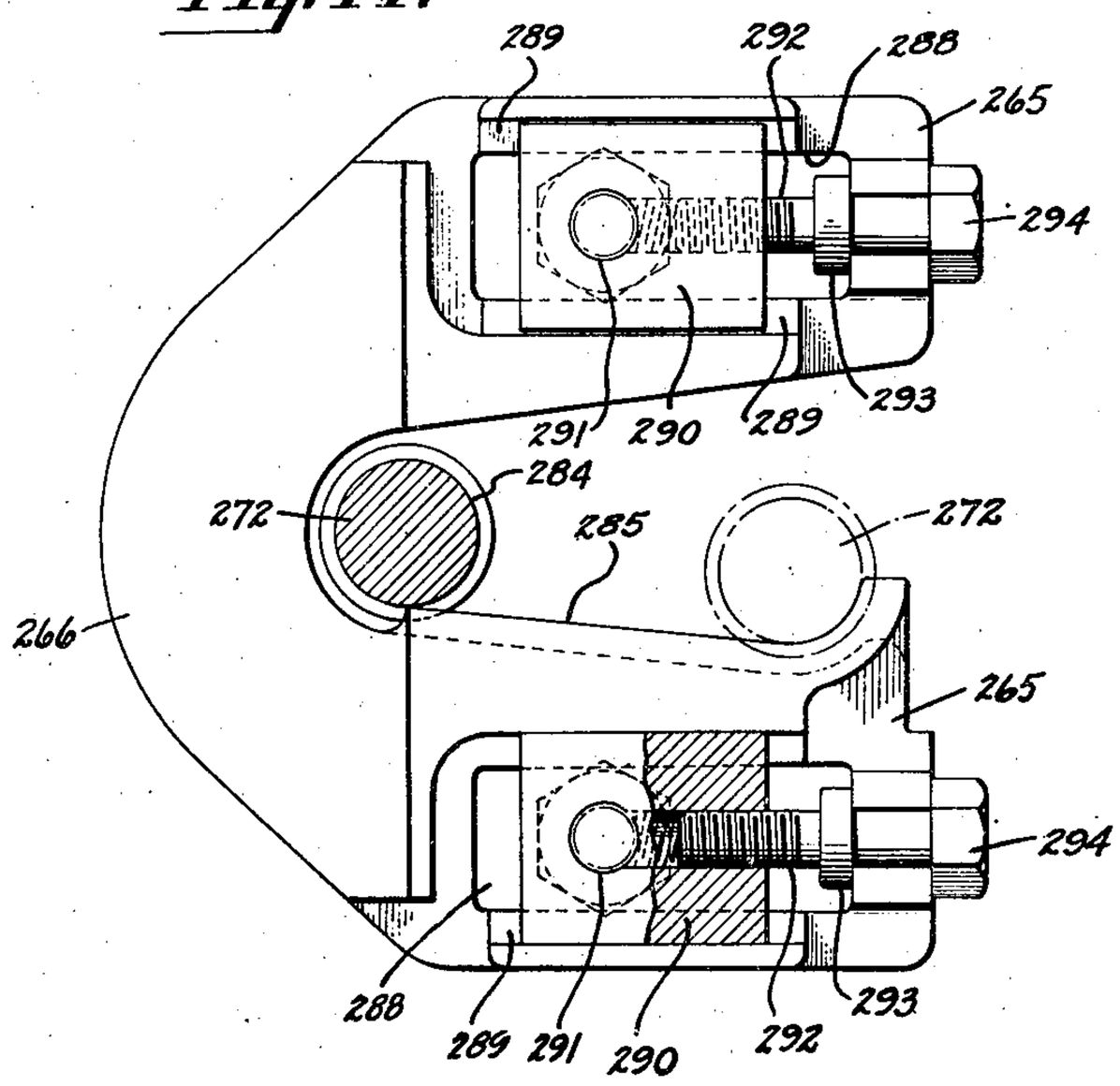


Fig. 14.



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Patented Dec. 19, 1939 2,183,739

UNITED STATES PATENT OFFICE

2,183,739

PRINTING PRESS

Curtis S. Crafts, Oak Park, Ill., assignor to The Goss Printing Press Company, Chicago, Ill., a corporation of Illinois

Original application September 15, 1933, Serial No. 689,512. Divided and this application January 6, 1936, Serial No. 57,681

10 Claims. (Cl. 101—350)

The present invention relates to printing presses and more particularly to a novel and improved rotary printing press adapted for the printing of newspapers at high speeds.

This application is a division of my copending application Serial No. 689,512, filed September 15, 1933, now United States Patent No. 2,085,185.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a side elevation of a single printing unit constructed in accordance with the present invention, and looking at the left side of the unit;

Figure 1A is a side elevation, partly in section and with certain parts removed, of the gearing for the left side of the unit shown in Fig. 1;

Fig. 2 is a similar view looking at the right side of the unit shown in Fig. 1;

Fig. 2A is a vertical section taken on the line 2*a*—2*a* of Fig. 1;

Figure 3 is a sectional view of the ink fountains for a single unit and taken on the line 3—3 of Figure 4;

Figure 4 is a plan view of the ink fountains for a single printing unit as shown in Figures 1 and 2, with the printing couple, inking drum and side frames removed;

Figure 5 is a section taken on the line 5—5 of Figure 4;

Figure 6 is a fragmentary horizontal sectional view of the right end of the ink fountain and showing the ductor roll operating mechanism;

Figure 7 is a fragmentary end view of the ink fountain and ductor roll operating mechanism, with the casing and certain other parts shown in section;

Figure 8 is a vertical sectional view taken on the line 8—8 of Figure 10;

Figure 9 is a similar sectional view of the other end of the inking drums and ink fountain;

Figure 10 is a fragmentary end view of the right side of the inking mechanism and drive therefor, with certain parts shown in section as taken on the line 10—10 of Figure 8, and other parts being broken away;

Figure 11 is a detailed side view of the mounting for the inking rollers in accordance with the present invention, certain parts being broken away;

Figure 12 is a section taken on the line 12—12 of Figure 11;

Figure 13 is a sectional view taken on the line 13—13 of Figure 12; and,

Figure 14 is a sectional view taken on the line 14—14 of Figure 11, with certain parts broken away.

The present invention has for its object the provision of a novel and improved printing press particularly adapted for use in the printing of newspapers at high speeds. A further object is the provision of a newspaper printing press having an improved lubrication system which insures constant and thorough lubrication of all bearing surfaces and driving gears. Still another object is the provision of a printing press which can be shipped in a partially assembled state, and can be completely assembled by relatively unskilled workmen.

As embodied, each of the units comprises a pair of printing couples, each provided with inking mechanism comprising ink drums arranged in substantially vertical alinement with the plate cylinder of the couple and driven from the plate cylinder, together with the usual inking rollers.

Means, driven by a vertical drive shaft, are provided for driving the fountain roller and vibrating the inking drums, and other means, driven by the fountain roller, are provided for operating the ductor roll to transfer ink from the fountain roll to the inking rollers and drums and thence to the plate cylinder.

The cylindrical body portions of the inking drums and fountain roller are preferably provided with detachable flanges and shafts at their ends whereby the drums and roller can be removed without removing their shafts and gears from the side frames in which they are journalled. After removing these relatively heavy bodies, the cylinders and the gearing units, the side frames may be shipped with certain of the shafts, bearings and gears in place, thereby avoiding the extensive disassembly and reassembly which has heretofore been necessary for shipping newspaper printing presses.

The inking rollers for transferring ink from one inking drum to another and to the plate cylinder are preferably mounted in hangers which receive the anti-friction bearing at the ends of the rollers, and these hangers are preferably adapted to pivot

about either or both of two spaced pivots so as to permit accurate positioning of the inking rollers with respect to both inking drums or an inking drum and the plate cylinder. Improved means are also provided for varying the pressure between the plate and impression cylinders as may be required for printing.

As embodied, means are provided for continuously circulating a relatively large amount of lubricant and for supplying it to the various bearings and gears of the unit, and these means preferably comprise a pump driven by the press and supplying oil under pressure to the various meshes of gears near the top of the unit and to the heavy bearings, as well as other means for receiving the excess oil from the gears and bearings and leading it to the other lighter bearings and the meshes of gears operating under relatively light pressure.

The excess oil on the drive side of the press is finally collected and received in the gearing unit mounted on the main drive shaft to provide a relatively deep oil bath for these gears, and from this point is then led to the oil pump.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the illustrative embodiment of the invention as shown in the accompanying drawings, the printing press comprises a plurality of synchronized printing units, only one of which is here shown, which may be of identical construction and are arranged in line with each other to supply the webs printed by them to a folding unit (not shown), also in line with the printing unit. Any suitable number of printing units and folding units may be employed, with the folding units preferably interposed between the printing units.

The printing units each comprise a pair of printing couples adapted to perfect a web of paper, each couple comprising a conventional impression cylinder **5**, and a conventional printing cylinder **6** which is provided with the usual particylindrical printing plates, both cylinders being rotatably mounted in suitable bearings.

Means are provided for rotating the cylinders **5** and **6** of both couples in register, and for this purpose a gear **30** fast to the forward cylinder **5**, and a gear **31** of similar size keyed to the shaft **7** of the rear cylinder **6**, meshes with a driven gear **130** carrying the drive. At their right-hand ends, the impression cylinder **5** and plate cylinder **6** are provided with gears **33** and **34** respectively, these gears meshing together so that the impression cylinder **5** is driven from the plate cylinder **6**.

For the forward couple, gear **30** drives the impression cylinder **5** and at its right hand end a gear **35** is fast thereto, meshing with a gear **36** fast to plate cylinder **6**. By this construction, the plate cylinders of one couple are driven in a direction opposite to that of the plate cylinders of the other couple, permitting the web to be perfected.

The side frames **8** are preferably substantial duplicates of each other, and each comprises a member having a general shape of an inverted U, formed from a single slab of heavy metal having its two sides planed to make it of uniform thickness. The two side frames are preferably bored in superposed relation, all of the holes being bored without changing the relative position of the slabs, thereby insuring proper alinement of all the bearing mountings and other parts.

The bottom portion of the frame members **8** is preferably planed to provide a flat surface to rest against the bed frames **40** and to which the frame members **8** may be securely bolted. The frame members **8** are preferably spaced apart and held rigid with respect to each other by means of a tie-plate **41** extending between the inner sides of the frames. Tie-plate **41** is preferably positioned between and slightly below the impression cylinders **5**, and comprises a plurality of irregularly shaped bars extending the width of the press and formed integrally with a flange **42** at each end, flange **42** being bolted to the frame **8** by screws **43**. At their lower ends, the frame members **8** are braced and held rigid by means of the ink fountain, as will later be described in detail.

For driving each of the units, there is provided a gear unit **55**, positioned in line with the shaft **50** and at one side of the printing unit, and serving to drive the individual vertical drive shafts **110** from the main drive shaft **50**. Each of these gear units, as embodied, comprises a hollow casing **60**, more or less rectangular in cross section, supported on the outside of bed frame **40** and held in close contact therewith.

Immediately above gear unit **55** is provided a gear unit adapted to be driven from unit **55**, and serving to drive the inking mechanism later to be described. This gear unit comprises a housing **84** secured to the upper surface of housing **60**, the lower surface of housing **84** and the upper surface of housing **60** being machined to fit each other. Within housing **84** is mounted a worm preferably formed integral with its shaft **87** which extends above and below it.

For driving shaft **87** and its worm **86** from sleeve **70**, a bevel gear **95** is keyed to sleeve **70** and is driven and rotatably supported thereby, meshing with a bevel gear **96** secured to the lower end of shaft **87** and held in place by the capping plate **97**.

Worm **86** meshes with a worm gear **100** mounted to one side of worm **86** and having its shaft **101** extending at right angles to shaft **87**. Shaft **101** is rotatably journalled in the side frames of housing **84**.

An ink fountain is preferably provided for each of the printing couples, and is supported directly on the bed frames **40**. This fountain comprises a relatively long, shallow and narrow trough **129** extending from one side frame **8** of the press to the other side frame. At either end, the trough **129** is formed with a downwardly projecting portion **131** adapted to be bolted to the inner side of bed frame **40** by bolts **132**, and a narrow vertical web **133** is provided extending between the portions **131**, serving to support the bottom of the fountain. The bottom of the fountain preferably slopes very slightly towards the center and a drain plug **134** is provided which may be removed for thorough cleaning of the fountain.

At its ends, the trough is also fastened to the side frames **8** by means of laterally extending brackets **135** formed integrally with the trough **129** and screws **136** passing through the brackets **135** and threaded into the frame.

Within the trough, and dipping into the ink retained therein, is a fountain roller **140** comprising a hollow roller of substantialy the same length as the cylinders **5** and **6**, and provided with shafts **141** and **142** secured to opposite ends of the roller by flanges **143** and **144** formed integrally with

their shafts, these flanges being secured to the roller ends by screws 145 (Figs. 8 and 9). Roller 140 is rotatably mounted by means of its shafts 141 and 142 in roller bearings 146 which are seated in bearing sleeves 147 and 148 secured in the lower portions of the side frames 8. Bearings 146 on shaft 142 are held spaced apart by means of a spacing sleeve 149, and are held within the sleeve 148 by means of the retaining rings 150 and 151, these rings being secured to opposite ends of the sleeve 148 by screws 152. At the other end of the roller, the bearings 146 are mounted on shaft 141 and are spaced apart by means of a spacer ring 154, while the bearings are held together by shoulder 155 on shaft 141 with the inner portion of the hub of gear 156 keyed to shaft 141 and pressed inwardly by means of plate 157 and screw 158. Sleeve 147 is held in proper position in the frame 8 by means of screw 159 passing through the outer flange of sleeve 147 and threaded into the frame.

Means are provided for rotating the fountain roll 140 at a relatively slow speed, and for this purpose gear 160 keyed to the end of shaft 142 and secured thereon by cap 162, meshes with a gear 161 mounted on the end of shaft 101. The necessary slow speed of fountain roller 140 is obtained through the worm gearing 86, 100 and bevel gears 160 and 161. Gears 160 and 161 are housed within a housing 165 which also serves to support the ball bearings 166 at either side of gear 161, the outer bearing being secured in place against a shoulder near the end of shaft 101 by means of screw 167 and cap 168, which are accessible by removal of plate 169 secured to the end wall of housing 165 by screws 170.

Means are provided for removing surplus ink from the fountain roller 140 and for regulating the quantity of ink to be fed from it to the printing couple, and for this purpose a scraper blade 175, of conventional construction, is mounted above the fountain roller, and variably pressed into contact with the surface of the fountain roller by means of the usual columnar adjusting means 176.

Means are provided for transferring ink from the fountain roller to a series of ink forwarding and distributing rollers and drums which spread the ink into a uniform film and then apply it to the plates on the plate cylinder of the couple. As embodied, these transferring means comprise a freely rotatable ductor roll mounted in arms which are adapted to be oscillated, first pressing the ductor roll against the fountain roller and then pressing it into contact with an ink drum mounted above it.

Ductor roll 180 is provided at its ends with reduced end portions 181 which are journalled in suitable bearings 182 carried at the outer ends of arms 183 which are clamped to shaft 184. Shaft 184 is mounted in suitable bearings in the side frames 8, and at one end is provided with an arm 185 fixed to said shaft and projecting upwardly therefrom. Means are provided for oscillating shaft 184, and for this purpose a cam 186 formed integrally with a gear 187 is rotatably mounted by means of shaft 188 carried in ball bearings 189 seated in the frame 8, and bearings 190 seated in a suitable recess in the outer wall of housing 191 attached to the outside of frame 8. Gear 187 meshes with gear 156, keyed to the end of shaft 141 and is driven by rotation of fountain roller 140. Cooperating with cam 186 is a cam roller 192 freely rotatable on bolt 193 screwed into the end of yoke 194. Yoke 194 is provided with parallel guideways 195 which cooperate with a guide 196 freely rotatable on shaft 188, serving to hold yoke 194 against vertical movement. At its other end, yoke 194 is connected to a lever 198 freely oscillatable on shaft 184, the connection being effected through pivot pin 199. Movement of lever 198 is transmitted to arm 185 and thence to the ductor roller 180 by means of the opposed screws 200 threaded in lugs 201 which are formed integrally with a bracket 202 secured to the upper end of lever 198, the inner ends of these screws being adapted to be tightened against a bolt 502 fixed in the upper end of arm 185 to vary the angular position of the ductor roll 180 and thereby accommodate different sizes of rollers. After suitable adjustment, screws 200 and bolts 502 are tightened to securely hold arms 185 in proper position. Means are provided for pressing cam roller 192 against the surface of cam 186, and for resiliently pressing roller 180 into contact with fountain roller 140. For this purpose, a rod 205 is slidable in a cylindrical bore 206 formed in guide 196, and at its other end rod 205 is pivotally connected with yoke 194 by means of a screw 207 passing through an eyelet 208 at the end of rod 205. A helically coiled spring 209 encircles rod 205 and is compressed between eye 208 and guide 196, and slides back and forth on said rod as yoke 194 is reciprocated by cam 186.

An inking drum 210 is rotatably mounted by means of its shafts 211 which are rotatably journalled in the side frames 8, the inner ends of these shafts being provided with flanges 212 which are bolted to the drum body 210 by screws 213. Immediately above drum 210 is a similar drum 215, of slightly larger diameter, similarly mounted by means of its shafts 216, rotatably journalled in the side frames 8 and secured to the drum body by flanges 217 and screws 218.

Means are provided for rotating drums 210 and 215 by rotation of the cylinders of the printing couple, and for this purpose a gear 219 is formed integrally with the gear body of gear 34 or 36, at one end of the plate cylinder 6 of each couple. Gear 219 meshes with an intermediate gear 220 which in turn meshes with a gear 221 rigidly secured to the end of one shaft 216 by key 222 and cap 223. Gear 221 drives a pinion 224 rotatably mounted by ball bearings 225 on stud 226 projecting laterally from the side frame 8. Drum 210 is rotatably driven through its shaft 211 by means of gear 230 rigidly secured on the end of one shaft 211 by key 231 and cap 232, which meshes with idler 224. Preferably, cylinder 6, drums 215 and 210, rollers 180 and 140 have their axis in substantially the same vertical plane.

Means are also provided for vibrating inking drums 210 and 215 as they rotate to facilitate uniform distribution of the link on said drums, and for this purpose the shafts 211 and 216 are slidable in their respective bearings 235 and 236 in side frames 8, and gear 220 and idler 224 have sufficiently wide teeth to rotatably drive drums 210 and 215 as these drums are vibrated. At their ends opposite the gears 221 and 230, the shaft ends of drums 210 and 215 are of reduced diameter and are each provided with a bushing 238 fitted to the reduced shaft end and provided with an annular flange 239 of larger diameter formed integrally with the bushing 238. An outer circular plate 240 is provided and is held tightly against the bushing 238 by means of a screw 241 passing through the center of the plate and threaded into the shaft end. Positioned between

plate 240 and flange 239 is a collar 242, and these collars for shafts 211 and 216 are pivotally connected to the opposite ends of bell crank 243 by means of pivot pins 244, projecting radially inwardly into suitable sockets in collars 242, and secured in the outer forked ends of bell crank 243. Bell crank 243 is pivotally mounted intermediate shafts 211 and 216 by means of a pivot pin 245 which is supported in bracket 246 secured to the outside of side frame 8. Bell crank 243 is formed with a laterally projecting arm 247 which is pivotally connected with link 248 by means of pivot pin 249, passing through an aperture in the upper end of link 248 and through similar apertures in the outer ends of forked arm 247.

Link 248 at its lower end is enlarged to form an eccentric strap 251 cooperating with eccentric 252 keyed to shaft 101 and driven thereby so that as the inking mechanism is driven, link 248 is reciprocated, causing vibration of inking drums 210 and 215.

Means are provided for transferring ink from drum 210 to drum 215 and from drum 215 to the plates on plate cylinder 6, as well as for distributing the ink on drums 210 and 215. For this purpose, transfer rollers 260 and form inking rollers 261 and 262 are rotatably mounted, each transfer roller contacting with drums 210 and 215, while the form inking rollers 261 and 262 contact with drum 215 and the plates on plate cylinder 6.

Means are provided for rotatably supporting the transfer and form inking rollers, and for minutely moving them with respect to either or both of the cylinders with which they contact. As embodied, these means preferably comprise a small frame 265 having a general U-shape, on one side of which is formed a socket for receiving ball bearings at the end of a roller, and this socket is preferably made in separable halves 266 and 267, one of which may be formed integrally with frame 265, while the other half is secured to the first half by means of studs 268 and extension wing nuts 269, studs 268 being threaded into the sides of socket member 266 and passing through a slightly larger aperture at the sides of socket member 267.

Socket members 266 and 267, when held together form a cylindrical socket having beveled side walls into which may be closely fitted the ball bearing assembly on the end of the roller shaft. This ball bearing assembly comprises a self-aligning ball bearing 270, the inner race of which has a slightly tapered bore, and is fitted on to cone 271 which, in turn, is closely fitted on the reduced end portion 272 of the roller shaft, and is held against shoulder 273 by threaded collar 274 which is screwed on the threaded outer portion 275 of the roller shaft. The outer race of ball bearing 270 is seated within a cylindrical carrier 276 having a beveled outer wall, and is retained therein by a collar 277 screwed to carrier 276 by screws 278. Suitable lubricant retaining rings 280 are provided in members 276 and 277 and cooperate with collar 274 and a reduced portion of the roller to retain lubricant within the bearing, and lubricant may be introduced into the bearing through nipple 281 and passageway 282. At its extreme end, the roller shaft is provided with a relatively wide groove 284 which may be engaged either by a hook or by the operator's hand in moving the roller, and this extreme end of the shaft is received within the U of the frame 265, also providing a surface to engage with the lower guiding surface 285 on the frame 265 and by which the roller may be pushed into operative position.

Means are provided for relatively moving the roller body 260 or 261 with respect to the cooperating cylinders or drums, for varying the pressure between the roller and the cylinder or drums, and thereby evenly distributing the ink on the drums. For this purpose, the legs of the U-shaped frame are provided with openings 288 having guideways 289 along their sides, and cooperating with a rectangular block 290 slidable in the opening and secured to the side frame of the press by bolts 291. Guide blocks 290 are threaded to receive the threaded end of screw 292 which is rotatably mounted in an aperture at the outer end of the frame 265, and is held against axial movement with respect to the frame by means of collar 293, fast on the shank of screw 292, and head 294. By turning the head 294 of screw 292, guide block 290 is moved within its guideway, pivotally moving supporting frame 265 and roller 260 about the other bolt 291 as a pivot, or by simultaneously moving both screws 292, both ends of the frame 265 are simultaneously moved with respect to their guide blocks 290, and the frame 265 and roller 260 is thereby moved inwardly or outwardly.

Means are provided for continuously circulating a relatively large quantity of oil or other lubricant, and for continuously supplying oil to all of the principal bearings and to all of the gear meshes while the press is in operation.

As embodied, the bottom of the oil tight housing 60 encloses an oil pump which is submerged in the oil in said housing. This pump is driven from the main shaft and delivers oil under pressure to pipe 316 which is connected to pipes 317 by a T, and each pipe 317 is connected to a vertical pipe 318 extending upwardly on the left hand side of the press at one end of each plate cylinder and its cooperating inking drums. The oil supply pipe 318 extends vertically upward, and from it oil is supplied to bearings 16 for impression cylinder 5 by pipe 320, to housing 115 through pipe 321, to gear 130 through pipe 322 and thereby to gears 30 and 31, and also to gears 117 and 130 (driven from gear 117) through pipe 333.

A gear housing is provided which, together with the side frame 8 on the left-hand side of the press, completely encloses gears 30, 31 and 130 and, as embodied, comprises the sections 340, 341, 342, 343 and 115, which are tightly fitted together in oil tight relation and secured together by bolts 344, and to the frame 8 by screws 345. These sections, taken together, are somewhat larger than the outside of gears 30, 31 and 130, and serve to retain and collect the oil supplied to the gears as it flows from these gears.

The oil supplied through oil pipes 320, 321, 322, 333 and 336 is fed to various drive shaft and cylinder bearings, and the excess flows into the lower portion of housings 340 and 343.

For lubricating the vibrator yoke and bearings for the ink drums, the lower portions of housings 340 and 343 are connected with drain pipes 368, extending downwardly and tapped into the upper walls of the vibrator housings 371. At 372, the wall is enlarged and formed with a tubular passage 370 which is provided with an aperture 373 directly above shaft 216, and is supplied with oil under pressure from pipe 370', so that oil flowing through the aperture 373 is collected and caught in cup 374 formed at the top of collar 242. Cup

374 communicates with the oil ducts 375 leading to oil grooves on pins 244, and also communicates with duct 376 which lubricates sleeve 242 on bushing 238.

For supplying the upper ink drum bearing 236 with oil, channel 360 is connected to passage 370 and communicates with the pockets 361 formed in the side frame 8. The outer and upper portion of the bearing bushing 236 extends upwardly across the outer face of the pocket 361 to retain a considerable amount of oil within the pocket, and the lower portion of the pocket communicates with an oil duct 362 leading to an oil hole and groove 363 in the bushing. At its inner end, bushing 236 is provided with an oil packing ring 365 retained in place by flange 366 screwed to the frame, and drained by pasageway 366'. Lower bearing 235 is similarly supplied with oil from ledge 381 through pipe 360'.

A second oil hole 380 is also provided in the wall 372, and the oil flowing through hole 380 is caught on a narrow U-shaped ledge 381 formed integrally with and extending inwardly of housing 371, which also catches the oil from pipe 368. Ledge 381 is provided with holes 384 through which oil flows and is caught in pockets 385 formed on the upper surface of arms 247 of bell crank 243, which pockets supply oil to oil grooves 386 on pin 249. At its sides, ledge 381 is provided with oil holes 387 through which oil flows and is caught by pockets 388, formed in bracket 246 and supplying oil to oil grooves 390 on pin 245. The surplus oil supplied to pocket 385 flows over the inner edge thereof and is supplied to a pocket 391 communicating with the oil tube 392 through which oil flows and is supplied to the cup 374 on the lower collar 242. The construction of the lower collar 242 is the same as that of the upper collar 242, and will not be described in detail.

The vibrator housing 371 is supported on and closely fitted to housing 395 enclosing the fountain roller driving gears, and housing 395 is formed with an upper wall 396 on which the surplus oil from pockets 361 and holes 373 and 380 accumulates. This wall 396 is apertured to provide an opening through which extends the link 248, and the surplus oil flows over the edge of this aperture into cup 398 formed on the lower portion link 248 and above the eccentric strap 251, communicating with the eccentric by means of oil duct 399. The oil flowing over plate 396 collects in the bottom of the housing 395 and gear 160 dips into this mass of oil as it rotates, and a sufficient quantity of oil is always maintained in the housing to bring the oil level above the bottom of bearings 146, while leakage of the oil through the bearings is prevented by packing ring 400.

Means are provided for withdrawing surplus oil from the housing 395 and returning it to the reservoir in the bottom of housing 60, and for this purpose an overflow pipe 401 is tapped into the outer wall of housing 395, and is connected to a horizontal pipe 402 which returns the oil through pipe 403, and hand hole cover 404, covering an aperture 405 formed in the outer side wall of housing 60.

The bearings and gear meshes on the right-hand side of the press are also supplied with oil by pump 311', which supplies oil under pressure to pipe 317' which in turn is connected with vertical pipes 410, one for each couple, extending upwardly on the outside of the side frame 8 and adjacent to the right end of the ink drums and plate cylinder. Pump 311' is mounted in a sump 446' and is driven from gear 156 through idler 451. As embodied, pipe 410 delivers oil under pressure to pipes 411 and 412 supplying oil to the plate and impression cylinder bearings. Pipe 410 is also connected with pipe 414 terminating at a point slightly below the mesh of gears 33 and 34 or 35 and 36, and oil is supplied to the mesh between gears 219 and 220 or 219' and 220 by a pipe 415. Pipe 416 is positioned immediately below gear 220 and delivers oil to the mesh point between gears 220 and 221, while pipe 417 supplies oil to the mesh between gears 221 and 224 and pipe 418 supplies oil to the mesh between gears 224 and 230.

Oil is supplied to the bearings for idler gear 224 through pipe 420 which passes through the side wall of casing 421 enclosing the inking drive gears and is connected to the end of stub shaft 226 to communicate with passageway 422, which, in turn, communicates and supplies oil to oil groove 423 and bearings 224 and 225. A similar oil pipe 425 is provided for supplying oil to the bearings for gear 220 which may be similarly mounted.

The upper oil pocket 361 on the right hand side is supplied with oil from the oil pipe 425 which feeds oil to oil pipe 410' for shafts 211 and 216. Inasmuch as these oil pockets are similar to those at the left-hand end of the shafts, they will not be again described in detail. The lower oil pocket 361 on the right side is supplied with oil from pipe 420' which is in communication with oil passageway 422.

The surplus oil supplied to the gears through pipes 414 and 415 is retained adjacent to the gears by the gear housing 427 secured to the outside of the press frame 8 and enclosing the gears, and at its lower end is open to communicate with the open upper end of the housing 421. Housing 421 is also supported on press frame 8 and is bolted to the upper flat surface of a housing 428 enclosing gear 230 and the fountain roller and ductor gears. In its upper portion housing 428 is provided with a concave wall 430 extending around the lower portion of gear 230, and forming with the side frame of the press and web 431 an oil pocket which retains a considerable amount of oil and provides an oil bath for gear 230. Near its bottom, wall 430 is apertured to receive a pipe 432 which takes oil from the oil bath and leads it to an oil pocket 434 formed at one corner of the casing 191 and provided with an oil hole 435 through which oil drains to the bearings on shaft 184.

Means are also provided for continuously supplying oil to the ink vibrating mechanism and for this purpose the excess oil supplied through pipes 414, 415, 416, 417, 418, 420, 425, and 426 collects in the pocket formed by wall 430, and the excess oil which is not drained off through pipe 432 flows over the upper edge of web 431 and through passageway 436 and on to the horizontal web 437 extending from the outer wall of housing 428 to a point closely adjacent to the side frame 8. Web 437 is apertured at 438, and the oil accumulating on the surface of the web drips downwardly into a pocket 439 extending longitudinally of and formed as an integral part of the yoke or link 194. Longitudinal pocket 439 is divided into two end-to-end sections by means of a web 439' extending between the side walls 440 of the pocket, and the excess oil flowing into the left-hand portion of pocket 439 flows over the web 439' and into the right-hand pocket 439, these pockets supplying oil holes 443 and 441

respectively. Housing 428 is oil tight and encloses all of the feed roller vibrating mechanism, and its lower wall is provided with a drain plug 442 which may be removed for changing the oil.

As the surplus oil accumulates in the bottom of the housing 428, the excess is drained off through pipe 445 which extends to one end of the unit and is inclined downwardly towards sump 446' within which is located the right hand press driven pump. This oil collects in the bottom of housing 428 below the level of drain pipe 445 and provides an oil bath for the feed roller vibrating mechanism, as well as the fountain roller bearings 146, the oil being retained within the bearings by means of oil-tight packing ring 446. In the rear housing 428, bearings 146 are lubricated by oil flowing through oil groove 447.

Suitable oil pressure gauges 448 may be provided for indicating proper functioning of the oiling system.

Means are provided for lubricating the ductor roller bearings at the ends of shaft 181, and for this purpose grease fittings 450 are provided threaded into the bearings 182 and through which grease may be supplied for this bearing.

By reason of the present invention, the units may be easily disassembled for shipment and may be easily erected in the field with the certainty that the parts will be properly fitted. After the press has been completely assembled, as in the factory, it may be prepared for shipment, as follows: The main driving shaft 50 with its bearings and the main driving gears within housing 60 are removed as a unit. The upper portion of housing 342 is removed, the outer part 115 of the housing is removed and drive shaft 110 may then be removed.

Thereafter, the cylinders 5 and 6, with their gears, bearings and impression adjustment may be lifted after removal of bearing caps 26. The ink drum shafts 211 and 216 are unbolted from the drum bodies 210 and 215, and the frames are moved apart to permit removal of the fountain roller body and the drum bodies 210 and 215. In this manner, the principal bearings and gear meshes are not disturbed, and there can be no danger of improper setting of the gears or bearings when the press is reassembled for use. When disassembled, the parts are very compact, not unduly large or heavy, and none of the parts require unusual care in shipment, thereby avoiding the expense which has heretofore been necessary in completely disassembling and reassembling the parts of the press.

Means are also provided for optionally and alternatively running either printing couple in the reverse direction whereby each unit may print one side of a web in two colors, and by running the web through two printing couples, the web may be printed three colors on one side and one color on the other, or may be perfected in two colors. As embodied, a stub shaft 461 is provided, projecting outwardly from the right hand side frame 8, and positioned medianly between gears 33 and 35. Shaft 461 is adapted to rotatably support an idler, meshing with gears 33 and 35, and when used, causes all of the cylinders to be driven from gear 34 or gear 36.

After the idler gear has been put in place, gear 31 may be removed from its shaft, so that the couples are driven from gear 130, through gears 30 and 36.

When reversing either of the couples, it is not necessary to make any changes in the inking apparatus as the drums, rollers and fountain roll always rotate in the proper direction with respect to their respective plate cylinders.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. In an inking mechanism for printing presses, the combination of ink drums and bearings for rotatably supporting them in a frame, means for vibrating said drums, a plurality of oil cups communicating with the bearings and arranged at different levels, means for circulating oil and supplying it to certain of said uppermost cups and means for conducting the overflow from said uppermost cups to the remaining cups.

2. In a printing press, the combination of a side frame, vibratable ink drums and bearings for rotatably mounting the drums in said frame, a fountain roller journalled in said frame, means for driving said roller and vibrating said drums, a housing covering the vibrating means, means for continuously circulating and supplying an excess of oil to the upper bearings for said drums and vibrating means, and for directing the excess oil to the lower bearings for said vibrating means, said housing collecting the excess oil to form an oil bath for the fountain roller bearing and driving gears.

3. In a printing press, the combination of an ink trough, a fountain roller running in said trough and having detachable shaft ends and side frames in which said ends are journalled, the journals being removable and of sufficient diameter to permit removal of the shafts by endwise movement through the frame.

4. In an inking mechanism for printing presses, the combination of an ink drum rotatably journalled in a frame, a fountain roller parallel to said drum, a drive shaft for driving said fountain roller, a ductor roll transferring ink from said roller to said drum, means for operating said ductor roll from the fountain roller, a cam carried by said shaft and means interconnecting said drum and cam for vibrating said drum.

5. In a printing press, a pair of spaced side frames, a fountain roller, an inking drum and shafts detachably secured to the ends of the roller and drum and rotatably journalled in the side frames, all of said shafts being axially movable whereby the roller and drum bodies may be removed without removal of said shafts.

6. In a printing press, a pair of spaced side frames, a fountain roller and inking drums, shafts having flanged ends detachably secured to the ends of the roller and drums and rotatably journalled in the side frames, said drum shafts being vibratable, and axially removable bearings for the fountain roller shafts permitting endwise movement of the roller shaft ends relative to the frames whereby the roller and drum bodies may be removed by endwise movement of the shafts without removal of said shafts.

7. In a printing press the combination of a printing couple, inking mechanism for the couple including a fountain roller and vibratable inking drums, a main drive shaft, a unit drive shaft driven therefrom, a shaft extending to said fountain roller, worm gearing driving said last shaft from the unit shaft, an eccentric on said

last shaft for vibrating said drums and means for driving said drums from said couple.

8. In a printing press the combination of a printing couple, inking mechanism for the couple including a fountain roller and a vibratable inking drum, a main drive shaft, a unit drive shaft driven therefrom, a shaft extending to said fountain roller, worm gearing driving said last shaft from the unit shaft, an eccentric on said last shaft for vibrating said drum, a ductor roll and means driven by the fountain roller for oscillating the ductor roll and means for driving said drum from said couple.

9. In a printing press the combination of a printing couple, inking mechanism for the couple including a fountain roller and a vibratable inking drum, a unit drive shaft, a shaft extending to said fountain roller, gearing driving said last shaft from the unit shaft, an eccentric on said last shaft for vibrating said drum, a ductor roll and means driven by the fountain roller for oscillating the ductor roll and means for driving said drum from said couple.

10. In a printing press, a cylindrical body to be removed from the press, flanged shaft ends detachably secured to the body, bearings for the shaft ends and in which the shaft ends are axially movable when detached from the body, whereby the body may be removed without removal of the shaft ends.

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