Oct. 31, 1950 F. M. CARROLL ET AL 2,528,420

SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 1

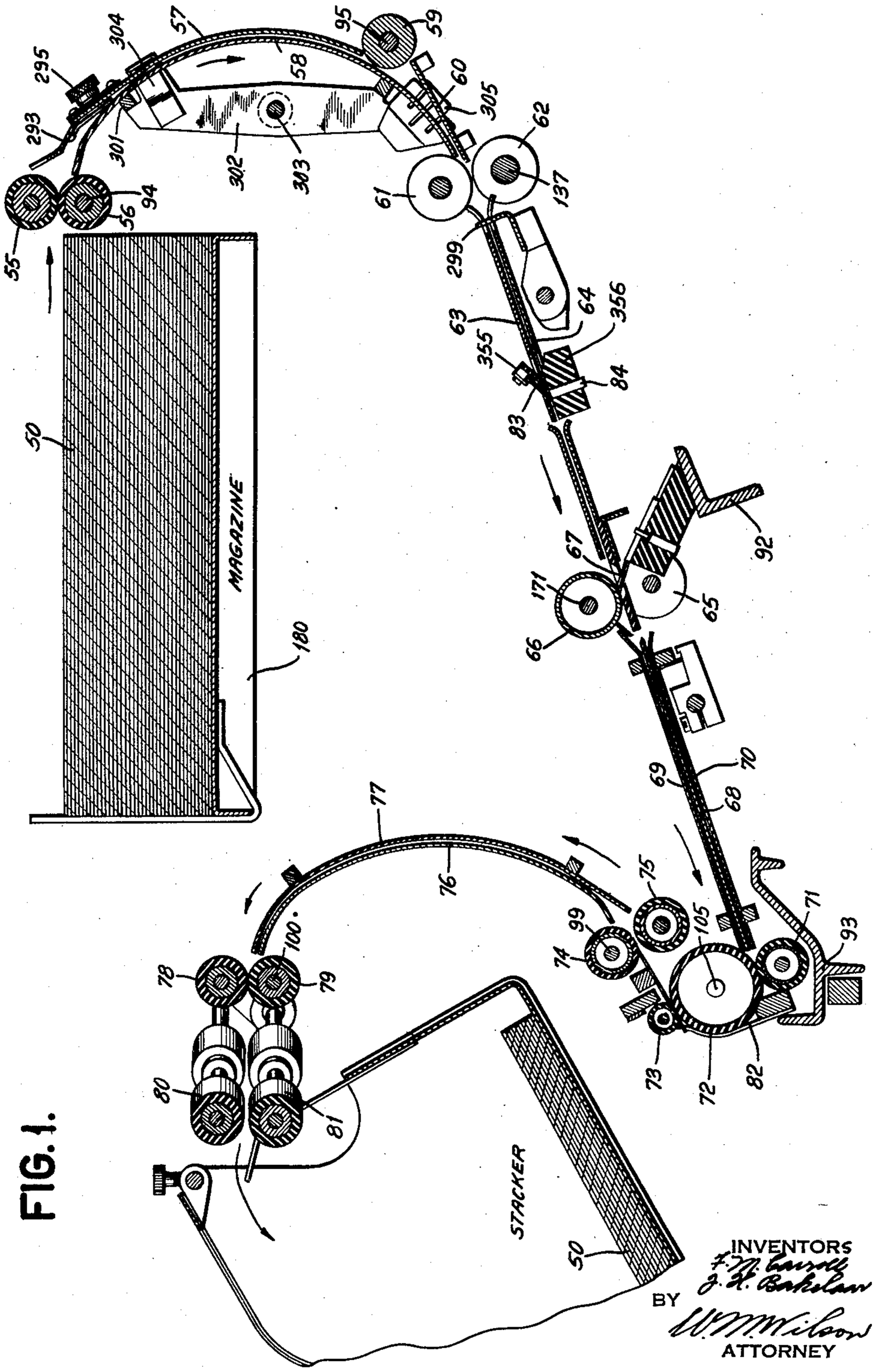

FIG. 1.

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SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 2

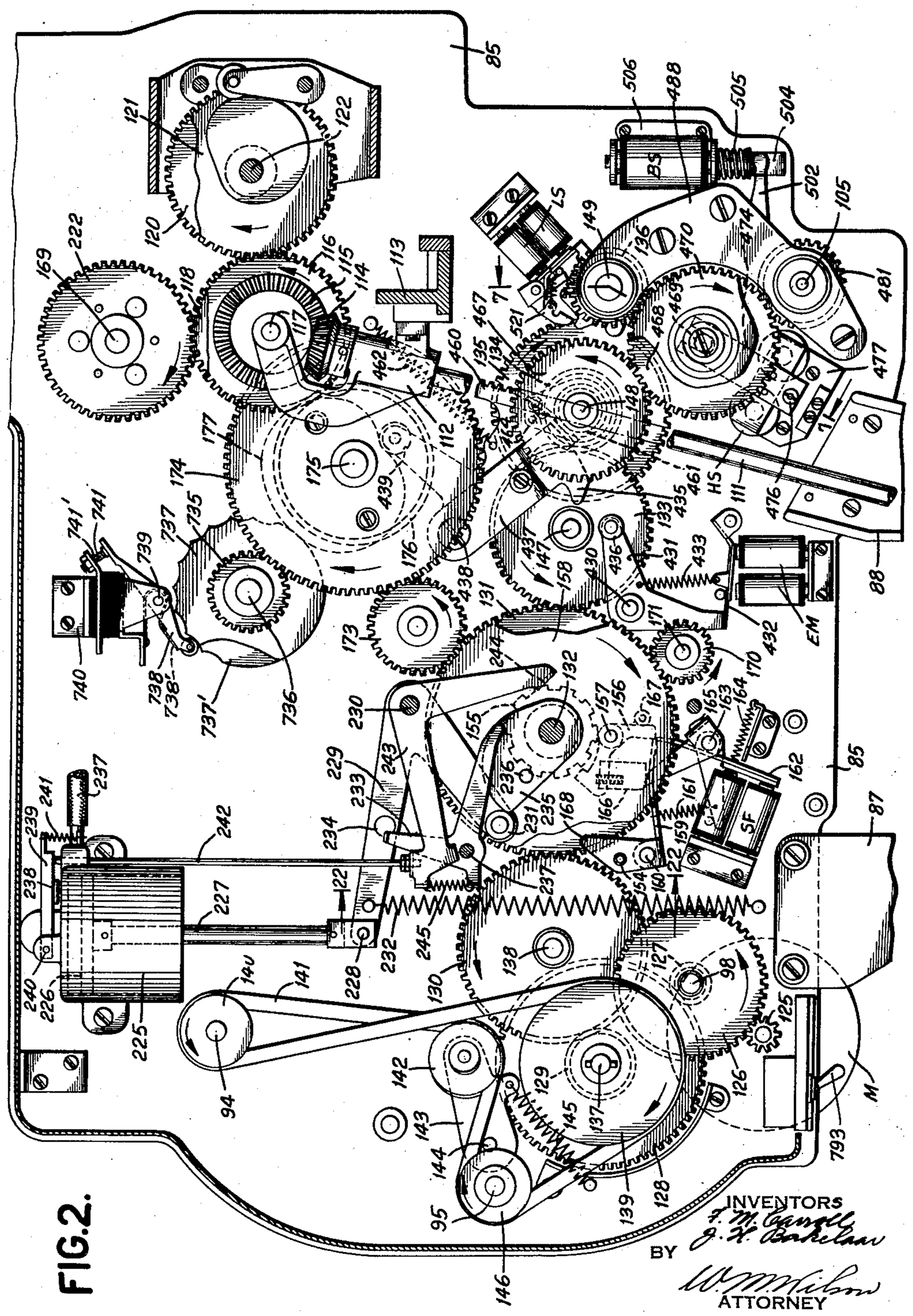

FIG.2.

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SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 3

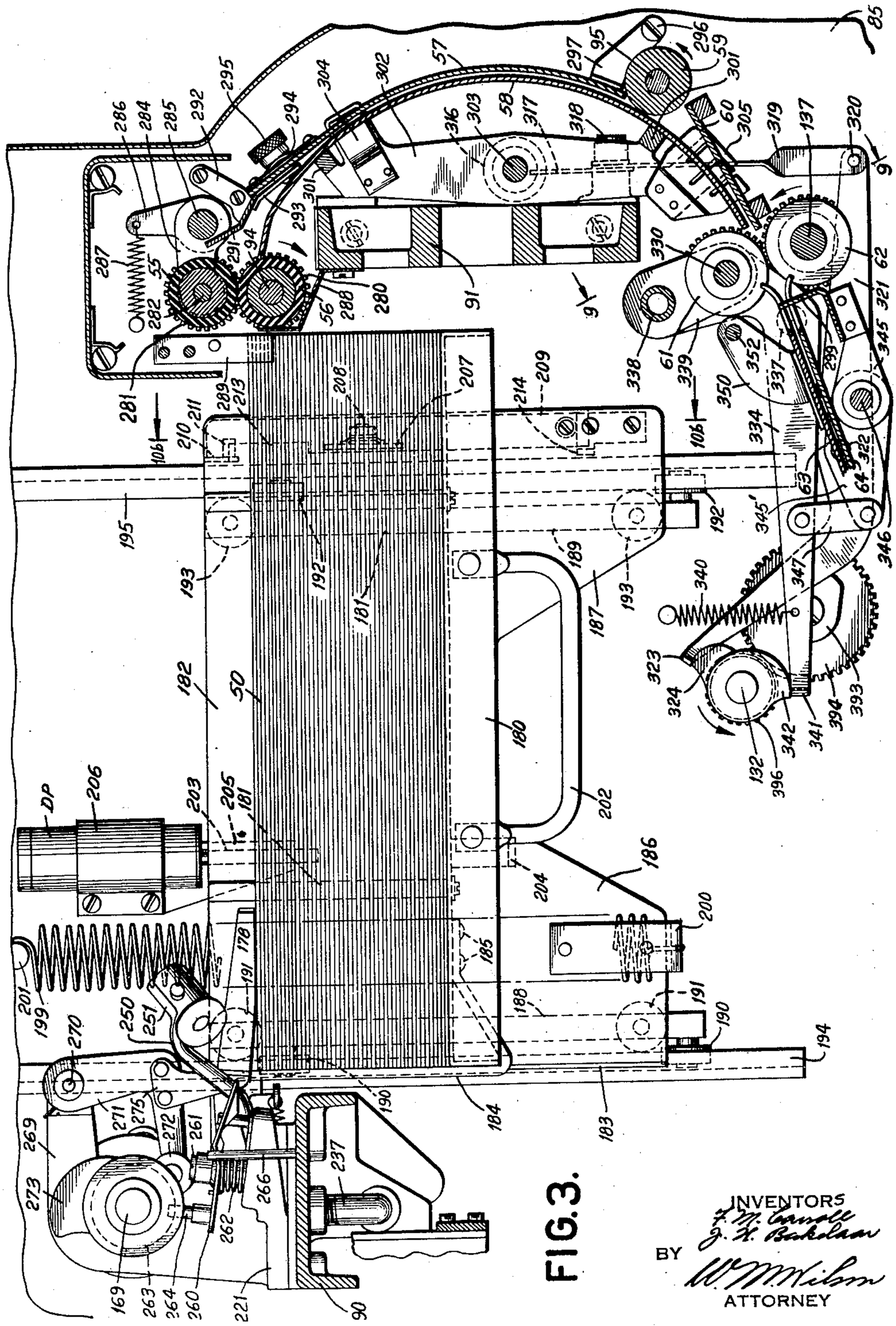

FIG. 3.

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SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 4

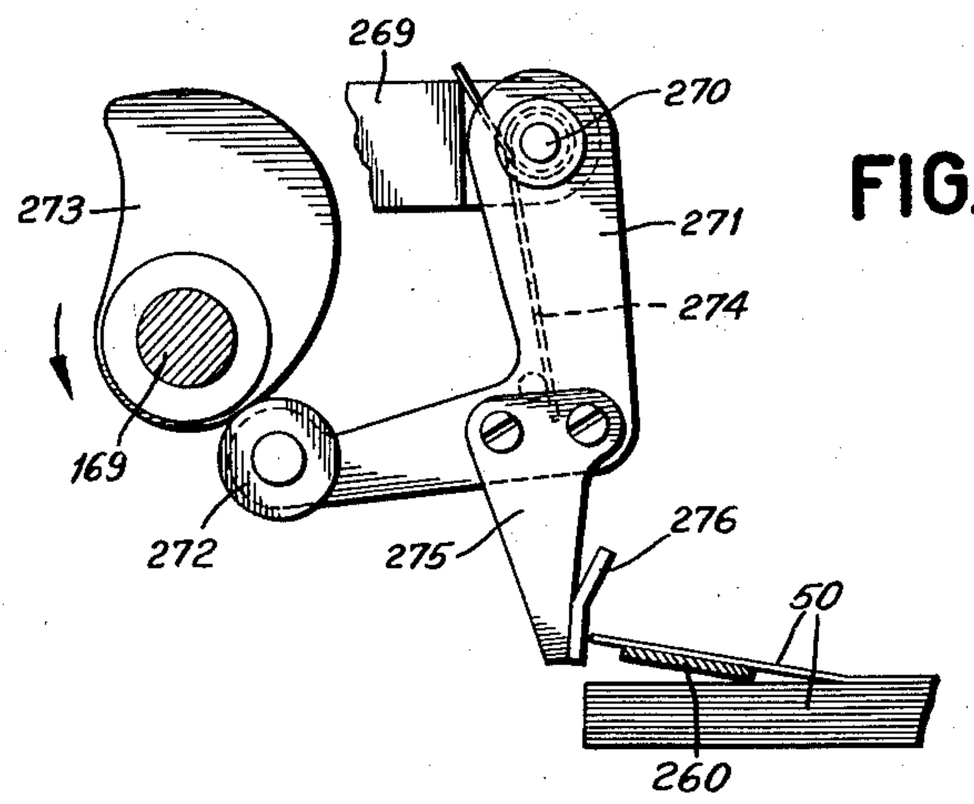


FIG. 4.

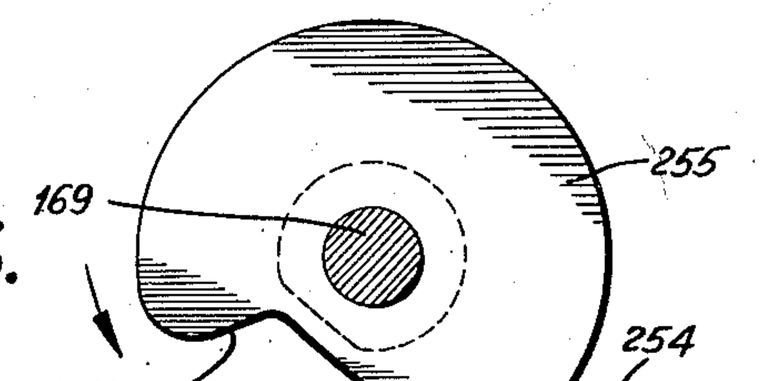
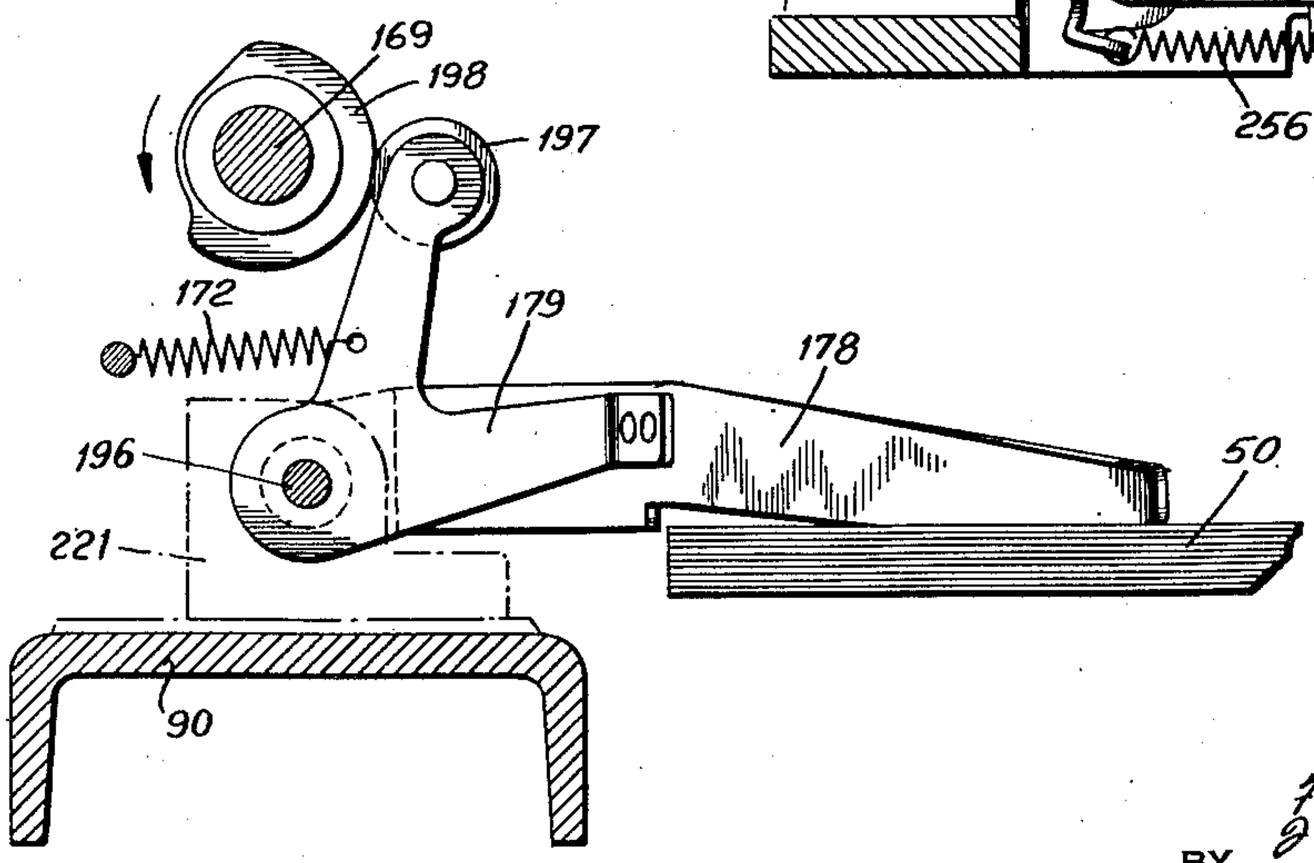


FIG. 5.

FIG. 6.



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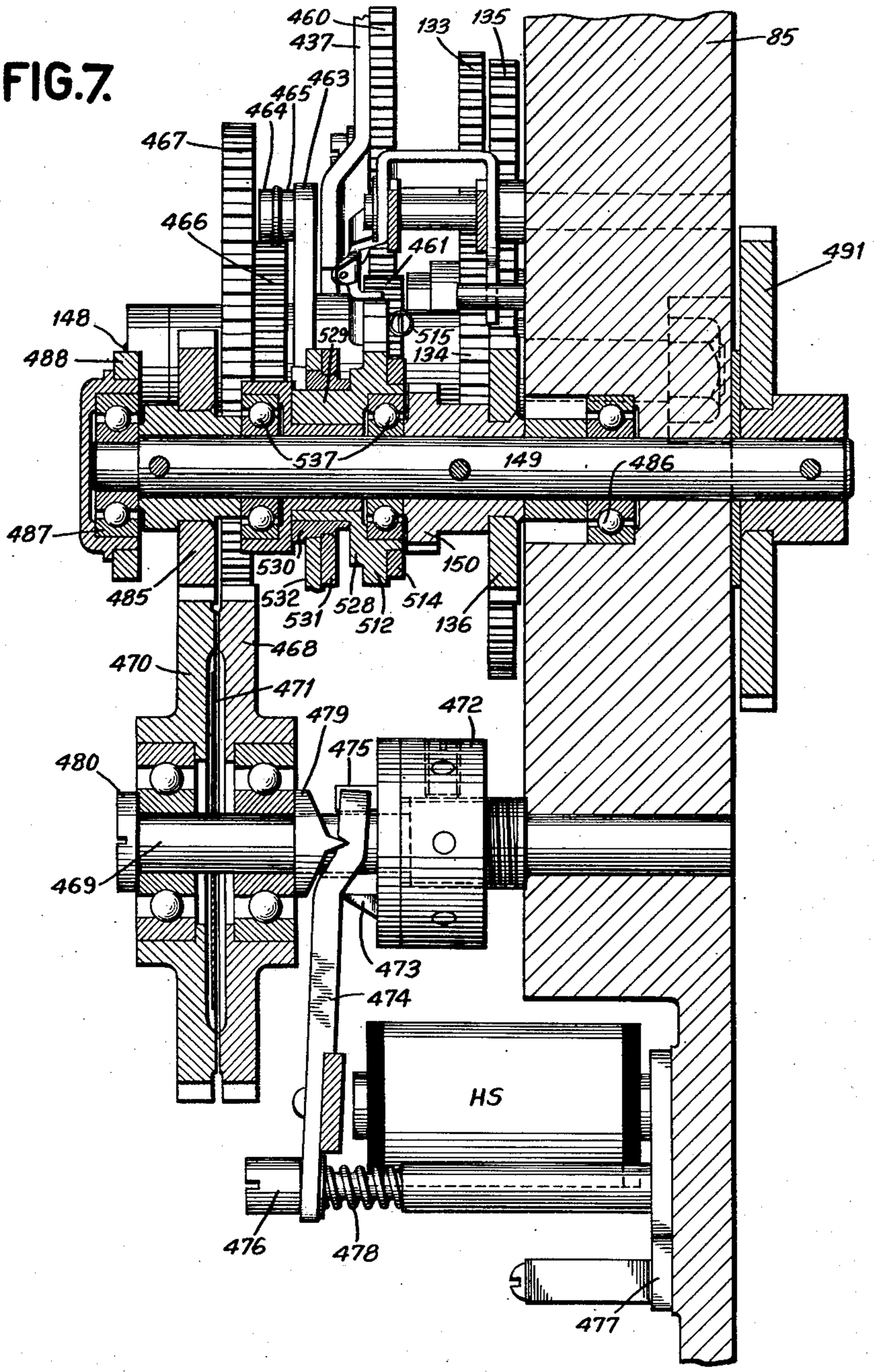
SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 5

FIG.7.



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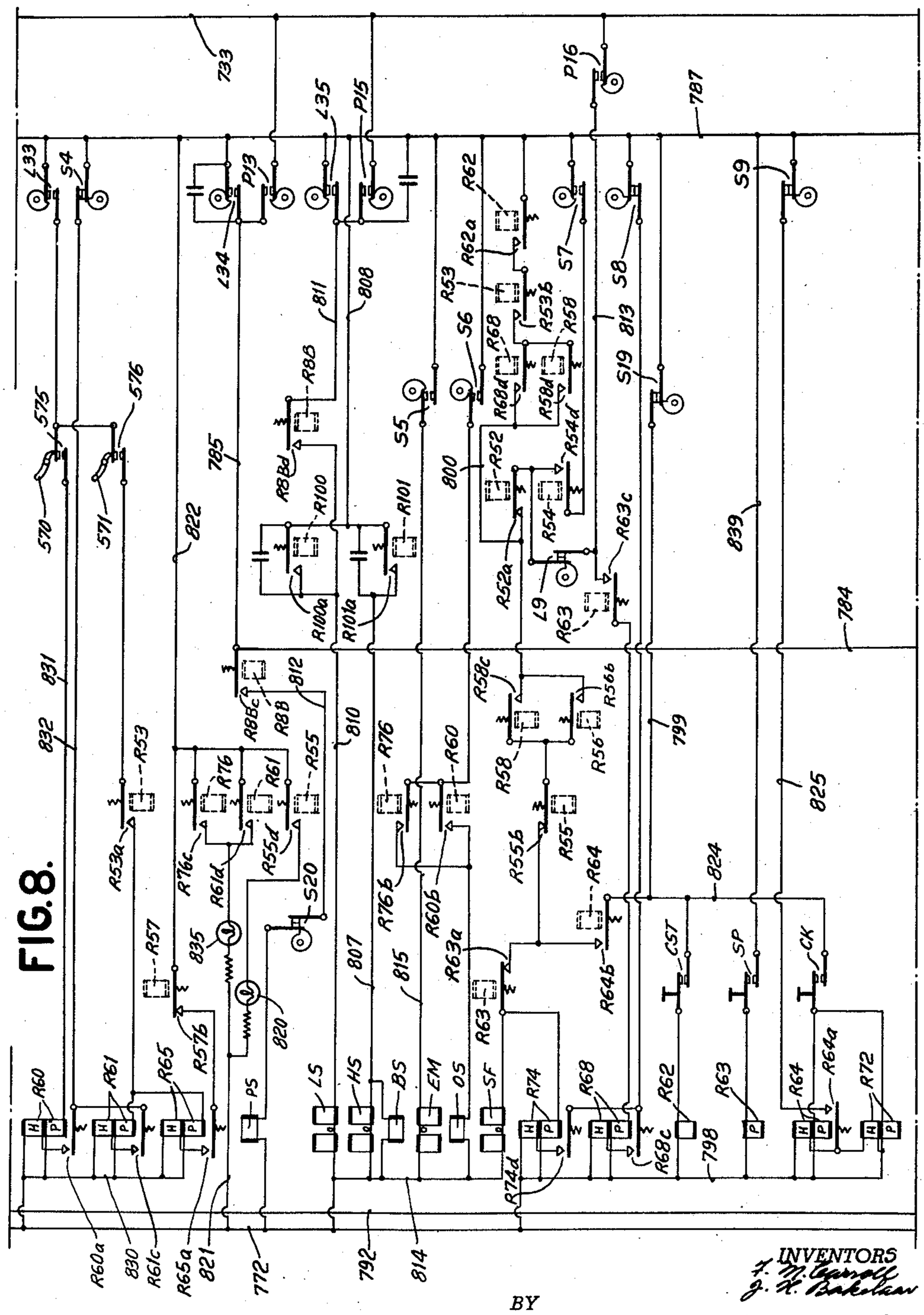
SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 6

FIG.8.



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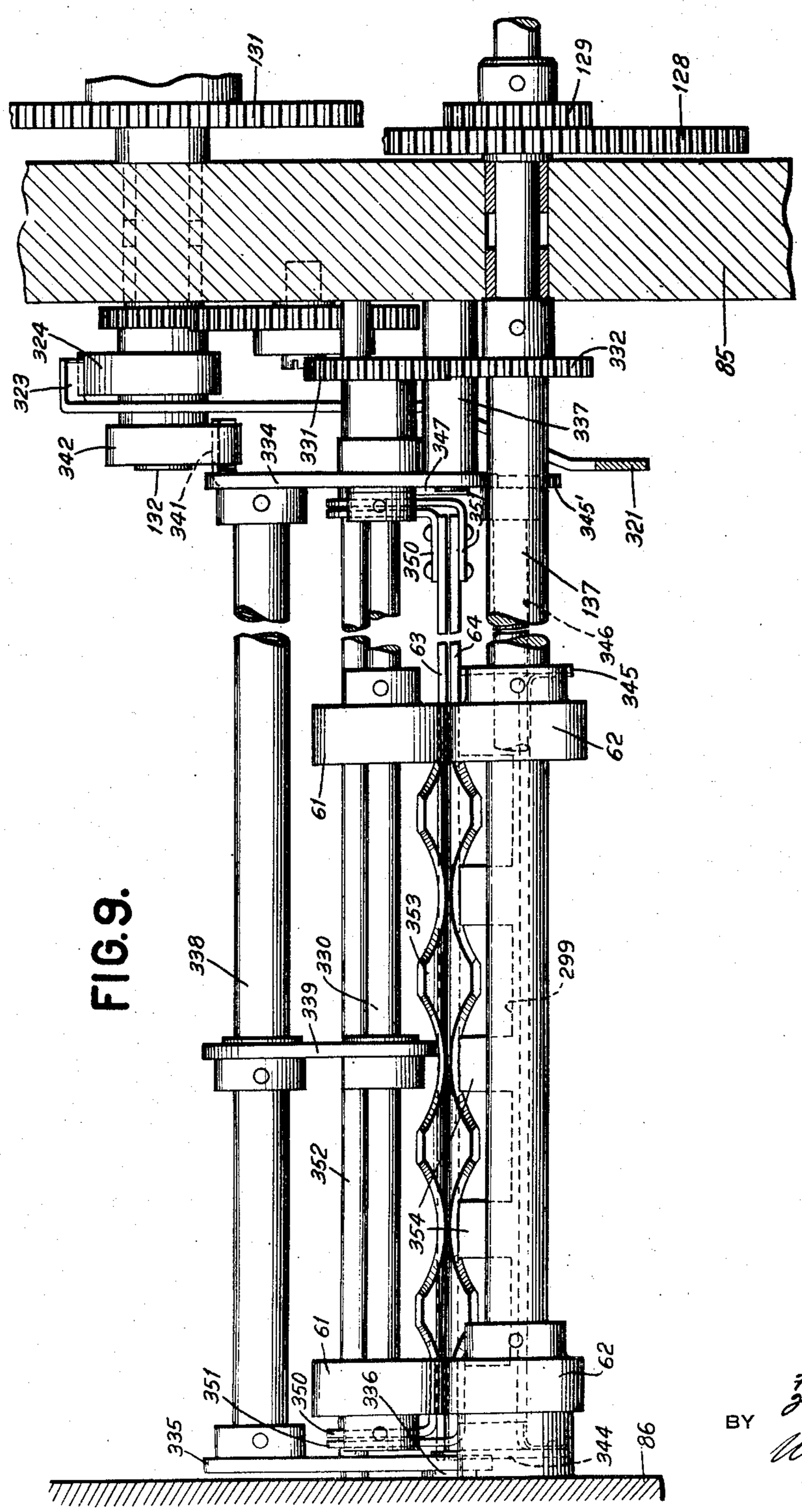
SHEET FEEDING DEVICE

Original Filed May 3, 1941 7 Sheets-Sheet 7

FIG. 9.



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Patented Oct. 31, 1950 2,528,420

UNITED STATES PATENT OFFICE

2,528,420

SHEET FEEDING DEVICE

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Original application May 3, 1941, Serial No. 391,732. Divided and this application December 17, 1945, Serial No. 635,556

2 Claims. (Cl. 197—130)

1

This application is a division of the copending parent application of Fred M. Carroll, John H. Bakelaar and William B. Pond, Serial No. 391,732, filed May 3, 1941, now U. S. Patent No. 2,442,970, issued June 8, 1948.

This invention relates generally to paper feeding devices and more particularly to mechanism for advancing record sheets one by one, to, and around, an impression receiving platen.

An object of the invention is the provision of improved means for feeding record sheets to an impression receiving position.

Another object of the invention is the provision of means for advancing sheets one by one from a magazine and locating them by a stop or detent before they are advanced to a print receiving position on a platen. An ejector with a suction lifting device is provided to lift the sheets one by one out of the magazine and put them singly in feeding rollers to be carried to the platen. At an intermediate stage between the magazine and the platen, the aligning or positioning stop is engaged by the front edge of the sheet and the sheet is thus held at a fixed distance from the platen before the resumption of feeding. A train of actuating connections is present between the platen and stop operator to control them in synchronism. The stop and an intermediate feed roller are coordinated for alternate engagement with the sheet to stop it and feed it by connected movements.

An object of the invention is to provide common carrying and operating means for a sheet stop or detent and a sheet feeding device.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a diagrammatic side elevation view showing the path taken by the ledger sheets in moving from the magazine past the platen and into the stacker.

Fig. 2 is a side elevation view disclosing the driving connections of the sheet feeding devices.

Fig. 3 is a sectional elevational view taken through the magazine and ejector mechanism and the path taken by the sheet up to the intermediate stopping position.

Fig. 4 is a detail view of the sheet pushing device for advancing the top sheet from the magazine into the first set of feed rollers.

Fig. 5 shows the cam and associated controls

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for operating the suction devices which serve to lift the corner of the top sheet in the magazine.

Fig. 6 is a detail view of the sheet depressing member used to hold the sheets down in the magazine while the corner of the top sheet is lifted.

Fig. 7 is a sectional view taken along line 7—7 in Fig. 2 and illustrating the line spacing and high speed drive connections to the platen.

Fig. 8 is a portion of the wiring diagram showing the connection of the high speed control magnet HS and the sheet feed control magnet SF as they are connected for initiation of the sheet advancing operations.

Fig. 9 is a rear view taken along line 9—9 in Fig. 3 and showing the sheet stop and associated feed rollers.

The main purpose of the feeding devices is to select and move a ledger sheet 50 (Fig. 1) to the correct printing position as rapidly as possible.

In the diagrammatic view (Fig. 1) is shown the path followed by the ledger sheet 50 in going from the magazine to the stacker. The top sheet is pushed to the right into engagement with the first set of feed rollers 55 and 56 and is then curved downward to a substantially upright position and toward the front by a pair of guides 57 and 58. An auxiliary roller 59 and a flat guide 60 direct the sheet into a second pair of rollers 61 and 62. Roller 62 is on a fixed pivot 137 but the upper roller 61 is liftable relative thereto and provides an opening at the same time that a stop or detent 299 is projected into the path of the sheet. As the stop 299 is lowered or withdrawn, the roller 61 is moved in synchronism therewith to drop into operative contact with a sheet 50 and provide feeding means in cooperation with the lower roller 62.

After leaving the second set of feed rollers, a sheet continues forward and downward in a straight path between guides 63 and 64. The sheet is next drawn between feed rollers 65 and 66. Advancing further, the sheet passes along one of two alternate paths defined by a separation plate 68 and two outer guides 69 and 70. As the sheet passes around the front of a platen 72 on platen shaft 105, it is held thereon by curved guide wires 82 and pressure rollers 71 and 73. In going upward the sheet is elevated by ejection feed rollers 74 and 75 and its rearward movement is reversed by curved guides 76 and 77 which direct the sheet between ejecting rollers 78 and 79 which throw the sheet into the stacker box.

During a normal printing operation, three sheets are in the course of advancement from

the magazine to the stacker. The first sheet is around the front of the platen 72 and in printer impression receiving position where it is held by rollers 71 and 73. The second sheet is between the rollers 65 and 66 with the top of the sheet already past the rollers and near the platen. One side of the double channel 69, 70 contains the tail of the first sheet which is overlapped by the top of the second sheet in the other side of the channel. The third sheet normally rests with its front or leading edge against the stop or detent 299 and the adjacent rollers 61, 62 are open.

When a sheet feeding operation is initiated, four sheets are advanced along the path shown in Fig. 1. The first sheet is ejected; the second sheet is advanced around the platen; rollers 61, 62 are closed to move the third sheet along to rollers 65, 66 and the fourth sheet is picked off the top of the pile in the magazine and pushed into the bite of rollers 55, 56.

Turning now to the drive connections from motor M, Fig. 2, it is seen that the motor shaft carries a driving pinion 125 which meshes with gear 126 of a speed reduction train comprising pinion 127, gear 128, pinion 129 and idler gear 130. Gear 126 and pinion 127 are fastened together and pivoted on a stud 98.

The other feed roller shafts 94 and 95 are driven by a belt drive. Referring to Fig. 2, it is seen that gear 128 and pinion 129 are fastened together and attached to shaft 137 which carries feed rollers 62, Fig. 1, and also carries a drive pulley 139, Fig. 2. An endless belt 141 is drawn around pulley 139 and passed over a small pulley 140 secured to shaft 94 which carries feed roller 56, Fig. 1. The belt is then passed under an idling tension roller 142, Fig. 2, before passing around another pulley 146 secured to shaft 95. Tension roller 142 is pivoted on an arm 143 fulcrumed at 144 on the side frame. A spring 145 tends to rock the arm in a clockwise direction to take up the slack in the belt 141. By means of the connections traced, shaft 94 is rotated in a counterclockwise direction, Fig. 2, and shafts 95 and 137 are rotated in a clockwise direction to operate the feed rollers near the back of the feeding device, so that any sheet pushed out of the magazine is advanced downwardly and forward toward the platen.

A train of drive gearing extends across the machine in a horizontal line to reach the drive connections for the platen line spacing, head spacing, high speed feed and ejecting mechanisms. It is already explained that gear 130 is driven by the speed reduction gearing connected to the motor. This gear is loosely pivoted on a stud 138 projecting from the side frame. It meshes with another gear 131 loosely mounted on a shaft 132. Gear 131 meshes with another idler gear 133 pivoted on a stud 147 secured to the left side frame 85. The idler meshes with a pinion 134 secured to another gear 135 which is loosely pivoted on a fixed rod 148 extending from the side frame. Gear 135 meshes with a pinion 136 attached to the line space clutch ratchet 150, Fig. 7, secured to the shaft 149. Also secured to shaft 149 is a pinion 485 in mesh with a clutch gear 470 alongside a related clutch gear 468 which meshes with pinion 481 on the platen shaft 105.

At the inner end of shaft 149 is attached gear 491 for driving the constantly rotating shafts carrying the fixed ejection rollers.

Shaft 132, Fig. 2, controls the suction devices

for lifting the top sheet of record material out of the magazine, and this same shaft is part of the sheet feed clutch for operating detent 299, Fig. 3, and closing feed rollers 61, 62.

Attached to the large drive gear 131, Fig. 2, is a clutch ratchet 155 loosely mounted on shaft 132. Cooperating with the ratchet is a clutch pawl 156 pivoted at 157 on the side of another large gear 158 fixed to shaft 132 and of the same diameter as gear 131. The pawl 156 is normally held out of engagement by a disengaging member 159 pivoted on a stud 160 on the side frame. Member 159 is limited in its movement by a stop pin 154 projecting from the side frame and through a hole in a projection 168 formed on the member. A spring 161 attached to the member 159 urges it in a clockwise direction and tends to release the pawl. However, the rotation of the member is obstructed by the upper end of an armature lever 162 pivoted on a stud 163 extending from the side frame. Attached to the armature lever is a spring 164 tending to rock it in a counterclockwise direction to latch member 159 in a restored position. Whenever a sheet feeding operation is selected, a magnet SF is energized to attract armature lever 162 and rock it in a clockwise direction to release member 159 which in turn released pawl 156 so that the clutch is engaged and gear 158 is connected to the drive gearing from the motor for one complete revolution.

In order to prevent backward movement of the gear 158 when it is stopped at the end of a cycle of operation, there is pivoted on stud 163 a stop bail 165 with an arm extending under a block 166 attached to gear 158 for the added purpose of carrying a compression spring cooperating with the clutch pawl. Another arm of stop bail 165 is attached to one end of spring 161 and cooperates with a stop pin to limit the movement of the stop member.

Soon after pawl 156 is tripped and the gear 158 starts to rotate in a clockwise direction, block 166 on the gear cooperates with the projection 168 on the latching member 159, so that it is rocked about pivot 160 and restored to an effective position over armature lever 162 and ready to disengage the pawl when gear 158 reaches the home position.

Cooperating with gear 158 are gear connections leading to various mechanisms made effective whenever sheet feeding is selected. Meshing with gear 158 is a gear 170 attached to a shaft 171, Fig. 1, carrying the roller 66.

In Fig. 3, it is seen that the sheet magazine is supplied with sheets 50 through a large centralized opening in the right side frame. The magazine comprises a large tray which is movable up and down, so that the operator can pull it down to place a pile of ledger sheets thereon and then allow it to move upward again until the top sheet is in the sheet feeding position.

The sheet tray is composed of a base 180 with settable edge lugs 181, a left side wall 182, and a short front wall 183. It is proportioned to handle sheets of various widths. In the plan view it is apparent that the right side of the tray is without any wall, thus giving ready access for the removal and insertion of sheets through the opening in the right side frame. The rear edge of the tray is also without an upper wall because it is over this edge that the top ends of the sheets 50 are pushed into engagement with the feed rollers 55, 56. A flexible front gage is provided in the form of a removable L-shaped bar 184 in

contact with the flange on the front of the base **180** and secured at **185** to the under side of the base. In Fig. 3 it is seen that the left side wall **182** extends below the base and provides front and rear ends **186** and **187** to which various magazine controls are attached.

Attached to left wall **182** are two long roller holding bars **188** and **189** of rectangular cross section. Pivoted on bar **188** are a pair of rollers **190** and another pair of rollers **191** mounted at right angles to the first pair. On bar **189** there are also pivoted two pairs of angularly disposed rollers **192** and **193**. A pair of long channels **194** and **195** are secured to frame **85** in vertical spaced alignment to act as tracks with which the rollers cooperate to make the tray readily movable upward as the top sheets are fed therefrom. From the showing in Fig. 3, it is clear that the pairs of rollers **190** and **192** cooperate with inner walls of channels **194** and **195**, while the other pairs of rollers **191** and **193** contact with the edges of the channels. Thus, the magazine tray is held in a true horizontal plane in all positions and yet readily responsive to vertical adjustment.

A large spring **199** is attached to one end to an extension **200** on the bottom wall **186** and at the other end the spring is held by a fixed stud **201** on the frame **85**. The spring tends to raise the tray and bring the top sheets into feeding position regardless of the number of sheets or the thickness of the pile on the tray.

A handle **202** is attached to the flange of the tray base **180**, so that the tray can be pulled down against the tension of spring **199** when it is desired to insert sheets into the magazine.

When released to move upward to a sheet feeding position, the tray moves to a position determined by the thickness of the pile of sheets on the tray. The tray is stopped with the top sheet **50** (Fig. 6) pressing against the under side of a long stop lever **178** pivoted on a rod **196** supported in the frame casting **90**. The lever extends at an angle across the lower right hand corner of the sheet, and it is braced in the middle by an operating bell crank **179** riveted thereto and fulcrumed on the same rod **196**. Lever **178** and crank **179** together form a stopping bail which is held in the normal position by a spring **172**. A roller **197** on bell crank **179** cooperates with a cam **198** on an operating shaft **169** to raise and lower lever **178**. It is explained hereinafter how the lever is raised away from the sheets during sheet feeding when another means is brought into play to hold down all sheets except the top sheet.

Ejector control devices other than cam **198** are mounted on shaft **169**. This shaft is supported at the right end by a large bearing standard **221** (Fig. 3) fastened to the top of frame **90**, while the left end passes through side frame **85**, Fig. 2, and carries a gear **222** in mesh with gear **118**. Gear **118** is driven by a train of gearing **176**, **174** and **173** extending down to gear **158** which is rotated whenever a sheet feeding operation is selected by magnet SF. Gear **222** is equal in diameter to the drive gear **176** and therefore it is rotated through one complete revolution for each sheet feeding cycle.

The sheets are fed one by one from the top of the pile on the magazine tray. In order to separate the top sheet from the other sheets in the magazine, the corner of the sheet is engaged by a suction device and bent upward away from the other sheets. A separator blade passes under the raised sheet and holds down the pile while a sheet picker ejects the top sheet off the pile and into the feed rollers.

Suction for the sheet separator is provided by a suction pump shown in Fig. 2. There it is seen that a cylinder head **225** is fastened to the outside of side frame **85**. Within the cylinder is a piston **226** connected to a piston rod **227**, the lower end of which is articulated at **228** on an arm of a crank lever **229** pivoted on a stud **230** and provided with an operating roller **231**. A spring **232** tends to rock lever **229** in a counterclockwise direction to pull down piston **226**. However, the lever is held in a normal position by a latch lever **233**, the upper end of which cooperates with a notch in a stud **234** attached to the side of lever **229**. The operating lever **229** is restored to the home position by a cam **235** attached to the sheet feeding gear **158** and cooperating with roller **231** whenever a feeding operation is selected.

In the normal position of the parts, cam **235** holds the lever **229** in a raised position so that the latch **233** may fall under the shoulder on stud **234**. At the beginning of a sheet feeding cycle, cam **235** moves clockwise away from roller **231** and allows lever **229** to depend on latch **233**. After a short interval of time, a pin **236** on cam **235** strikes the lower arm of latch **233** which is pivoted on stud **237** extending from the side frame. When the latch is so operated and rocked in a counterclockwise direction, it is moved out of the path of stud **234** and lever **229** is free to be operated by spring **232**. The spring moves down the piston **236** and creates a partial vacuum in the top of the cylinder **225**. In communication with the top of the piston is a tube **237** leading to suction devices for engaging the top sheet in the magazine. The condition of a partial vacuum is maintained above the piston and throughout the length of tubing **237** for a short interval of time, during which the top sheet is lifted and separated from the remaining sheets in the magazine.

Before the sheet is pushed out of the magazine it is desired that the vacuum condition be relieved to release the sheet. This is accomplished by opening an air port **238** leading into the top of the cylinder. The air inlet port is normally closed by a valve lever **239** pivoted at **240** on the top of the cylinder head. A spring **241** tends to hold the valve closed. Abutting against the under side of the valve lever is a rod **242** guided near the top by a hole in the lug on the side of the cylinder head, and at its bottom end the rod is adjustably connected to one end of a bell crank **243** pivoted on stud **230**. The vertical arm of bell crank **243** is formed with an offset portion **244** in the path of pin **236**. As pin **236** is moved with cam **235** in a clockwise direction, it first encounters latch **233** to release the parts for the creation of suction in the feeding devices, and then, continuing in the same direction and soon after passing out of engagement with latch **233**, the pin strikes offset portion **244** and rocks bell crank **243** in a clockwise direction to lift rod **242** and valve lever **239**, so that air is allowed to enter above the piston and throughout the tubing **237** to relieve the vacuum condition causing suction therein.

A spring **245** is connected between latch **233** and bell crank **243** to hold these parts in the normal positions and to restore them when they are operated. As cam **235** continues to rotate in a clockwise direction and as it nears the end of the cycle, it cooperates with roller **231** to move lever **229** in a clockwise direction to restore the piston to the normal position near the top of the cylinder head and latch stud **234** over lever

233. As the piston moves, the air above the piston is driven through the port 238 automatically to permit an easier movement of the parts.

In Fig. 3, it is seen that the line of suction tubing 237 is terminated underneath the frame member 90 directly under the standard 221 and an opening within the standard provides an air passage between tubing 237 and a hollow shaft 249, Fig. 5, pivoted horizontally at an angle within the lower part of the standard. Extending rearwardly from the tubular shaft 249 is a smaller tube 250 which carries at its end a suction cup 251. In Fig. 3, it is seen that the lower part of the suction cup 251 is cut away with an opening that leads into the hollow tube 250, the end of which is filled to prevent leakage of air except through the cup. The cup is clamped on to tube 250 at an angle poised above the lower corner of the sheet. Tube 250 does not project in a straight line beyond the inside of the bearing tube 249 but is bent to form a crank, so that when the shaft 249 is rocked in the standard 221, the cup is clamped down upon the end of the top sheet, and then, on the return twisting motion, the crank lifts the cup into the position shown in Fig. 3.

The arrangement for raising the suction cup and lowering it is shown in detail in Fig. 5. There it is seen that an operating arm 253 is secured to the hollow shaft 249 and carries a projecting pin 254 in cooperation with a cam 255 which holds the cup in the normal raised position. A spring 256 urges the engagement of the cup and sheet. However, as soon as the feeding cycle is initiated and shaft 169 starts to rotate counterclockwise, a depression in cam 255 permits counterclockwise motion of arm 253 and the suction parts connected therewith, with the result that the suction cup is clamped down upon the corner of the top sheet of the supply packet. Since a vacuum condition is created in the tubing leading to the cylinder already described, the top sheet is attracted to the cup and moved along therewith when it is raised by the cam shoulder 257 on cam 255. The suction cup is held in the raised position through the remainder of the cycle, but the vacuum condition therein is terminated shortly after a sheet separator is operated to pass under the lifted corner of the top sheet.

In Fig. 3 is shown a side view of the sheet separator blade 260 which is pivotally mounted on a screw 261 fastened in the standard 221. The blade is shaped with a pointed end bent downwardly above the pile of sheets 50 but normally out of alignment with the front edge of the sheet, therefore permitting the suction cup to lift the edge of the top sheet higher than the blade. However, as soon as the cup and attached sheet edge are lifted, blade 260 is released to snap under the single lifted sheet and press down the other sheets. A coil spring 262 is coiled around a hub on screw 261 and tends to push the blade towards the sheets. However, movement of the blade is normally obstructed by a face cam 263 secured to shaft 169. Cooperating with the face of cam 263 is a pin 264 extending vertically upward from a short arm on the end of the blade opposite the separating point. As the cam 263 moves in a counterclockwise direction (Fig. 3) the pin 264 is in contact with a concentric level part of the face of the cam so that during the early part of the feeding cycle, while the suction cup is moving, the blade remains stationary. However, after

about 90° of movement, a sharp depression comes opposite the pin 264 and frees the blade for operation by the spring 262. The blade 260 is snapped into the sheet separating position and remains there until near the end of the cycle when a rise on the face of cam 263 strikes pin 264 and rocks the blade back to the home position. Overthrow of the returning blade is prevented by a long pin 266 riveted in frame 90 and projecting alongside the blade.

After the top sheet 50 is lifted by the suction cup 251 and held separated by the blade 260, lever 178 (Fig. 6) is lifted by the spring 172 under the control of the cam 198 to free the sheet for horizontal movement by a pushing device.

The sheet pushing device of the ejector is shown in detail in Fig. 4 where it is noted that a vertical web 269 of the standard 221 (Fig. 3) projects rearward to provide a fulcrum 270 for an L-shaped lever 271 carrying a roller 272 cooperating with a cam 273 on shaft 169. A coil spring 274 is wound around fulcrum 270 and pressed against a pin on the lever to urge it clockwise and press the roller 272 against the cam. Fastened to the side of lever 271 is a downwardly extending arm 275 formed with an offset pusher or picker extension 276 bent to cooperate with the front edge of the lifted sheet. During the first part of the rotation of shaft 169, lever 271 remains idle as roller 272 rides over a concentric part of cam 273. However, as soon as the sheet lifting, separating and releasing operations are completed, a sudden rise on cam 273, strikes roller 272 and rocks the lever 271 in a counterclockwise direction, causing extension 276 to push against the edge of the top sheet 50 and shove it towards the rear of the machine, into the bite of the feed rollers 55 and 56 (Fig. 3). Lever 271 is allowed to restore slowly by following a smooth descending surface on cam 273.

Directly behind the rear edge of the top sheet 50 are mounted the cooperating feed rollers 55 and 56 which rotate continuously during machine operation. When the top sheet is pushed between the rollers, it is carried along toward the rear and down to a substantially upright position between guides 57 and 58. The clockwise rotating rollers 56 are fastened to the shaft 94 which is driven by belt 141 (Fig. 2), as explained hereinbefore. A pinion 280 (Fig. 3) fastened to shaft 94 meshes with another pinion 281 on a shaft 282 carrying the upper pair of feed rollers 55, thus providing a driving connection between the rollers. Shaft 282 is not mounted in fixed bearings in the side frames 85 and 86 as is shaft 94. Instead, it is loosely supported at the right end in a bearing opening in frame 85, and its left end is flexibly supported by an arm 284 on a shaft 285 loosely mounted in the side frames. Also attached to shaft 285 is an arm 286 to which is connected a spring 287 pulling the shaft in a counterclockwise direction to press rollers 55 down upon rollers 56. Therefore, rollers 55 are free to rise when a sheet of substantial thickness is fed, but they are maintained in contact with rollers 56 at all other times by spring 287.

A shield 288 is fastened to frame 91 under rollers 56 and not only holds the rear edges of the sheets away from the rollers, but also pushes the sheets into alignment when the magazine is raised.

The sheets are aligned in the other direction by a guide strip 289 which is attached to the in-

side of right frame 86 and bent to cam the edges of the upper sheets into the proper position.

As the top edge of the sheet 50 appears behind the rollers 55, 56, it is directed downward by a deflector 291 with ears 292 attached to the side frames.

The top end of the outer guide 57 is attached to deflector 291 by a clamp comprising an inner holding block 293, a leaf spring 294 and a screw knob 295 for tightening the connection.

The lower end of guide 57 is pivotally fastened to studs 296 on the side frames by ears 297 projecting from the sides of the guide.

While the sheet is passing down between guides 57 and 58, it is urged downward by the counterclockwise rotation of rollers 59 on the shaft 95 which is belt driven as already explained. Rollers 59 do not press the sheet against guide 58 and feed it positively, but instead they merely contact the underside of the sheet and urge it downward. After the sheet has passed beyond the feed control of rollers 55, 56, and is loose within the guides 57, 58, rollers 59 urge it down against the sheet stop 299.

While the sheet is loose within the guides 57 and 58, it is aligned laterally before being engaged by the normally open rollers 61 and 62 and carried further into the machine. There is a side aligner 302 for putting the sheet in the proper position before it is fed further.

While the sheet is being aligned within the guides 57 and 58 (Fig. 3) it is located longitudinally by the end stop 299 in engagement with the front edge of the sheet. The movements of the sheet laterally and longitudinally into a correct position are made possible by the opening of a space between the feed rollers 61 and 62. The operation for separating the feed rollers is synchronized with the operation for putting the sheet stop in the path of the advancing sheet, because normally when the stop is in effect, the rollers are ineffective, and conversely when the rollers are made effective, the stop is to be withdrawn.

The lower pair of feed rollers 62 (Fig. 9) are attached to the shaft 137 provided with fixed bearings in both side frames and having gear connections with the driving motor as revealed in Fig. 2. The other or upper rollers 61 are fastened to a rod 330 (Fig. 9) which carries a gear 331 in mesh with another gear 332 attached to shaft 137, so that the rollers are in constant operation as long as the motor is energized. Rod 330 carrying the upper feed rollers is arranged to be moved as part of a bail suspending the upper rollers above the lower fixed rollers. The bail comprises a pair of side arms 334 and 335. Arm 335 is pivoted on a stud 336 secured to the left side frame 86 (Fig. 9), while the other arm 334 is fulcrumed on the end of a stud 337 attached to the inside frame 85. The two arms are connected by a tube 338 to which is attached the hub of a connecting bracer link 339 encircling rod 330 to stiffen it midway between feed rollers 61 and also act as a carrying means to rock the feed rollers in and out of contact with rollers 62.

The one side arm 334 (Fig. 3) is extended toward the front of the machine and formed with an offset lug 341 cooperating with a cam 342 attached to shaft 132. The cam is proportioned so that it normally depresses arm 334 to rock about center 337 and open rollers 61, 62 and close gate detent 299. Early in the feeding cycle, the rise on cam 342 moves away from lug 341 and allows closure of the rollers for sheet feeding until it nears the end of a complete revolution. Then, the rise on the cam cooperates with lug 341 to push down the front end of side arm 334 and rock it in a counterclockwise direction about the pivot 337. This serves to lift the entire roller holding unit comprising rod 330 and rollers 61.

At the time that this separation is caused between rollers 61 and 62, the advancing edge of the incoming ledger sheet is approaching a position between the rollers. It is, therefore, advisable to provide means for arresting and aligning the front of the sheet, and such a means is provided in the form of the stop or detent 299. The stop forms a cross member of a bail including a pair of levers 344 and 345 (Fig. 9) and an operating lever 345' secured to a rod 346 supported between the side frames. The cross section of stop 299 is formed in the shape of an L with a series of vertical extensions movable into the path of the advancing sheet. The ends of the stop member are formed with overturned ears riveted to the side levers 344 and 345. A link 347 is connected between the lever 345' and the operating side arm 334 so that the pair of bails form an interconnected vibratory carrier for the stop and feed rollers. A spring 340 attached to arm 334 holds the arm rocked in a clockwise direction with lug 341 in constant cooperation with cam 342. As the end of the cycle approaches, the cam pushes down the end of the arm as already explained to separate the rollers, and at the same time link 347 is pushed down to rock the levers 344 and 345 in a counterclockwise direction to lift stop detent member 299 into the path of the advancing sheet. The parts are held in this position with the sheet aligned at the end of the cycle when sheet feeding is suspended.

Early in the next cycle of operation, cam 342 presents an abrupt depression which allows spring 340 to rock the operating arm 334 in a clockwise direction to lower feed roller 61 into contact with the ledger sheet and press it against the lower feed roller 62. At the same time, link 347 is pulled upward and the sheet stop is lowered out of the path of the sheet which is now properly aligned and ready to be directed forward to the platen by rollers 61 and 62 which continue to rotate. Since drive gear 131, Fig. 2, is common to the platen drive gearing, namely, gears 133, 134, 135, 136 (Fig. 7), 485, 470, 468 and 481 (Fig. 2) and the gearing for shaft 132, the sheet stop and roller actuation is synchronized with the operation of the platen.

The sheet guides 63 and 64 are supported on pairs of hinge hangers 350 and 351, Fig. 9, which encircle a rod 352. The rear edges of the guides are flared as at 353 to facilitate the entry of the sheet, and the edges are also scalloped to provide spaces for the upstanding projections 354 on the sheet stop 299. The lower ends of the guides 63 and 64 are supported on studs extending from the top of brackets 377 fastened in the machine. These and other of the hinged guides give ready access to all parts of the sheet path for the removal of sheets should any jam occur.

As the sheet passes over the lowered detent 299, it is moved along by rollers 61 and 62 and then engaged by rollers 65, 66, Fig. 1, so that the front end of the sheet is directed into guides 69, 70 while the previously fed sheet at the platen also occupies a space between guides 69, 70. However, there is no conflict between the overlapping edges of the two sheets because they are in separate compartments between the guides. The central plate 68 acts as a divider or separator between

plates 69 and 70 to form two sheet guide spaces therein. A tilting mechanism is provided to rock the guide assembly 68, 69 and 70, upward on alternate sheet feed cycles so that the pointed edge of center plate 68 is above the sheet path to direct every other sheet into the lower guide space.

Cooperating with the upper and lower surfaces of the platen 72, Fig. 1, are a number of rollers 71 and 73 for pressing the sheet of record material against the platen while feeding and imprinting are taking place. As the sheet passes down between guides 68, 69 and 70, it is directed between the platen and curved wires 82 shaped concentric with the outer impression receiving surface of the platen. The sheet also passes over the long pressure roller 71 which is mounted on a tube on arms pivoted to move the roller away from the platen during ejection. The upper pressure rollers 73 are also movably mounted to be lifted away from the platen after printing is finished thereon.

Through the cooperation of roller 71, wires 82 and rollers 73 with the periphery of the platen, it is evident that the sheet is confined against the platen, as printing takes place, as it is spaced, and as it passes around and upward toward the ejection stacking devices.

Above the platen are the ejection feed rollers 74, 75 for carrying the sheet away from the platen. Roller 74 is fixed with respect to the platen since the center shaft carrying it is fulcrumed in the side frames. However, the other feed roller 75 is movable to provide a separation between rollers 74, 75 so that ejection feeding may be suspended while high speed insertion, line spacing and printing operations are taking place.

As soon as the sheet being ejected is engaged by rollers 78, 79, the rollers 74, 75 can be opened to permit the insertion of the second sheet around the platen. The ejection initiating mechanism is restored soon after the sheet feeding cycle is started.

Devices are provided, as already pointed out, to communicate the driving action of the motor M, Fig. 2, through the train of gearing and over to the high speed feed clutch gears 468, 470, Fig. 7, said gear 468 meshing directly with the gear 481, Fig. 2, on the platen shaft 105. The high speed feeding devices are provided because it is desired that the sheet pass beyond the heading space thereon and up to the imprint receiving position as rapidly as possible. Although gear 470 is constantly rotating, Fig. 7, platen driven gear 468 is not normally clutched thereto but is selectively clutched by the energization of the high speed magnet HS.

Adjustably secured to stud 469 (Fig. 7) is a fixed drum 472 carrying a fulcrum point 473 which engages the side of an armature 474 guided at its upper end by a projection 475 on the fixed drum and loosely pivoted at its lower end on a stud 476 projecting from a bracket 477 holding the high speed control magnet HS to the main side frame 85. The upper end of armature 474 is formed as a yoke embracing the sides of stud 469. The lower end of the armature is formed with a hole through which passes a reduced section of stud 476.

Pressing between the side of armature 474 and a head on stud 476 is a spring 478 tending to rock the armature in a clockwise direction about pivot 473. Keyed to stud 469 and slidable axially thereon is a pointed pressure block 479 cooperating with the sides of the armature 474 and gear 468.

When the magnet HS is energized to cause high speed operation of the platen, armature 474 is rocked in a counterclockwise direction about pivot 473 and the upper end of the armature is rocked toward the left (Fig. 7), pushing block 479 in the same direction and pressing gear 468 toward the left to engage the clutch face 471 on the constantly rotating gear 470 to form a driving connection therebetween. Gear 470 is driven rapidly by a pinion 485 fastened to the shaft 149 which is in constant rotation as driven by the gear 136 secured thereto as already explained. The driving motion of gear 470 is communicated through the clutch to gear 468 and then to pinion 481 (Fig. 2) fastened to the platen shaft.

The duration of the energization of the high speed magnet HS and the extent of high speed feeding of the sheet is determined at the platen by the number of feed control perforations extending down the margin of the sheet. A sensing brush senses the procession of marginal perforations and calls into operation a relay R101, Fig. 8, to close contacts R101*a* in series with magnet HS to maintain a high speed circuit until insulated by the unused part of the sheet.

In Fig. 8 it is seen that the sheet feed control magnet SF is in series with a number of contacts arranged in series and in parallel. It is sufficient to note one way in which the sheet feed operation can be initiated.

Sheet feed start contacts CST are key operated by hand, and when closed, a circuit is established for connected relay R62. This relay then closes associated contacts R62*a* in series with the sheet feed magnet SF. Upon energization of magnet SF, the picker or ejector mechanism cooperates with the top sheet in the magazine and pushes it into the initial set of feeding rolls which carry it down to be arrested temporarily by the detent. From there on the sheet is carried to the platen by the other feeding rollers already described.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a writing or imprinting machine, wherein record material is progressively advanced about a platen roll and past an impression receiving position, including a sheet feeding mechanism including an ejector for advancing a succession of sheets one by one from a supply packet thereof, carrier means with two supporting structures, an interconnecting link between said structures for alternating the direction of movement thereof, a sheet detent carried by one of said supporting structures and movable into and out of the path of ejected sheets to temporarily arrest said sheets, and a sheet feeding device carried by the other of said supporting structures and actuated into engagement with the sheet in alternation with the sheet detent, said feeding device being in said path between the supply packet and the platen roll, and actuating means for moving the carrier means in timed relation with the rotation of the platen

roll to disengage the detent from the sheet and engage the feeding device therewith.

2. In a writing or imprinting machine, wherein record material is progressively advanced about a platen roll and past an impression receiving position, including a sheet feeding mechanism including an ejector for advancing a succession of sheets one by one from a supply packet thereof, carrier means with a pair of pivoted levers one of which is a cam follower, a link connecting said levers, a sheet detent carried by one of said carrier levers and movable into and out of the path of ejected sheets to temporarily arrest said sheets, and a sheet feeding device carried by the other of said carrier levers and actuated into engagement with the sheet in alternation with the sheet detent, said detent and feeding device being in said path between the supply packet and the platen roll, said

detent being closer to the platen roll than said feeding device, and actuating means including a cam cooperating with said follower lever for vibrating the carrier means in timed relation with the rotation of the platen roll to disengage the detent from the sheet and engage the feeding device therewith.

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