Jan. 17, 1939. H. HALLSTREAM 2,144,057

PAPER FEEDING MACHINE

Filed April 21, 1937 13 Sheets-Sheet 1

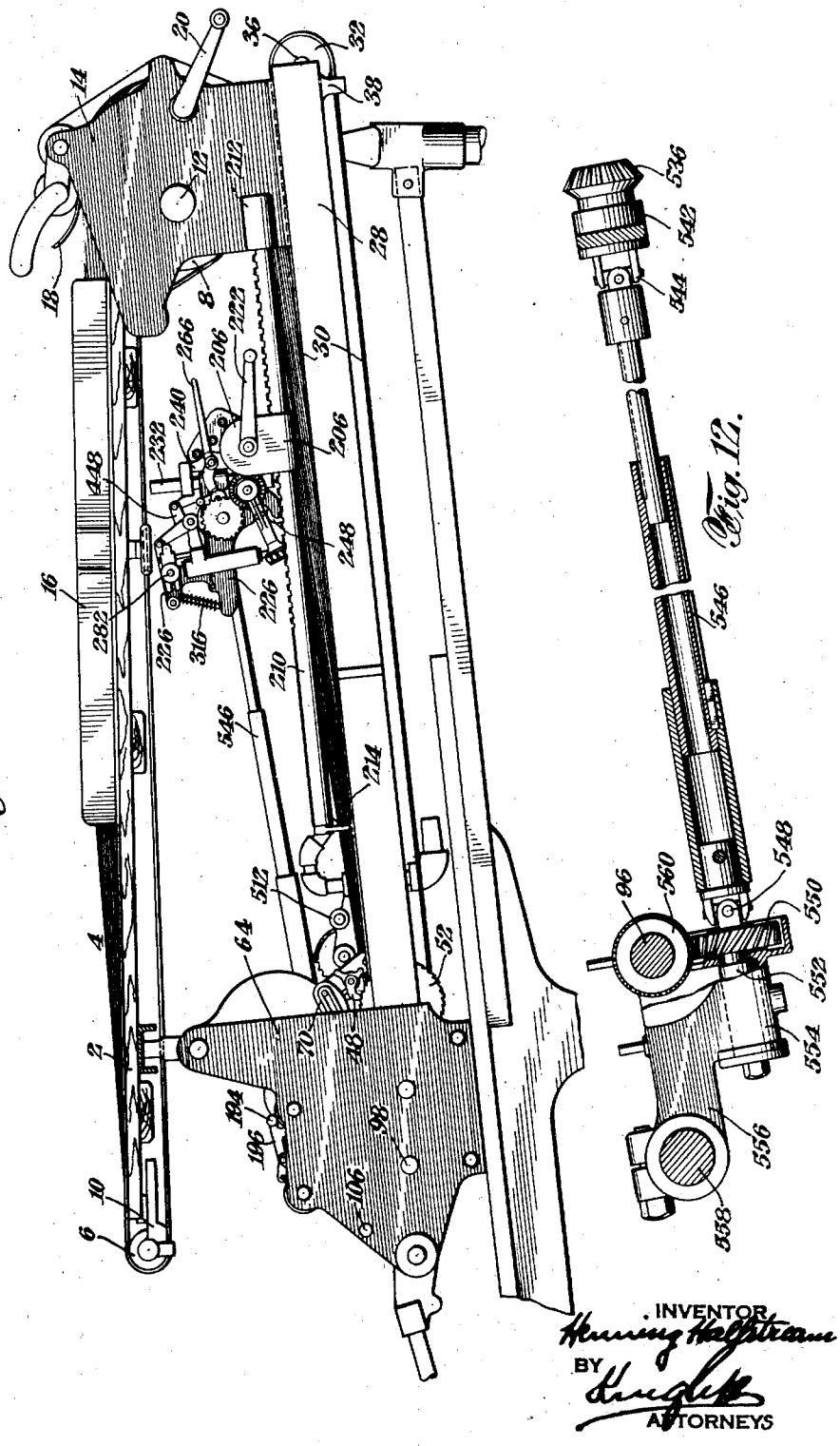


Fig. 1.

Fig. 12.

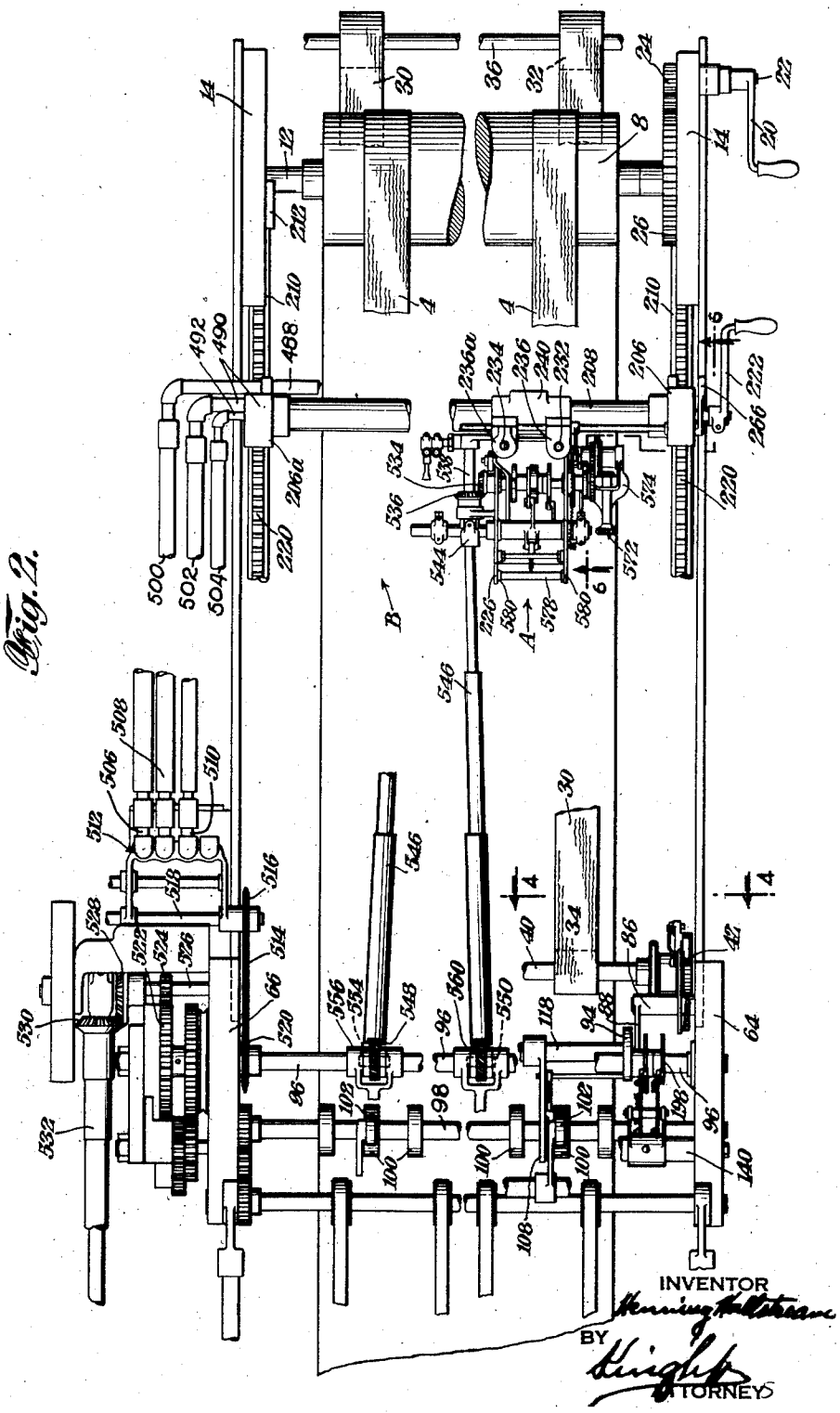
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Filed April 21, 1937 13 Sheets-Sheet 2

Fig. 2.



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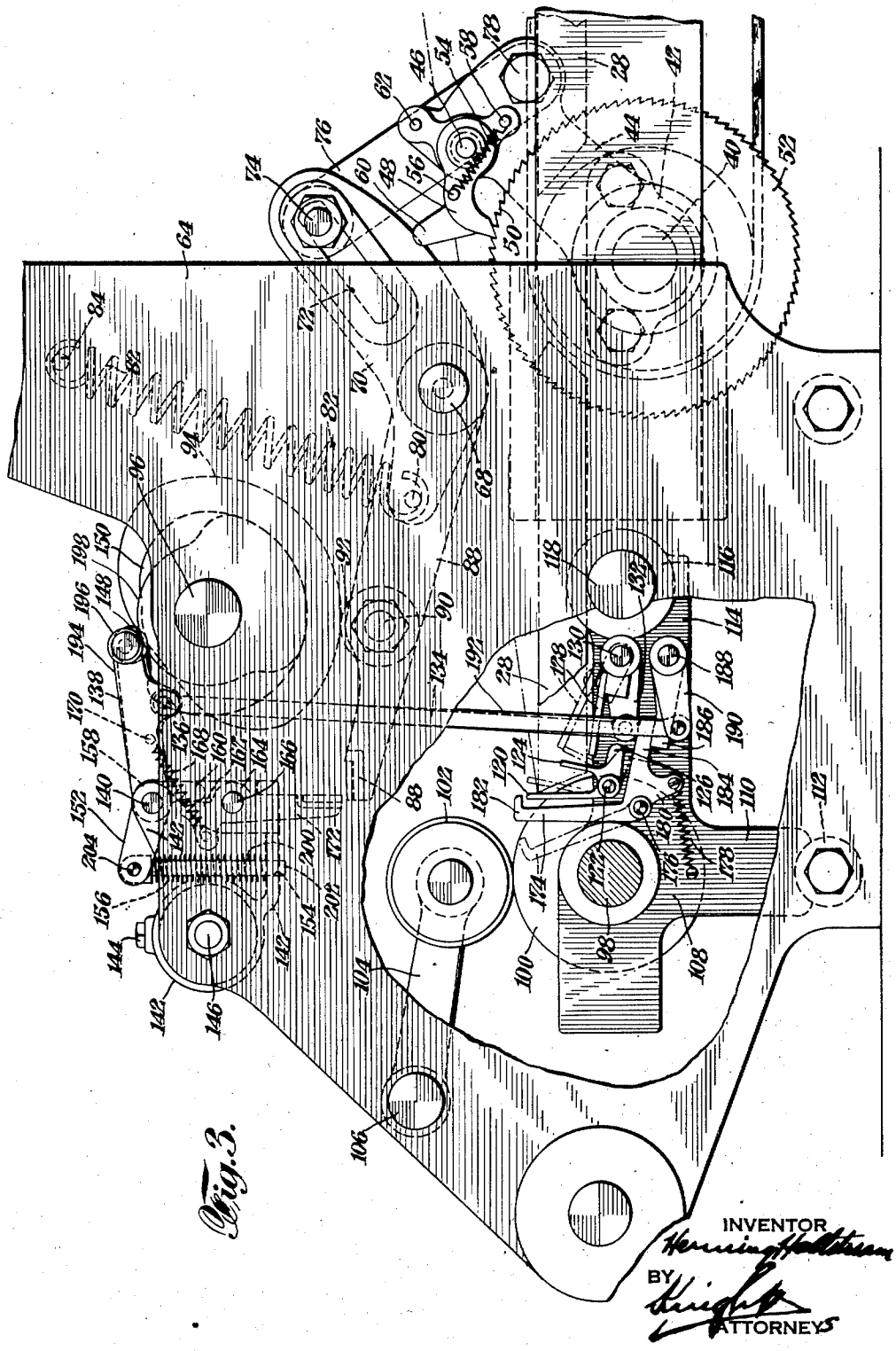


Fig. 3.

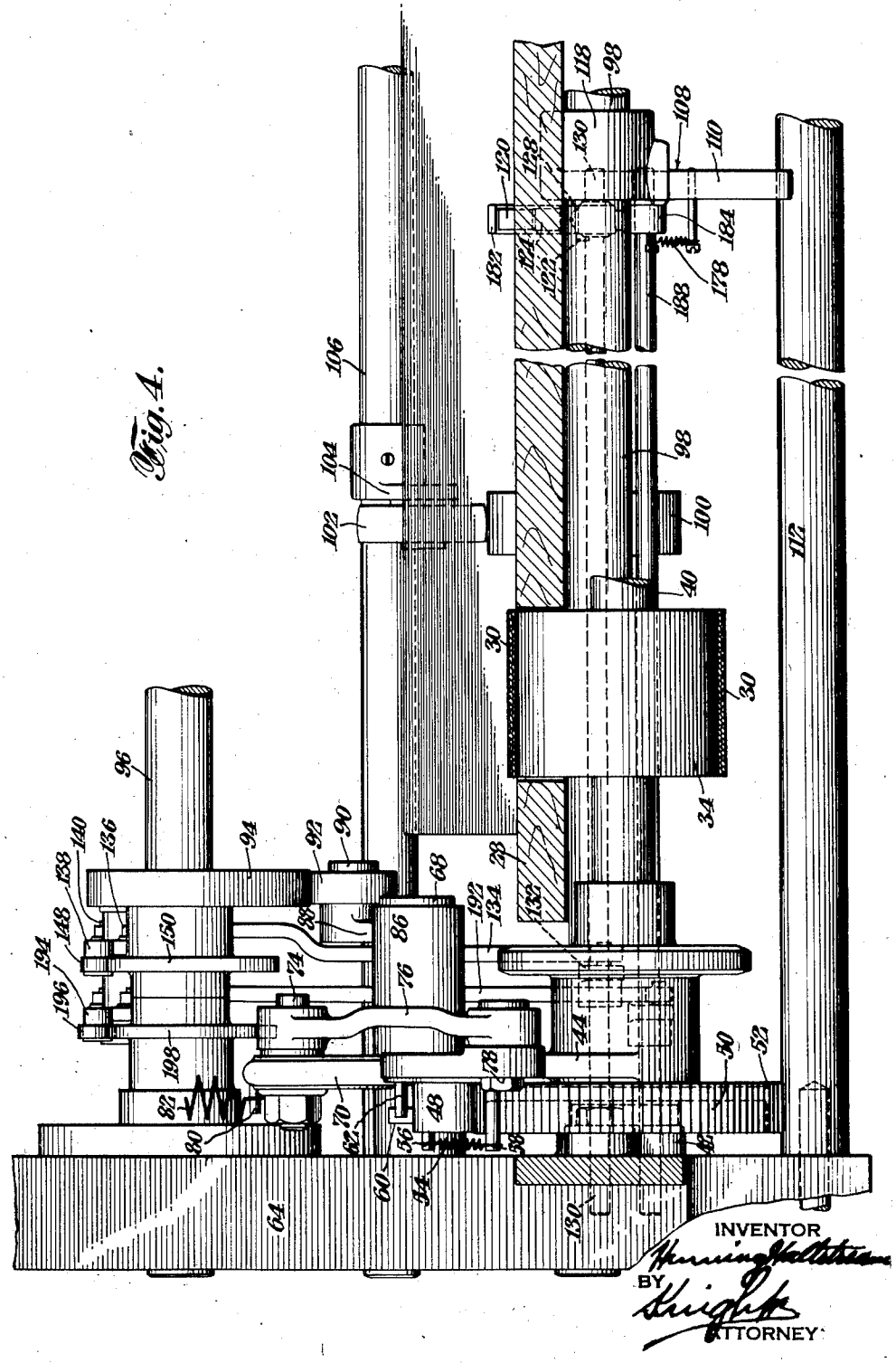
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Fig. 4.



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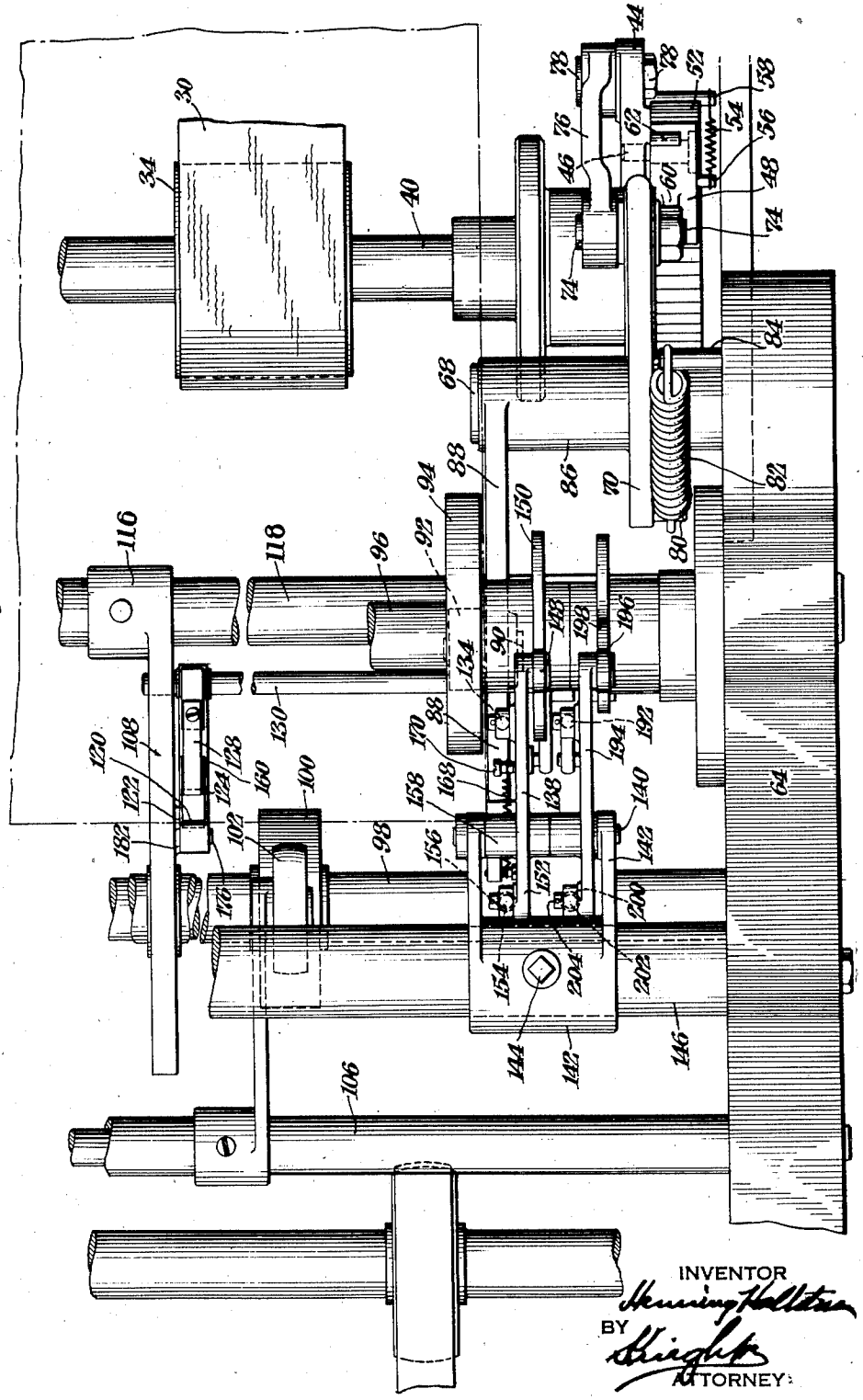


Fig. 5.

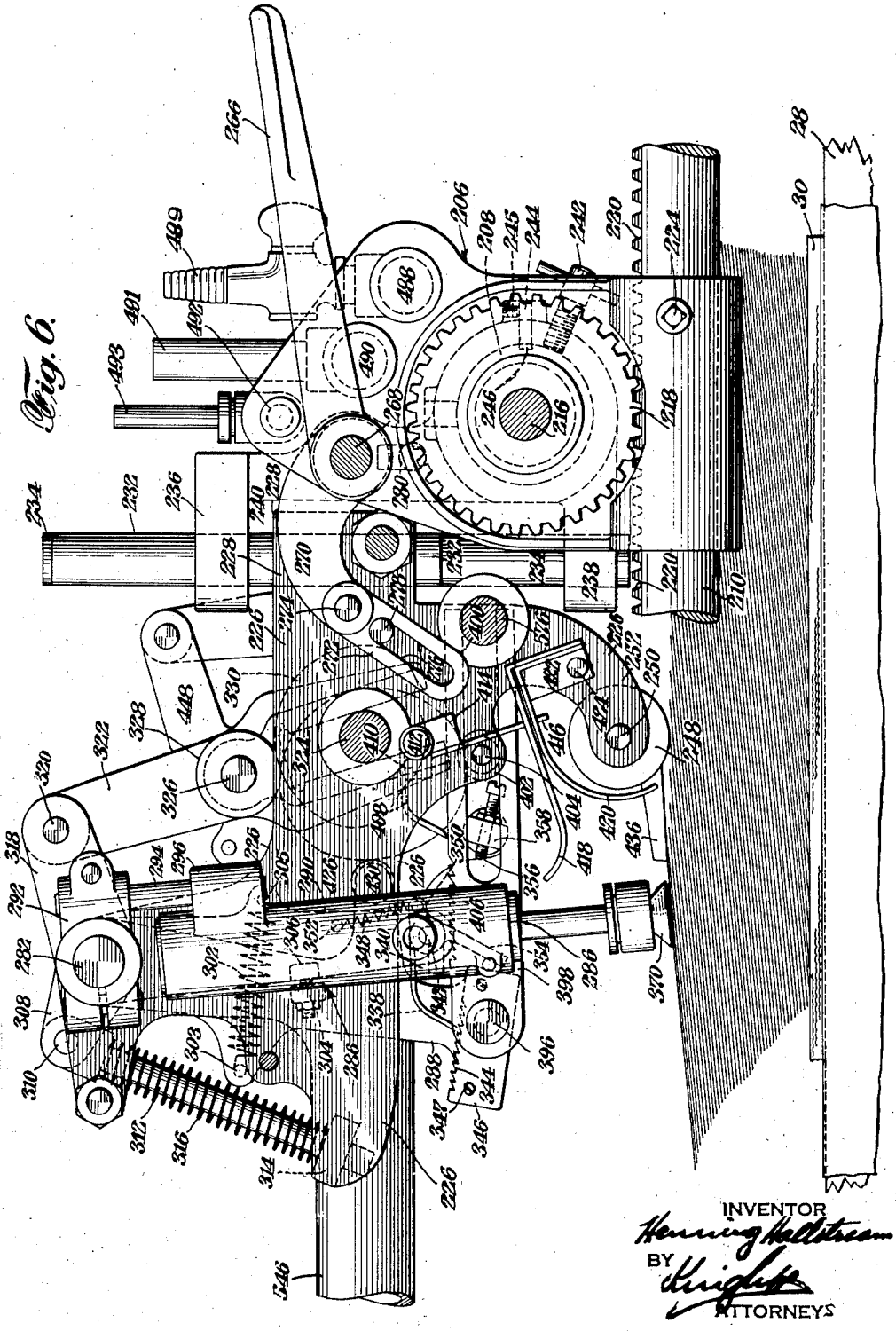
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Fig. 6.



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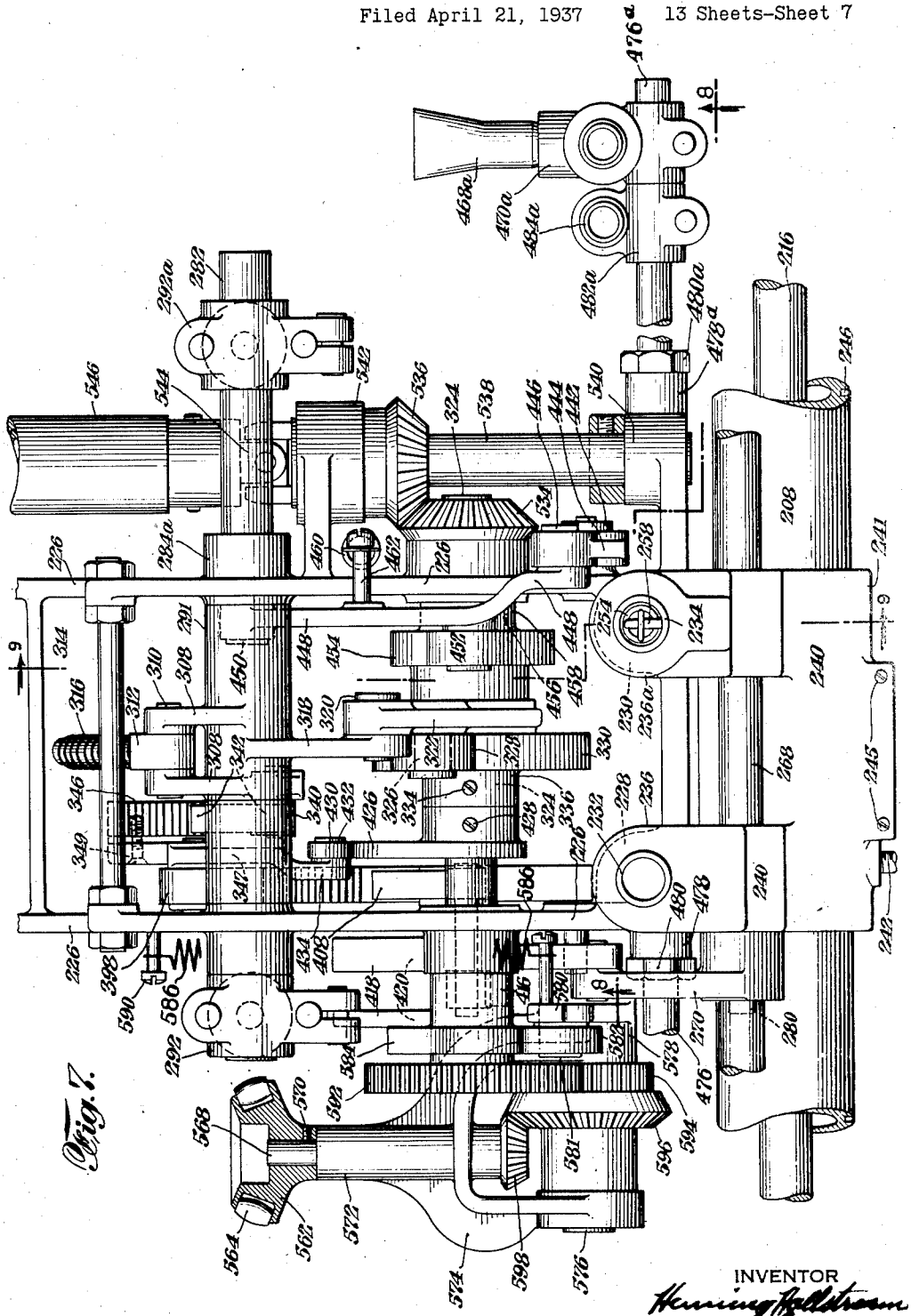


Fig. 7.

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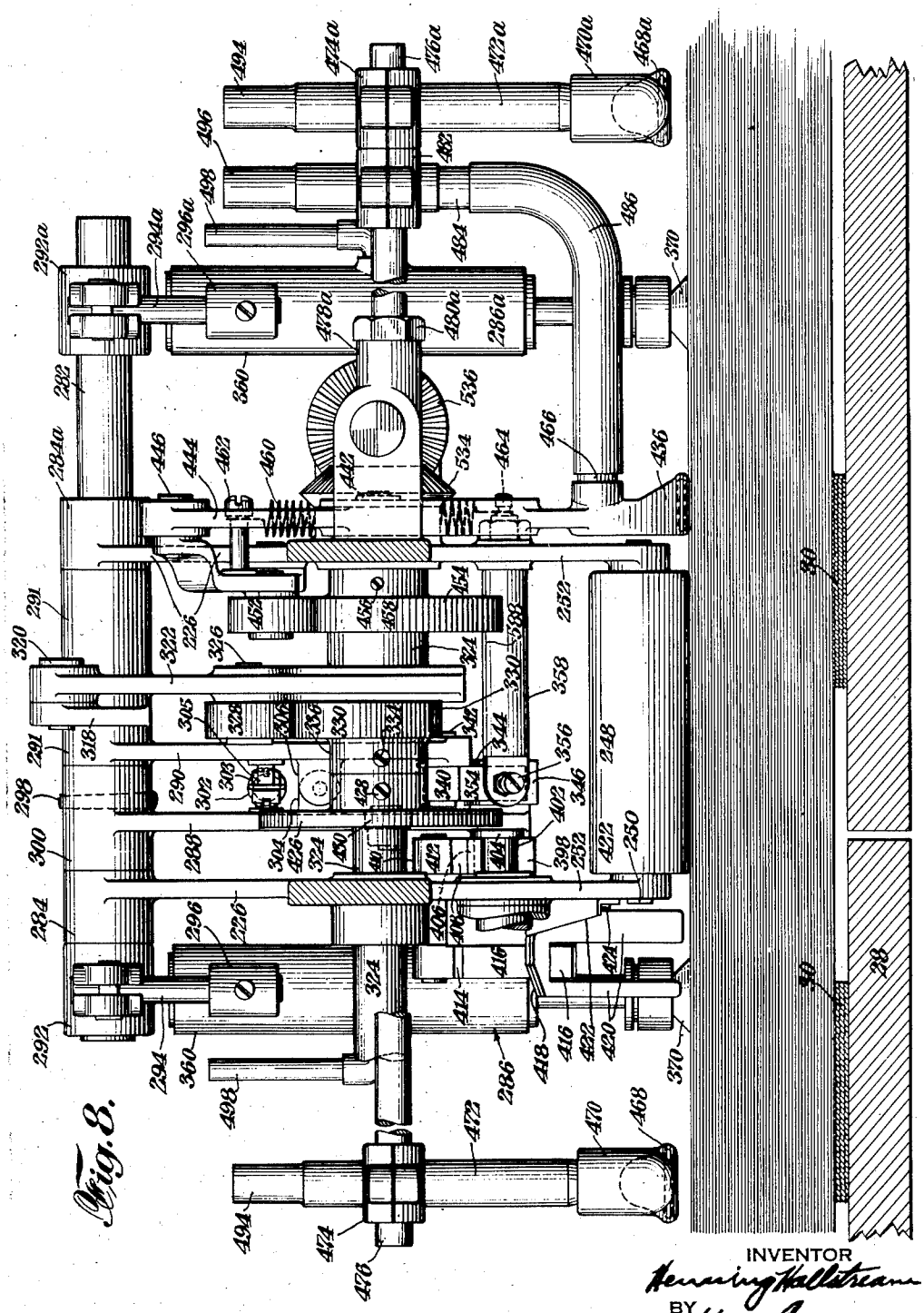


Fig. 8.

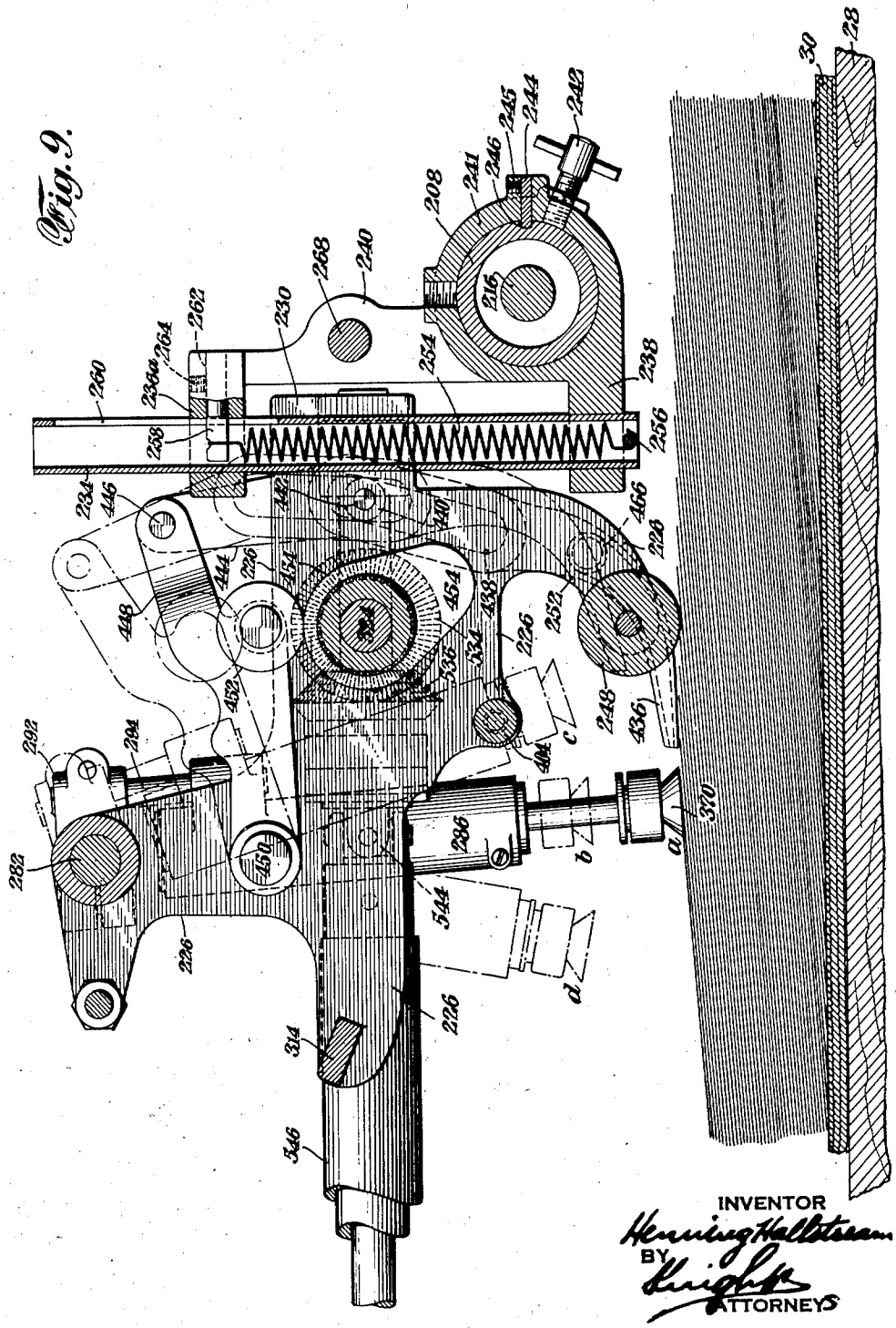
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Fig. 9.



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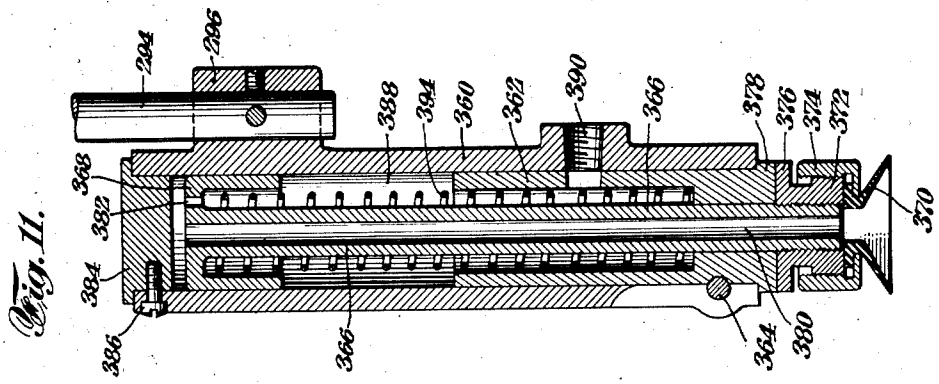


Fig. 11.

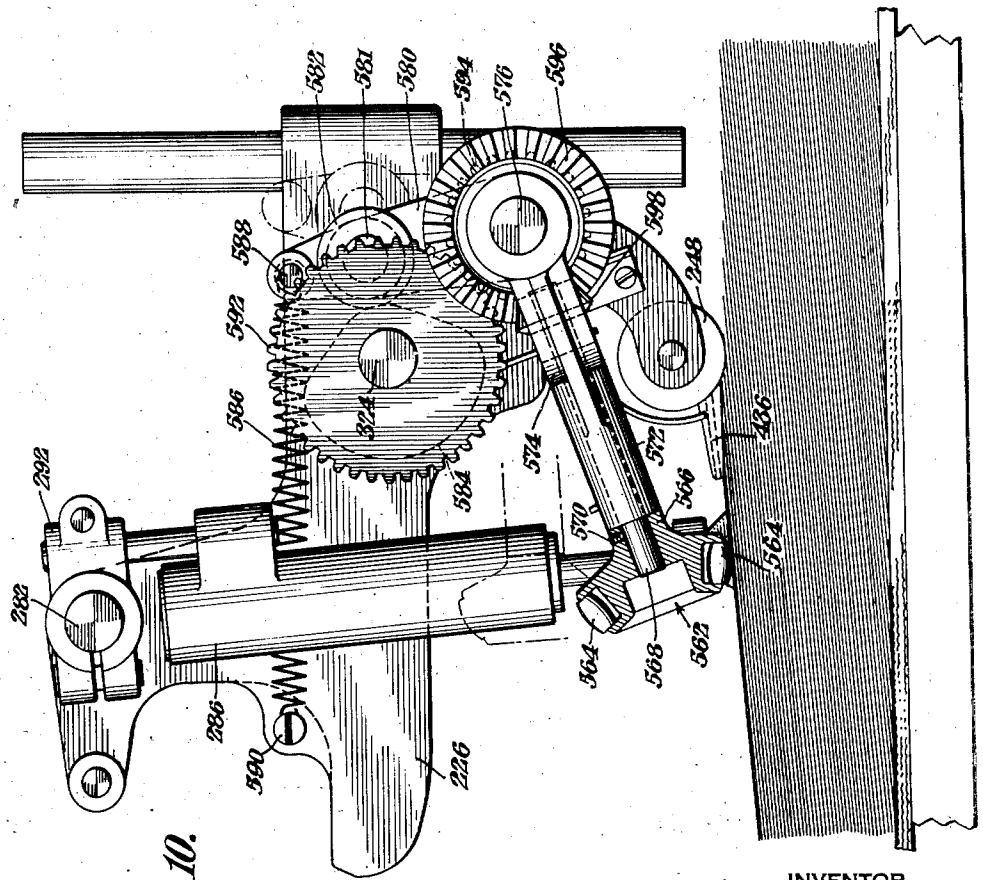


Fig. 10.

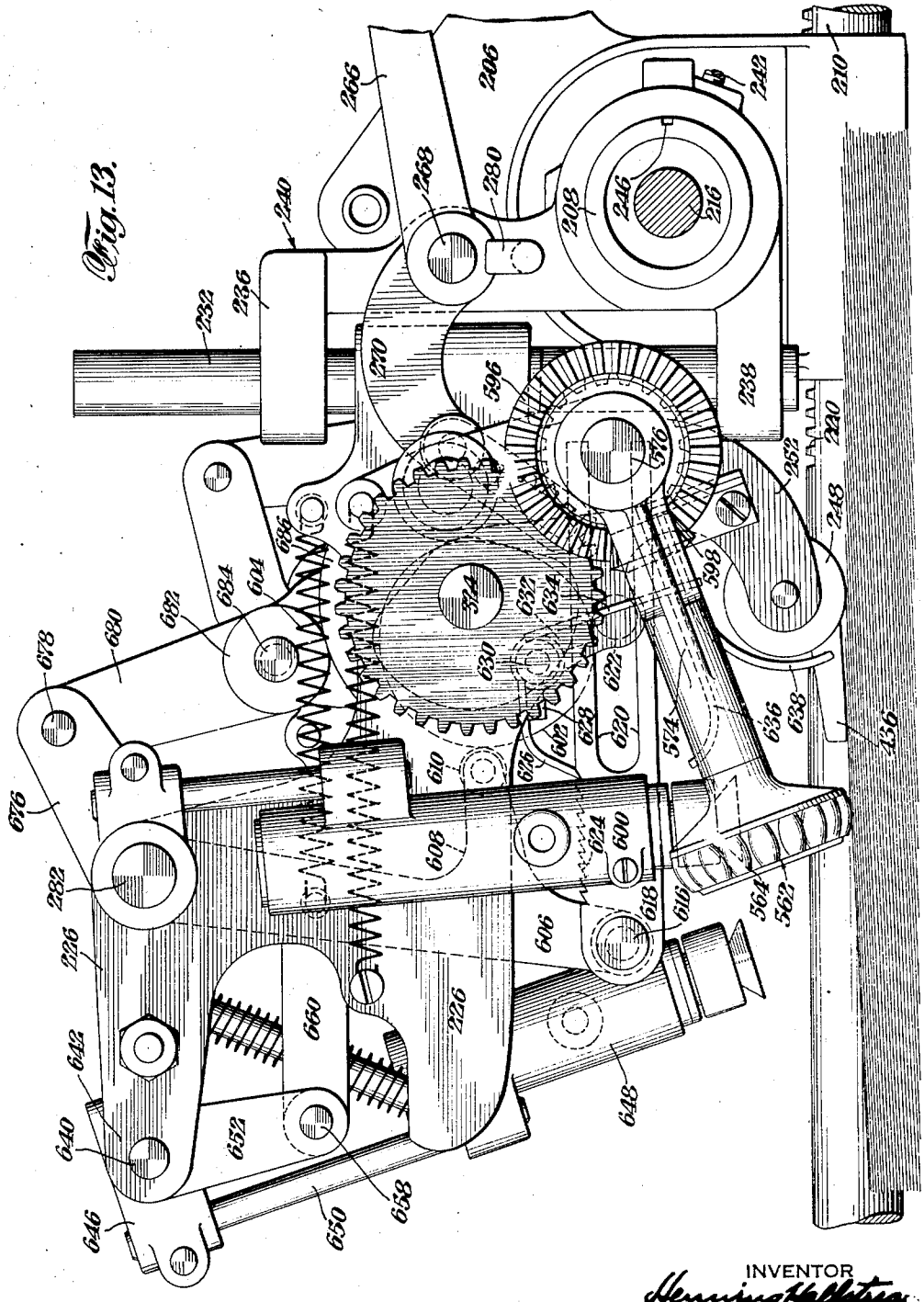
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Fig. 13.



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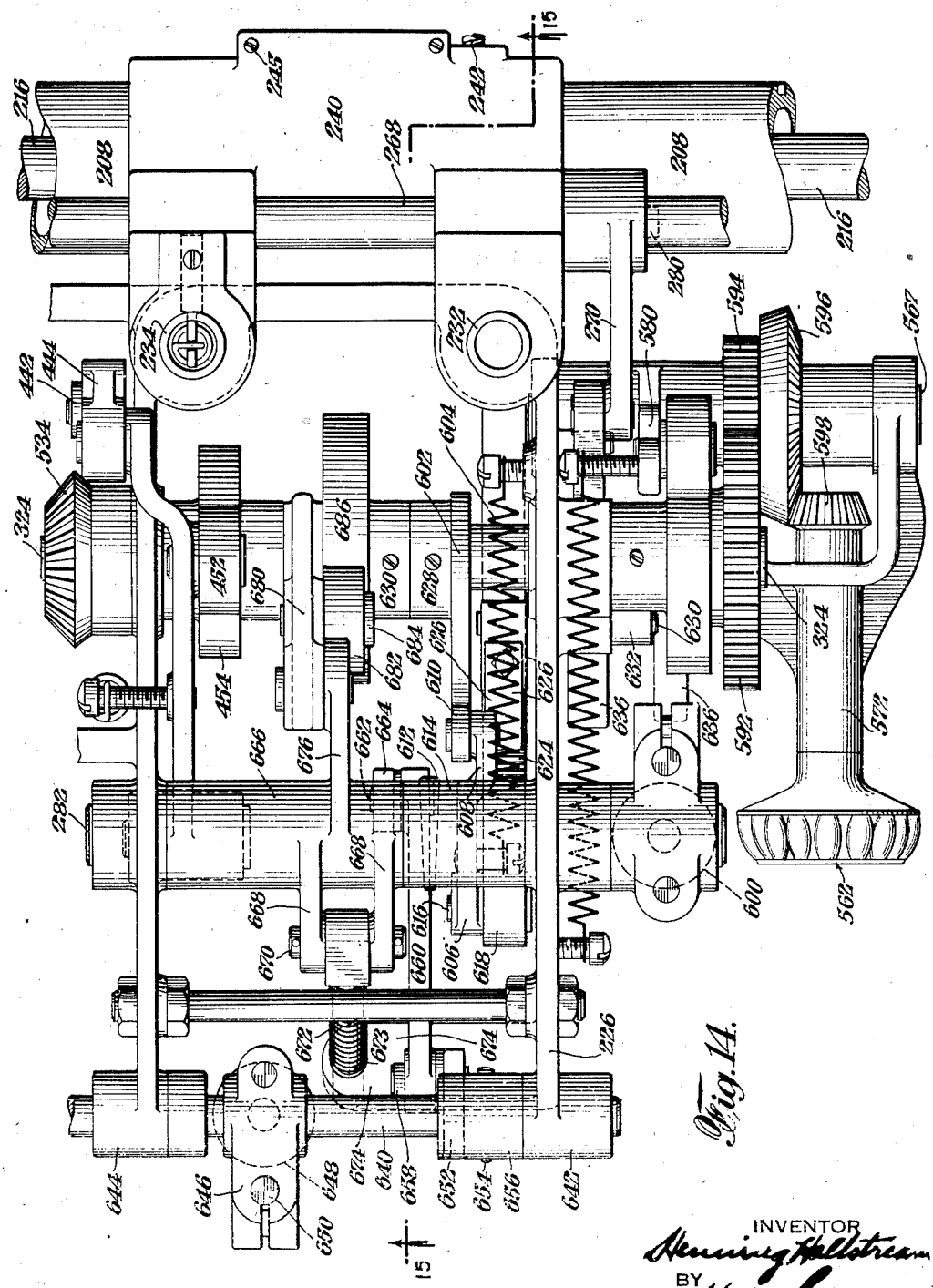


Fig. 14.

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PAPER FEEDING MACHINE

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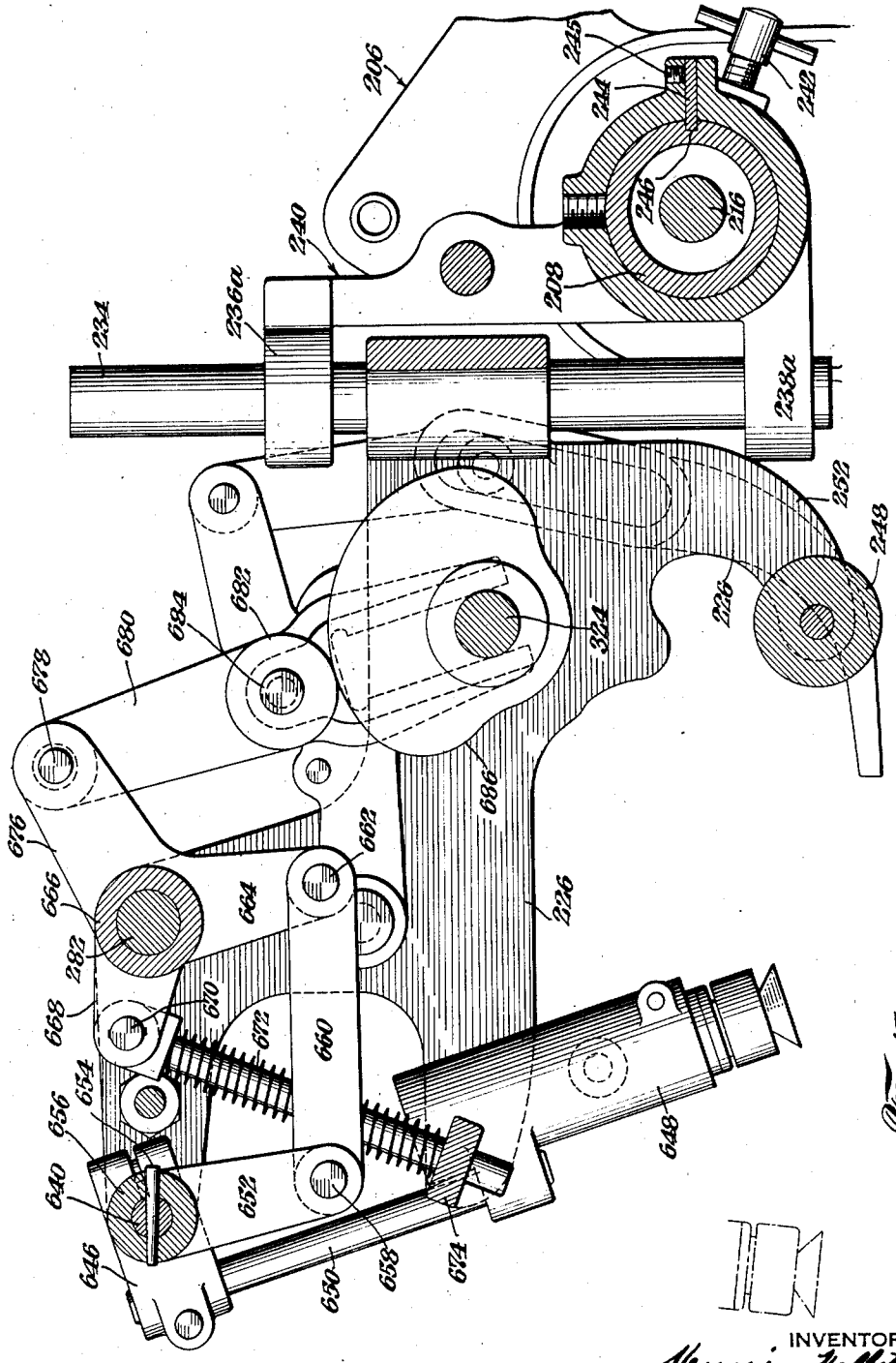


Fig. 15.

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Patented Jan. 17, 1939 2,144,057

UNITED STATES PATENT OFFICE

2,144,057

PAPER FEEDING MACHINE

Henning Hallstream, Braintree, Mass., assignor, by mesne assignments, to Dexter Folder Company, Pearl River, N. Y., a corporation of New York

Application April 21, 1937, Serial No. 138,119

31 Claims. (Cl. 271—38)

This invention relates to a machine for separating and feeding sheets of paper and its principal objects are greater certainty of pick-up of individual sheets and reduction of the travelling speed of the paper without reduction of the number of sheets fed per minute.

Improvements shown in the control of the bank feed mechanism are not claimed herein but form the subject of a divisional application.

In its preferred form the invention is applied to a machine wherein the sheets are picked up from a fanned out bank and fed forward in underlapping relation.

In accordance with the invention the top sheet is lifted at the rear edge and drawn backward for a short distance to free it from the bank, then moved forward to the delivery rolls. Preferably the sheet is winded from behind as its rear edge is lifted. Its rearward movement may be terminated by rear edge register mechanism to straighten it perfectly before its forward movement begins. With underlapping or "streamline" feeders, registering at the rear edge has important advantages.

The pick-up and feed of the sheet may be performed by a single set of grippers oscillating rearward and forward with the sheet attached; or one set of grippers may move the sheet rearward and another then move it forward. In the latter case the second set of grippers can engage the sheet further forward, because the sheet has been moved backward from under the previously fed sheet and because of the lapse of time before the second set of grippers take hold, during which the previous sheet has been travelling forward.

A buckling device may be employed to assist the grippers to take hold of and separate the top sheet.

The invention will be described in detail in the following specification, in which two illustrative embodiments are described with reference to the accompanying drawings.

In the drawings—

Figure 1 is a side elevation of a sheet separating and feeding machine operating with a fanned out bank of sheets.

Figure 2 is a plan view of the same machine, with the loader board removed, with parts broken away and parts omitted.

Figure 3 is a side elevation of the bank feed mechanism, with a part of the side plate broken out for clearness of illustration.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a plan view of one side of the bank feed mechanism.

Figure 6 is a section on the line 6—6 of Figure 2, showing the sheet separating means in elevation.

Figure 7 is a plan view of one of the sheet separating mechanisms.

Figure 8 is a section on the line 8—8 of Figure 7.

Figure 9 is a section on the line 9—9 of Figure 7, being a simplified view of the sheet separating mechanism, with different positions of the moving parts indicated by dotted lines.

Figure 10 is a simplified side elevation of the sheet separating mechanism, showing particularly the combing mechanism in its relation to the other parts, the combing wheel appearing in section.

Figure 11 is an axial section of one of the suction grippers.

Figure 12 is a detail elevation of a part of the driving gear.

Figure 13 is a side elevation of a different embodiment of the invention having two sets of suction grippers.

Figure 14 is a plan view of the same, and

Figure 15 is a section on the line 15—15 of Figure 14.

At the top of the machine shown in Figure 1 is a loader board 2 over which travel loader belts 4 trained over rollers 6 and 8 (Figure 2). The roller 6 is mounted on bearing blocks 10 secured to the forward end of the loader board, while the roller 8 is mounted upon a shaft 12 journalled in side plates 14. A loader gauge 16 is provided to align the paper initially upon the loader board 2. Between the side plates 14 is a reversing throat of well-known form, represented by a guide 18, one end of which appears above the side plates in Figure 1. A crank handle 20 is secured to a shaft 22, the opposite end of which bears a pinion 24 meshing with a gear 26 fixed to shaft 12. By rotating the crank handle 20 from time to time the roller 8 is revolved to feed a bank of paper resting on the loader board 2 in preliminarily fanned out condition down through the reversing throat 18, which further fans out the bank.

The paper is received from the reversing throat by a bank feed table 28, over which travel bank feed belts 30 trained over rollers 32 and 34. The rollers 32 are mounted upon a shaft 36 journalled in bearing blocks 38 attached to the rear end of bank feed table 28. The rollers 34 are mounted on a shaft 40 journalled in bearings 42 at the

forward end of the bank feed table. The shaft 40 is rotated intermittently by the mechanism now to be described, to feed forward the bank of paper resting upon the table 28 and belts 30.

Bank feed mechanism

In describing the bank feed mechanism reference will be made to Figures 3, 4 and 5, in addition to Figures 1 and 2. While not claimed herein, it will be fully described to make clear the function of the cooperating elements of the separating and sheet feeding mechanisms. At the left side of the machine there is pivoted upon shaft 40 a rocker arm 44, which carries on a pin 46 a pivoted pawl 48 engaging with the teeth 50 of a ratchet wheel 52, which is fixed to shaft 40. The pawl is held against the ratchet wheel by a spring 54 stretched between a pin 56 on the pawl and a pin 58 on the rocker arm 44. The pawl bears a nose 60 which can be grasped to pull the pawl back from contact with ratchet wheel 52, throwing spring 54 above the center of pin 46, so that the pawl comes to rest in an inoperative position against a pin 62 projecting from the face of rocker arm 44. The rocker arm 44 is intermittently rocked by a driving mechanism mounted between two side plates 64 and 66 at the front end of the machine. On a stationary shaft 68 projecting inward from side plate 64 is pivotally mounted a rock lever 70 having a slot 72 in its rear end in which engages a bolt 74 of a link 76 connected by a bolt 78 with rocker arm 44. The forward end of lever 70 is connected by a pin 80 to the lower end of a spring 82, the upper end of which is hooked over a stationary pin 84 on side plate 64. The lever 70 has a hub 86 from which projects a rigid arm 88 bearing a pin 90 which pivotally supports a roller 92. This roller bears against a cam 94 fixed to a shaft 96, which is revolubly mounted in bearings in side plates 64 and 66. The shaft 96 is rotated by a driving mechanism to be described later and cam 94, with the cooperation of spring 82, causes lever 70 to rock and oscillate the rocker arm 44, thus turning ratchet wheel 52 by pawl 48 and feeding forward the bank of paper.

The feed of the bank of paper is not continuous, but is interrupted when the leading edge of the bank reaches a certain position at the forward end of the bank feed table. The interruption of the feed of the bank may be effected by a feeler mechanism now to be described.

At the forward end of the bank feed table 28 there extends across the machine between the side plates 64 and 66 a shaft 98, which carries lower delivery rolls 100. Upper drop rolls 102 are mounted upon swinging arms 104 supported on a shaft 106 pivotally mounted in the side plates 64 and 66. The delivery rolls 100 and 102 receive the paper from the sheet separating mechanism to be described later. On shaft 98, near the center line of the feeder, there is mounted a bracket 108, which has a depending arm 110 recessed to fit over stay bolt 112, and a rearwardly extending arm 114 provided with a bearing 116 embracing a shaft 118, which is mounted between the side plates 64 and 66. The feeler mechanism includes a trip lever 120 mounted at the center line of the feeder upon a pivot 122 on bracket 108. In addition to its paper engaging arm this lever 120 has a stop arm 124 and a weight arm 126 tending to tip it toward the right (Figure 3). The upper end of the stop arm is positioned so as to lie under the end of an arm 128 clamped to a shaft 130 pivotally mounted in the side plate 64 and bracket 108. The shaft has fixed to it another arm 132 connected at its end to a rod 134. The upper end of rod 134 is connected at 136 to a lever 138 pivoted upon a shaft 140 mounted between the arms of a bracket 142. The bracket is fixed by set screw 144 upon a stay bolt 146 mounted between the side plates 64 and 66. The outer end of lever 138 bears a roller 148, which rides upon a cam 150 mounted upon drive shaft 96. Lever 138 has an arm 152 extending to the left, the end of which is articulated to a rod 154 guided for vertical movement in a hole in the bottom plate of bracket 142. A compression spring 156 surrounding rod 154 tends to rotate lever 138 clockwise, so that its roller 148 constantly rides upon cam 150. The hub 158 of lever 138 has a cam finger 160, which bears against a cam finger 162 of a lever 164 pivotally mounted on a shaft 166 extending across the arms of bracket 142. This lever is held against cam finger 160 by a spring 168 connected at its opposite end to a pin 170 on lever 138. Lever 164 has a downwardly extending arm 172 which cooperates with the outer end of arm 88 to interrupt the rocking motion of that arm at times. The mechanism just described operates in the following manner:

Assuming the paper feed mechanism to be in operation, that is, the arm 44 rocking and stepping the ratchet wheel 52 forward, the bank of paper will be advanced until the leading edge of the bank comes against trip lever 120 and moves it to the left, from its dot and dash line position of Figure 3 to its full line position. This motion swings stop arm 124 to the left and allows arm 128 to rock downward and to the full line position, and rod 134 to descend as roller 148 rides onto the lower part of cam 150. The downward movement of rod 134 and lever 138 attached thereto causes cam finger 160 to swing to the left against cam finger 162, moving the lower arm 172 of lever 164 over the end of lever 88. Thus the lever 88 is prevented from following cam 94 and the rocking motion of arm 44 is stopped. When paper has been removed from the bank sufficiently to allow trip lever 120 to return to the normal position shown in dot and dash lines, the stop arm 124 prevents downward movement of rod 134 and consequently the lever arm 172 remains out of the path of lever arm 88, which is then free to execute its rocking movements under the control of cam 94. The forward feed of the paper is thus resumed and it will be evident that the mechanism will operate in such a way that there will be little variation in the position of the top sheet of the bank of paper.

To prevent the sheet of paper which is being fed forward after separation from the bank from riding upon the top of finger 120 and holding the finger toward the left, thus interfering with the normal control of the bank feed, there is provided a finger guard 174 pivoted at 176 on bracket 108 and normally held by a spring 178 attached to its arm 180 so that its upper hooked end 182 overhangs the top of finger 120 and provides a support upon which the paper can glide as it moves into the delivery rolls 100, 102. If the finger guard 174 should remain constantly in its full line position, the leading edge of the paper might become hooked under its end 182. To prevent this the guard is momentarily swung to the left to its dot and dash line position, where its end 182 is within the periphery of delivery roll 100. For this swinging motion the guard is provided with an arm 184 resting upon an actuating arm

186 fixed upon a shaft 188, which is pivoted between side plate 64 and bracket 108 directly under shaft 130. Another arm 190 fixed to shaft 188 is connected by a rod 192 to a lever 194 which is similar to lever 138, being pivotally supported on shaft 140 and provided at its outer end with a roller 196 which rides upon a cam 198. The roller is pressed against the cam by a spring 200 surrounding guide rod 202 attached at 204 to the left end of lever 194 and guided for vertical movement in a hole in the bottom plate of bracket 142. The cam 198 is designed to raise lever 194 a moment before the paper begins its forward movement after separation (the drive of this arm being synchronized with that of the sheet separating mechanism), and to hold the lever in its elevated position, with guard 174 swung to the left, until the paper has entered the delivery rolls 100, 102. The guard 174 is then restored by spring 178 to its normal position over finger 120.

Sheet separating mechanism

The principle upon which the separator mechanism operates is to lift the top sheet at its rear edge, then to move the sheet backward by its rear edge, thus causing it to ride up upon the air which enters between it and the sheet below, and then to move it forward. Preferably a blast of air is sent under the sheet as its rear edge is raised, to shake it loose from the bank. By the time the rearward movement is ended the sheet is raised clear of the pile over its whole surface and is supported upon the air beneath it. It is then fed forward, either by the same means used to lift the rear edge from the pile, or by another set of grippers which grasp it further forward. The forward movement of the sheet is assisted by the forwardly moving current passing under it. The volume of air blown under the sheet may be increased by additional jets which become effective as soon as the rear edge of the sheet has been raised to the limit of its upward movement. The sheets are preferably fed in such rapid succession that the sheet previously fed has not passed the front edge of the sheet in the act of being separated, when the latter begins its forward movement. The rearward movement of the sheet may be used for registering the sheet, by stopping the rearward movement by means of trip fingers positioned so as to engage the rear edge at different points and to interrupt the rearward movement at each point independently.

The separator mechanism of the machine shown in Figures 1 to 12 has two pairs of suction grippers controlled independently by two actuating mechanisms. At least two grippers are needed to hold the paper in proper alignment, but more may be used if desired. Reference will now be made to Figures 6–12, in addition to Figures 1 and 2. The separator mechanisms are supported on a carriage comprising two riders 206, 206a joined together by a tube 208. The riders travel upon round bars 210 supported at their right ends in bearings 212 on side plates 14, and at their left ends on brackets 214 secured to the bank feed table 28. Within the tube 208 is rotatably mounted a shaft 216 to the opposite ends of which are fixed two gears 218 meshing with teeth 220 on bars 210. The shaft 216 is provided with a crank handle 222, whereby it can be turned to make gears 218 travel upon the teeth 220 and thus adjust the separator mechanism longitudinally over the bank feed table 28. The carriage can be locked in position on the bars 20 by a set screw 224.

There are two separator heads mounted upon the carriage 206, 206a, 208 located respectively at A and B (Figure 2), the head A being shown, while the head B is omitted as being merely repetitious. Each head comprises a main bracket 226, the general outline of which appears best in Figures 1 and 9. The bracket 226 is secured by two bushes 228 and 230 to tubes 232 and 234 mounted to slide vertically in the bored ears 236, 236a and 238 of a bracket 240. The body of the bracket 240 comprises a sleeve 241 which is slidably mounted upon the tube 208 and which provides for the lateral adjustment of the separator heads. The sleeve 240 is locked upon the tube 208 by a set screw 242. Rotary movement of the sleeve 241 upon tube 208 is prevented by a key 244 engaging in a groove 246 of the tube 208, the key being held in place by set screws 245.

The separator head is supported directly upon the bank of paper by a roller 248 mounted upon a shaft 250 between the arms 252 of bracket 226. The tube 234 houses a counterbalance spring 254 (Figure 9), which is connected at its bottom to a pin 256 extending across the bottom of tube 234 and at its top is hooked over a pin 258 projecting through a slot 260 in the tube 234. The pin 258 is inserted through a bore 262 in the supporting ear 236a and is secured therein by a set screw 264. The tube is vertically slidable in ears 236a and 238 to allow the position of the separator head to change in accordance with the height of the bank of paper. A portion of the weight of the separator head is supported by the counterbalance spring 254. The tube 232 also guides the head for vertical movement, but this tube is guided only in an upper ear 236, to avoid difficulties of alignment which would be caused by passing it through a lower ear similar to ear 238. The separator heads can be raised from the bank of paper by a lever 266 fixed to a shaft 268 mounted in the riders 206, 206a and extending through the supporting brackets 240 of the two heads. Two arms 270 are keyed to shaft 268 beside the respective brackets 240, only one of these arms appearing in the drawings. Each has a link 272 pivoted to its end by a pin 274, this link having a slot 276 in which engages a pin 278 on the side of bracket 226. By depressing lever 266 the links 272 are raised so that the bottom of the slots 276 engage pins 278 and raise the separator heads. Normally the separator heads are free to rise and fall, pins 278 moving in slots 276. The arms 270 are free to move axially on shaft 268 and are held in abutment with brackets 240 by hook-shaped retainers 280 on the brackets.

The active elements of the separator head are suspended upon a shaft 282 supported in bearings 284, 284a at the upper end of bracket 226. These active elements comprise suction grippers 286, 286a, a suction gripper lever 288, and an actuating lever 290. The suction grippers and the suction gripper lever are both fixed to shaft 282, which is rotatably mounted in its bearings 284, 284a, while the actuating lever 290 is revolubly mounted upon shaft 282 by means of a hub 291. The suction grippers are fixed to the shaft 282 by clamps 292, 292a and rods 294, 294a secured to bushes 296, 296a on the sides of the cylinders 360 of suction grippers 286, 286a. The suction gripper lever 288 is fixed to shaft 282 by a pin 298 extending through its hub 300. A spring 302, with its two ends hooked over screws

303 and 305, urges levers 288 and 290 together scissors fashion, up to the point where an abutment 304 on lever 288 strikes an abutment 306 of lever 290.

The hub 291 of lever 290 has projecting to the left (Figure 6) from it a pair of arms 308 (Figure 7) connected by a pin 310 with the upper end of a rod 312. The lower end of this rod is guided in a hole in a plate 314 which forms a part of bracket 226. Surrounding the rod 312 is a compression spring 316 which tends to swing arms 308 upward and thus to throw lever 290 to the left. Projecting to the right from hub 291 is an arm 318 connected by a pin 320 to a yoke 322. The forked lower end of yoke 322 is guided upon a cam shaft 324. On the pin 326 the yoke carries a roller 328 which rides upon a cam 330 fixed to shaft 324 by a set screw 334 extending through its hub 336. The cam and the yoke work in opposition to spring 316 to cause the lever 290 to execute rocking movements of constant extent for each sheet of paper fed. It is from these rocking movements of the actuating lever 290 that the movements of the suction grippers are derived. At its lower end the actuating lever 290 bears a pawl 338 fixed to a hub 340 rockably mounted upon a pin 342 in the lower end of the actuating lever. The pawl 338 is in position to engage in teeth 344 of a plate 346 mounted on the lower end of lever 288 by screws 347 (Figure 6). The pawl is normally held in engagement with teeth 344 by means of a spring 348 connected at one end to an arm 350 on hub 340 and at its other end to a pin 352 on lever 290. The pawl 338 determines the relative angular position of levers 288 and 290 during the leftward movement of these levers. The levers move in general together, but have a relative movement to compensate for the slightly different positions at which the suction grippers engage successive sheets of paper. An arm 354 on hub 340 engages a set screw 356 on the end of a bolt 358, when the actuating lever 290 swings to its extreme right position, disengaging pawl 338 from ratchet teeth 344 and allowing levers 288 and 290 to assume a different relative position, in a manner to be described.

The suction gripper itself is of known type. It comprises an outer cylinder 360 (Figure 11) into which is clamped an inner bush 362 by means of a screw 364 which draws together the bifurcated lower end of cylinder 360. Slidably guided in bush 362 is a hollow piston rod 366 bearing in its upper end a mushroom piston 368 and at its lower end a suction cup 370 secured to the piston rod by means of a collar 372 and a screw cap 374. In the upper position of the piston rod, flange 376 of collar 372 bears against flange 378 of bush 362. The bore 380 of piston rod 366 opens at its upper end above the piston 368 and at its lower end into suction cup 370. The piston 368 has a bleed port 382 providing limited communication between the spaces on the two sides of the piston. The upper end of cylinder 360 is closed by a plug 384 held by a screw 386. The space 388 within the cylinder and below the piston is connected with exhausting means through a hole 390, into which is screwed a pipe connection 498 (Figure 8). A spring 394 normally holds piston 368 in its upper position. The device operates as follows:

When the space 388 is being evacuated, but the cup 370 is not covered by a sheet of paper, air can pass through cup 370, bore 380, and bleed port 382 into space 388; but the bleed port throttles the air sufficiently to reduce the pressure in space 388 low enough to cause the piston 368 to be forced down by the substantially atmospheric pressure above it. This motion is utilized to bring the suction cup 370 against the top sheet of the bank of paper. When the sheet of paper is sucked against cup 370, bleed port 382 rapidly equalizes the pressure above and below piston 368, so that spring 394 asserts itself, raising piston 368 to its upper position. The evacuation of space 388 is discontinued at the moment the paper is snatched away from the suction cup by the delivery rolls 100, 102. Atmospheric pressure then prevails on both sides of the piston 368 and the piston remains in its upper position. When the suction is turned on to space 388 again the piston 368 is pulled down in the manner previously described, forcing suction cup 370 into contact with the paper, whereupon the operation is repeated. There is pivotally attached to the lower end of lever 288, by means of a pin 396, a ratchet bar 398, the right end of which is guided by a slot 400 on a roller 402 mounted upon a flanged pin 404 of bracket 226. This ratchet bar is provided on its upper edge with teeth 406 with which cooperates a pawl 408 clamped by a hub 410 to one end of a small shaft 412 rotatably mounted in bracket 226. The other end of shaft 412 has fixed to it by a clamp 414, a finger 416, which moves between the forked arms of a guide 418, 420, fastened tightly by clamp 422 to a supporting stud 424 projecting from bracket 226. When the lever 288 and suction gripper 286 are moving to the right, in a manner to be described, after the paper has been picked up by the suction gripper, their motion continues until the rear edge of the paper entering between guides 418, 420 strikes finger 416. This throws pawl 408 into engagement with the teeth 406 on ratchet bar 398, stopping the ratchet bar and the lever 288, as well as the suction gripper which moves with it.

The movement to the right of lever 288 is controlled by a cam 426 fixed to shaft 324 by a set screw 428 passing through its hub. A roller 430 revolubly mounted upon a pin 432 at the end of an arm 434 of lever 288 rides upon cam 426 at certain times to control the movement of lever 288 independently of the movement of lever 290.

The rear edge of the top sheet of the bank is clamped by blower clamp feet 436 (Figures 8 and 9) one on each separator head. Each clamp foot is in the form of a blower nozzle at the bottom and has in its solid upper part a slot 438 guided upon a roller 440 revolubly mounted on bracket 226 by a pin 442. On the clamp foot above the slot is an arm 444 articulated at 446 to the outer end of a lever 448 which is pivoted at 450 upon the bracket 226. The lever 448 carries a roller 452 which rides upon a cam 454 fixed to shaft 324 by a set screw 456 passing through its hub 458. The lever 448 is pulled down by a spring 460 engaged over a screw 462 on the lever and a pin 464 on bracket 226. The cam 454 is shaped to give the clamp foot an upward and rearward movement at the moment the top sheet is being separated from the bank, then to return it immediately to position to clamp the sheet below. The nozzle-like lower end of the clamp is provided with a nipple 466 for the connection of a compressed air hose. At the instant the clamp foot returns to its position on the paper bank a blast of air is emitted from its under the sheet, which has been raised at its rear edge by the suction grippers. Supplemental blower nozzles 468 and 468a are provided at an elevation slightly above the bank

of paper to supply a larger volume of air beneath the sheet than the nozzles 436 could supply alone. These auxiliary blast nozzles 468, 468a are connected by elbows 470, 470a to the lower end of pipes 472, 472a. The pipes 472, 472a are secured by clamps 474, 474a to rods 476, 476a, screwed into sockets 478, 478a and clamped therein by lock nuts 480, 480a. There is also clamped upon rod 476a, by a clamp 482, a short section of pipe 484, to which is connected the hose 486 leading to nipple 466 on the clamp foot.

Extending between the two riders 206, 206a are three pipes 488, 490, 492. These are provided respectively with nipples 489, 491 and 493, connected respectively by hose connections (not shown) with nipples 494, 496, 498. The pipes 488 and 490 carry compressed air while the pipe 492 is a vacuum pipe. They are connected respectively by pipes 500, 502, 504 with nipples 506, 508, 510 of a valve mechanism 512. The valve mechanism is synchronized with the gripper driving mechanism by a gear comprising a sprocket chain 514 travelling over a sprocket wheel 516 on shaft 518 of the valve mechanism 512 and a sprocket wheel 520 of main drive shaft 96. The shaft 96 has keyed to it a gear 522 meshing with a pinion 524 on a shaft 526. This shaft is driven by meshing bevel gears 528, 530 from a drive shaft 532 leading from the press with which the sheet feeding mechanism is associated.

The cam shaft 324 of each separator head is connected by bevel gears 534, 536 with a shaft 538 mounted in bearings 540, 542 on bracket 226. This shaft is connected by a gimbal joint 544 with a telescopic shaft 546, the forward end of which is connected by a gimbal joint 548 with a spiral gear 550 mounted on a shaft 552 which rotates in a bearing 554 forming a part of a bearing block 556 suspended on the main drive shaft 96 and a second non-rotating shaft 558. The spiral gear meshes with a spiral gear 560 keyed to the main drive shaft 96.

There may be provided on the separator head a combing device. Such a device is shown in detail in Figure 10 in association with the adjacent parts of the separator head. A combing wheel 562 is provided on its periphery with rollers 564, in the well-known manner. The combing head is mounted by its hub 566 upon the end of a shaft 568 to which the hub is secured by a set screw 570. The shaft 568 is rotatably supported by a sleeve 572 provided with a forked bracket 574 (Figures 2 and 7) rockably mounted upon a shaft 576. Standing up from the hub 578 of bracket 574 is an arm 580 bearing a pin 581 which carries a roller 582. The roller is held against a cam 584 fixed on cam shaft 324 by a spring 586 hooked over a screw 588 at the top of arm 580 and a screw 590 on bracket 226. This mechanism serves to dip the combing wheel into contact with the top sheet during a certain interval for each sheet fed. The combing wheel is rotated by a gear 592 fixed to cam shaft 324 and driving a pinion 594, which is integral with a bevel gear 596 meshing with a bevel pinion 598 fixed to shaft 568.

The general scheme of operation of the paper separating mechanism is as follows:

The suction cups 370 of the two separator heads pick up the paper when in their lower central position *a* (Figure 9). They may engage the paper at slightly varying distances from the rear edge of the sheet, depending upon the position of the top sheet at the time. The suction cups are then to be raised to position *b* and moved rearward for a short distance to bring the rear edge of the sheet to a definite line separated by a predetermined distance from the delivery rolls 100, 102; this line being defined by the triggers 416. The motions of the suction grippers are derived from the actuating levers 290 through the suction gripper levers 288. The actuating levers 290 have a constant oscillating motion imparted to them by cams 330 and springs 316. This motion is just sufficient to swing the suction gripper levers 288 forward through a distance which will carry the sheet of paper from its rearmost position determined by triggers 416 to the position in which its front edge is engaged by delivery rolls 100, 102. Since the suction cups 370 may be located at different points on different sheets of paper, it is necessary to provide a variable connection between the actuating levers 290 and the suction gripper levers 288. For this reason the positive connections between these levers are interrupted during the rearward motion of the suction grippers from position *b* to position *c* (Figure 9) and are reestablished in a relation dependent upon the position in which the suction grippers are stopped in their rearward movement. Thus, while the actuating levers always swing between the same limits and the sheets of paper are all moved forward through the same distance from their rearmost positions, the suction gripper levers swing between different limits depending upon the location of the top sheet when it is picked up.

The operation will now be described in detail.

Assuming the suction cups of both separator heads to be in their lower central position, as shown at *a* in Figure 9, the top sheet of the bank is drawn against the suction cups, assisted by the buckling action of the combing wheels 562, which are dropped into contact with the paper slightly prior to this time. The closure of the suction cups by the paper causes the pistons 368 with their attached cups 370 to be raised in the manner described, to position *b*. At this time the actuating levers 290 have moved to their extreme right position, while the levers 288 are restrained from moving to the right by cams 426 bearing against rollers 430. The cams 426 are at this moment turned so that the rollers 430 ride down onto the lower part of the cams, thus allowing levers 288 to be drawn to the right by springs 302, carrying with them suction grippers 286, 286a, until the rear edge of the paper, which has been guided by lips 418, 420, strikes triggers 416 and throws pawls 408 into engagement with the teeth 406. This stops the ratchet bars 398 and also the levers 288. At this time the suction cups are in the position indicated at *c*. If the paper is not squarely positioned, one side of the rear edge will strike one of the triggers 416 before the other and thus stop the suction grippers of the head on that side, while the suction grippers on the other head continue their motion, swinging the sheet of paper around into square position, where it is completely stopped by engagement of the other side of its rear edge with the other trigger 416. At about this time cams 330 begin to recede from rollers 328, allowing springs 316 to rock actuating levers 290 clockwise. In their extreme right-hand position the arms 354 of pawl clamps 340 have been engaged by set screws 356, so that pawls 338 are swung out of contact with teeth 344. As soon as the actuating levers 290 begin to move clockwise, the arms 354 leave set screws 356 and pawls 336 drop into the teeth 344. Thus the suction gripper levers 288 are carried with the actu-

ating levers during their further movement to the left. The suction grippers 286, being rigid with the levers 288, also move to the left, carrying with them the sheet of paper. The movement continues until cams 330 begin to rise again, which occurs at the moment the forward edge of the sheet is engaged by delivery rolls 100, 102, as the suction cups reach position *d* (Figure 9). At this instant the suction valve in valve mechanism 512 relieves the vacuum in cylinders 388 and since atmospheric pressure prevails on both sides of piston 368, the suction cup remains in raised position by the influence of spring 394. The levers now swing back to their central position due to the roller 328 riding up on cam 330. The levers 290 continue on toward their extreme right hand positions, but in the meantime the high parts of cams 426 have again come opposite rollers 430 and the levers 288 are stopped in their central positions, with the suction cups at position *b*. The pawls 338 ratchet over teeth 344 and springs 302 are stretched. Near the end of the rightward movement of levers 290 arms 354 of pawl clamps 340 engage set screws 356 and the pawls are raised above the teeth 344. Thus the levers 288 are free to move to the right until individually stopped by pawls 408 when the rear edge of the paper strikes the triggers 416. Meanwhile, during the dwell of the levers 288 in central position the valve mechanism 512 opens the vacuum pipe to the suction again and suction cups 370 are forced down on to the paper by the atmospheric pressure above pistons 368. When the suction cups are closed by the paper the pressure is equalized in the cylinders 360 and springs 394 raise the suction cups from position *a* to position *b*. At about this time the rollers 430 begin to ride down on to the low part of cams 426.

The moment before the suction cups 370 raise the rear edge of the sheet of the clamp feet 436 are raised from the paper by the action of cams 454 on levers 448. As soon as the rear edge of the sheet has been raised the clamp feet are dropped upon the bank of paper again and at this instant a blast of air is emitted from the nozzle of the foot by the operation of the valve mechanism 512. Shortly after the valve mechanism operates to send a blast of air out of nozzles 468, 468*a*, so that the sheet is floated free of the bank. The separating mechanism may operate with sufficient rapidity to feed the sheets forward in underlapping or streamline relation, the cams 330 being designed to swing the suction grippers forward at the same speed as the stream of paper is travelling through the delivery rolls.

Instead of having all the pick-up and feed movements executed by a single set of gripper devices, the pick-up and rearward movement of the sheet may be carried out by one set and the forwarding movement by another. A machine of this type is shown in Figures 13–15. A large part of the mechanism shown in these figures is the same as in Figures 1–12 and will therefore not have to be described again. A pick-up suction gripper 600 is mounted on the shaft 282 rigidly in the same way as in the other form of the invention. The movement of this suction gripper is controlled entirely by a cam 602 and a spring 604, through the instrumentality of a suction gripper lever 606 provided on an arm 608 with a roller 610 bearing against cam 602. The lever 606 is fixed to shaft 282 by a pin 612 passing through its hub 614. The lower end of lever 606 is connected by a pin 616 with a ratchet bar 618 slotted at 620 to ride upon a pin 622 on bracket 226. Cooperating with the teeth 624 of this ratchet bar is a pawl 626 fixed to a clamp 628 which is secured to a small shaft 630 revolubly mounted in a bearing in bracket 226. The opposite end of shaft 630 carries a clamp 632 bearing a finger 634 which projects between the arms of a forked paper guide 636, 638, as in the form of the invention first described. The pawl 626 is normally held out of engagement with the ratchet teeth 624 by a spring (not shown) and is thrown into engagement with the ratchet bar when struck by the rear edge of the paper, thus arresting the rearward movement of the suction gripper 600. As before, there are two separator heads and the suction gippers 600 on the respective heads are independently stopped, thereby serving to register the sheet by its rear edge.

Upon a shaft 640 rotatably mounted in bearings 642, 644 of bracket 226 is fixed a clamp 646. A front suction gripper 648 is attached to clamp 646 by a rod 650 rigidly secured to both suction gripper and clamp. The suction gripper 648 can be placed upon either side of bearing 644. An arm 652 is also fixed to shaft 640 by a pin 654 passing through its hub 656. This arm 652 is connected by a pin 658 with a link 660, the rear end of which is articulated by a pin 662 to the downwardly projecting arm 664 of a three-armed lever 666 rotatably mounted upon shaft 282. Forwardly projecting arms 668 of lever 666 are connected by a pin 670 with the upper end of a rod 672, the lower end of which is guided in a hole 673 in a plate 674 extending laterally from one side of bracket 226. A rearwardly projecting arm 676 of the three-armed lever 666 is connected by a pin 678 with a yoke 680, the forked lower end of which is guided upon cam shaft 324. The yoke 680 carries a roller 682 by means of a pin 684, which roller bears upon cam 686 fixed to shaft 324.

The pick-up and feed mechanism just described operates in the following manner:

Assuming the suction grippers 600 to be at the forward limit of their movement, the suction grippers 648 will be returning to the rear, or will have reached their rearmost position. A valve mechanism (not shown) similar to the valve mechanism 512, will operate to apply suction to the suction grippers 600. This will cause the suction grippers 600 to dip into contact with the paper and then to rise, in the manner previously described. The air blasts 436 and combing rollers 562 operate the same as before. The cams 602 now allow suction grippers 600 to move toward the rear carrying the paper into the guides 636, 638, until it strikes triggers 634 and throws pawls 626 into the ratchet teeth 624, stopping the rearward movement of the suction grippers 600. Shortly thereafter the suction grippers 648, which have been waiting in their rearmost position, have suction applied to them by the valve mechanism, so that they dip and grasp the paper, the suction being cut off from the grippers 600 at the same time. The suction grippers 648 are now thrown forward by springs 672, the rollers 682 riding on to the low part of cams 686. At the forward end of the movement the front edge of the paper is picked up by the delivery rolls and suction is cut off from the grippers 648, which are thereafter restored to their rearmost positions. Meanwhile the suction grippers 600 have ben moved forward in readiness to pick up another sheet.

This form of the invention has the advantage

over the one first described that it enables the forwarders to grasp the sheet somewhat in advance of its rear edge, because the sheet has been pulled backward by the pick-up grippers and also the preceding sheet has been moving forward and uncovering more and more of the sheet which is about to be engaged by the forwarders. The latter can therefore be placed in advance of the pick-up grippers to the point where the read edge of the preceding sheet has just passed under them at the time they go into action on the next sheet of paper.

The invention has been particularly described as applied to separating and feeding sheets from a fanned out bank, but it can equally well operate on a pile.

I claim:

1. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising separating gripper means at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly; and actuating means for causing the gripper means to seize the top sheet at the lowermost position of said means and for imparting said three movements to said gripper means in the sequence named.

2. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising separating gripper means at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly; actuating means for causing the gripper means to seize the top sheet at the lowermost position of said means and for imparting said three movements to said gripper means in the sequence named, and means for winding the top sheet during the rearward movement of said gripper means.

3. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising separating gripper means at the rear edge of the top sheet mounted to reciprocate along the direction of feed, means to reciprocate said gripper means adapted to hold said gripper means in an intermediate position in the course of its rearward movement, and means to cause said gripper means to seize the top sheet adjacent its rear edge while in said intermediate position and to raise said gripper means, in order to lift the rear edge of the top sheet before the rearward movement of said gripper means is resumed.

4. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising separating gripper means at the rear edge of the top sheet mounted to reciprocate along the direction of feed, means to reciprocate said gripper means adapted to hold said gripper means in an intermediate position in the course of its rearward movement, means to cause said gripper means to seize the top sheet adjacent its rear edge while in said intermediate position and to raise said gripper means, in order to lift the rear edge of the top sheet before the rearward movement of said gripper means is resumed, and means for winding the top sheet during the movement of said gripper means rearward from said intermediate position.

5. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising gripper means at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly; actuating means for imparting said three movements to said gripper means in the sequence named, and rear edge register means for terminating the rearward movement of said gripper means.

6. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising separating gripper means at the rear edge of the top sheet, means for moving said gripper means forwardly and rearwardly along the direction of feed, means for causing said gripper means to pick up the rear edge of the top sheet before the rearward movement of said gripper means is completed and to raise it above the level of the top of the pile, and means to cause said gripper means to release the sheet on the following forward movement.

7. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising gripper means engageable with the top sheet of the pile near its rear edge and movable away from the plane of the top of the pile and rearward, means for winding the top sheet as it is raised from the pile, means for arresting the rearward movement of the sheet, and means for moving the sheet forward.

8. A machine for separating sheets from the top of a pile one at a time and feeding them forward to delivery rolls; comprising gripper means at the rear edge of the pile; means for causing said gripper means to engage the top sheet of the pile near its rear edge and raise it above the top of the pile; means to move said gripper means rearward, then forward, and means for arresting the rearward movement of said gripper means when the rear edge of the sheet of paper is at a predetermined distance from the delivery rolls.

9. A machine for separating sheets from the top of a pile and feeding them forward, comprising a suction separating griper above the pile movable toward and away from the top of the pile and also forward and rearward along the direction of feed, means for causing said gripper to suck the top sheet near its rear edge and raise it from the pile, and means for then moving said gripper first rearward and then forward.

10. A machine for separating sheets from the top of a pile and feeding them forward, comprising a suction separating gripper above the pile movable toward and away from the top of the pile and also forward and rearward along the direction of feed, means for causing said gripper to suck the top sheet near its rear edge and raise it from the pile, means for winding the top sheet, and means for then moving said gripper first rearward and then forward.

11. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising gripper means supported above the rear edge of the top sheet so as to be movable along the line of feed; means for causing said gripper means to grip the top sheet of paper near its rear edge; means for moving said gripper means rearward and then forward after it has gripped the top sheet, comprising actuating means having a reciprocating movement of constant extent along the line of feed for each paper feeding operation; coupling means between said actuating means and said gripper means for coupling said means in various relative positions; and means controlled by the rear edge of the sheet on its rearward movement for determining the relative position in which said gripper and actuating means will be coupled during the following forward movement.

12. A machine for separating sheets from the

top of a pile one at a time and feeding them forward, comprising gripper means supported above the rear edge of the top sheet so as to be movable along the line of feed; means for causing said gripper means to grip the top sheet of paper near its rear edge; means for moving said gripper means rearward and then forward after it has gripped the top sheet, comprising actuating means having a reciprocating movement of constant extent along the line of feed for each paper feeding operation; coupling means between said actuating means and said gripper means comprising a resilient connection adapted to draw said gripper means with said actuating means on the rearward movement of the latter and a connection for positively connecting said gripper means to said actuating means in one of various possible relative positions on the forward movement of the latter, and means controlled by the rear edge of the sheet on its rearward movement for determining the relative position in which said gripper and actuating means will be coupled during the following forward movement.

13. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising gripper means supported above the rear edge of the top sheet so as to be movable along the line of feed; means for causing said gripper means to grip the top sheet of paper near its rear edge; means for moving said gripper means rearward and then forward after it has gripped the top sheet, comprising actuating means having a reciprocating movement of constant extent along the line of feed for each paper feeding operation; a resilient connection adapted to draw said gripper means with said actuating means on the rearward movement of the latter; means controlled by the rear edge of the paper for arresting the rearward movement of said gripper means, and means operable at a definite point in the forward movement of said actuating means for positively connecting said gripper means and said actuating means together during the latter's forward movement.

14. A machine for separating sheets from a pile one at a time and feeding them to delivery rolls, comprising rear edge guide means located at a distance from the delivery rolls somewhat greater than the length of the paper to be fed, gripper means engageable with the top sheet of the pile near its rear edge and movable rearwardly and forwardly along the line of feed, actuating means for moving said gripper means rearwardly and forwardly for a distance approximately equal to the difference between the distance from said rear edge guide means to the delivery rolls and the length of the paper, means for connecting said actuating means and said gripper means together in various relative positions, and means controlled by said rear edge guide means for arresting the rearward movement of said gripper means and for determining the relative position in which said actuating means and said gripper means are to be connected together during their forward movement.

15. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising suction separating gripper means supported above the rear edge of the top sheet so as to be movable along the line of feed and also toward and away from the pile, actuating means having a reciprocating movement along the line of feed, resilient connecting means between said actuating means and said suction gripper means tending to make them move together, means for delaying the movement of said suction gripper in the course of the rearward movement of said actuating means, and means operable during said delay for causing said suction gripper to suck up the top sheet near its rear edge and raise it from the pile.

16. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising a gripper member, an actuating member, means for reciprocating said actuating member, a spring interconnecting said members, ratchet means forming a positive interconnection between said members in one direction of movement of said actuating member, means for controlling the movement of said gripper member independently of said actuating member, and means for disabling said ratchet means in one position of said actuating member.

17. A machine for separating sheets from the top of a pile one at a time and feeding them forard, comprising a gripper member and an actuating member both mounted to swing about the same axis, means for rocking said actuating member about said axis, a spring interconnecting said members, a pawl and ratchet connection between said members adapted to stop their relative movement under the influence of said spring in certain relative positions, means for disabling said pawl and ratchet connection in one position of said actuating member, and means for controlling the position of said gripper member independently of said actuating member while said pawl and ratchet connection is disabled.

18. A machine for separating sheets from the top of a pile one at a time and feeding them forward, comprising a gripper member, an actuating member, means for reciprocating said actuating member, a spring interconnecting said members, ratchet means forming a positive interconnection between said members in the forward direction of movement of said actuating member; means for delaying the motion of said gripper member while said actuating member is executing its rearward movement, thereby tensioning said spring; means for causing said gripper member to grip and raise the top sheet from the pile during said delay; means for disabling said ratchet means during resumed rearward movement of said gripper member under the influence of said spring and the control of said delaying means, means controlled by the rear edge of the sheet carried by said gripper member for arresting rearward motion of said gripper member, said disabling means being operative to restore said ratchet means to operative condition as said actuating member begins its forward movement.

19. A machine for separating sheets from the top of a pile one at a time and feeding them to delivery rolls, comprising a plurality of grippers movable independently forward and rearward along the line of feed, means for swinging said grippers rearward and forward in unison, means for causing said grippers to grip the top sheet near its rear edge before they reach the limit of their rearward movement, and means comprising trip fingers in position to be engaged by the rear edge of the sheet of paper near the respective grippers, for individually arresting the rearward movement of said grippers.

20. A machine for separating sheets from the top of a pile one at a time and feeding them to delivery rolls, comprising a plurality of grippers movable independently forward and rearward along the line of feed, actuating means for moving said grippers forward in unison, resilient

means for moving said grippers rearward, means for causing said grippers to pick up the top sheet near its rear edge before they complete their rearward movement, means comprising trip fingers in position to be engaged by the rear edge of the sheet of paper near the respective grippers, for individually arresting the rearward movement of said grippers, and means for coupling said grippers to said actuating means for the forward movement according to the positions in which they were arrested.

21. A machine for separating the top sheet from a pile of sheets, comprising a gripper member and an actuating member therefor both mounted to reciprocate along the line of feed, a spring connecting said members to cause said gripper member to be drawn rearward by said actuating member, positive connecting means between said members effective during the forward swing of said actuating member, yielding means urging said actuating member rearward, cam means for swinging said actuating member forward, cam means for delaying said gripper member temporarily in its rearward movement following said actuating member, and means to cause said gripper member to pick up the top sheet near its rear edge while it is delayed.

22. A machine for separating the top sheet from a fanned out bank of sheets, comprising a bank feed table, a bracket supported to move vertically with respect to said table, a drag mounted on said bracket and adapted to rest upon the bank of paper to support said bracket at a definite height above the bank of paper, a suction gripper mounted on said bracket to reciprocate along the line of feed of the paper and having a suction cup adapted to dip into contact with the top sheet of the bank near its rear edge, means for raising said suction cup after it has sucked up the rear part of the top sheet, and means for then swinging said suction gripper first rearward and then forward.

23. A machine for separating the top sheet from a fanned out bank of sheets, comprising a bank feed table, a bracket supported to move vertically with respect to said table, a drag roller mounted on said bracket and adapted to rest upon the bank of paper behind the rear edge of the top sheet to support said bracket at a definite height above the bank of paper, a drag arm extending forward of said roller so as to rest upon the rear edge of the top sheet, a suction cup mounted so as to have a reciprocating movement along the line of feed of the paper and an up and down movement, means for causing said suction cup to dip into contact with the top sheet near its rear edge and to pick up said rear edge, means for momentarily raising said drag arm before said suction cup picks up the rear edge of the top sheet and returning said drag arm to contact with the bank of paper after the rear edge of the top sheet has been picked up, and means for moving said suction cup with the top sheet adhering thereto first rearward and then forward.

24. A machine for separating the top sheet from a fanned out bank of sheets, comprising a bank feed table, a bracket supported to move vertically with respect to said table, a drag roller mounted on said bracket and adapted to rest upon the bank of paper behind the rear edge of the top sheet to support said bracket at a definite height above the bank of paper, a forwardly directed blower nozzle extending forward of said roller so as to rest upon the rear edge of the top sheet, a suction cup mounted so as to have a reciprocating movement along the line of feed of the paper and an up and down movement, means for causing said suction cup to dip into contact with the top sheet near its rear edge and to pick up said rear edge, means for momentarily raising said forwardly directed blower nozzle before said suction cup picks up the rear edge of the top sheet and returning said forwardly directed blower nozzle to contact with the bank of paper after the rear edge of the top sheet has been picked up, means for sending a blast of air through said nozzle under said top sheet after its rear edge has ben picked up, and means for moving said suction cup with the top sheet adhering thereto first rearward and then forward.

25. A machine for separating the top sheet from a fanned out bank of sheets, comprising a bank feed table, a carriage mounted crosswise on said table so as to be movable longitudinally thereof, pick-up mechanism mounted on said carriage comprising a gripper member reciprocating longitudinally of the table, cam controlled means for reciprocating said gripper member, a driving member stationarily mounted on said table, and drive means between said driving member and said cam comprising a telescoping shaft.

26. A machine for separating the top sheet from a pile of sheets and feeding it forward, comprising a suction separating gripper at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly, means for imparting said three movements to said suction gripper in the sequence named ,and buckling means associated with said suction gripper.

27. A machine for separating the top sheet from a pile of sheets and feeding it forward, comprising a suction separating gripper at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly, means for imparting said three movements to said suction gripper in the sequence named, and a combing wheel associated with said suction gripper.

28. A machine for separating the top sheet from a pile of sheets and feeding it forward, comprising a suction separating gripper at the rear edge of the top sheet movable upwardly, rearwardly, and forwardly, means for imparting said three movements to said suction gripper in the sequence named, buckling means associated with said suction gripper, and means for imparting to said buckling means a downward and upward movement to bring it momentarily into contact with the top sheet prior to the upward movement of said gripper.

29. In a machine for separating sheets from the top of a pile one at a time; two gripper devices at the rear edge of the top sheet, one in front of the other; means for oscillating said gripper devices in a fore and aft direction, the forward movement of the front gripper device beginning when the rearward movement of the rear gripper device ends; means to cause said rear gripper device to dip and pick up the top sheet near its rear edge, at the forward limit of movement of said rear gripper device, and to release the sheet at the rearward limit of its movement; and means to cause said front gripper device to grasp the sheet before its forward movement begins.

30. In a machine for separating sheets from the top of a pile one at a time; the combination of a sheet gripper, means for causing the gripper to seize the top sheet of a pile at variable positions depending upon the position of the sheet at the moment of seizure, means for causing the

gripper to separate the top sheet from the pile and move it rearward to an invariable position, and means for moving the gripper and attached sheet forward through a fixed distance and delivering it from the machine.

31. In a machine for separating sheets from the top of a pile one at a time; the combination of pivoted sheet gripper actuating levers, paper registering means, paper delivery means, suction gripper levers actuated by the actuating levers to move the paper through a fixed distance between registered position and the delivery means, and means for causing the suction gripper levers to swing between different limits depending on the location of the top sheet when it is picked up.

HENNING HALLSTREAM.

DISCLAIMER

2,144,057.—*Henning Hallstream*, Braintree, Mass. PAPER FEEDING MACHINE. Patent dated January 17, 1939. Disclaimer filed August 28, 1944, by the assignee, *Dexter Folder Company*.

Hereby disclaims from the scope of claims 1, 2, 3, 4, and 6 any structure except wherein the same gripper means separates the top sheet from the pile, moves it rearwardly and then feeds it forwardly.

[*Official Gazette September 26, 1944.*]

Disclaimer

2,144,057.—*Henning Hallstream*, Braintree, Mass. PAPER FEEDING MACHINE. Patent dated Jan. 17, 1939. Disclaimer filed Dec. 24, 1947, by the assignee, *Dexter Folder Company*.

Hereby enters this disclaimer to claims 1, 2, 3, 4, 6, 9, 10, and 26 of said patent.

[*Official Gazette January 20, 1948.*]