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[Continued on next page]

(54) Title: CIGARETTE BLANK LOADING APPARATUS

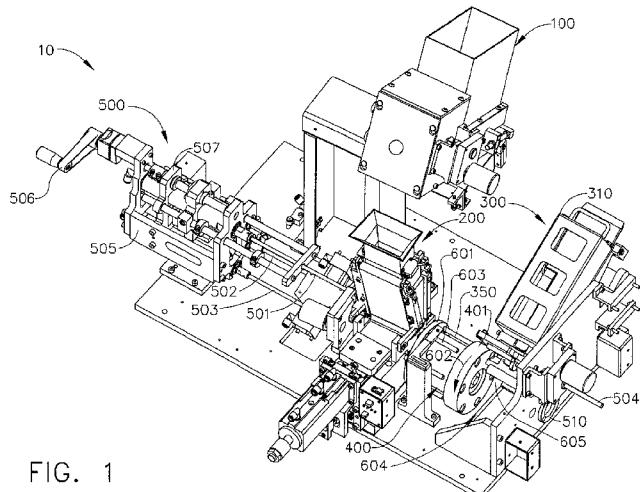


FIG. 1

(57) Abstract: An apparatus for loading a cigarette blank onto a filling tube. The apparatus comprises a filling tube having a first end, a second end, an inside diameter, an outside diameter, and a pin sized to fit within the filling tube. The pin has a first end and a second end comprising a guide head. When the filling tube receives the second end of the pin, at least a portion of the guide head of the pin extends beyond the second end of the filling tube for guiding the cigarette blank on said filling tube. Also disclosed is a method for loading a cigarette blank onto a filling tube and an apparatus for dispensing cigarette blanks in a cigarette manufacturing machine. The apparatus comprises a base having an upper end, a lower end opposite the upper end, a first side, a second side opposite the first side, and a shaker communicating with the base. The base also comprises a retainer for retaining at least one cigarette blank. Also disclosed is a method for separating and dispensing cigarette blanks.



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CIGARETTE BLANK LOADING APPARATUS

FIELD OF INVENTION

[0001] This invention relates generally to an apparatus for loading a cigarette blank onto a filling tube. This invention also relates generally to an apparatus for dispensing cigarette blanks in a cigarette manufacturing machine. More particularly, the invention relates to a filling tube and a guide pin used to guide a cigarette blank onto a filling tube. Also more particularly, the invention relates to an apparatus for separating cigarette blanks from a plurality of cigarette blanks and dispensing the separated cigarette blanks to a loading area. The invention also relates to methods of using a cigarette blank loading apparatus. The invention also relates to methods of using a cigarette blank dispensing apparatus.

BACKGROUND OF THE INVENTION

[0002] Prior to the invention of the electronic rolling machine, rolling your own cigarettes was restricted to manual table top machines, hand held machines, and attempts that have been made to perfect personal single stick electric machines. These machines employ a chamber for loading tobacco, a manual lever that compresses the tobacco, and a spoon mechanism that injects the tobacco into an empty preassembled cigarette blank. Many attempts have been made with varying degrees of success to perfect a table top electric machine. These basically employed the same technology, only electronically enhanced. The shortcoming is that the spoon mechanism shreds the tobacco. Secondly, loading the proper amount of tobacco each time is extremely variable. The other obvious drawback is the tedious nature of the process; each cigarette blank must be mounted on a nozzle manually. Moreover, the empty cigarette blanks are extremely fragile and easily damaged during the process.

[0003] While other electronic machines for use in retail settings have been developed, there remain drawbacks with those machines. First, separating the cigarette blanks for individual loading onto a filling tube remains imprecise. Secondly, loading the fragile cigarette blanks unto filling tubes often results in damaged and unusable cigarette blanks.

[0004] What is needed is an apparatus and method for separating and loading the cigarette blanks on a machine in a retail setting.

SUMMARY OF THE INVENTION

[0005] This invention relates to an apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising a filling tube having a first end, a second end, an inside diameter, and an outside diameter, and a pin sized to fit within said filling tube, said pin having a first end and a second end, said second end comprising a guide head, wherein when said filling tube receives said second end of said pin, at least a portion of the guide head of the pin extends beyond the second end of the filling tube for guiding a cigarette blank onto the filling tube.

[0006] This invention also relates to an apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising a filling tube holder capable of holding a plurality of filling tubes, a plurality of filling tubes mounted to said filling tube holder, each filling tube having a first end, a second end, an inside diameter, and an outside diameter, and at least one pin sized to fit within said filling tubes, said at least one pin having a first end and a second end, said second end comprising a guide head, wherein when each said filling tube receives said second end of said pin, at least a portion of the guide head of said pin extends beyond the second end of said filling tube for guiding a cigarette blank onto the filling tube.

[0007] This invention further relates to a method of locating a cigarette blank on a filling tube for receiving tobacco, comprising providing a filling tube having a first end, a second end, an inside diameter, and an outside diameter, providing a pin sized to fit within said filling tube, said pin having a first end and a second end, said second end comprising a guide head, inserting said pin into said filling tube so at least a portion of the guide head of said pin extends beyond the second end of said filling tube, dispensing a cigarette blank over said guide head and onto said filling tube, and retracting said pin from said filling tube.

[0008] Further, this invention relates to an apparatus for dispensing cigarette blanks in a cigarette manufacturing machine, comprising a base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side, and a shaker communicating with said base, wherein said base comprises a retainer for retaining at least one cigarette blank.

[0009] This invention also relates to an apparatus for dispensing cigarette blanks in a cigarette manufacturing machine, comprising a base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side, wherein said base comprises a retainer for retaining at least one cigarette blank, a shaker communicating with said base, and a cartridge for receiving a plurality of cigarette blanks, wherein said cartridge is mountable on said base.

[0010] This invention further relates to a method for dispensing cigarette blanks in a cigarette manufacturing machine, comprising providing a base comprising a retainer for retaining at least one cigarette blank, said base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side, providing a shaker communicating with said base, holding a plurality of cigarette blanks on said base, shaking said cigarette blanks, retaining with said retainer at least one cigarette blank, and dispensing a cigarette blank to a loading area.

[0011] This invention further relates to an apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising a filling tube having a first end, a second end, an inside diameter, and an outside diameter, a hollow tube sized to fit within said filling tube, said hollow tube having a first end and a second end, said second end comprising a guide head, and wherein when said filling tube receives said second end of said hollow tube, at least a portion of the guide head of the hollow tube extends beyond the second end of the filling tube for guiding a cigarette blank onto the filling tube.

[0012] This invention also relates to an apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising a filling tube having a first end, a second end, an inside diameter, and an outside diameter, a hollow tube sized to fit within said filling tube, said hollow tube having a first end and a second end, said second end comprising a guide head, a pin disposed in said hollow tube, the pin having a first and second end, wherein when the filling tube receives said second end of said hollow tube, at least a portion of the guide head of said hollow tube extends beyond the second end of said filling tube for guiding a cigarette blank onto the filling tube, and wherein said guide head comprises a conical portion, the conical portion defining an internal cavity for receiving the second end of the pin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a perspective view of a cigarette making apparatus of the invention.

[0014] FIG. 2 is a perspective view of a tobacco input hopper of the invention.

[0015] FIG. 3A is a section view of a tobacco conveying and compressing device of the invention.

[0016] FIG. 3B is an enlarged section view of the compressing device of FIG. 3A.

[0017] FIG. 4A is a perspective view of a filling tube of the invention.

[0018] FIG. 4B is a perspective view of another embodiment of the filling tube of the invention.

[0019] FIG. 5A is a perspective view of a guide head and pin of the invention.

[0020] FIG. 5B is a perspective view of another embodiment of the guide head and pin of the invention.

[0021] FIG. 6A is a section view of the filling tube holding drum of the invention.

[0022] FIG. 6B is a section view of a filling tube mounted in a drum partially receiving a guide head of the invention.

[0023] FIG. 6C is a section view of a filling tube mounted in a drum fully receiving a guide head of the invention.

[0024] FIG. 6D is a section view of a filling tube mounted in a drum fully receiving a guide head of the invention showing further a cigarette blank being forwarded to the filling tube.

[0025] FIG. 6E is a section view of a filling tube mounted in a drum fully receiving a guide head of the invention showing further a cigarette blank being fully loaded on the filling tube.

[0026] FIG. 6F is a section view of a tobacco plug being injected into a cigarette blank loaded onto a filling tube of the invention.

[0027] FIG. 6G is a section view of a completed cigarette being ejected from a filling tube of the invention.

[0028] FIG. 6H is a section view of an improperly loaded cigarette blank being ejected from a filling tube of the invention.

[0029] FIG. 7 is a side view of a cigarette blank loading cartridge of the invention.

[0030] FIG. 8 is a perspective view of a cigarette blank separation device of the invention.

[0031] FIG. 9 is a section view of a cigarette blank separation device of the invention having a mounted cigarette blank loading cartridge in the lowered position holding a plurality of cigarette blanks.

[0032] FIG. 10 is a section view of a cigarette blank separation device of the invention having a mounted cigarette blank loading cartridge in the raised position holding a plurality of cigarette blanks.

[0033] FIG. 11 is a perspective view of another embodiment of the guide head and pin of the invention.

[0034] FIG. 12 is a section view of the guide head and pin of FIG. 11 with a portion of the guide head collapsed and having exited the filling tube.

[0035] FIG. 13 is a section view of the guide head and pin of FIG. 11 with a portion of the guide head expanded and having exited the filling tube.

DETAILED DESCRIPTION OF THE INVENTION

[0036] A cigarette making apparatus 10 is illustrated in FIG. 1. The apparatus 10 includes a tobacco input hopper 100 (rotated upward for clarity), a tobacco conveying and compressing device 200, a cigarette blank separation device 300, a filling tube holder 400, a material and product transfer mechanism 500, and a discharge container (not shown).

[0037] The input hopper 100, illustrated in FIG. 2, has a main body 101 with a tobacco inlet 102. The input hopper has a top end 104, a bottom end 105, a first side 106, a second opposing side 107, a discharge end 108, and an input end 109. A conveyor 103 may be mounted in the bottom end 105 of main body 101 to convey the tobacco from the input end 109 toward a strand separator 110 mounted generally on the discharge end 108. The conveyor may include a tension adjustment mechanism 116 for adjusting the conveyor belt tension. The strand separator 110, having a shaft 111 and a plurality of pins or combs 112 extending outwardly therefrom, is mounted on the discharge end 108 of the main body 101. The strand separator shaft 111 may be rotatably driven by an electric motor 113. Depending on the desired rotational speed of the strand separator 110, a speed reduction mechanism 114 may be employed to communicate the electric motor 112 with the strand separator shaft 111.

[0038] In operation, cut tobacco is poured into the tobacco inlet 102 of the input hopper 100. The cut tobacco falls onto the input end 109 of the conveyor 103 and is thereby transferred toward the strand separator 110 and discharge end 108 of the conveyor 103. After going through the strand separator 110, the cut tobacco is discharged from the input hopper 100 through a discharge opening 115.

[0039] FIG. 3A illustrates a tobacco conveying and compressing device 200. The device 200 generally has an input end 201, a receiving hopper 215, and a tobacco conveying zone 218. A tobacco conveyor system 210 has a first conveyor 202 having a top end 203 and a lower end 204 and a second conveyor 205 having a top end 206 and a lower end 207. The conveyors 202 and 205 are mounted between a first side plate 217 and a second plate (not shown). Conveyor 202 has a conveyor belt 208, and conveyor 205 has a conveyor belt 209. The conveyor belts 208 and 209 may have striations or fingers on them, allowing the moving belts to grip the cut tobacco. The top end 203 of the first conveyor 202 and the top end 206 of the second conveyor 205 communicate with the receiving hopper 215. Typically, the conveyors 202 and 205 converge on each other as they move in the direction of arrows 211

and 212, respectively. At least one electric motor (not shown) may be used to drive the first conveyor 203 and second conveyor 205.

[0040] In operation, the receiving hopper 215 receives cut tobacco from the discharge opening 115 of the input hopper 100 described above. As an inward side 213 of conveyor 202 and an inward side 214 of conveyor 205 move downward, cut tobacco is received from the receiving hopper 215, compressed by conveyors 202 and 205, and ultimately transferred to a compressor device 250.

[0041] The tobacco compressing device 250 illustrated in FIG. 3B has a first compression plate 251 and a second compression plate 252, which define generally a compression cone 253. The first compression plate 251 is slideably mounted in the tobacco compressing device 250 to allow it to move toward the second compression plate 252. The first compression plate 251 has a first end 254 and a second end 255, the second end defining a semi-circular compression cavity 256 having a top edge 257. A pneumatic cylinder 261 having a piston rod 262 may be mounted to a frame (not shown), with the piston rod 262 of the pneumatic cylinder 261 communicating with the first end 254 of the first compression plate 251, thereby slideably operating the first compression plate 251 towards and away from the second compression plate 252. Other methods may be used to slideably move the first compression plate 251, such as a servo motor or a hydraulic cylinder. The second compression plate 252 has a first end 258 and second end 259, the second end 259 defining a semi-circular compression zone 260. The second compression plate 252 also contains a knife 263 with a cutting edge 264 that is coplanar with the top edge 257 of the semicircular compression cavity 256 of the first compression plate 251 and with a top edge 266 of the semicircular compression cavity 260 of the second plate 252. The knife 263 may be mounted so that it is not parallel to the top edge 257 of the first compression plate 251, resulting in the first plate 251 contacting only one portion of the knife edge 264 at a time as the first plate 251 slideably moves towards the second plate 252.

[0042] In operation, the downwardly moving inner sides 213 and 214 of conveyors 202 and 205, respectively, partially compress cut tobacco and deliver it to the compression cavity 253. The conveyors 202 and 205 run for a period of time to deliver an amount of cut tobacco into the compression cavity 253, and then stop. The amount of tobacco that is delivered into the compression cavity 253 may be within a predetermined range, with the exact amount being established by the operator of the machine depending on individual preferences, which may include, among other things, the operator's preferred "draw" of the cigarette. Then, the piston 261 pushes the first compression plate 251, by way of piston rod

262, toward the second compression plate 252, further compressing the tobacco in the tobacco cavity 253. As the first compression plate 251 moves toward the second compression plate 252, the top edge 257 of the first compression plate 251 meets the cutting edge 264 of the knife 263. The cut tobacco in the compression cavity 253 is then sheared from the cut tobacco in the tobacco conveying zone 214. The first compression plate 251 continues to move toward the second compression plate 252, thereby forming a tobacco plug 265. The first compression plate 251 then retreats slightly away from the second compression plate 252, allowing a tobacco plug insertion pin 501 (FIG. 1) to push the tobacco plug 265 out of the compression cavity 253 into a filling tube 350 (described later). Typically, the tobacco plug 265 is smaller in diameter than the inside diameter of a filling tube and a cigarette blank to allow for easy insertion into the filling tube and the cigarette blank.

[0043] FIG. 4A illustrates a filling tube 350 having a first end 351, a second end 352, an inside diameter 353, and an outside diameter 354. These tubes are mounted on the filling tube drum 401 shown in FIG. 1. Other shapes of tubes may be used as filling tubes, including square or octagonal shaped tubes. The first end 351 of the filling tube may have a shoulder 355 for securing the filling tube 350 to a filling tube holder (not shown). Alternatively, a filling tube may be secured to a filling tube holder (not shown) by other means, such as a press fit or welding. FIG. 4B shows an embodiment of the filling tube 359 without a shoulder that may be press fit or welded to a filling tube holder (not shown). The inside diameter of the first end 351 may have a taper 358 from the first end 351 outside diameter 356 to the inside diameter 353 for receiving a guide head 370. Also, as shown in the embodiment of FIG. 4B, the second end 356 may be tapered to facilitate the reception thereon of a cigarette blank.

[0044] FIG. 5A illustrates an embodiment of a guide head 370. The guide head 370 has a distal end 371 and a proximal end 372 and is sized to fit within the inside diameter 353 of the filling tube 350. The proximal end 372 of the guide head 370 has fastening means 373 for attaching the guide head 370 to a pin 374 having a complimentary fastening means 375. The fastening means 374 and 375 can be a threaded connection, a press fit, or other methods known to those of ordinary skill in the art. Additionally, the guide head 370 and the pin 374 may be fabricated from a single piece of material. The distal end 371 of the guide head 370 has a substantially conical head 376. The largest diameter 377 of the conical head 376 is typically equal to or greater than the outer diameter 354 of the filling tube 352.

Therefore, the conical head 376 is collapsible to enable it to pass through the filling tube 350 and exit out the second end 352 of the filling tube 350.

[0045] Various means may be used to provide a collapsible guide head. In the embodiment 370 shown in FIG. 5A, a plurality longitudinal slots 365 are cut from the tip 378 of the conical head 376 to a slot termination location 367. The slots typically terminate at a radius 366 to reduce stresses that the slots may induce into the guide head material and thereby prevent self propagation of the slots toward the proximal end 372 of the guide head 370. The guide head 370 may be made from a variety of materials, including plastics and metals. Typically, one may use a hardened steel, such as 01 steel hardened to 58-60 Rockwell C, for the guide head. Other means, such as a flexible rubber guide head, a polymer guide head, or an inflatable guide head may be used to produce a collapsible guide head.

[0046] FIG. 5B illustrates an embodiment of a pin 362 with guide head 363 in which the outside diameters of the pin 362 and the guide head 363 are equal to or less than the inside diameter 353 of the filling tube 350. In this embodiment, the guide head 363 does not need to collapse to pass through the filling tube 350.

[0047] Referring to FIG. 6A, there is a filling tube holder 400 comprising a drum 401 having a first end 402 and a second end 403. The first end 402 of the drum 401 has a plurality of holes 404 and 405 for receiving a plurality of filling tubes 350. Other holes (not shown) for receiving filling tubes may also be disposed on the first end 402 of the drum 401.

[0048] This description describes filling tube 350 and the features in the drum 401 associated with filling tube 350. Other filling tubes mounted in the drum will typically be mounted in a similar manner, and the drum typically will have similar features for each of the other filling tubes. One method of attaching a filling tube 350 to a drum 401 is a clamping device 408 against the shoulder 355 on a first end 351 of the filling tube 350. Alternatively, other means for attaching the filling tubes to a filling tube holder may be used. For example, the filling tubes and the plurality of holes in the holder for receiving the filling tubes may be threaded. Additionally, other methods instead of a drum may be used for holding a plurality of tubes, for instance, the filling tubes may be mounted on a plate or on a belt.

[0049] Axially aligned with the filling tube hole 404 is a conical directing hole 411, having a proximal end 412 and a distal end 413. The distal end 413 of the cone shaped hole defines the larger diameter of the cone, and the diameter of the proximal end of the cone shaped hole is slightly larger than the outside diameter of a cigarette blank (discussed later).

[0050] FIG. 6B is a partial section view of the drum 401 having the filling tube 350 into which the guide head 370, typically attached to a pin 374 (not shown), is passing. As the conical head 376 of the guide head 370 passes into the first end 351 of the filling tube 350, the filling tube 350 squeezes the guide head 370, thereby collapsing guide head 370 and allowing the largest diameter 377 of the guide head 370 to be less than the inside diameter 353 of the filling tube 350.

[0051] FIG. 6C is a partial section view of the drum 401 having the filling tube 350 through which the conical head 376 of the guide head 370, typically attached to a pin 374 (not shown), has passed. The conical head 376, having passed through the guide tube 350, can be observed in its relaxed state with the large diameter 377 of the guide head 370 now equal to or greater than the outside diameter 354 of the filling tube 350.

[0052] FIG. 6D illustrates a cigarette blank being loaded onto the filling tube 350. The conical head 376 extends beyond the filling tube 350. A loading pin (not shown) induces a force on the filter end 426 of a cigarette blank 425, causing the cigarette blank 425 to move toward the conical head 376 of the guide head 370. In this illustration, an open end 427 of the cigarette blank 425 has been damaged, resulting in the normal circular shape of the end of the cigarette blank 425 becoming oblong. As the cigarette blank 425 moves toward the guide head 370, the smaller diameter 412 of the conical hole 411 in the drum 401 will operate to return the oblong open end 427 of the cigarette blank 425 to a more circular shape. The cigarette blank 425 continues through the conical hole 411, over the conical head 376, and then onto the filling tube 350.

[0053] FIG. 6E is similar to FIG. 6D, with the exception that the cigarette blank 425 has been fully inserted on the filling tube 350 by a cigarette blank insertion pin 504 (FIG. 1). Thereafter, the guide head 370 is removed from the filling tube 350 by withdrawing it out through the first end 351 of the filling tube 350. The filling tube 350 and cigarette blank 425 are then ready to receive the tobacco plug 265 prepared by the previously discussed compressing device 250.

[0054] FIG. 6F is similar to FIG. 6E, with the additional step of removing the guide head (not shown) and inserting the tobacco plug 265. A sensor 601 (FIG. 1) determines whether a cigarette blank 425 is present and properly loaded onto a filling tube 350 before a tobacco plug 265 is injected into the filling tube 350. After confirming that a filling tube 350 is ready to receive a tobacco plug, an injection pin 501 pushes a tobacco plug 265 out of the compression chamber and into the filling tube 350. Thereafter, the injection pin 501 is withdrawn.

[0055] FIG. 6G illustrates an ejecting pin 503 (FIG. 1) ejecting a completed cigarette tube 430, having been filled with a tobacco plug 265, from the filling tube 350. Typically, the ejection pin 503 is hollow, and pressurized air may be introduced into the ejection pin 503 during the ejection process. Pressurized air escaping from forward end 510 of the ejection pin 503 further facilitates the ejection of the completed cigarette tube 430.

[0056] As noted above, the sensor 601 determines whether a cigarette blank is loaded properly onto a filling tube before injecting a tobacco plug into the filling tube and cigarette tube. If an improperly loaded cigarette blank is found, the cigarette blank is not injected with a tobacco plug and the improperly loaded cigarette blank continues to rotate on the drum, eventually arriving at the cigarette tube rejection location. FIG. 6H depicts the removal of a rejected cigarette tube from a filling tube. FIG. 6H illustrates a rejection pin 502 forcing a damaged cigarette blank 428 off of the filling tube 350 toward a collection mechanism 510 (FIG. 1). Typically, the rejection pin 502 is hollow, and pressurized air may be introduced into the rejection pin 502 during the rejection process. Pressurized air escaping from the forward end 511 of rejection pin 502 further facilitates removal of the cigarette blank 428 by blowing air against the rejected cigarette blank 428. The collection mechanism 510, such as a vacuum, collects the rejected cigarette blank 428.

[0057] Referring now to FIG. 7, there is cigarette blank holding cartridge 310 having a rectangular-shaped box 321 with first end wall 311, a second end wall 312, side walls 313 and 314 (not shown) disposed between end walls 311 and 312, and a top 322. The first end wall 311 has a lower edge 315, to which a cartridge bottom 316 may be pivotably mounted using a hinge 317 or other similar pivoting mounting means. The first end wall 311 has a handle 318. Mounting tab 319, affixed to the bottom 316 of the cartridge 310, is slideably mountable onto a base plate 326 (FIG. 9). Mounting tab 320, affixed to the second end wall 312 at the cartridge 310, is receivable into a cartridge tab receiving area 337 (FIG. 9) of the cigarette blank separation device 300. Typically, the cartridge 310 may hold a plurality of cigarettes, e.g., about 200 cigarette tubes. Typically, the cartridge is of a size so that a user may set an entire carton of cigarette blanks (200 cigarette blanks) into the cartridge without removing the cigarette blanks from the box before loading. The cartridge may also be of a size to hold a carton of 100 cigarette blanks. Alternatively, if one desires to use a carton of cigarette blanks containing less than 200 cigarette blanks in a cartridge designed for 200 cigarette blanks, than a block may be used to take up the extra space in the cartridge.

[0058] In operation, a user turns the cartridge 310 upside down so that the bottom 316 is on the top, and opens fully the bottom 316. The user then sets a full box of cigarette

blanks into the cartridge 310. Thereafter, the user may tear the top from the cigarette carton and close the cartridge bottom 316. The loaded cartridge is then ready for loading into the cartridge tube separator device 300.

[0059] FIG. 8 illustrates a perspective view of the cigarette blank separation device 300 having received cartridge 310. Also visible is the sensing mechanism 601 and the collection mechanism 510 for collecting a rejected cigarette blank (not shown).

[0060] FIG. 9 is a partial section view of the cigarette blank separation device 300 having received a cartridge 310 holding a plurality of blank cigarettes 325. The cigarette blank separation device 300 has a base plate 326 that has a lower end 327, an upper end 328, a first side 330, and an opposing second side. A first side plate 331 is disposed on the first side 330 of the base plate, and an opposing second side plate (not shown) is disposed on the opposing second side of the base plate 326.

[0061] The mounting and operation of the first side plate 331 will be described herein, and the mounting and operation of the opposing second side plate (not shown) is substantially similar to that of the first side plate 331. A cross bar 336 ties the first side plate 331 to the second side plate (not shown). The cross bar 336 has a cartridge tab receiving area 337 for receiving the mounting tab 320 disposed on the second end wall 312 of the cartridge box 321. The first side plate 331 has an upper end 332 that is pivotally mounted at a pivot point 338 adjacent to the upper end 328 of the base plate 326. A portion 335 of the first side plate 331 rides on an eccentric cam 333 that rotates about a camshaft 334. The cam shaft may be driven by a motor (not shown) or by other means available to impart a rotational action upon the camshaft 334. FIG. 9 depicts the first side plate 331 and the cigarette blank loading cartridge 310 in a down position, the position in which a user would insert a cigarette blank loading cartridge 310 containing a plurality of cigarette blanks.

[0062] As the cam 333 rotates about the camshaft 334, the first side plate 331 and opposing second side plate (not shown) pivot about pivot point 338, thereby resulting in the lower end 339 of the first side plate 331 and the lower end of the second side plate moving along an upward arc 340. The cross bar 336, being affixed between the first side plate 331 and the second side plate, moves upward. The cartridge box 321 also moves upward, because the mounting tab 320 of the cigarette blank loading cartridge 310 has been received in the cartridge tab receiving area 337 of the cross bar 336.

[0063] FIG. 10 is a partial section view of the cigarette blank separation device 300 with the cartridge box 310, the first side plate 331 and the second side plate (not shown) in the elevated position.

[0064] The lower end 327 of the base plate 326 abuts a shaking assembly 380. In one embodiment, the shaking assembly 380 has a shaking plate 381 pivotably mounted at a top end 383 to a frame 382. The shaking plate 381 may be shook by a variety of methods, and one method of shaking the plate is by an eccentric cam 384. In operation, the rotation of the eccentric cam pivots the plate about the top end 383 of the shaking plate 381, thereby shaking a plurality of cigarette blanks 390. Typically, the lower end 385 of the shaking plate 381 is at a sufficient distance above the base plate 326 to allow a lowest plurality of cigarette blanks 396 to pass between the base plate 326 and the lower end 385 of the shaking plate 381.

[0065] The plurality of cigarette blanks 390 has a first row 387, a second row 388 and upper rows 389. As the shaking plate 381 advances towards the upper end 328 of the base plate 326, because of the rotation of the cam 384, the shaking plate 381 pushes the plurality of cigarette blanks 390 toward the upper end 328 of the base plate 326. The base plate 326 has a retainer 391 for maintaining the position of the cigarette blanks once they move to the lower end 392 of the retainer 391. The retainer may be a step, fingers, or other item used to retain the position of the cigarette blanks. By shaking the second row 388 and the upper rows 389 of a plurality of cigarettes blanks 390, the shaking plate breaks up the pyramidal structure 393 that ordinarily forms between successive rows of cigarettes. Additionally, the retainer 391 keeps the lower plurality of cigarette blanks 396 from moving toward the upper end 328 of the base plate 326, furthering the shaker's effectiveness in breaking the pyramidal structure 393.

[0066] The cigarette blank loading area 394 has in it a cigarette blank 395 ready to be loaded onto a filling tube 350 as depicted in FIG. 6D and FIG. 6E. After a cigarette blank loading pin 504 pushes the cigarette blank 395 out of the cigarette blank loading area 394, the lowest plurality of cigarette blanks 396 advance forward, moving another cigarette blank into the cigarette blank loading area 394.

[0067] Referring back to FIG. 1, there is the material and product transfer mechanism 500 that has on it the tobacco plug injection pin 501, the completed cigarette ejection pin 503, and the improperly loaded cigarette blank rejection pin 502. Typically, the pins 501, 502 and 503 are linearly moved along their axis by a plurality of pneumatic cylinders (not shown). The injection pin 501 and the pneumatic cylinder associated therewith are mounted in a slideable fixture 507. The fixture 507, slideably mounted in a frame 505, is slideable by a hand crank 506. The slideably mounted injection pin 501 allows for adjustment of the pin to accommodate various lengths of cigarette blanks.

[0068] FIG. 1 illustrates the general operation of the cigarette making apparatus. In operation, a user fills a cigarette blank cartridge with a plurality of cigarette blanks and loads the cartridge 310 into the cigarette blank separation assembly 300. The user also pours tobacco into the tobacco inlet 102 of the input hopper 100. The user then starts the operation of the cigarette making apparatus 10. The automatic operation of the cigarette making apparatus is typically controlled by electronics such as a computer or a programmable logic controller (“PLC”) (not shown) adapted to interface with the various components of the cigarette making apparatus 10.

[0069] The cigarette blank separating device 300 separates a cigarette blank 395 from the plurality of tubes in the cartridge 310, allowing a cigarette blank to flow into the loading area 394 as shown in FIG. 10. A filling tube 350 with a portion of the guide head 370 extending beyond the second end 352 of the filling tube 350 (FIG. 6C) mounted on a drum 401 is axially aligned with the cigarette blank 395. Thereafter, a cigarette blank loading pin 504 pushes the cigarette blank onto the filling tube 350, and the guide head 370 is withdrawn from the filling tube 350 (as addressed in the discussion regarding FIG. 6D and FIG. 6E). The drum 401 then indexes forward in the direction shown by arrow 602.

[0070] Referring again to FIG. 1, when the filling tube 350 having on it a cigarette blank reaches a position 603, a sensor 601 ensures that a cigarette blank is loaded properly. If the sensor finds a tube properly loaded, then an injection rod 501 injects a previously compressed tobacco plug 295 into the filling tube 350 (as discussed above regarding FIG. 6F). If the sensor 601 finds an improperly loaded tube, then the cigarette making apparatus skips the tobacco plug injection process, and the drum 401 continues to index forward in the direction of arrow 602.

[0071] After a tobacco plug is successfully injecting into a filling tube 350 having on it a cigarette blank, the drum 401 continues to index forward in the direction of arrow 602, whereupon the filling tube 350 will arrive at a completed cigarette ejection position 604. Once there, an ejection rod 503 will eject the completed cigarette from the filling tube 350, as shown in FIG. 6G. The completed cigarettes may then fall into a collection device (not shown), where they may be retrieved by the operator.

[0072] If the sensor 601 has found an improperly loaded cigarette blank, then the drum 401 with the filling tube 350 holding the improperly loaded cigarette blank will continue to index forward on in the direction of arrow 602, skipping the tobacco injection process and the completed cigarette ejection process, whereupon it arrives at an improperly

loaded tube rejection area 605. Thereafter, a rejection pin 502 pushes the improperly loaded cigarette blank off of the filling tube. (FIG. 6H).

[0073] After the above discussed process is complete and a completed cigarette is made (or an improperly loaded cigarette blank is rejected), the filling tube is ready to receive a new cigarette blank. Typically, the above discussed process will produce 25 completed cigarettes a minutes with less than 4 rejected cigarettes per 100 completed.

[0074] The plurality of filling tubes on the drum 401 allows the above steps to take place concurrently. For instance, a cigarette blank may be inserted on a filling tube at the same time a tobacco plug is being injected into another filling tube, which may be occurring at the same time a completed cigarette is being rejected from a filling tube, which may be occurring at the same time an improperly loaded cigarette blank is being rejected. Additionally, the tobacco conveying and compressing and the cigarette blank separating may also be occurring concurrently with the above steps.

[0075] Another embodiment of a guide head and a pin is shown in FIG. 11. The expandable head system 700 comprises a guide head 701, a hollow tube 702, a spring shaft 703 having a collar 704, a spring 705, and a body 706.

[0076] As illustrated in FIG. 12, the body 706 has an internal bore 708 in a forward end 709 for receiving the spring shaft 703. The spring shaft 703 is slideably mounted in the internal bore 708 of the body 706. Friction reduction members 713 and 714 may be disposed in the internal bore 708 between the spring shaft 703 and the body 706 to guide the spring shaft 703. The spring 705 is disposed on the spring shaft 703, and the spring shaft 703 is retained in the internal bore 708 by a stop 735 mounted to a back end 710 of the spring shaft 703. The spring 705 is compressed and is retained between a front face 711 of the body 706 and the collar 704 of the spring shaft 703. A washer 712 may be disposed on the spring shaft 703 and against the front face 711 of the body 706 for receiving an end 732 of the spring 705.

[0077] A first end 720 of the hollow tube 702 is affixed to the collar 704 of the spring shaft 703, and a second end 733 of the hollow tube 702 receives the guide head 701. An internal bore 719 of the spring shaft 703 communicates with a hollow central portion 721 of the hollow tube 702. A pin 707 has a first end 715 that is affixed to a back end 718 of the body 706. The pin 707 passes through the internal bore 719 of the spring shaft 703, through the hollow tube 702, and terminates in the guide head 701. Friction reduction members 722 and 723 may be disposed in the internal bore 719 of the spring shaft 703 to guide the pin 707.

[0078] A second end 724 of the pin 707 terminates in a conical head portion 725 of the guide head 701. The conical head portion 725 has a conical internal cavity 726 that is

sized to receive the second end 724 of the pin 707 when the conical head portion is in a collapsed configuration and further has an internal cavity 727 that is smaller than the second end 724 of the pin 707. The guide head 701 may have a plurality of longitudinal slots similar to the embodiment of a guide head shown in FIG. 5A.

[0079] FIG. 12 illustrates the conical head portion 725 of the guide head 701 having passed through the second end 352 of the filling tube 350 with the pin 707 in the retracted position. FIG. 12 shows the distal end of the expandable head system 700 enlarged to illustrate detail. With the pin 707 in the retracted position, the conical head is collapsed, whereby a large diameter 728 of the conical head portion 725 is equal to or smaller in diameter than the inside diameter 353 of the filling tube 350. The expansive forces of the spring 705 maintain the pin in the retracted position and maintain the position of the guide head 701 relative to the pin 707 until a force sufficient to overcome the expansive spring force is induced on the pin 707.

[0080] FIG. 13 illustrates the conical head portion 725 of the guide head 701 having passed through the second end 352 of the filling tube 350 with the pin 707 in the extended position. FIG. 13 shows the distal end of the expandable head system 700 enlarged to illustrate detail. With the pin 707 in the extended position, the second end 724 of the pin 707 has passed into the internal cavity 727 of the conical head portion 725, thereby expanding the conical head portion 725 to a diameter 729 that is typically greater than the inside diameter 353 of the filling tube 350, and more typically is greater than the outside diameter 354 of the filling tube 350. In that position, the conical head portion 725 is positioned to receive and guide a cigarette blank onto the filling tube.

[0081] In operation, the guide head 701 is passed through the filling tube until the conical head portion 725 passes through the second end 352 of the filling tube 350, at which time means for stopping the spring shaft 703 acts to stop the forward movement of the spring shaft 703, the hollow tube 702, and the guide head 701. Thereafter, the body 706 continues to move forward a distance 730 to extend the second end 724 of the pin 707 into the internal cavity 727 of the conical head portion 725, thereby expanding the conical head portion 725 of the guide head 701. A cigarette blank may then be inserted over the conical head portion 725 and onto the filling tube 350. The body 706 is then retracted, thereby retracting the second end 724 of the pin 707 from the internal cavity 727 and allowing the conical head portion 725 to return to its collapsed configuration. The retraction of the body 706 continues, extracting the tube 702 and the guide head 701 from the filling tube 350.

[0082] While the present invention has been illustrated by the description of embodiments thereof, and while the embodiments have been described in considerable detail, it is not intended to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will be readily apparent to those skilled in the art. The invention is therefore not limited to the specific details, representative apparatus and method, and illustrated examples shown and described. Accordingly, departures may be made from such details without departing from the scope or spirit of the invention.

What is claimed is:

1. An apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising:

 a filling tube having a first end, a second end, an inside diameter, and an outside diameter, and

 a pin sized to fit within said filling tube, said pin having a first end and a second end, said second end comprising a guide head,

 wherein when said filling tube receives said second end of said pin, at least a portion of the guide head of the pin extends beyond the second end of the filling tube for guiding a cigarette blank onto the filling tube.

2. The apparatus according to claim 1, wherein said guide head is collapsible to a diameter at least as small as the inside diameter of said filling tube.

3. The apparatus according to claim 2, wherein the diameter of said guide head is greater than the inside diameter of said filling tube when said guide head is in a relaxed state.

4. The apparatus according to claim 2, wherein the diameter of said guide head is equal to or greater than the outside diameter of said filling tube when said guide head is in a relaxed state.

5. The apparatus according to claim 2, wherein said guide head comprises a plurality of longitudinal slots.

6. The apparatus according to claim 1, wherein said pin comprises a shaft sized to fit within said filling tube and a detachable guide head mounted to said shaft.

7. The apparatus according to claim 1, wherein said guide head has a substantially conical shape.

8. The apparatus according to claim 1, wherein said second end of said filling tube is tapered.

9. An apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising:

a filling tube holder capable of holding a plurality of filling tubes,
a plurality of filling tubes mounted to said filling tube holder, each filling tube having a first end, a second end, an inside diameter, and an outside diameter, and
at least one pin sized to fit within said filling tubes, said at least one pin having a first end and a second end, said second end comprising a guide head,
wherein when each said filling tube receives said second end of said pin, at least a portion of the guide head of said pin extends beyond the second end of said filling tube for guiding a cigarette blank onto the filling tube.

10. The apparatus according to Claim 9, wherein said tube holder is a drum.

11. The apparatus according to claim 10, wherein said drum is rotatable.

12. The apparatus according to claim 9, wherein said guide head of said pin is collapsible to a diameter at least as small as the inside diameter of said filling tube.

13. The apparatus according to claim 12, wherein the diameter of said guide head of the pin is greater than the inside diameter of the filling tube when said guide head is in a relaxed state

14. The apparatus according to claim 12, wherein the diameter of said guide head of said pin is equal to or greater than the outside diameter of said tube when said guide head is in a relaxed state.

15. The apparatus according to claim 12, wherein said guide head comprises a plurality of longitudinal slots.

16. The apparatus according to claim 9, wherein said pin comprises a shaft having a maximum cross measurement no greater than said inside diameter of said tube, and a detachable guide head mounted to said shaft.

17. The apparatus according to claim 9, wherein said guide head has a substantially conical shape.

18. A method of locating a cigarette blank on a filling tube for receiving tobacco, comprising:

providing a filling tube having a first end, a second end, an inside diameter, and an outside diameter,

providing a pin sized to fit within said filling tube, said pin having a first end and a second end, said second end comprising a guide head,

inserting said pin into said filling tube so at least a portion of the guide head of said pin extends beyond the second end of said filling tube,

dispensing a cigarette blank over said guide head and onto said filling tube, and

retracting said pin from said filling tube.

19. The method according to claim 18, further comprising ejecting a cylinder of tobacco into said filling tube.

20. The method according to claim 19, further comprising ejecting a completed cigarette from said filling tube.

21. The method according to claim 20, wherein said method produces cigarettes at a rate of at least 25 cigarettes per minute and with at least 95% of the cigarette blanks being made into completed cigarettes.

22. An apparatus for dispensing cigarette blanks in a cigarette manufacturing machine, comprising:

a base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side, and

a shaker communicating with said base,

wherein said base comprises a retainer for retaining at least one cigarette blank.

23. The apparatus according to claim 22, wherein said retainer comprises a step.

24. The apparatus according to claim 22, wherein said retainer comprises fingers.
25. The apparatus according to claim 22, wherein said shaker is located at said lower end of said base.
26. The apparatus according to claim 25, wherein said shaker is a plate.
27. The apparatus according to claim 25 wherein said shaker is driven by an eccentric cam.
28. The apparatus according to claim 22, wherein said apparatus is configured to hold a plurality of cigarette blanks.
29. An apparatus for dispensing cigarette blanks in a cigarette manufacturing machine, comprising:
 - a base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side, wherein said base comprises a retainer for retaining at least one cigarette blank,
 - a shaker communicating with said base, and
 - a cartridge for receiving a plurality of cigarette blanks, wherein said cartridge is mountable on said base.
30. The apparatus according to claim 29, wherein said retainer comprises a step.

31. The apparatus according to claim 29, wherein said retainer comprises fingers.
32. The apparatus according to claim 29, wherein said shaker is located at said lower end of said base.
33. The apparatus according to claim 29, wherein said shaker is a plate.
34. The apparatus according to claim 29, wherein said shaker is driven by an eccentric cam.
35. The apparatus according to claim 29, wherein said cartridge is configured to receive a plurality of boxed cigarette blanks without having to remove the cigarette blanks from the box.
36. The apparatus according to claim 29, wherein said cartridge is mechanically openable, allowing cigarette blanks to be dispensed from said cartridge after mounting said cartridge on said base.
37. A method for dispensing cigarette blanks in a cigarette manufacturing machine, comprising:
 - providing a base comprising a retainer for retaining at least one cigarette blank, said base having an upper end, a lower end opposite said upper end, a first side, and a second side opposite said first side,
 - providing a shaker communicating with said base,
 - holding a plurality of cigarette blanks on said base,

shaking said cigarette blanks,
retaining with said retainer at least one cigarette blank, and
dispensing a cigarette blank to a loading area.

38. The method according to claim 37, further comprising,
providing a cartridge for receiving a plurality of boxed cigarette blanks without
having to remove the cigarette blanks from the box.
39. The method according to claim 38, further comprising,
mechanically opening said cartridge for allowing the flow of cigarette blanks after
mounting of said cartridge on said base.
40. An apparatus for loading a cigarette blank onto a filling tube, said apparatus
comprising:
a filling tube having a first end, a second end, an inside diameter, and an outside
diameter,
a hollow tube sized to fit within said filling tube, said hollow tube having a first end
and a second end, said second end comprising a guide head, and
wherein when said filling tube receives said second end of said hollow tube, at least a
portion of the guide head of the hollow tube extends beyond the second end of the filling tube
for guiding a cigarette blank onto the filling tube.
41. The apparatus according to claim 40, wherein the diameter of said guide head is less
than the inside diameter of said filling tube when said guide head is in a relaxed state.

42. The apparatus according to claim 40, wherein said guide head comprises a plurality of longitudinal slots.

43. The apparatus according to claim 40, further comprising a pin disposed inside the hollow tube.

44. An apparatus for loading a cigarette blank onto a filling tube, said apparatus comprising:

a filling tube having a first end, a second end, an inside diameter, and an outside diameter,

a hollow tube sized to fit within said filling tube, said hollow tube having a first end and a second end, said second end comprising a guide head,

a pin disposed in said hollow tube, the pin having a first and second end,

wherein when the filling tube receives said second end of said hollow tube, at least a portion of the guide head of said hollow tube extends beyond the second end of said filling tube for guiding a cigarette blank onto the filling tube, and

wherein said guide head comprises a conical portion, the conical portion defining an internal cavity for receiving the second end of the pin.

45. The apparatus according to claim 44, wherein the diameter of said guide head equal to or less than is greater than the inside diameter of the filling tube when said guide head is in a relaxed state

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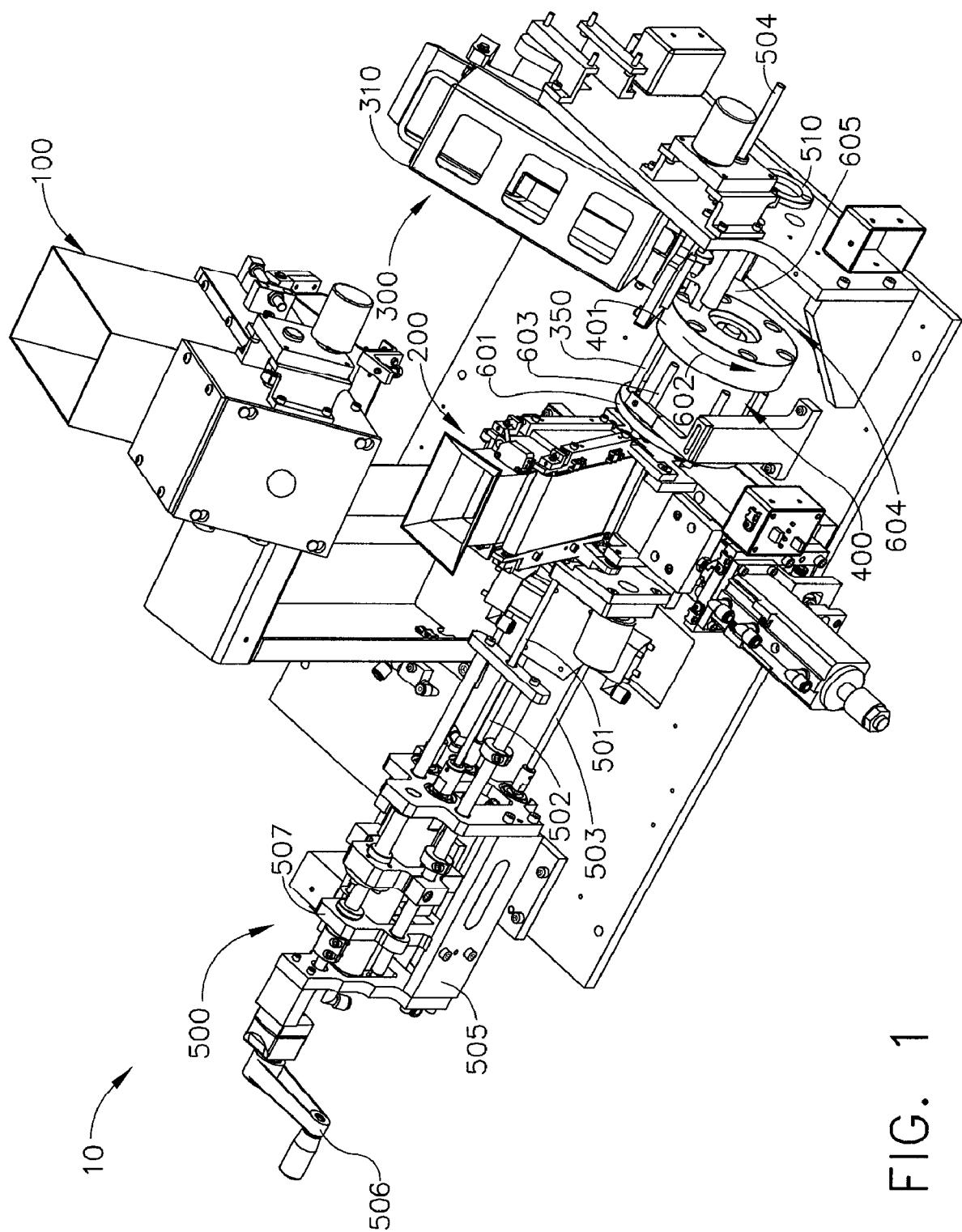


FIG. 1

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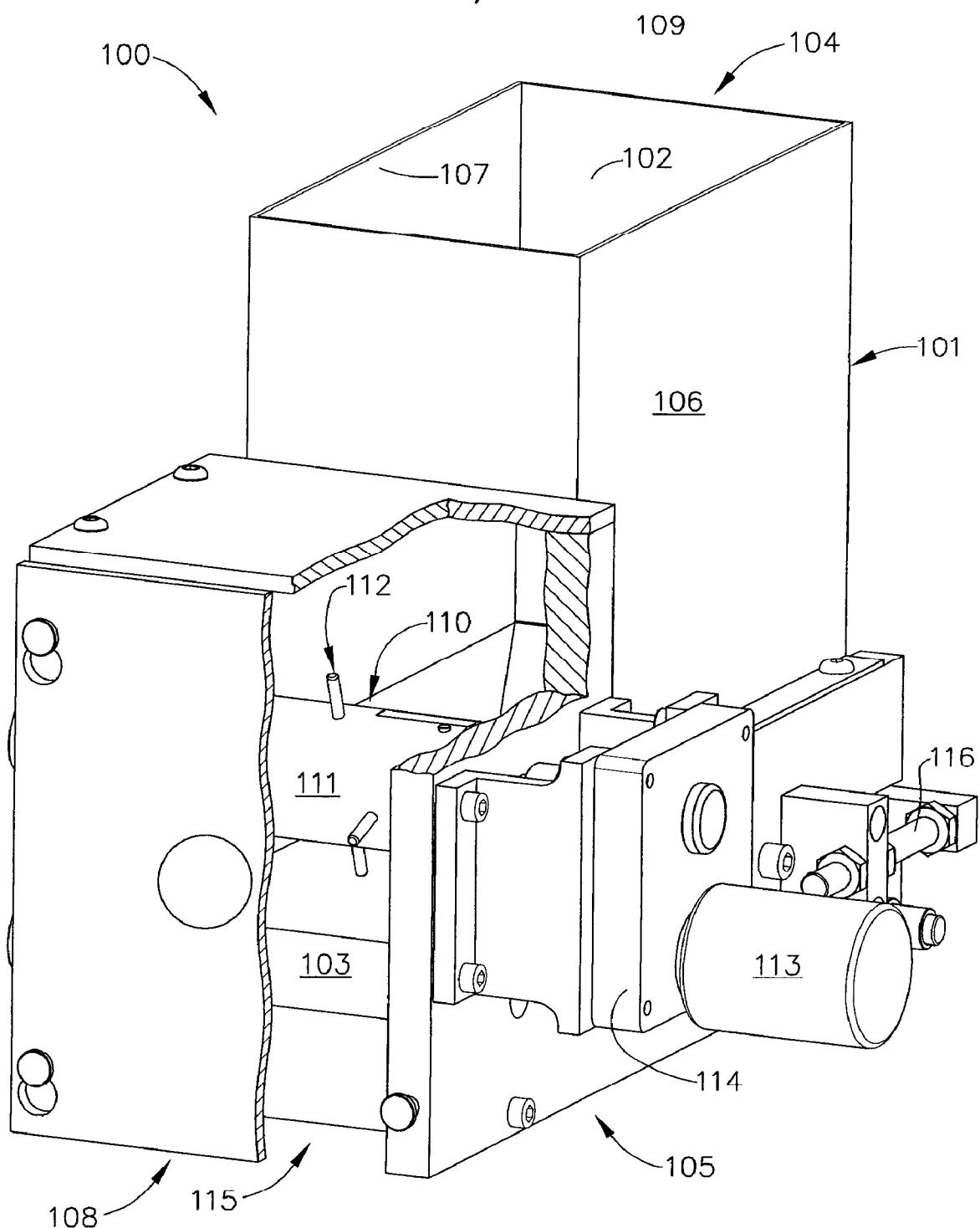
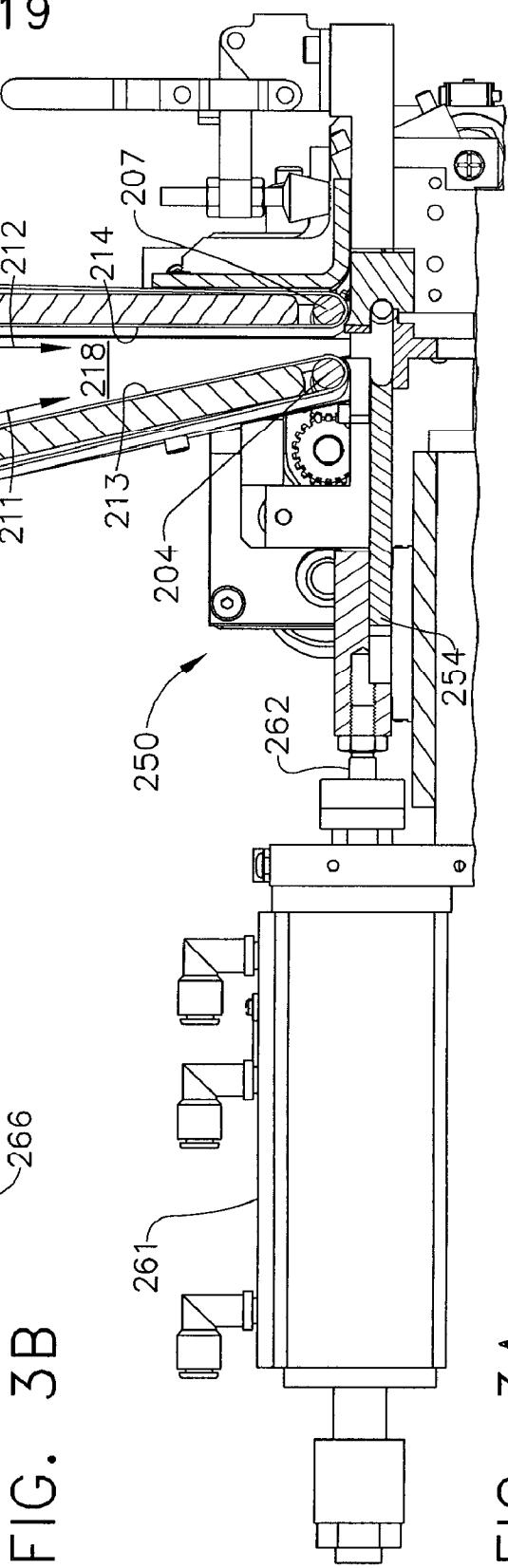
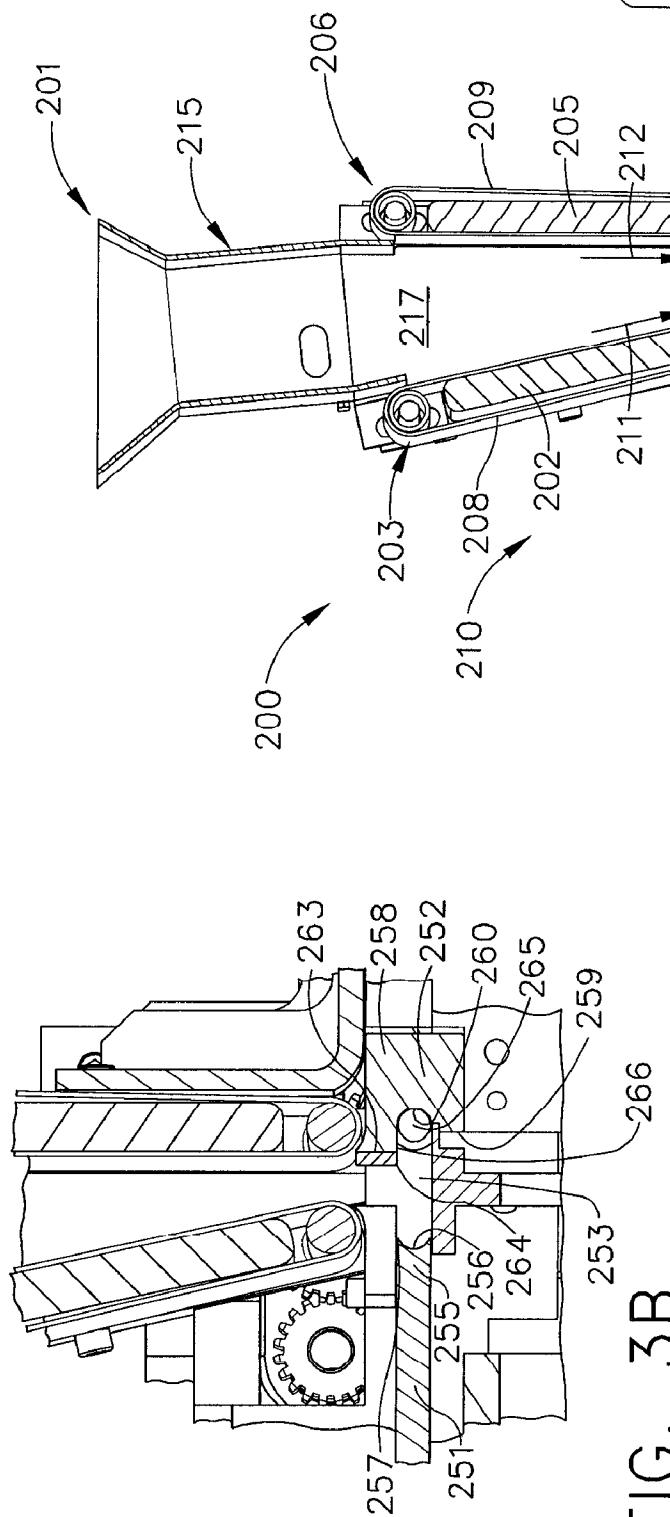


FIG. 2

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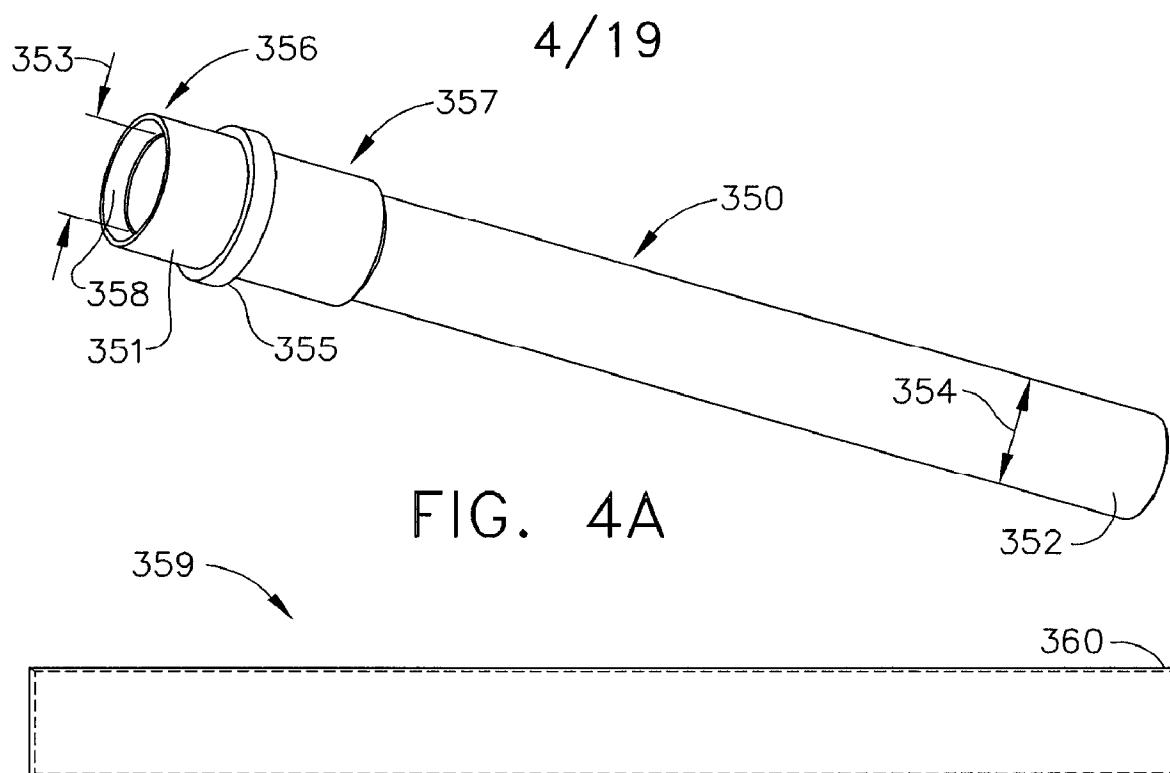
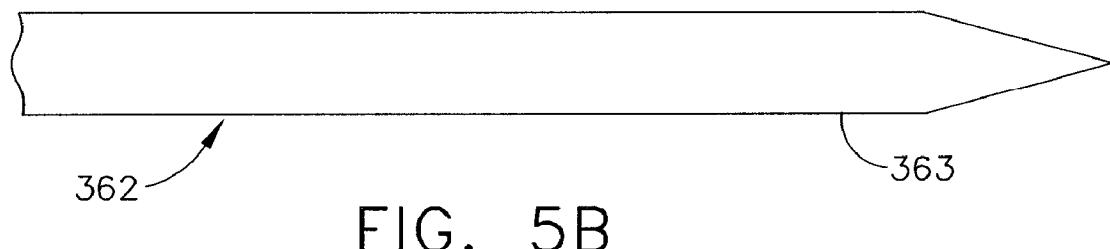
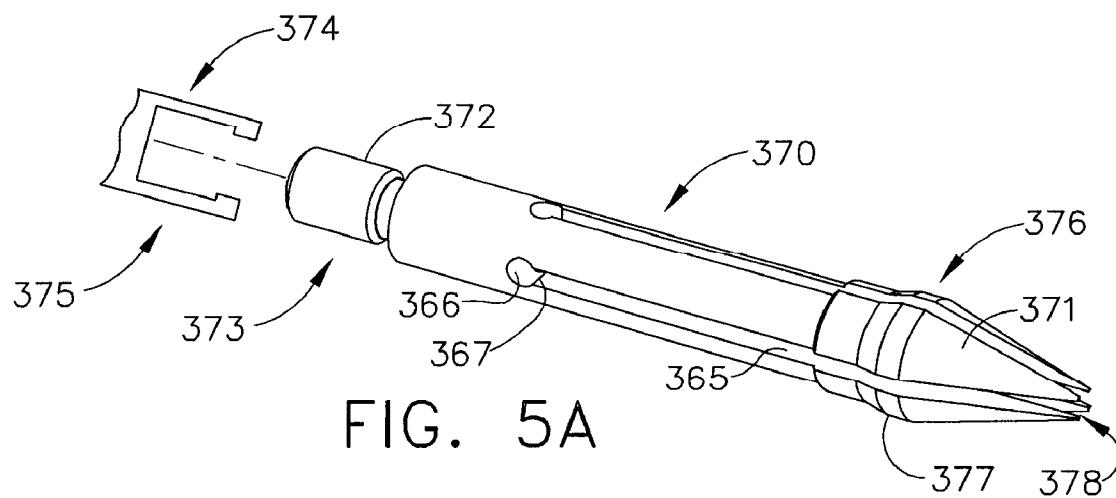


FIG. 4B



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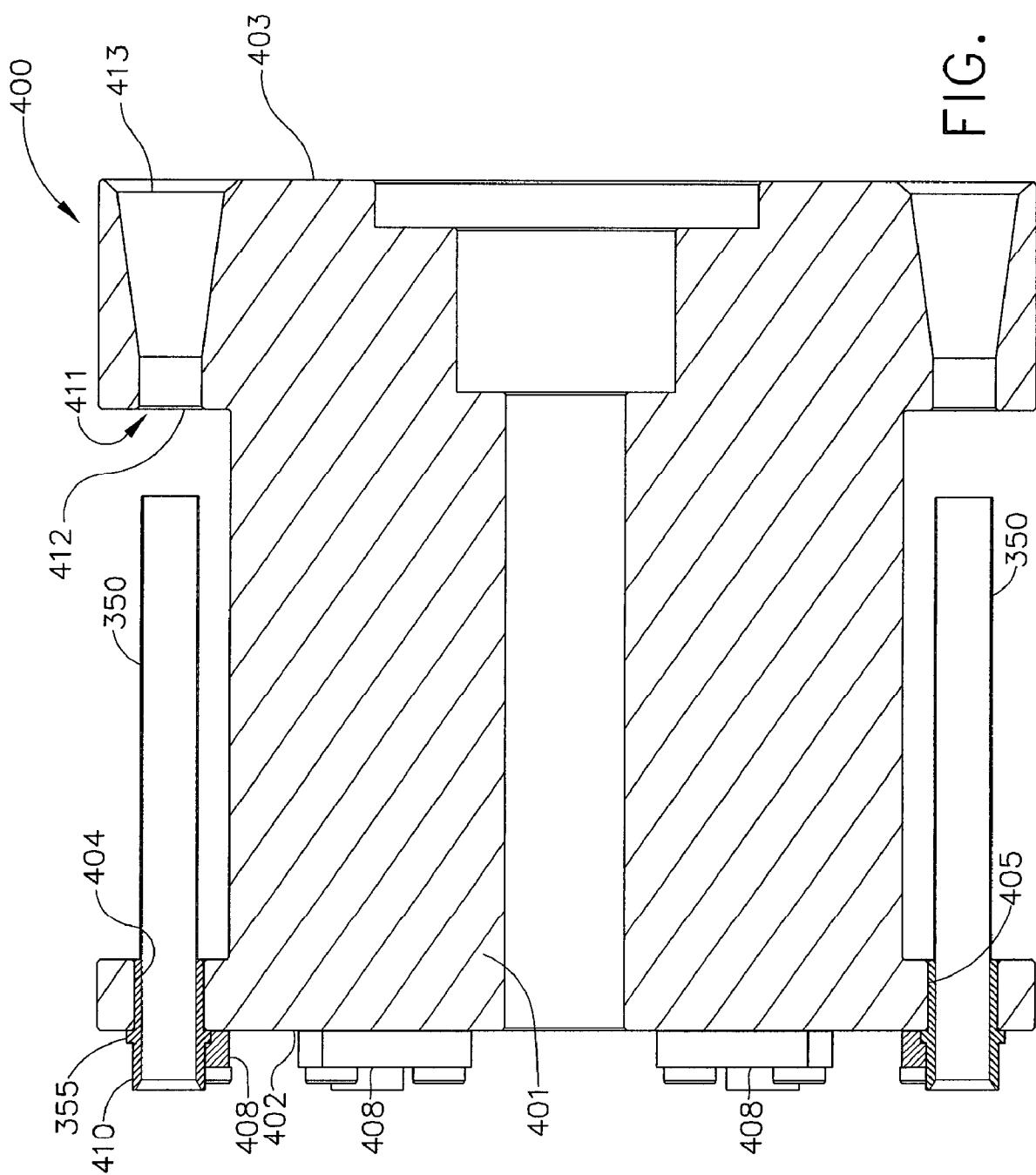


FIG. 6A

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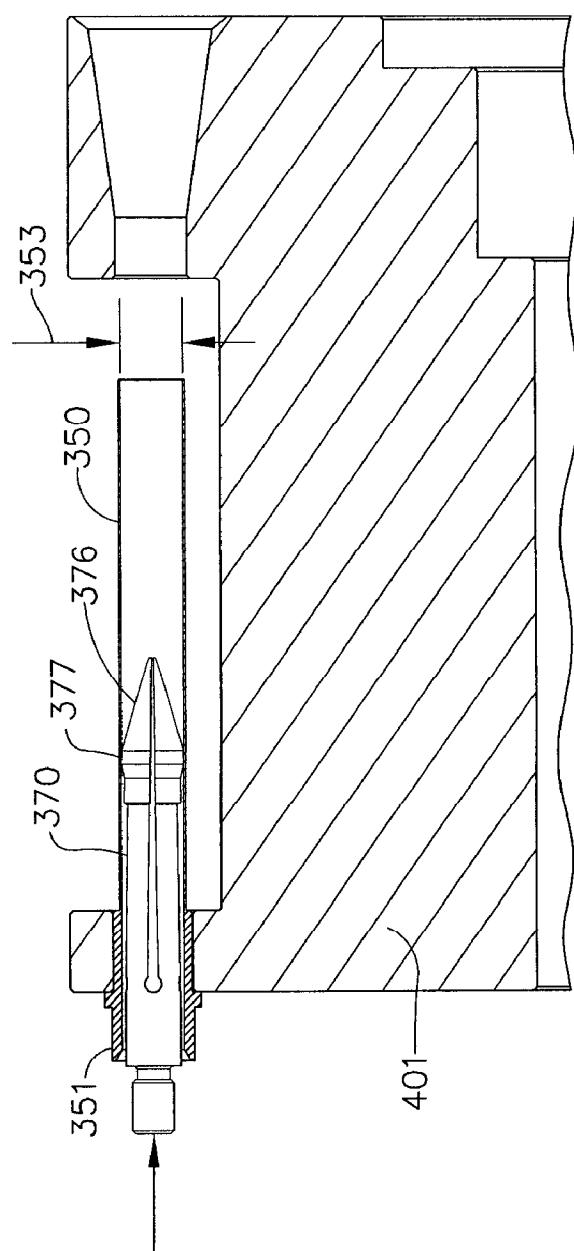


FIG. 6B

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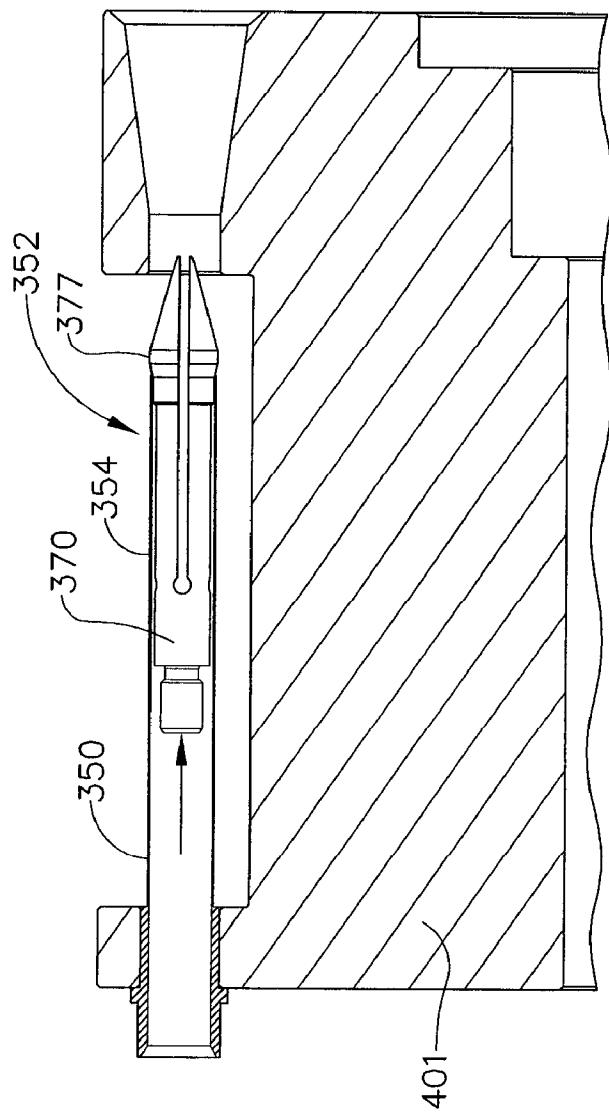


FIG. 6C

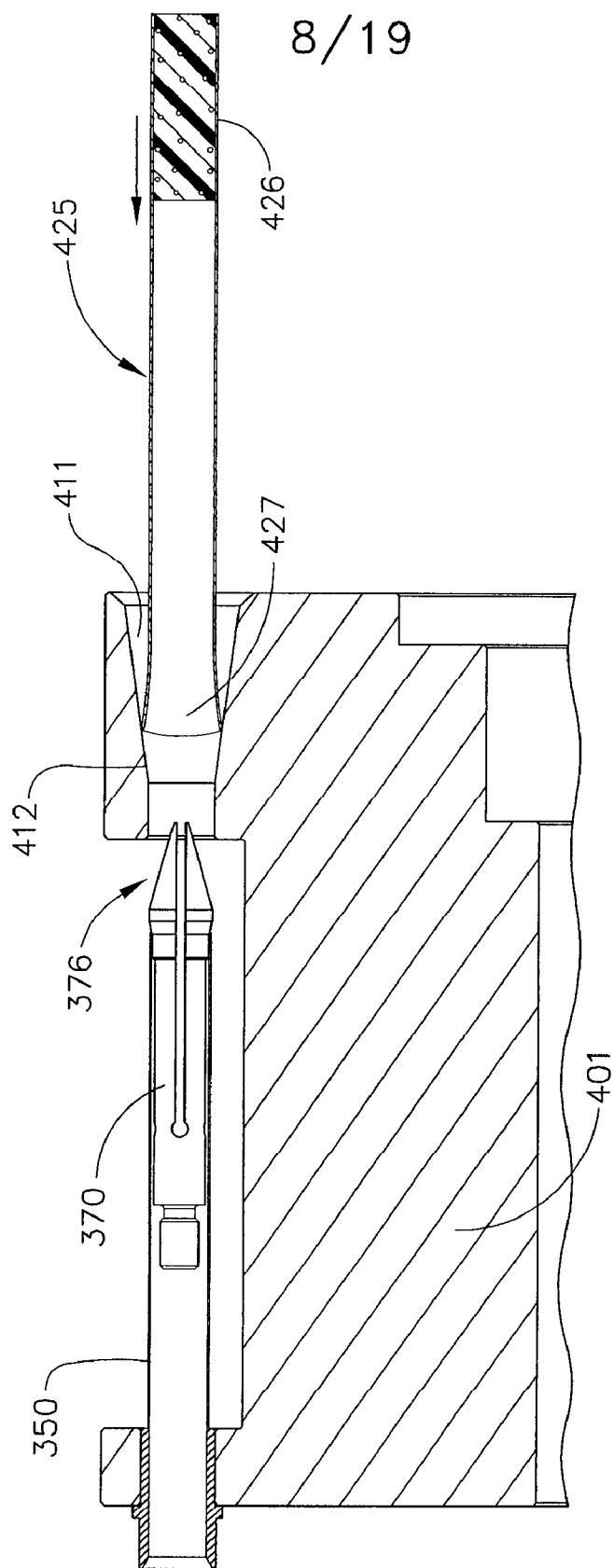


FIG. 6D

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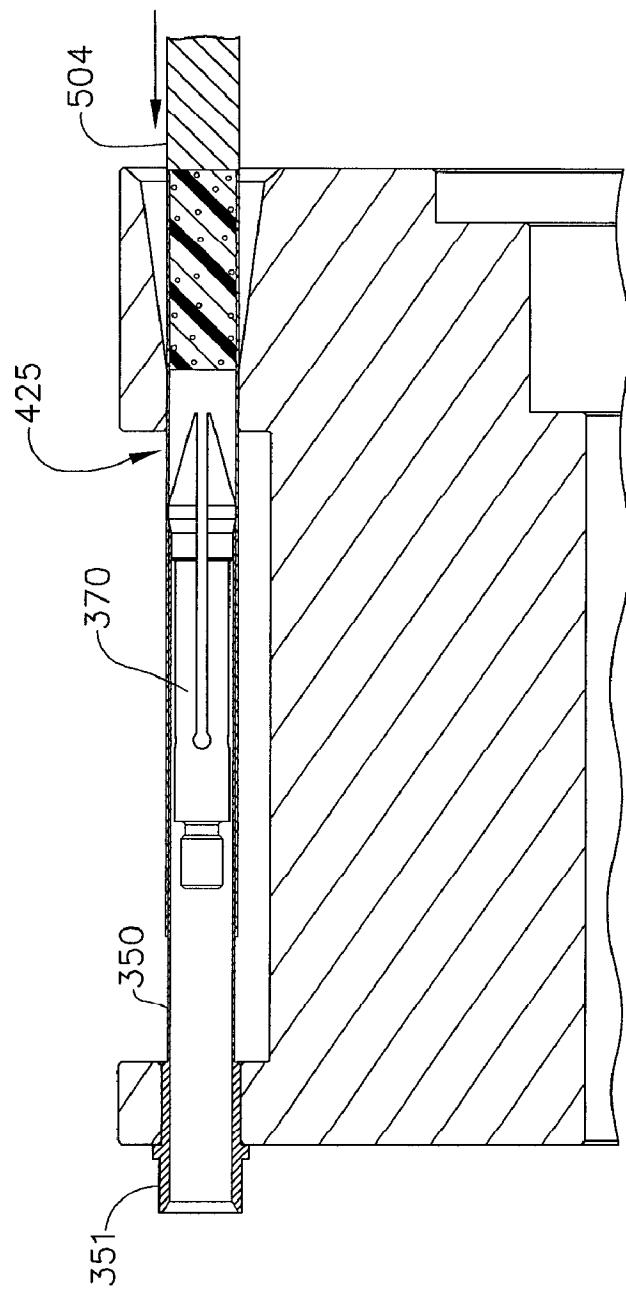


FIG. 6E

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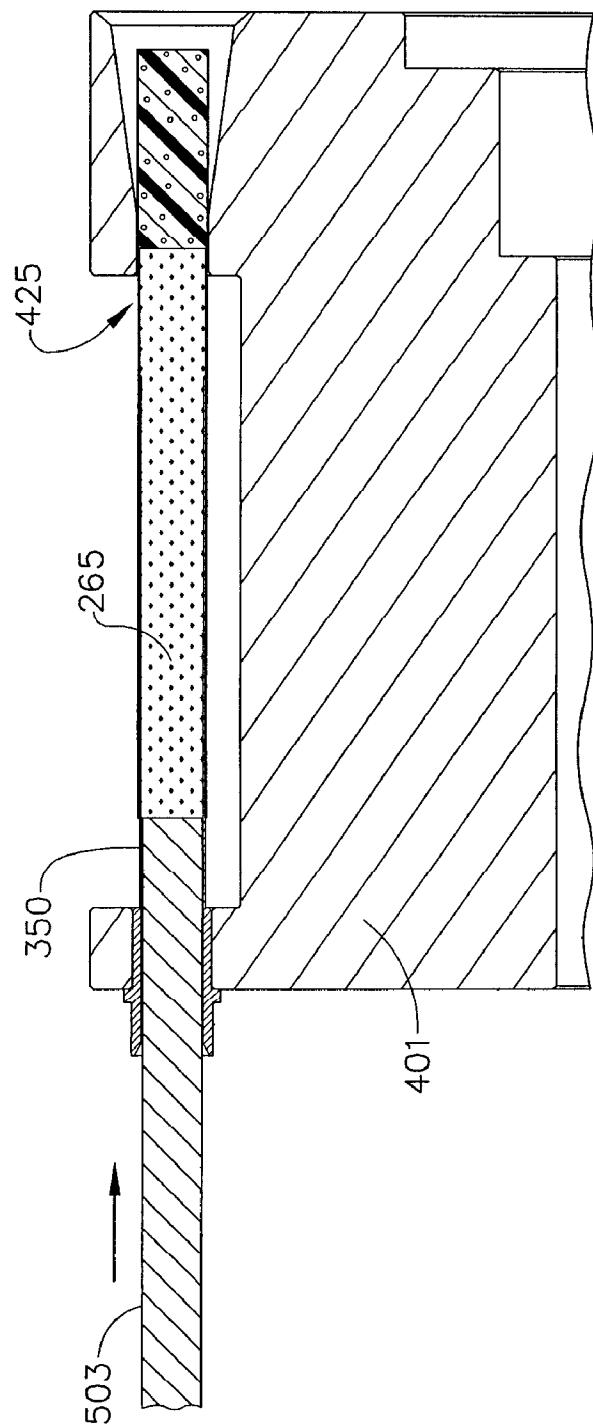


FIG. 6F

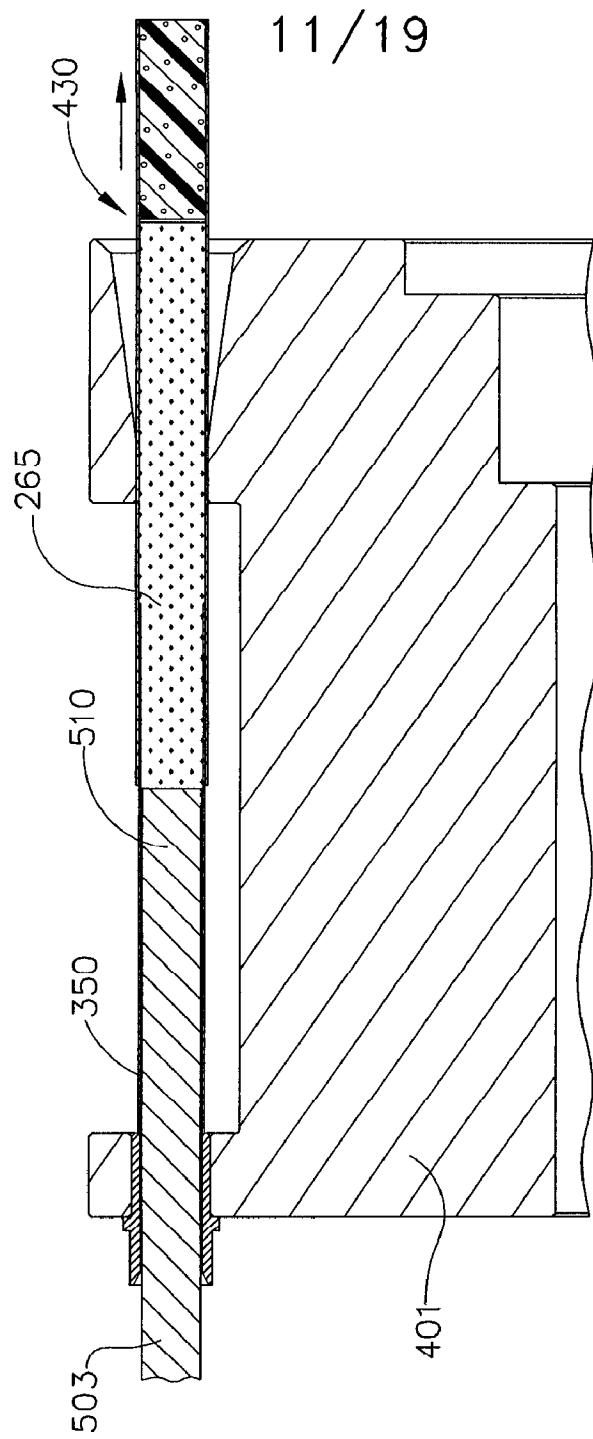


FIG. 6G

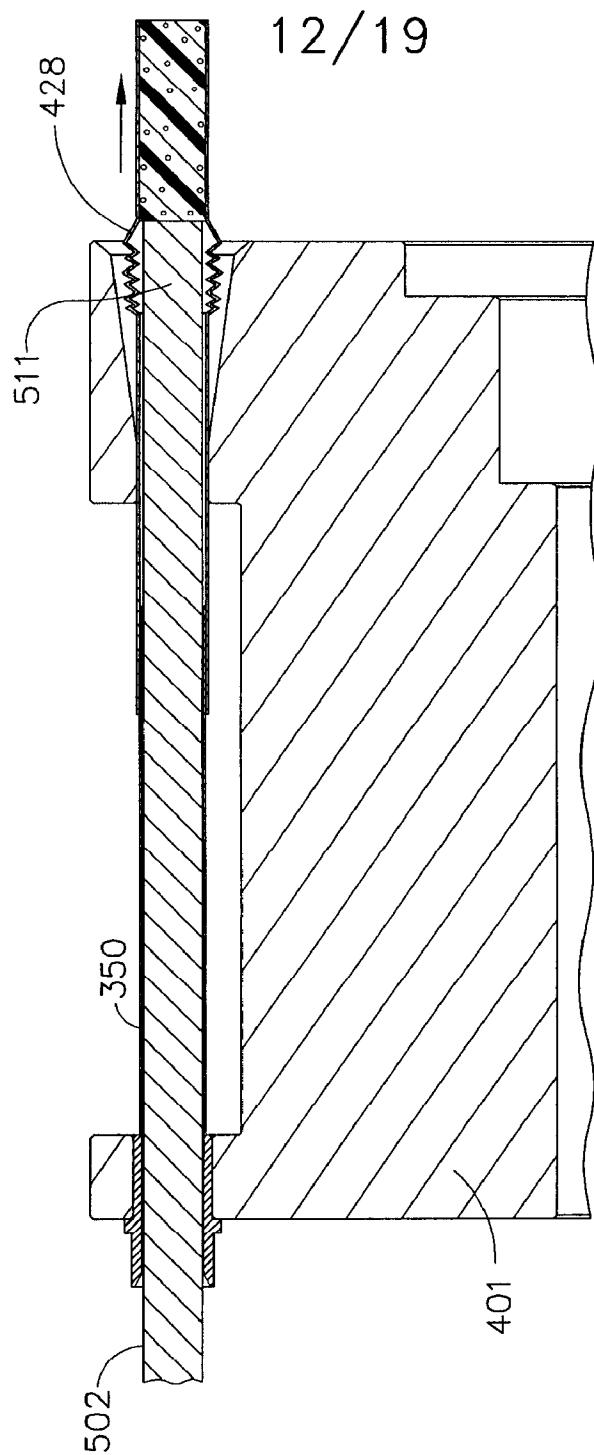


FIG. 6H

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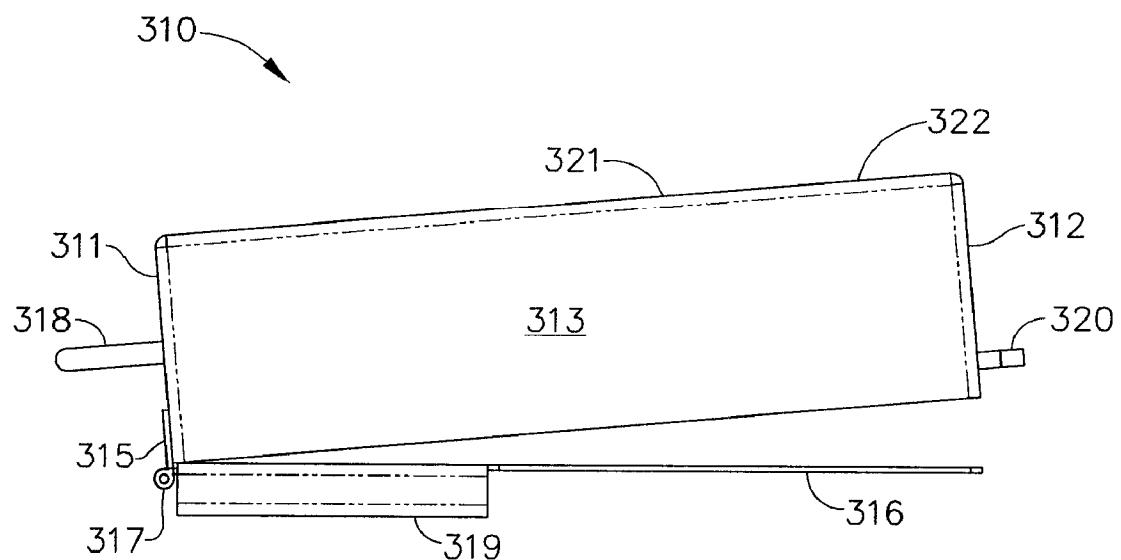
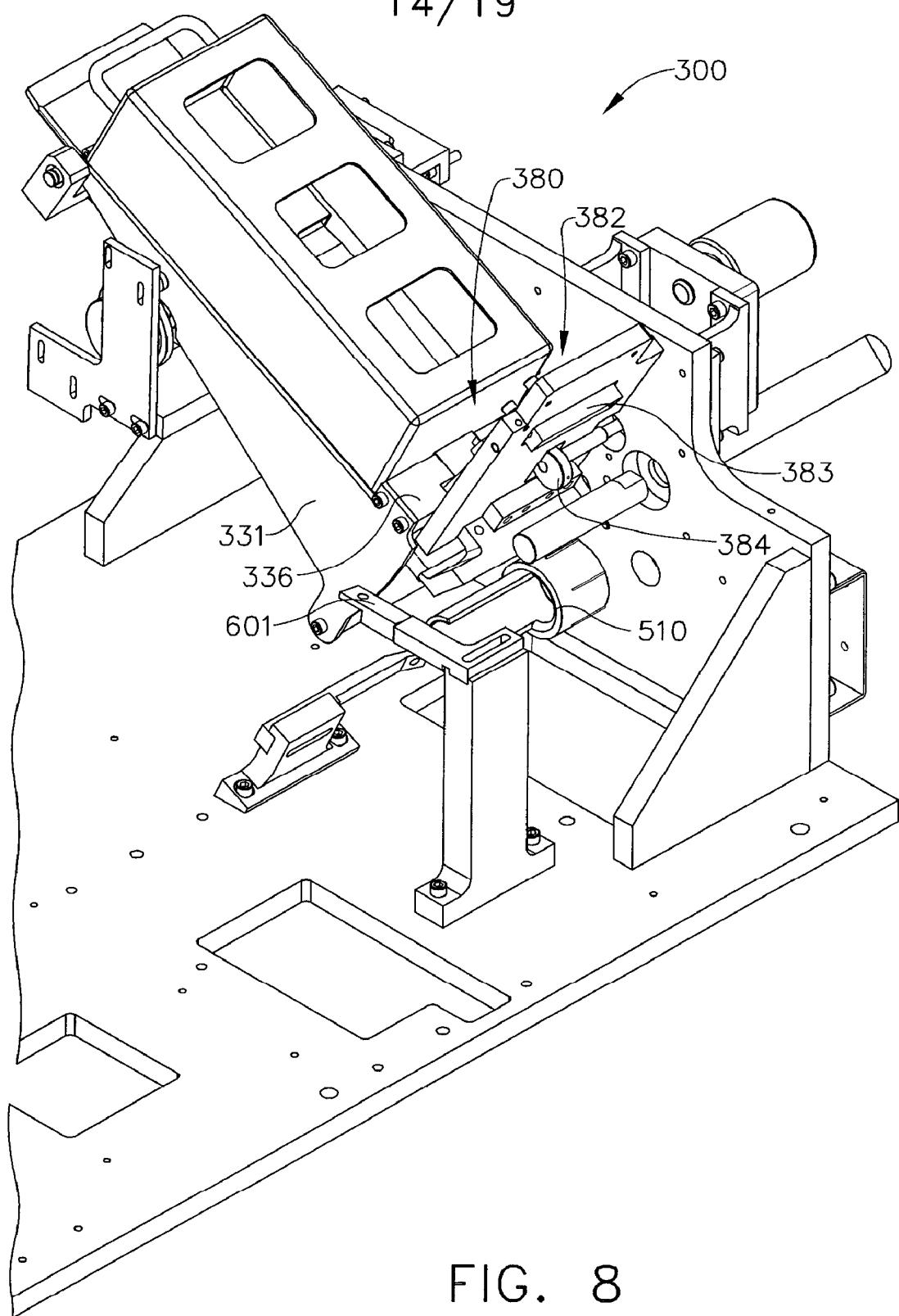


FIG. 7

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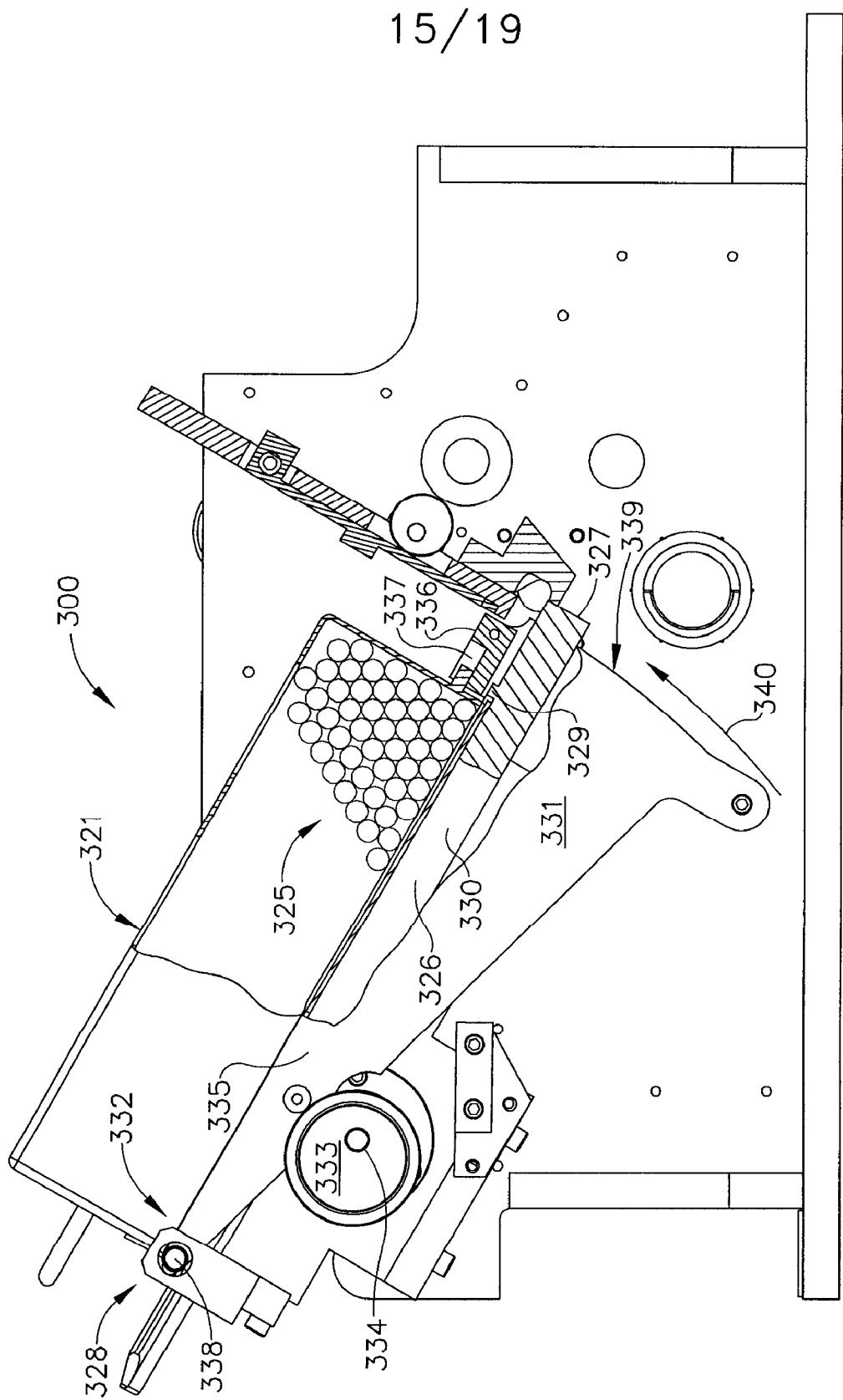


FIG. 9

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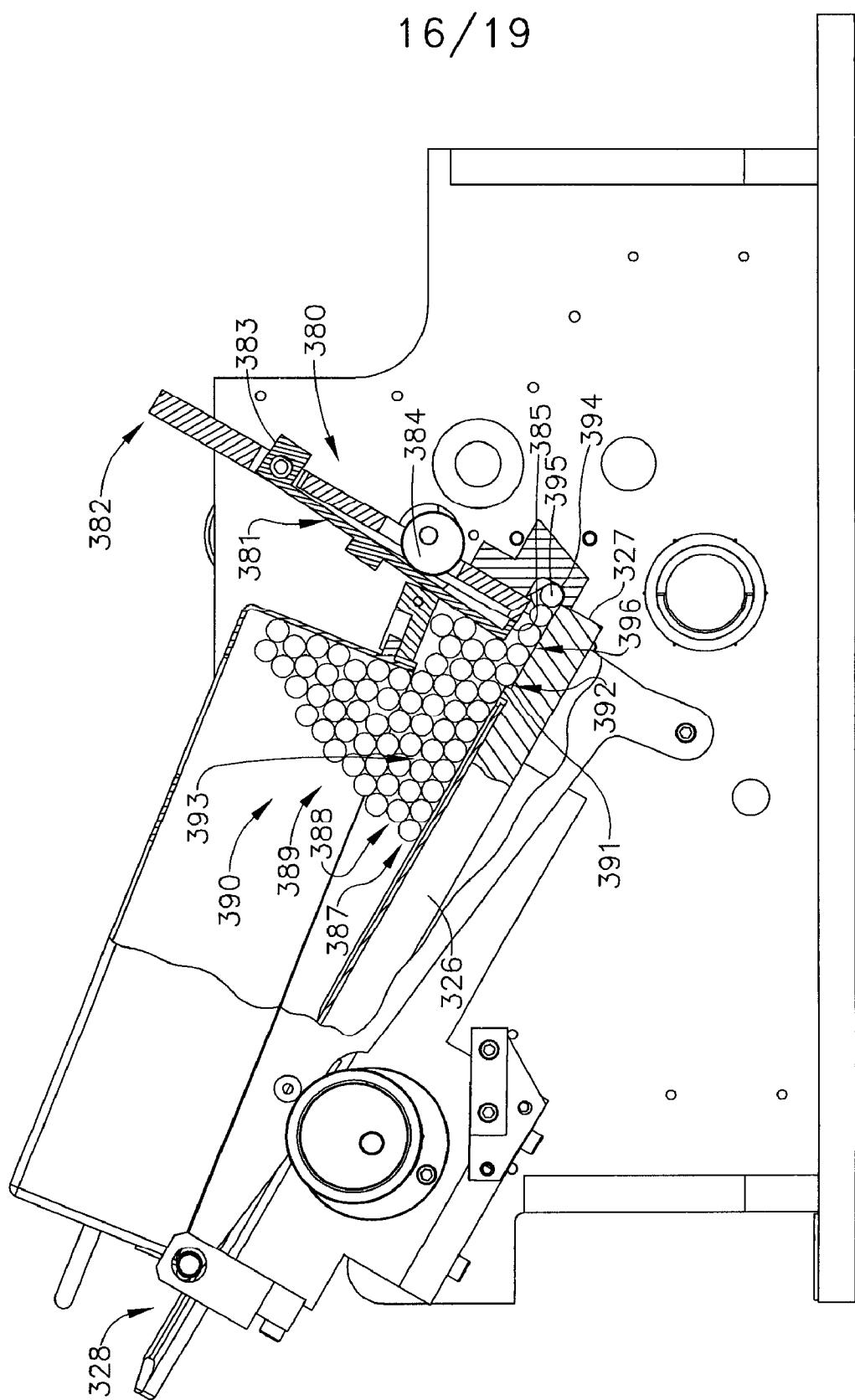


FIG. 10

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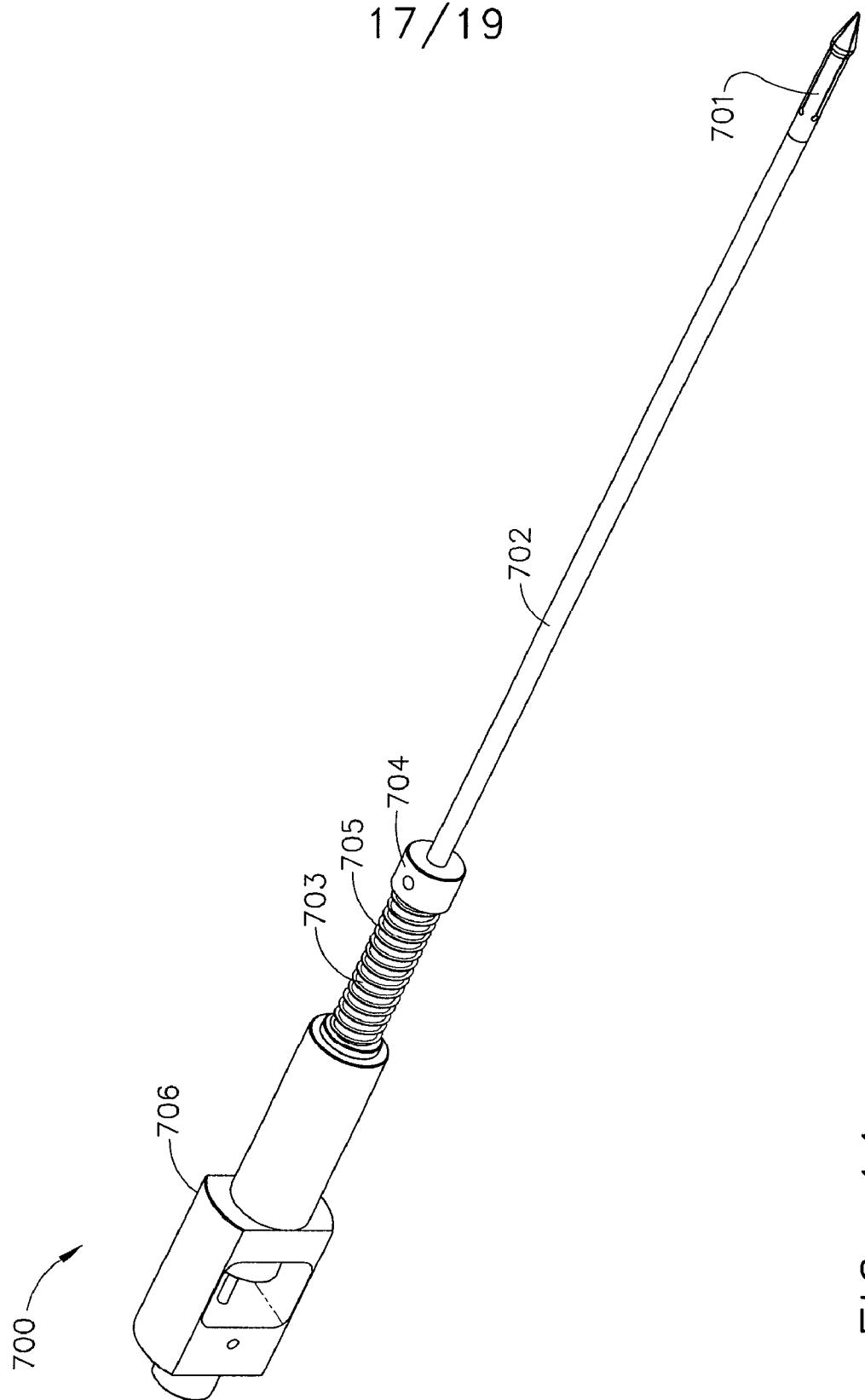


FIG. 11

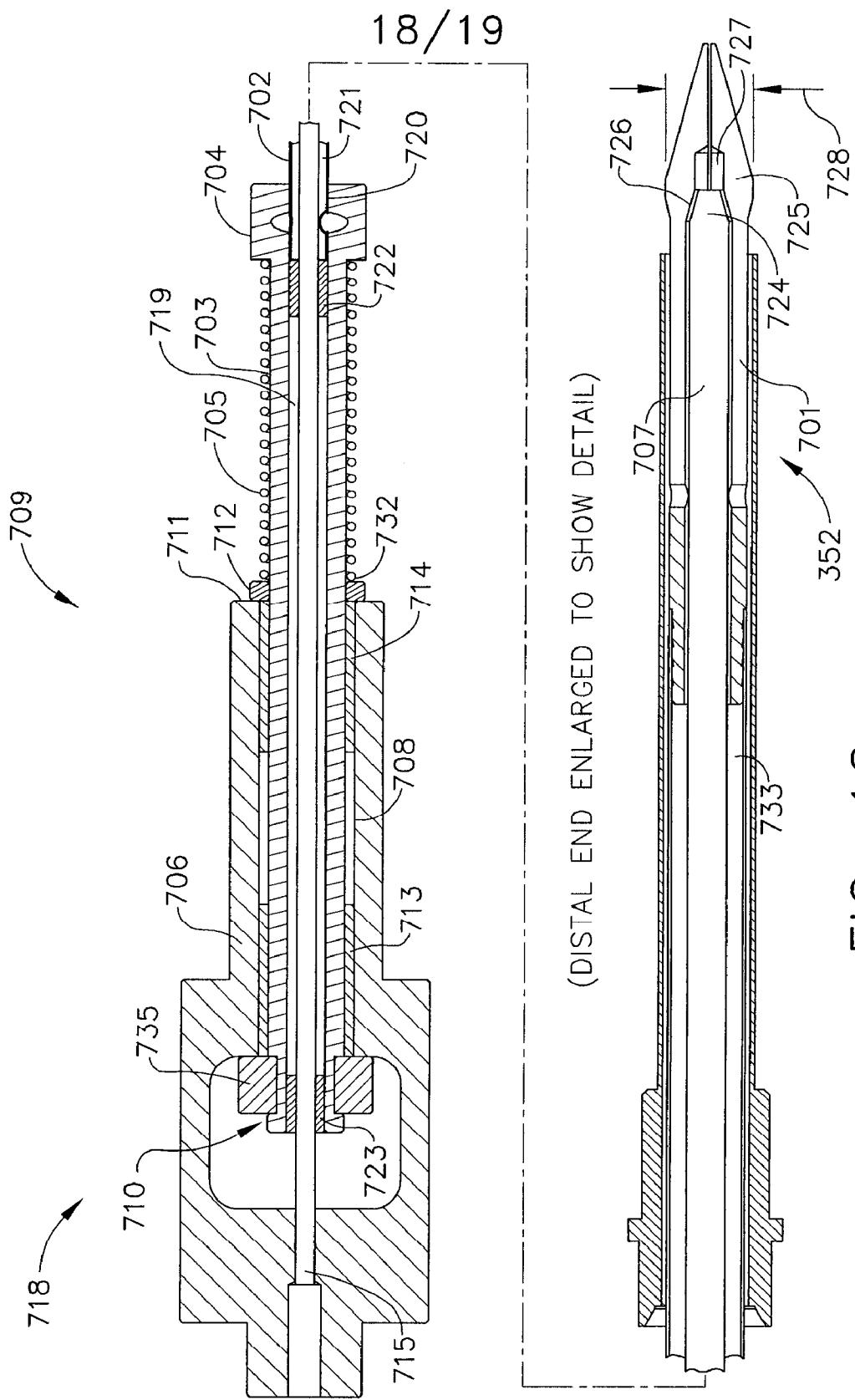


FIG. 12

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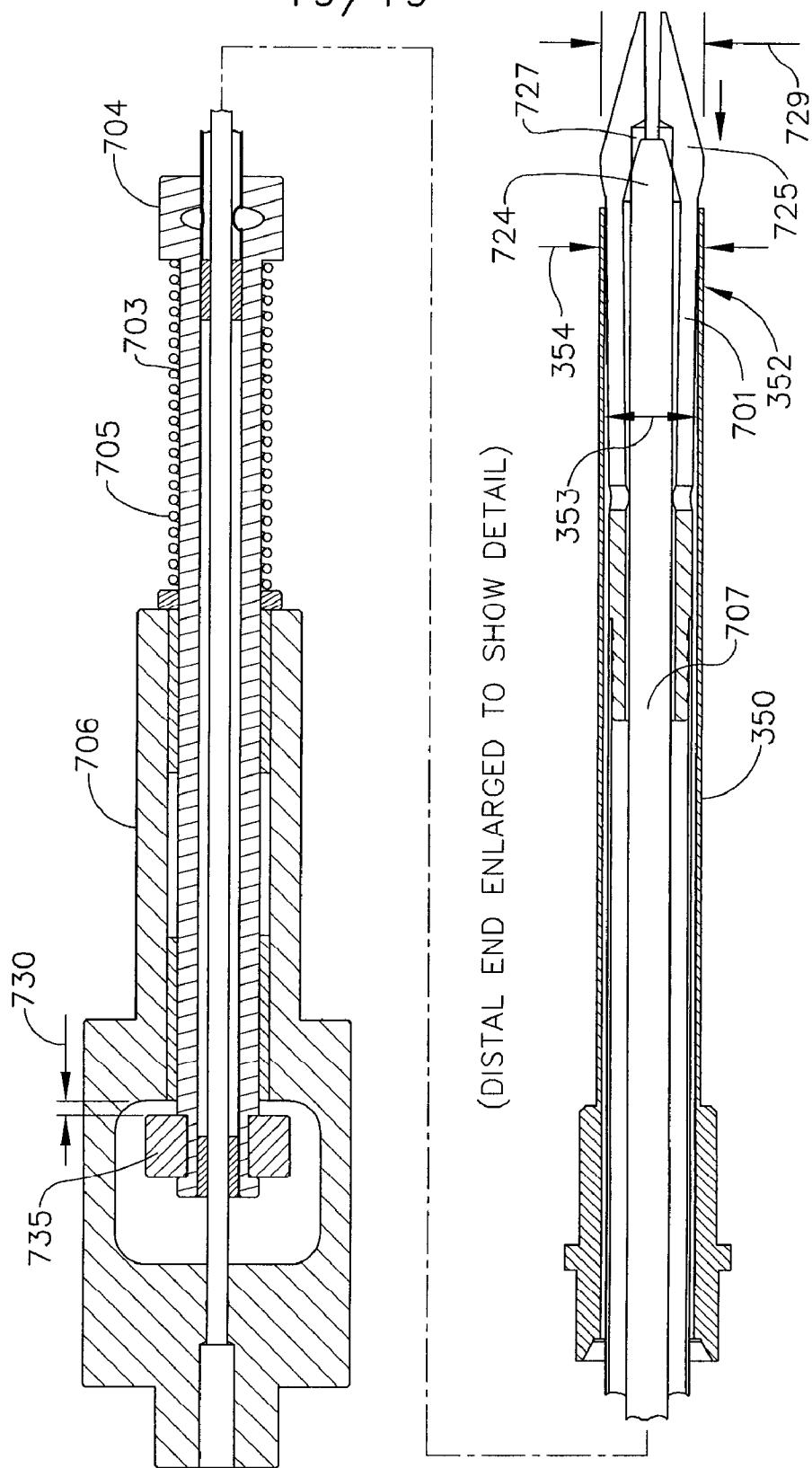


FIG. 13