Oct. 25, 1949. E. E. WEST 2,486,350

BAG STRINGING MACHINE

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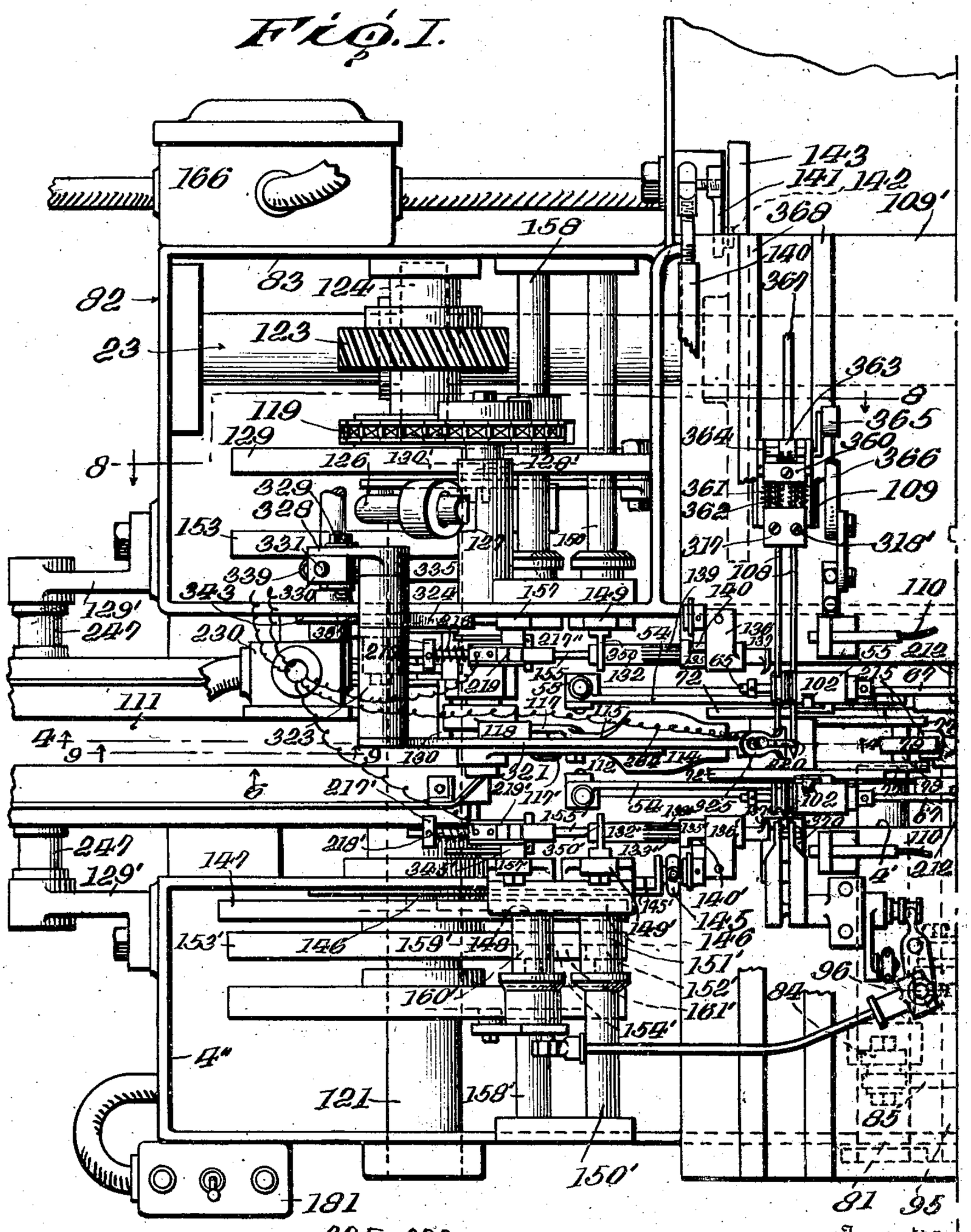
Fig. 1.



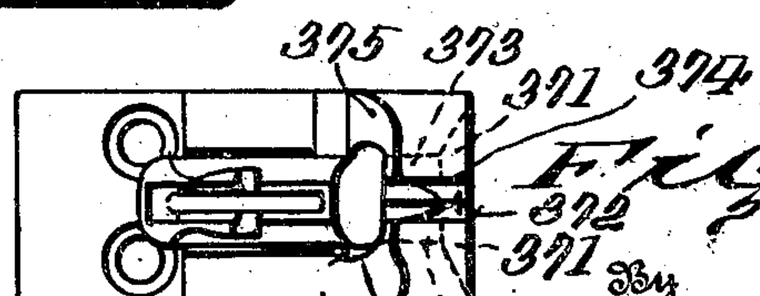


Fig. 19.

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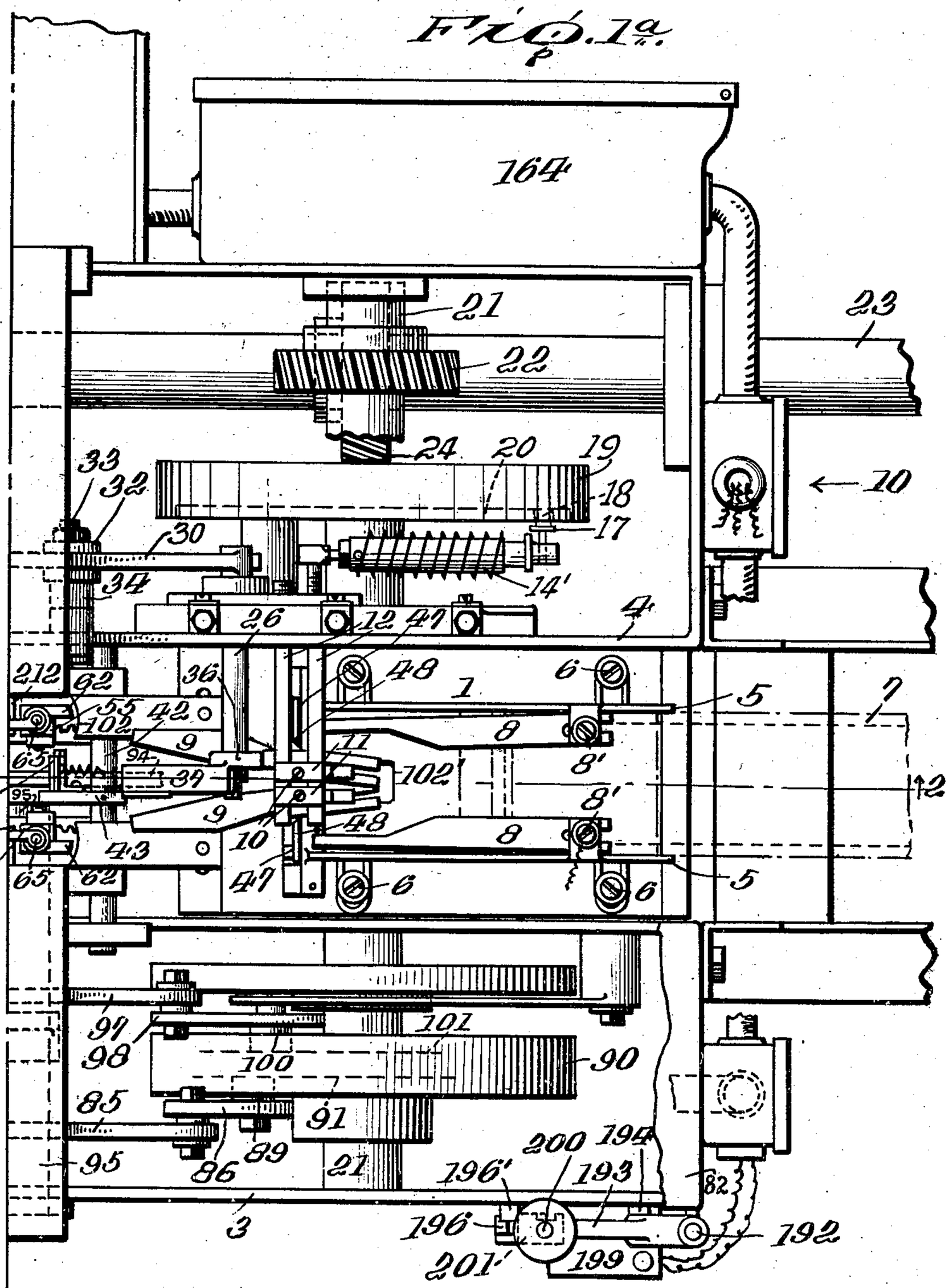
FIG. 1a.



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BAG STRINGING MACHINE

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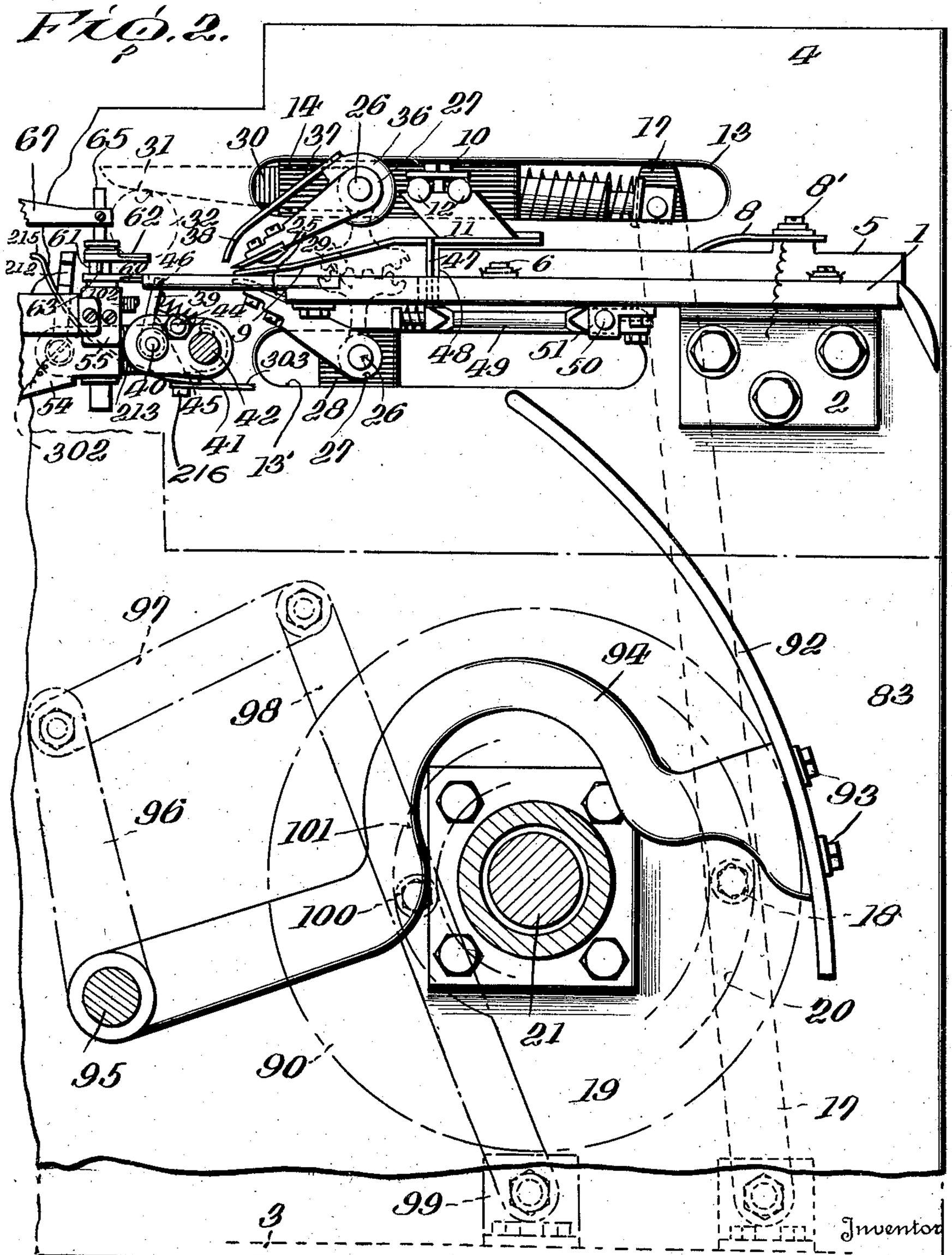
FIG. 2.



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BAG STRINGING MACHINE

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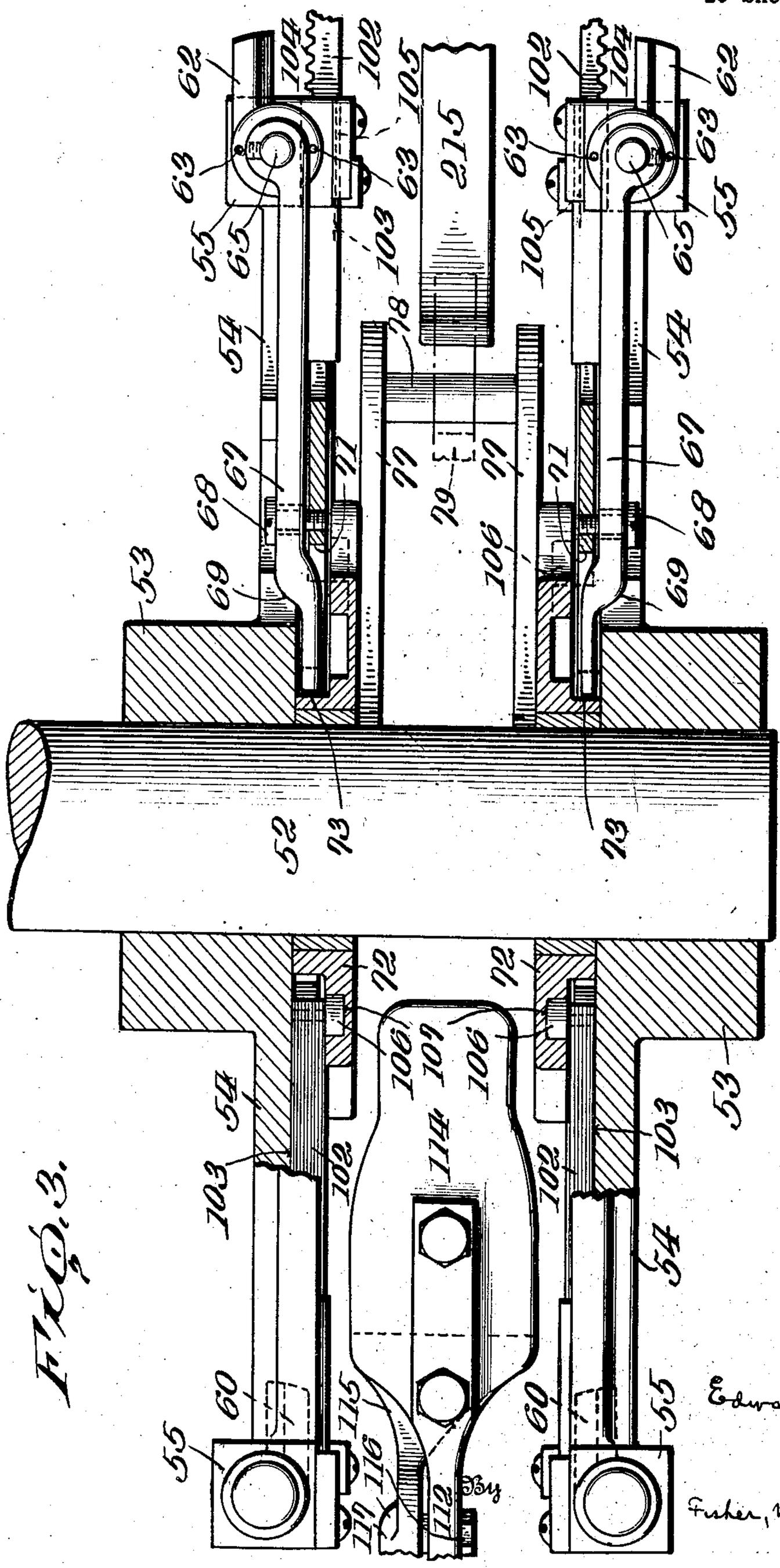

Fig. 3.

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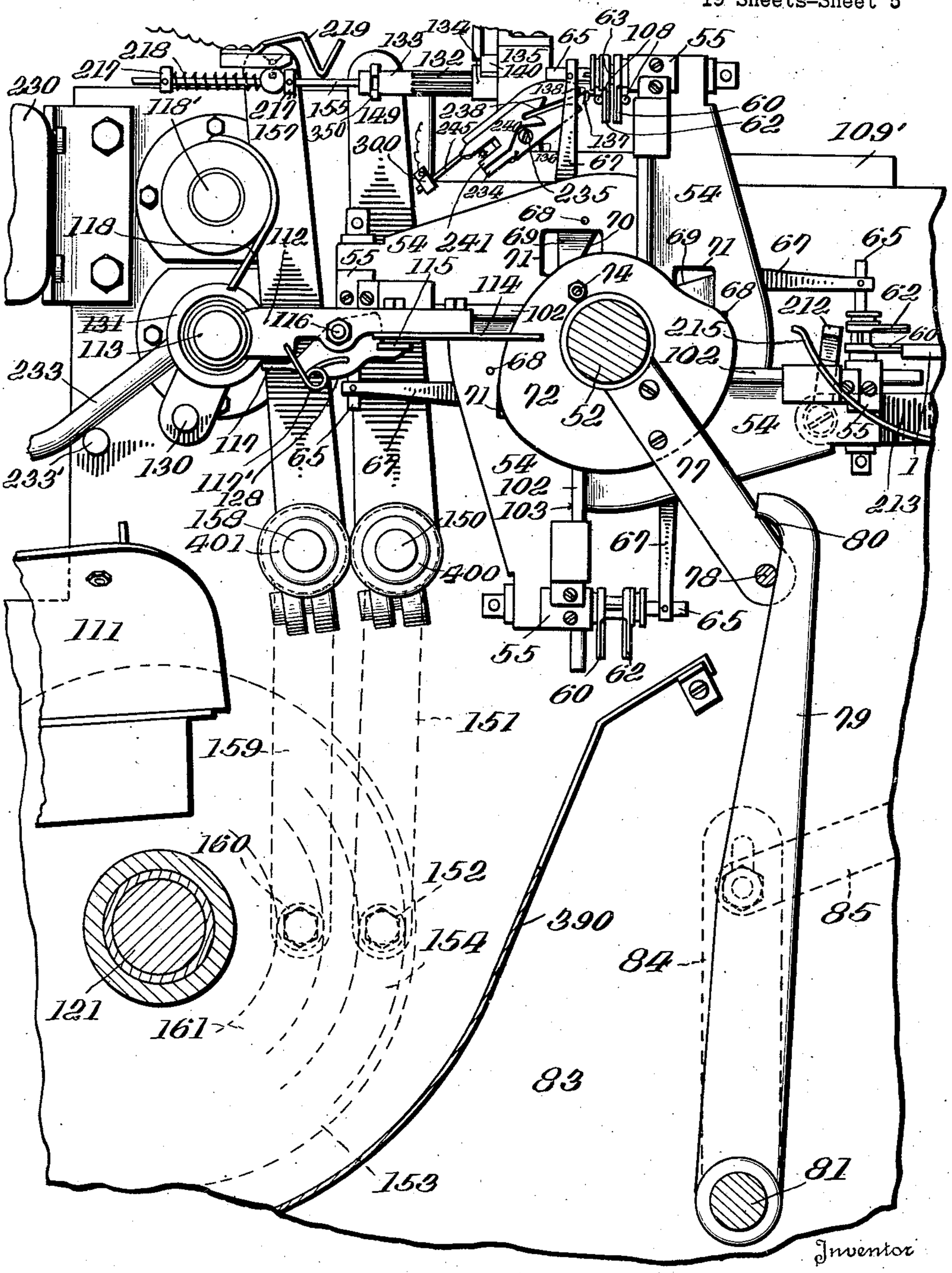

Fig. 4.

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Fig. 5.

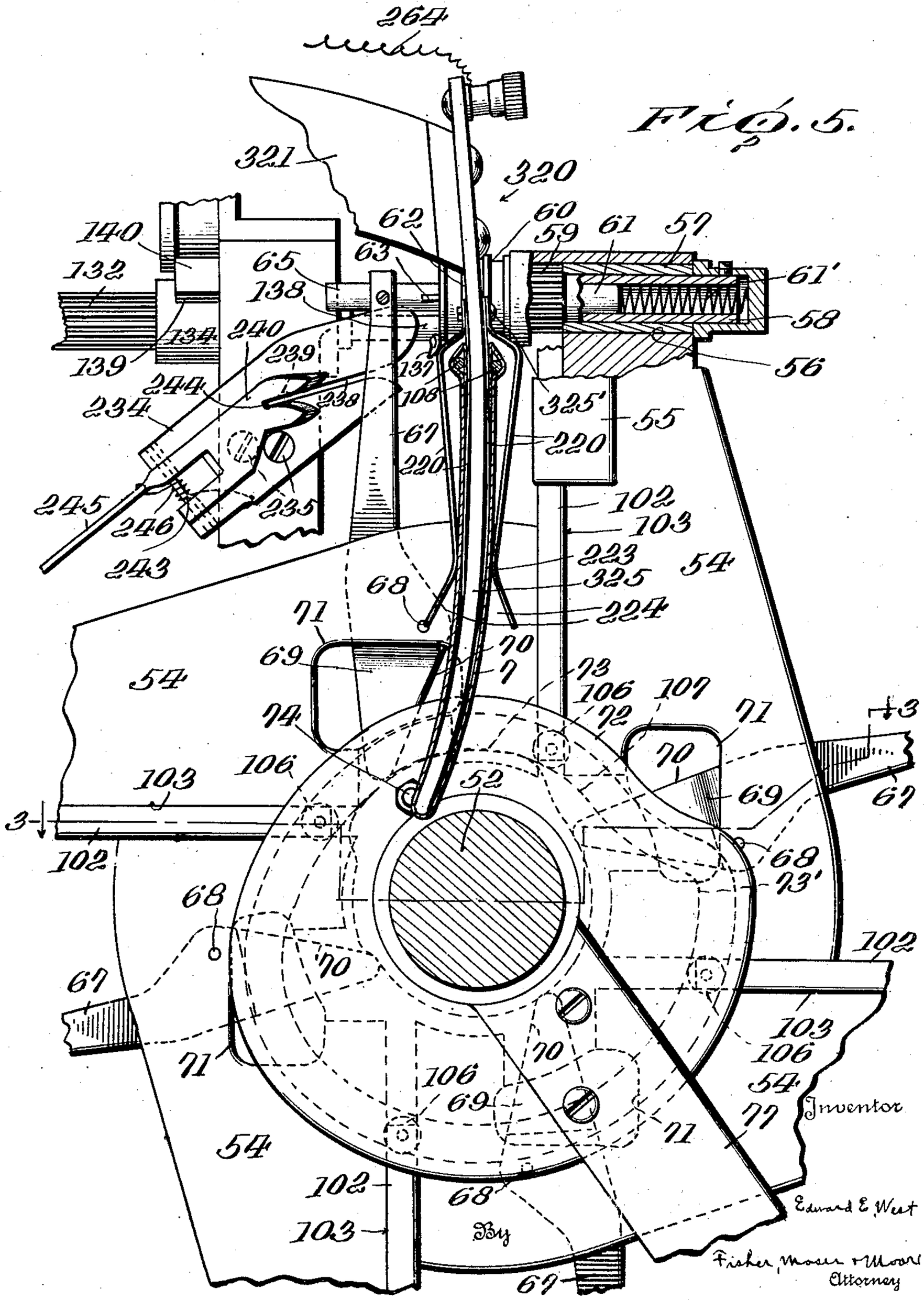

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FIG. 6.

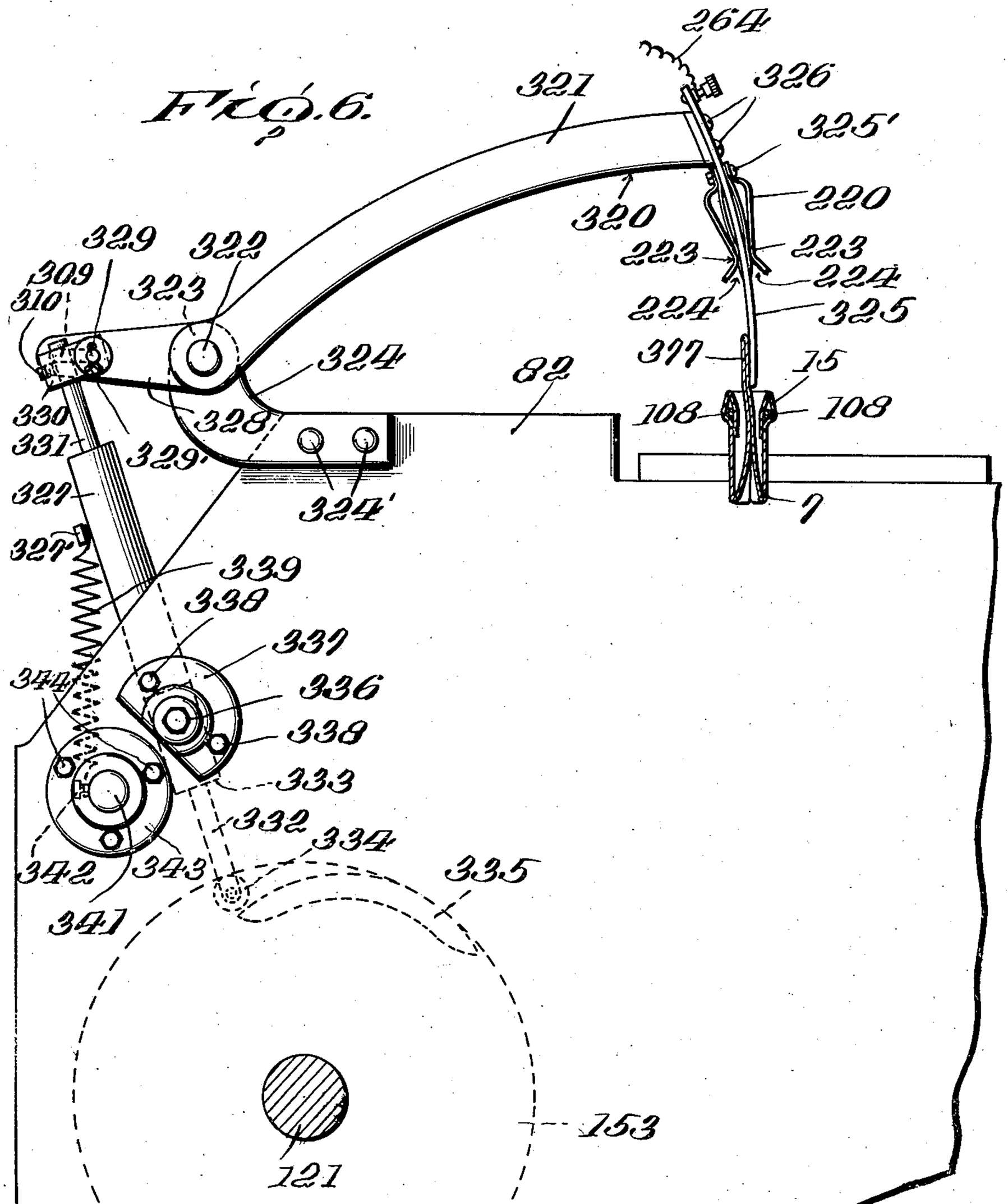

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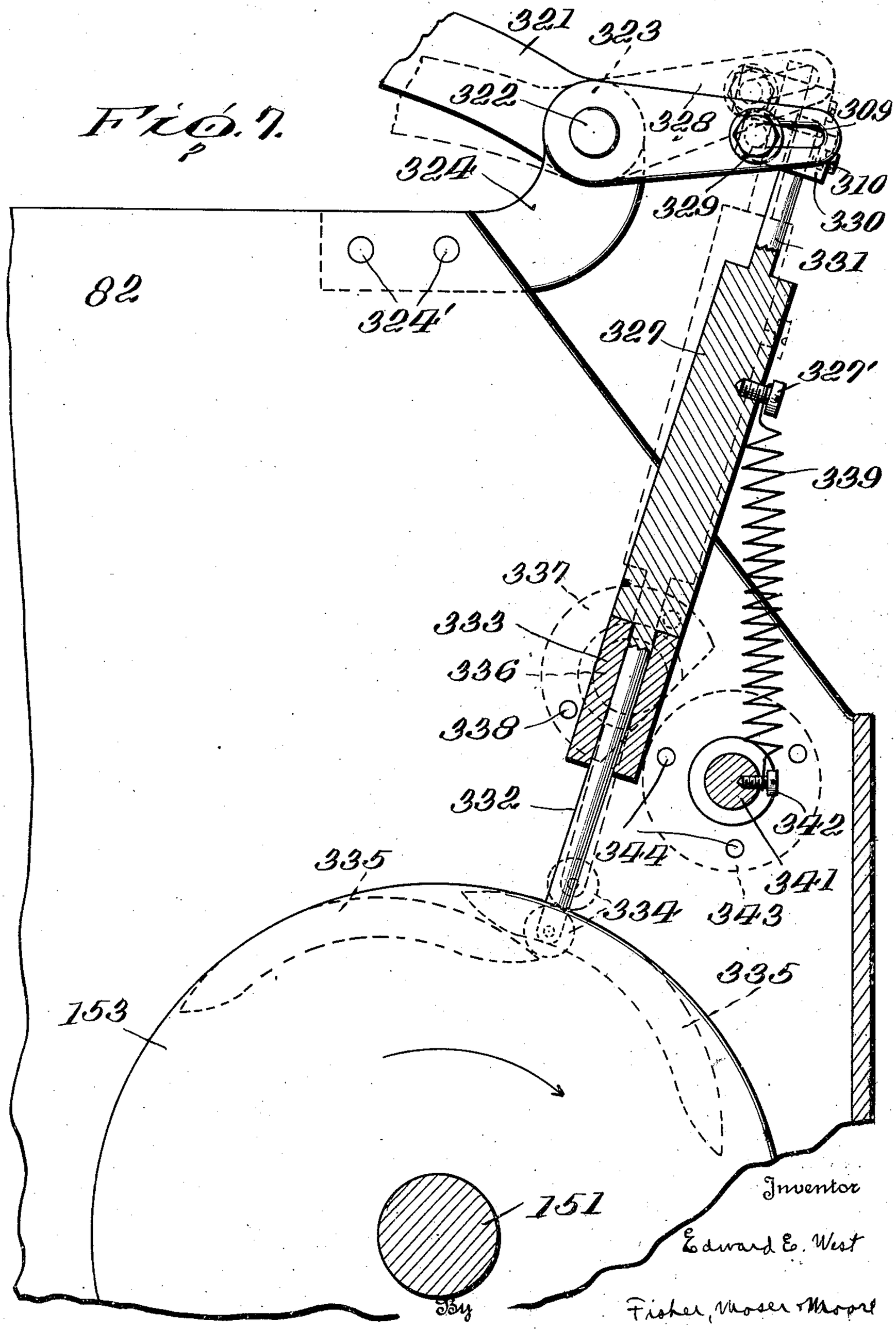
Fig. 7.



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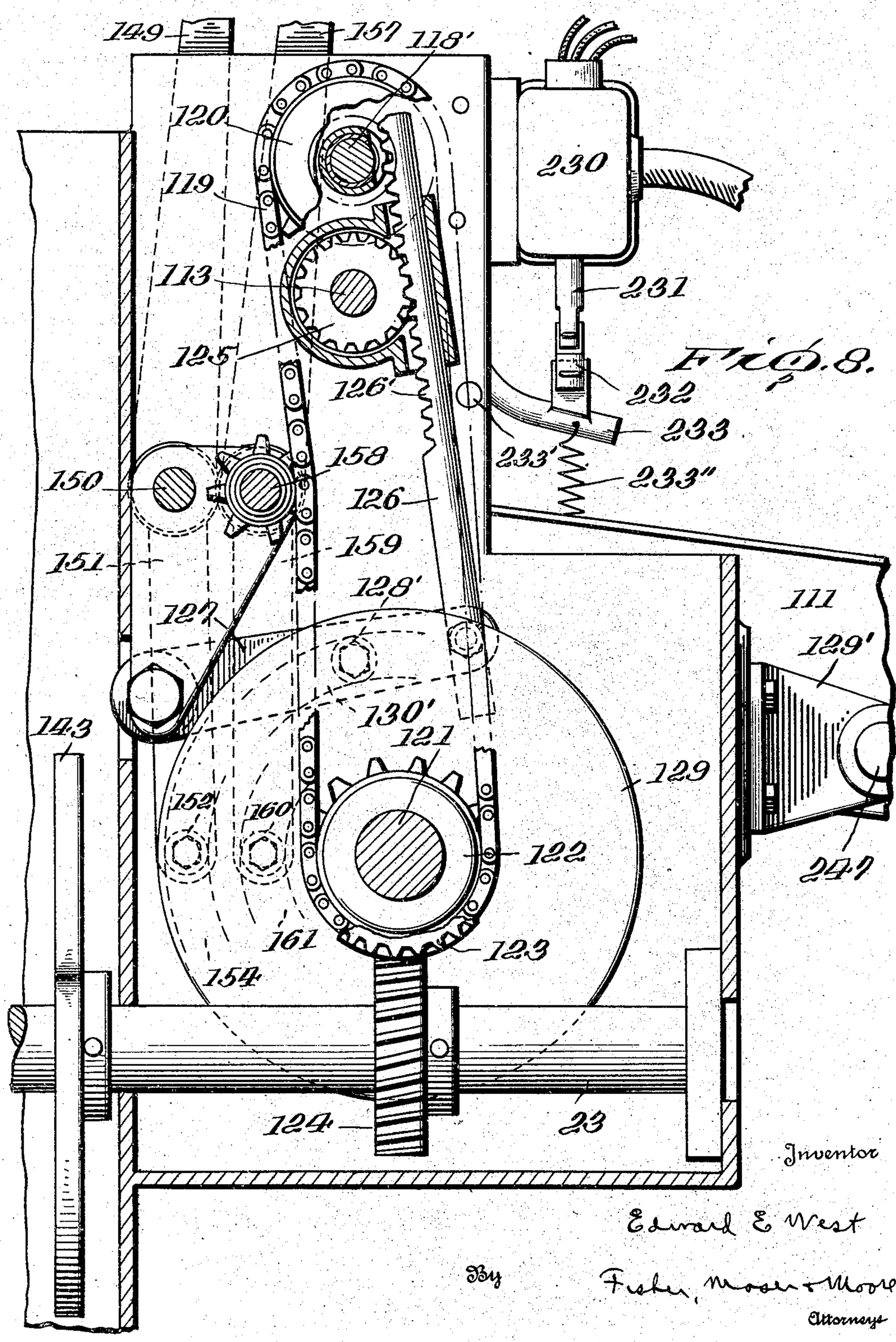

Fig. 8.

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Fig. 20.

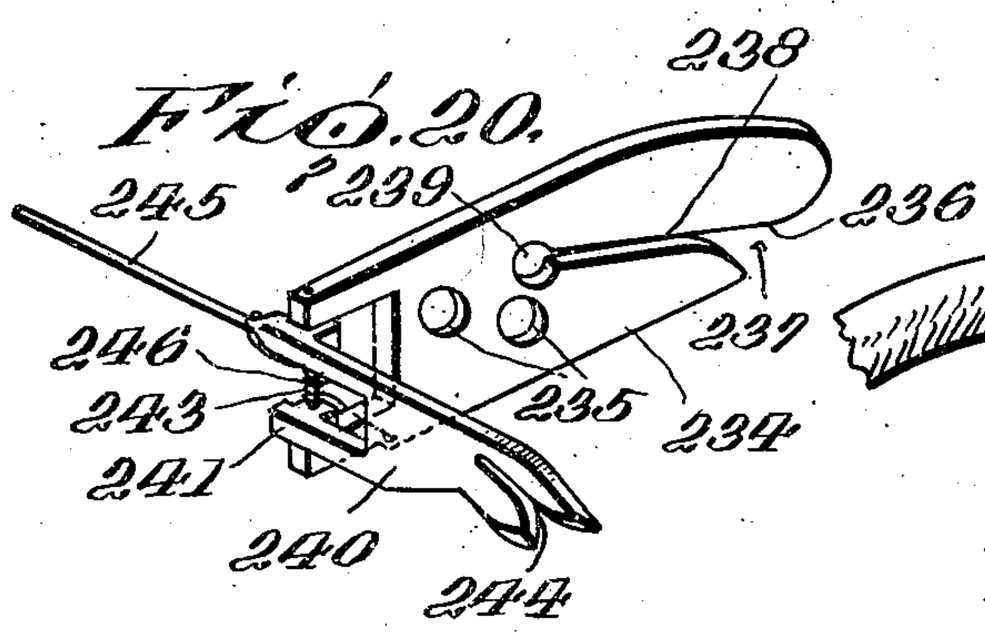


Fig. 9.

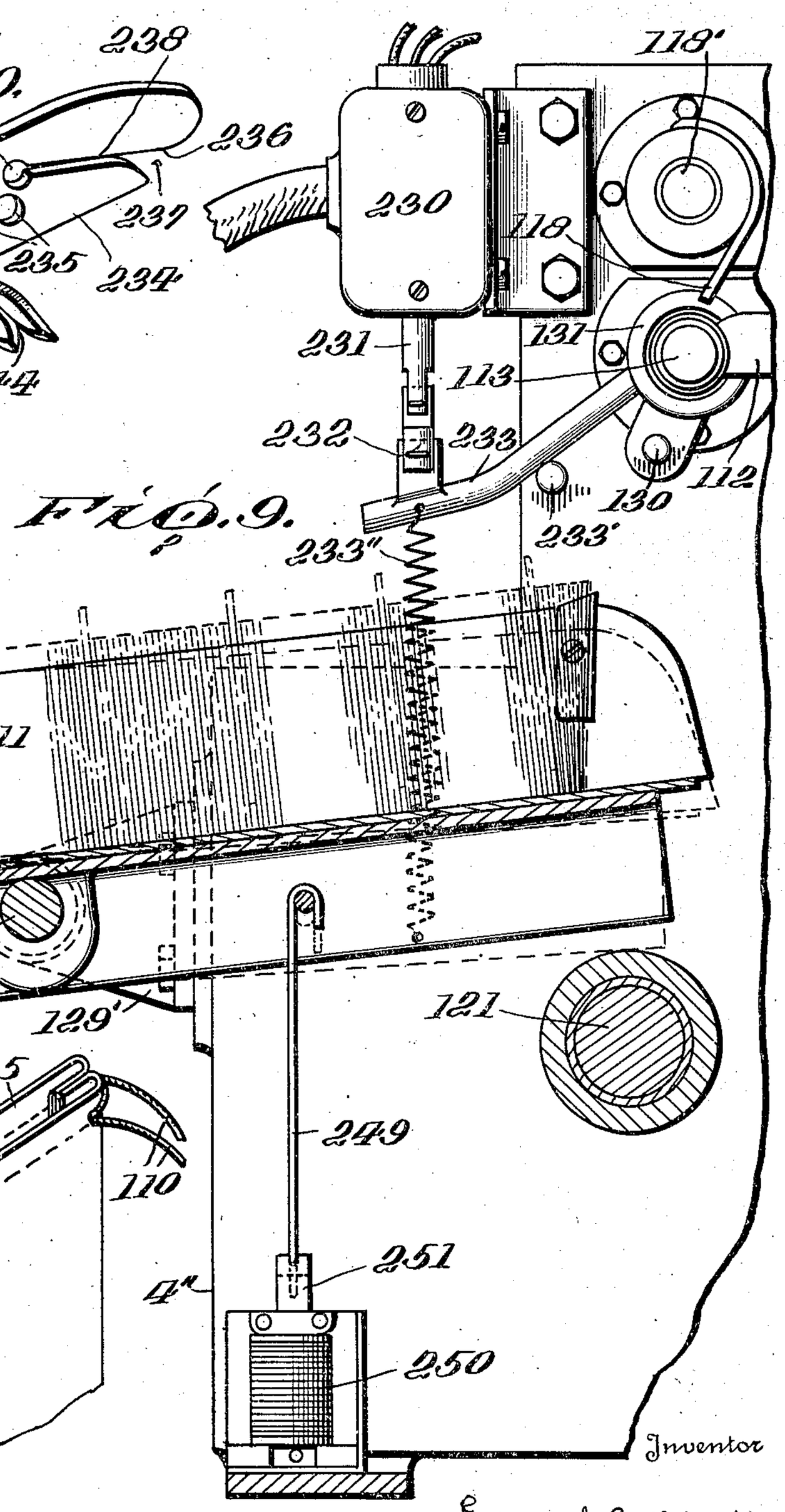
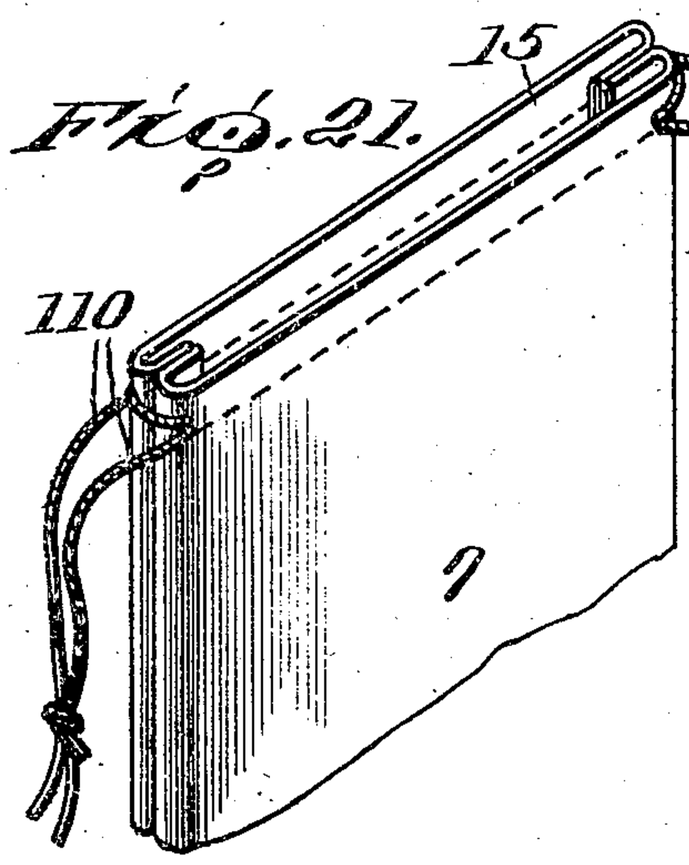


Fig. 21.



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BAG STRINGING MACHINE

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FIG. 10.

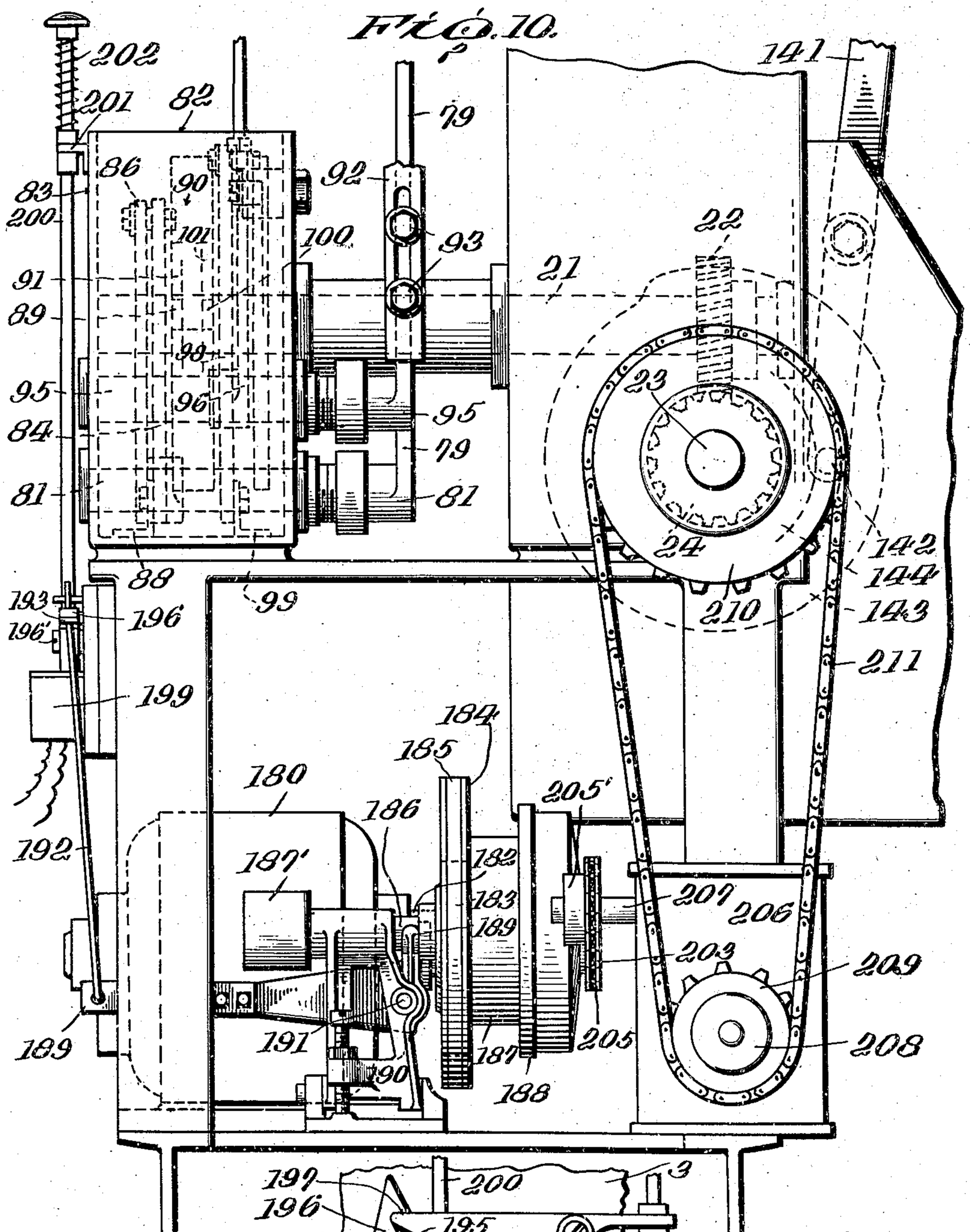

FIG. 11.

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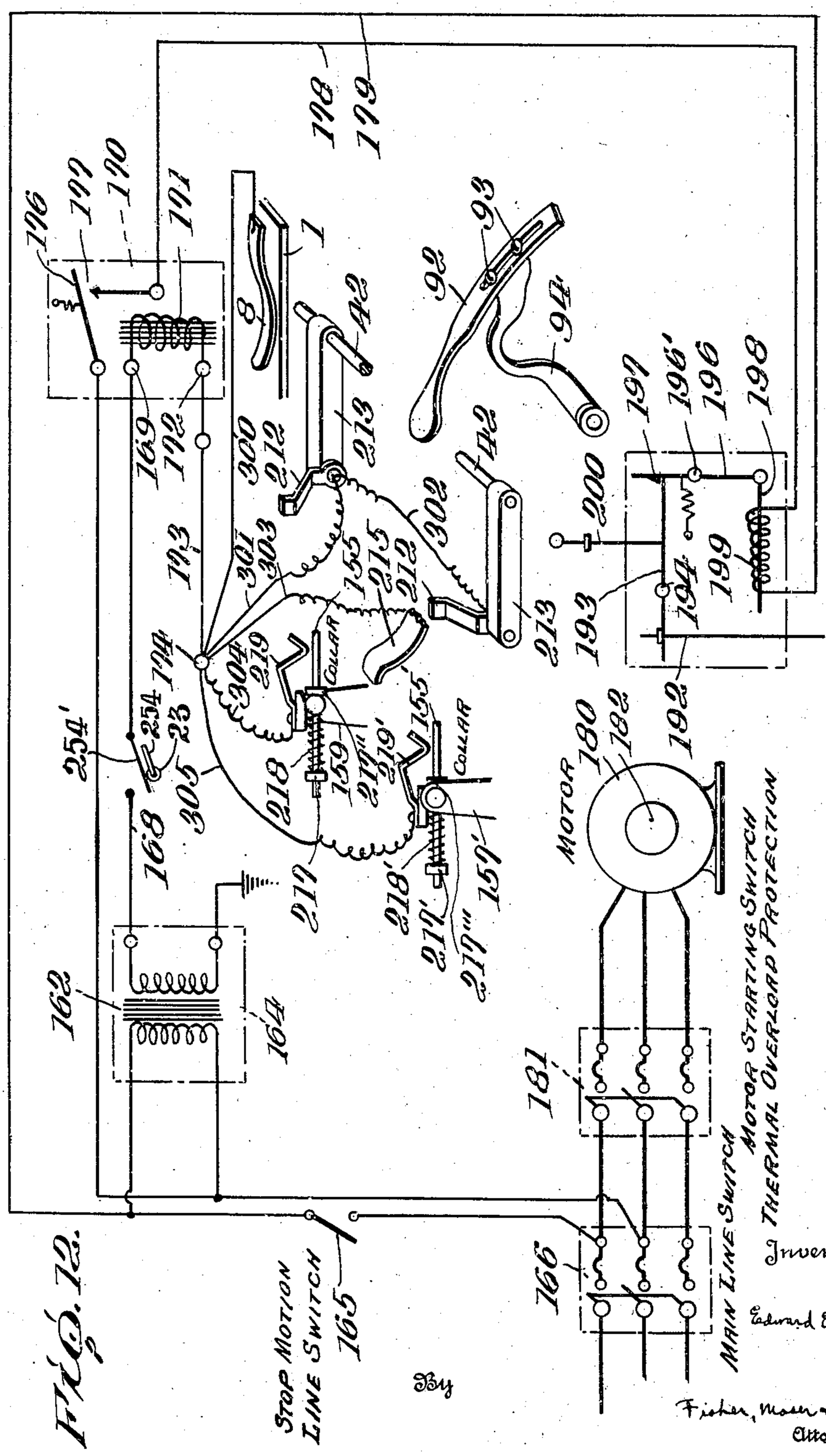

FIG. 12.

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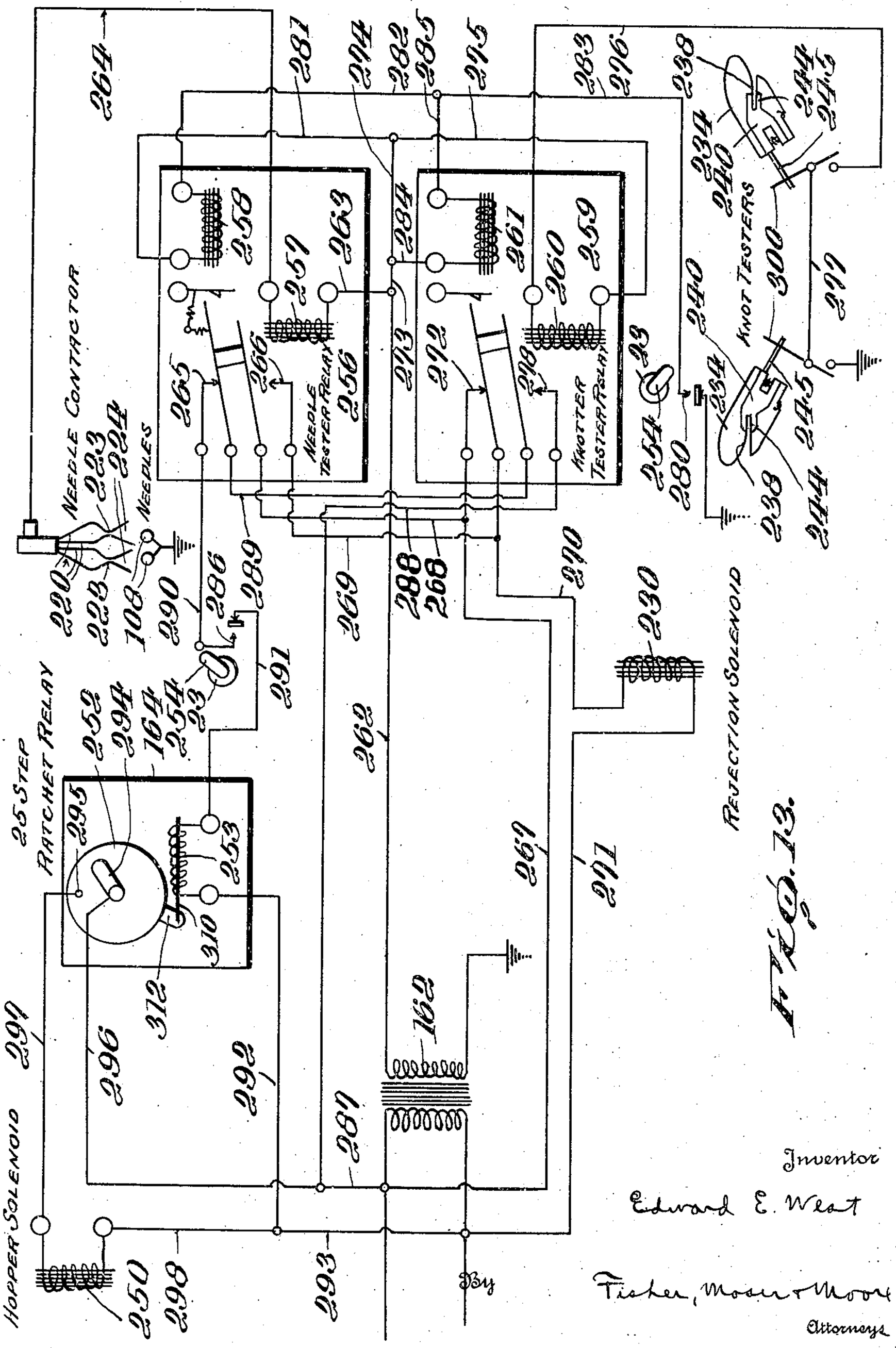

Fig. 13.

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BAG STRINGING MACHINE

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Fig. 14.

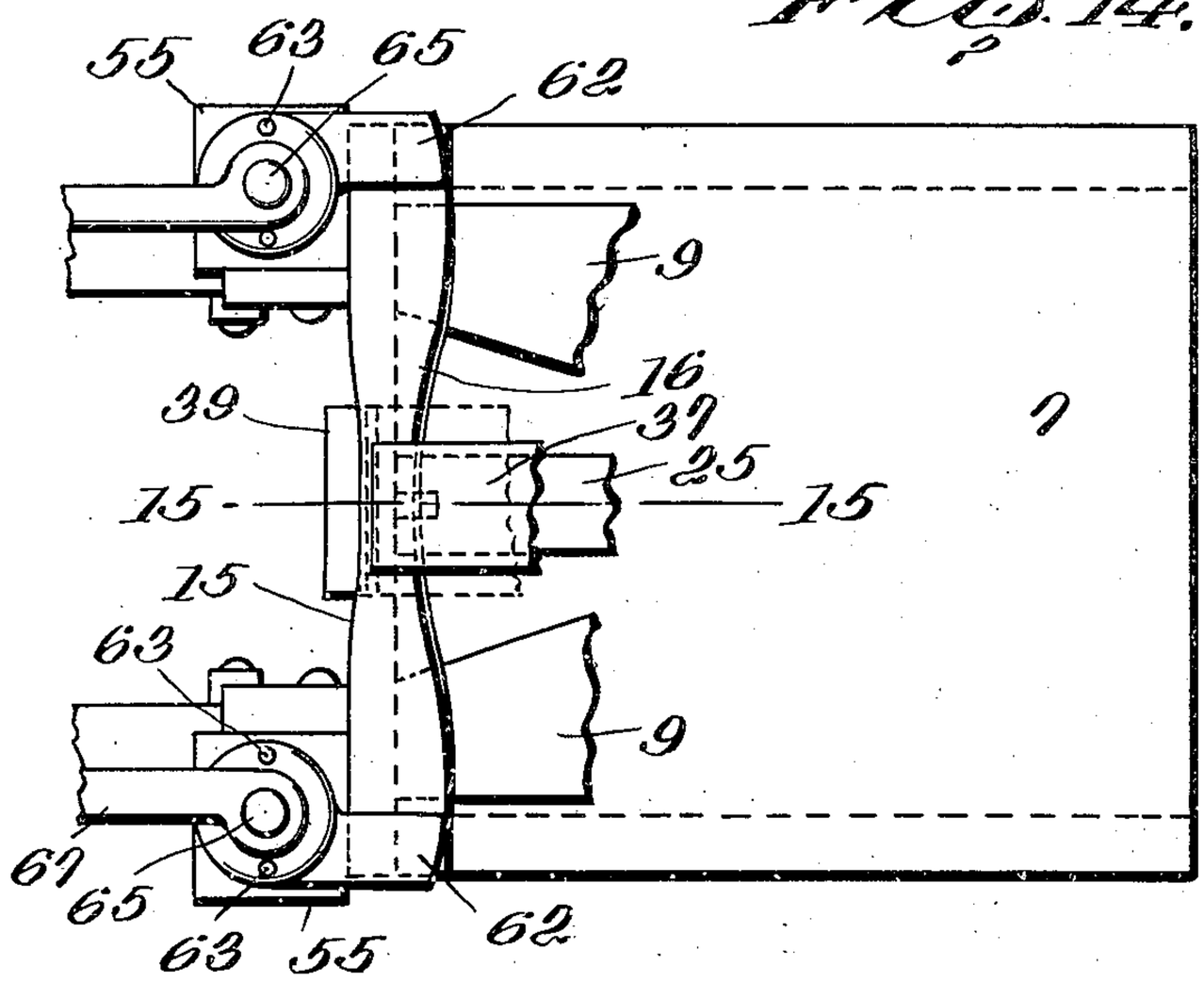

Fig. 15.

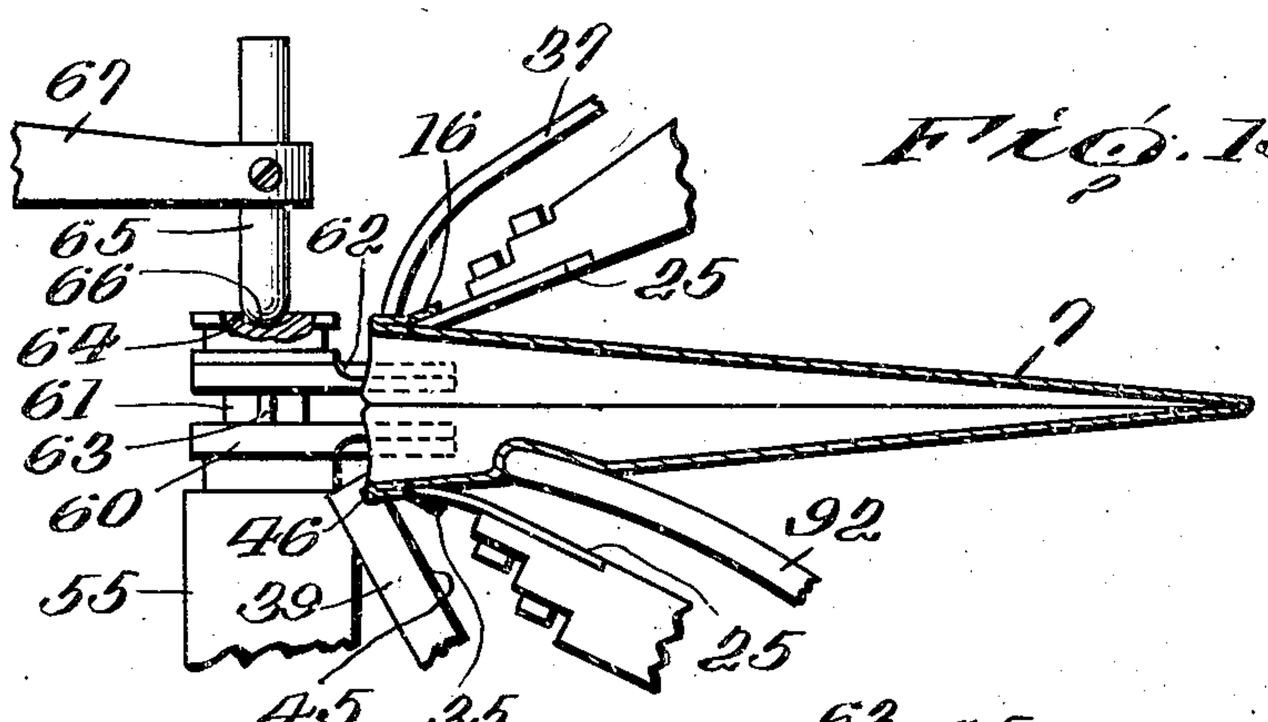

Fig. 16.

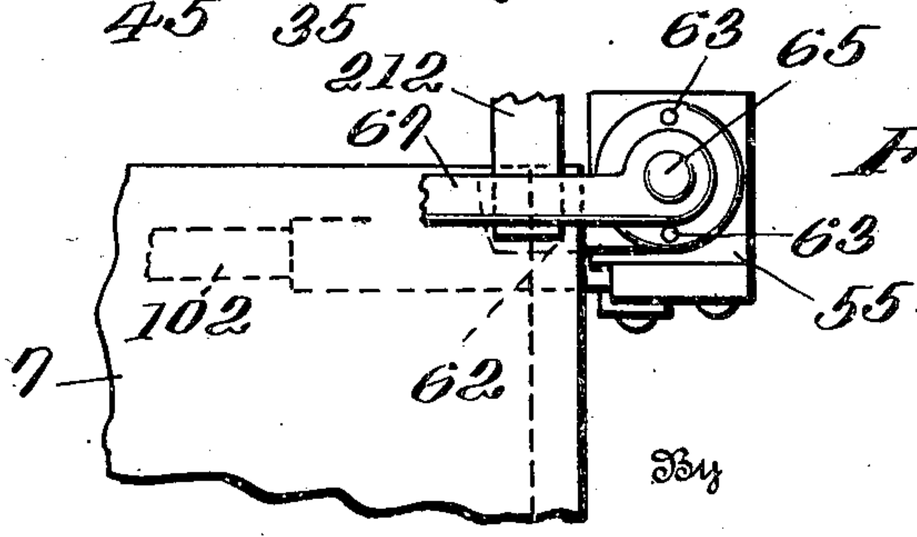

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Fig. 17.

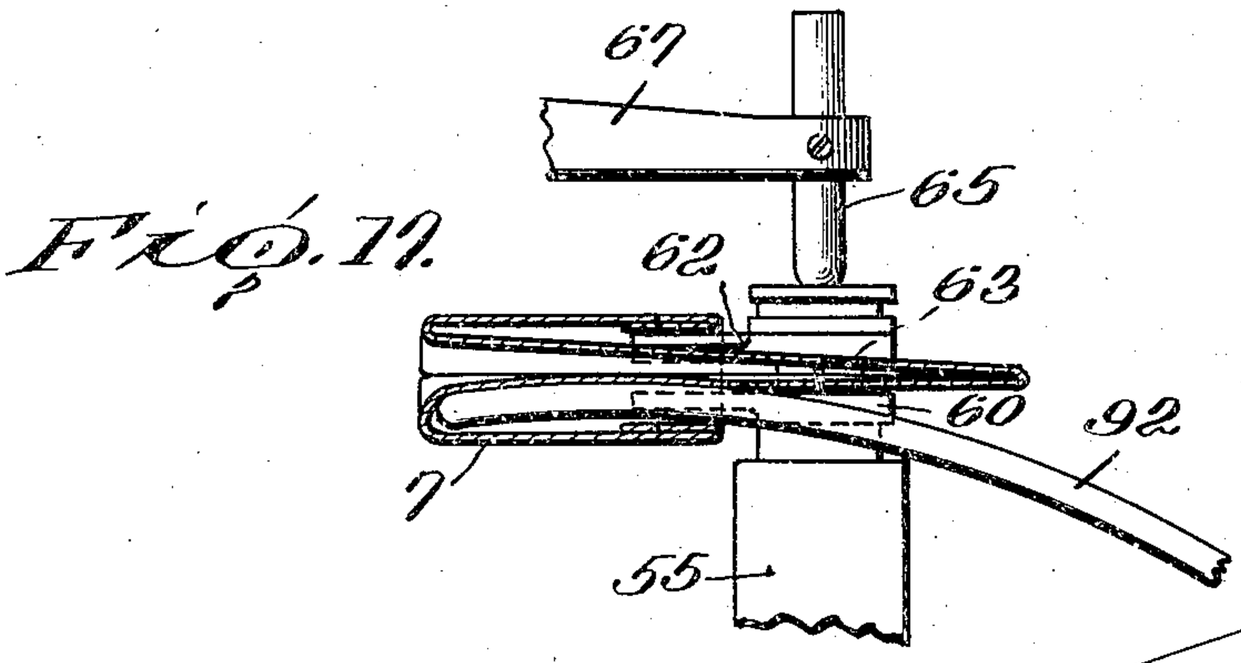

Fig. 18.

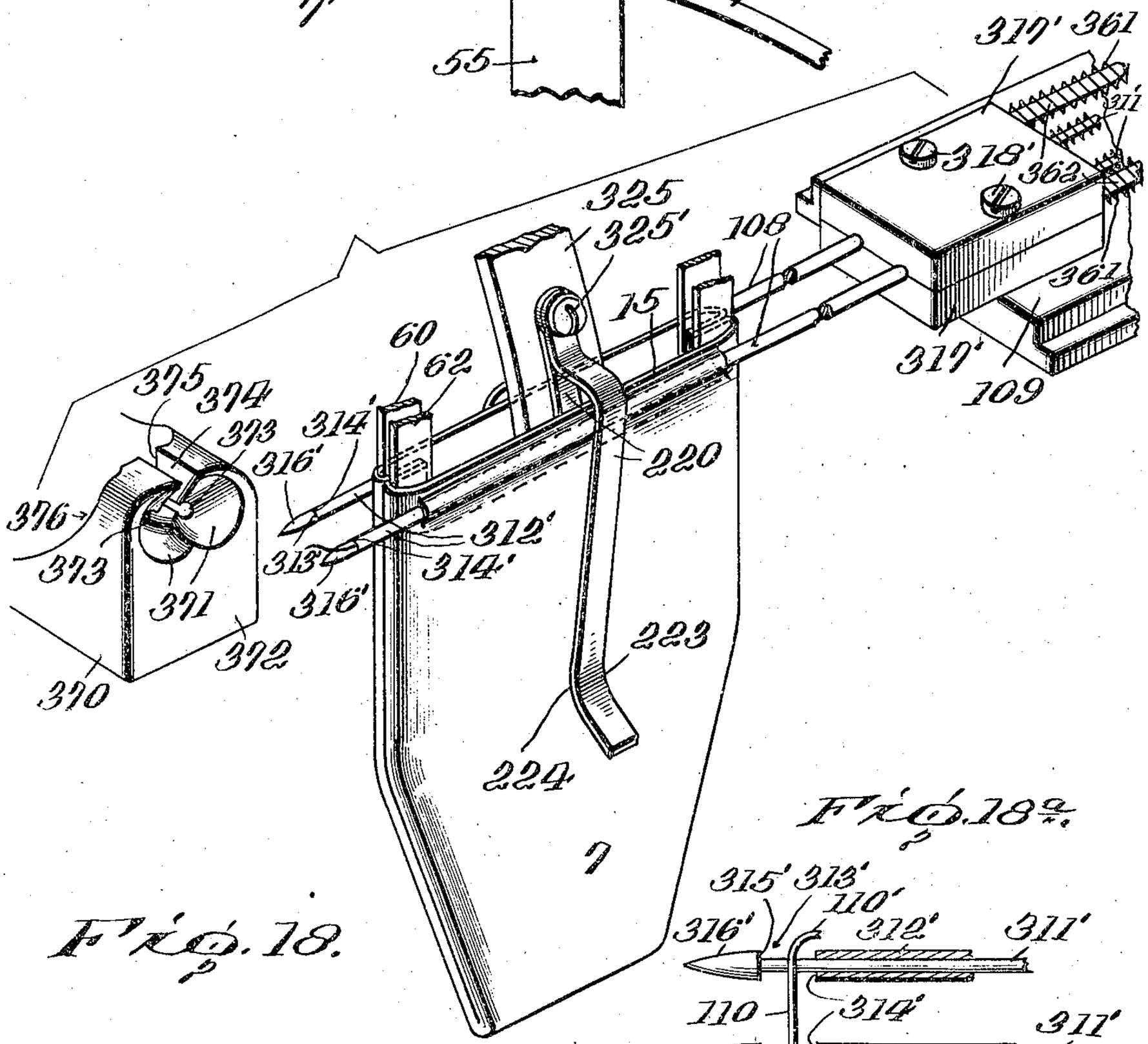

Fig. 18a.

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Fig. 22a.

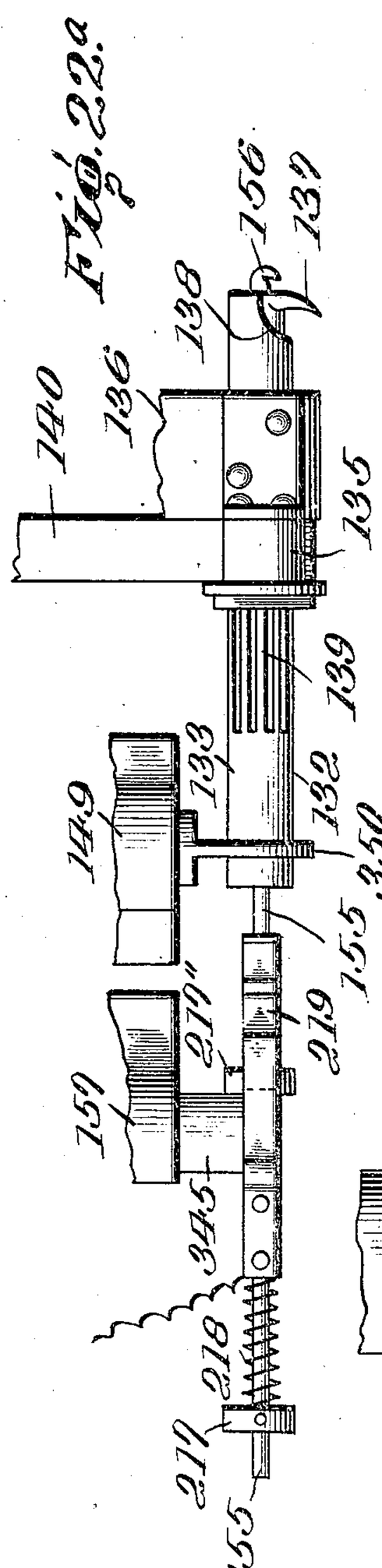

Fig. 22c.

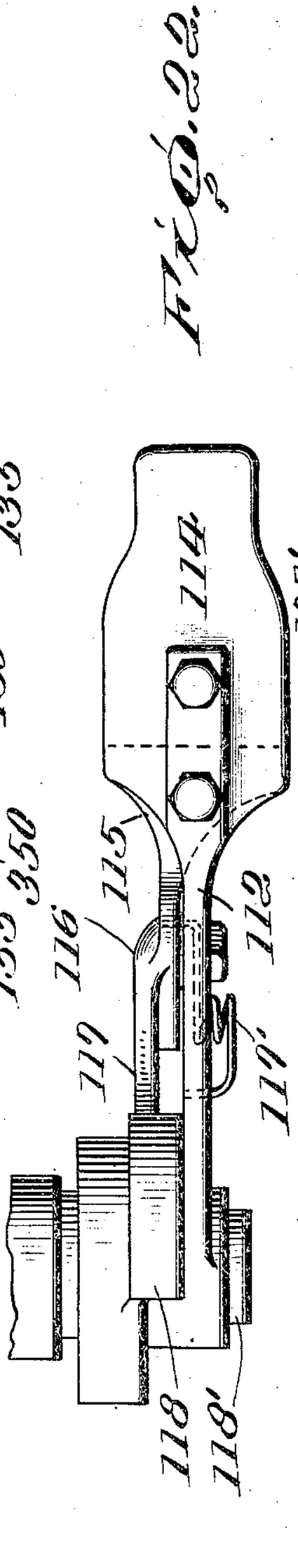

Fig. 22b.

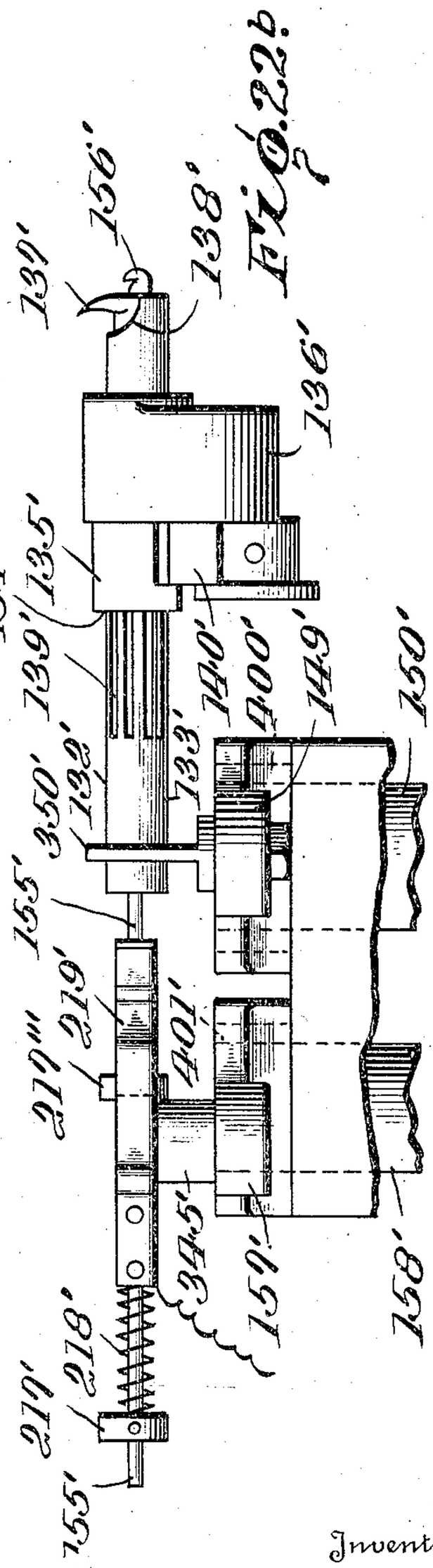

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Fig. 23.

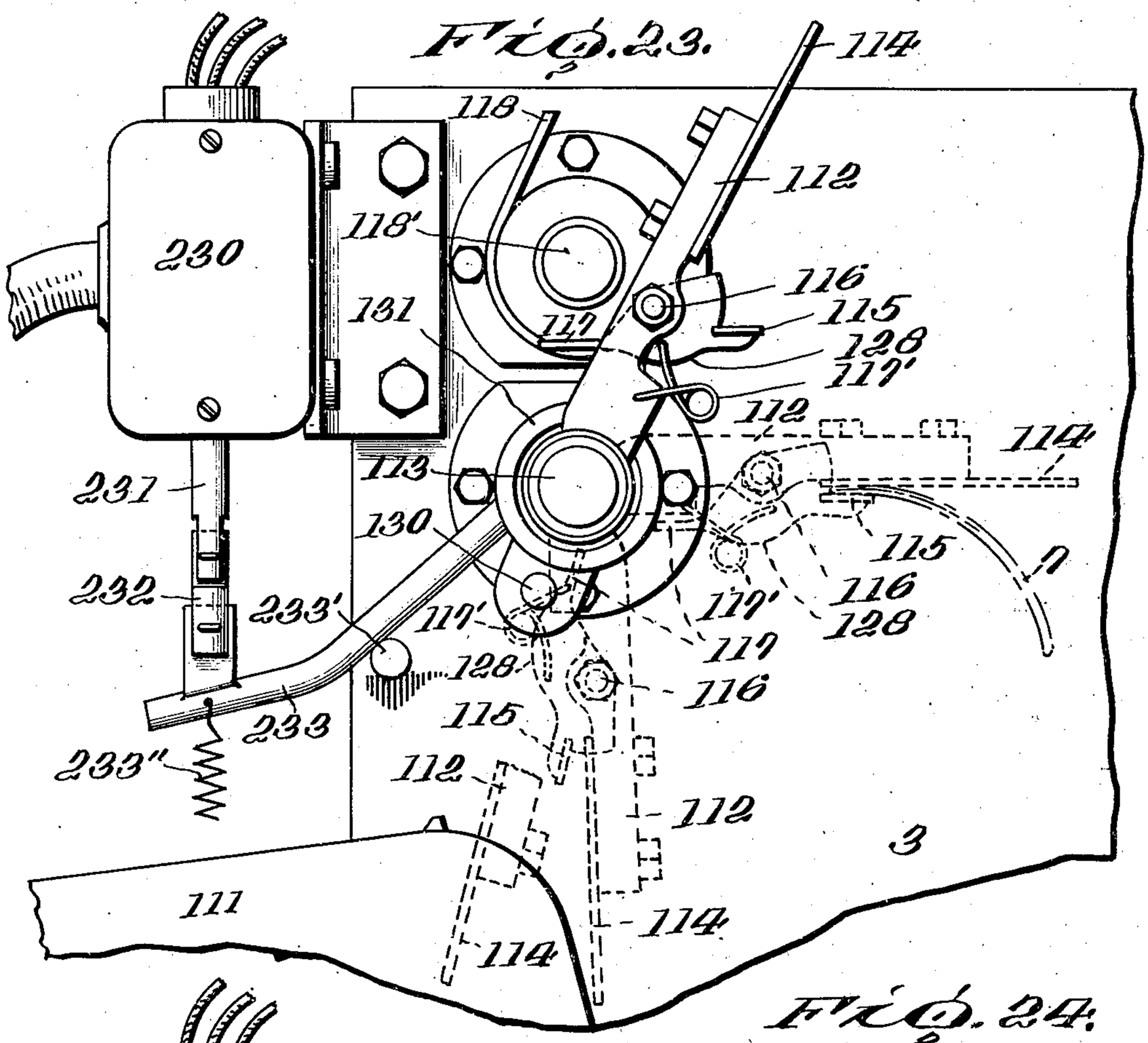
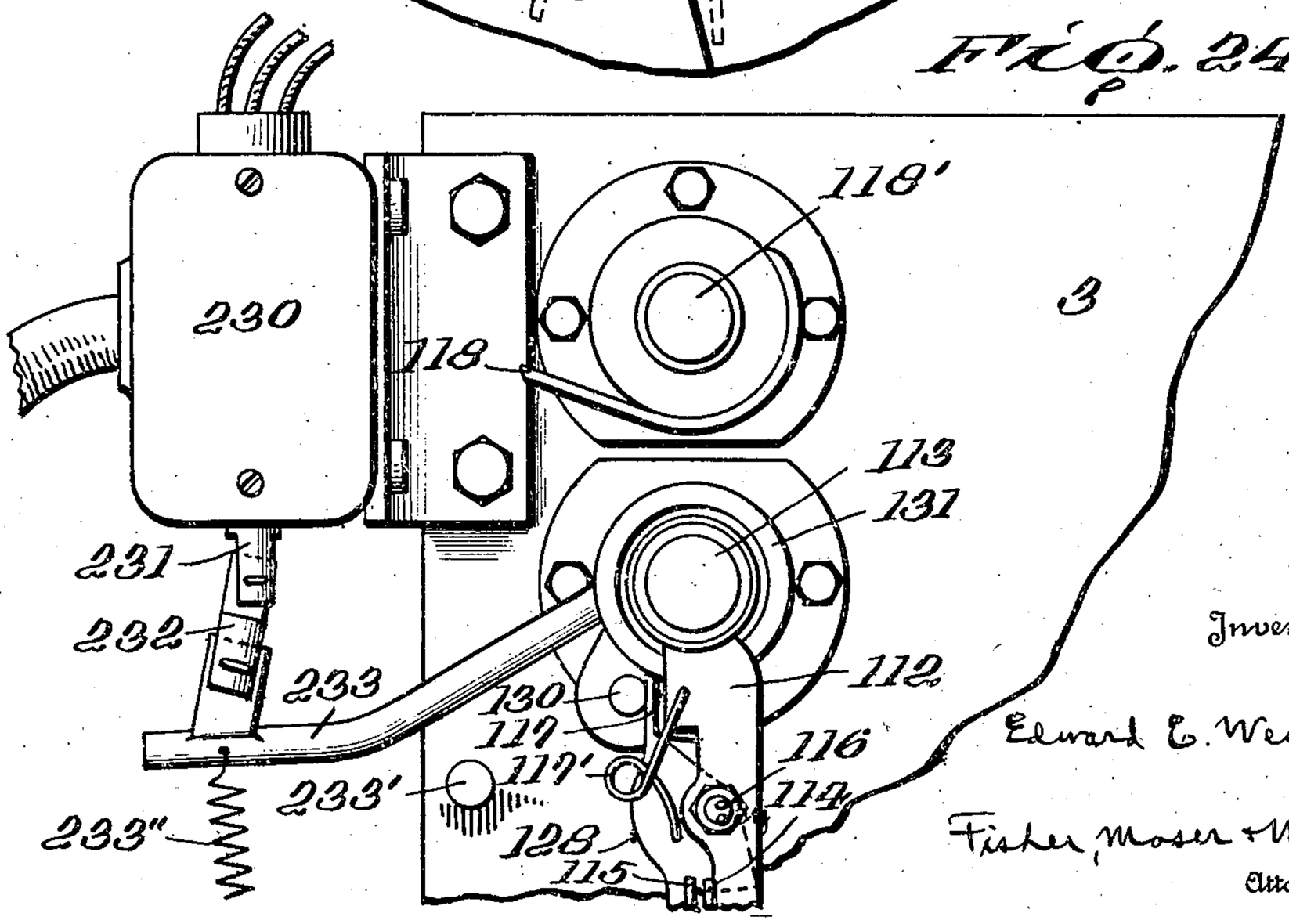


Fig. 24.



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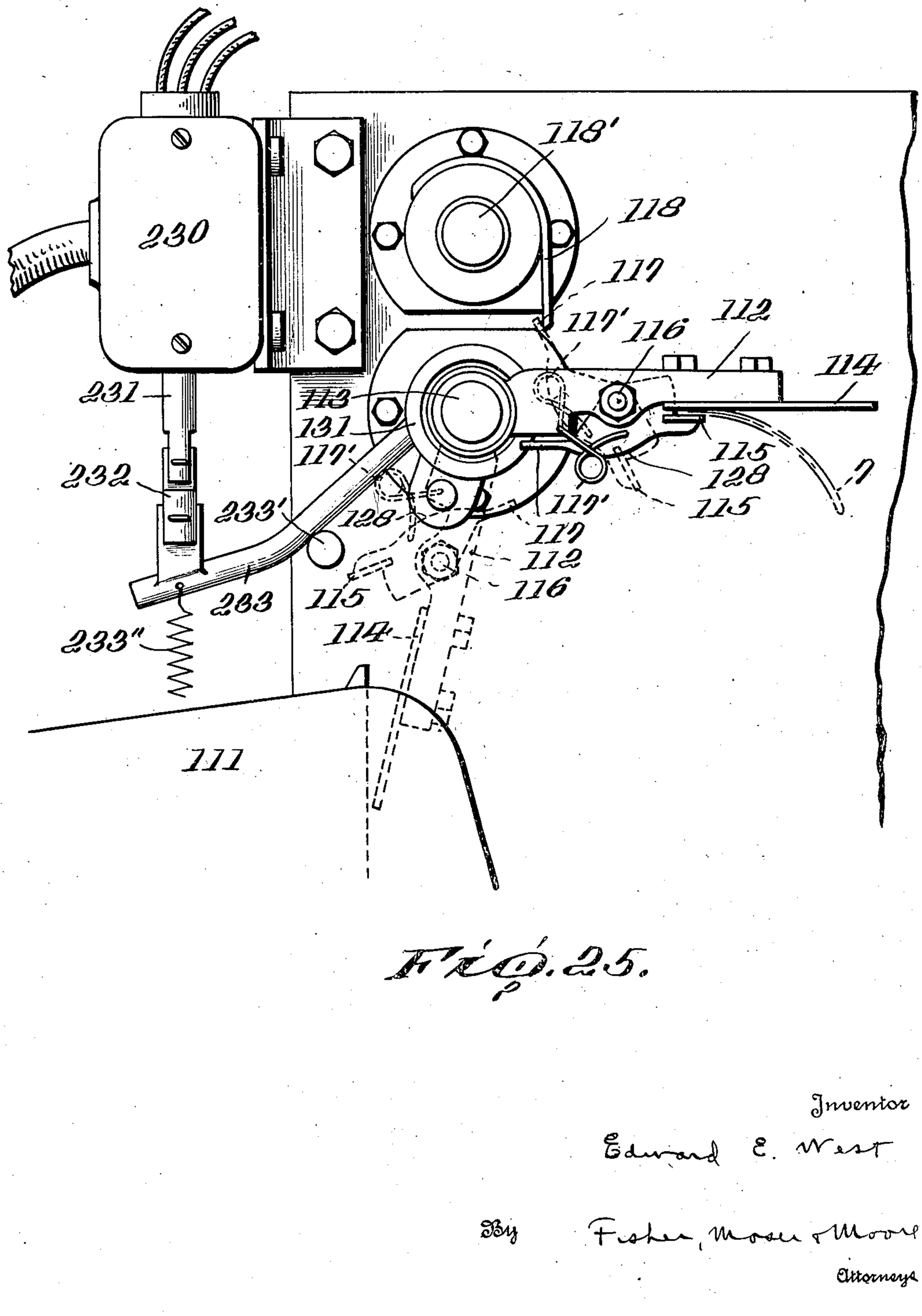

FIG. 25.

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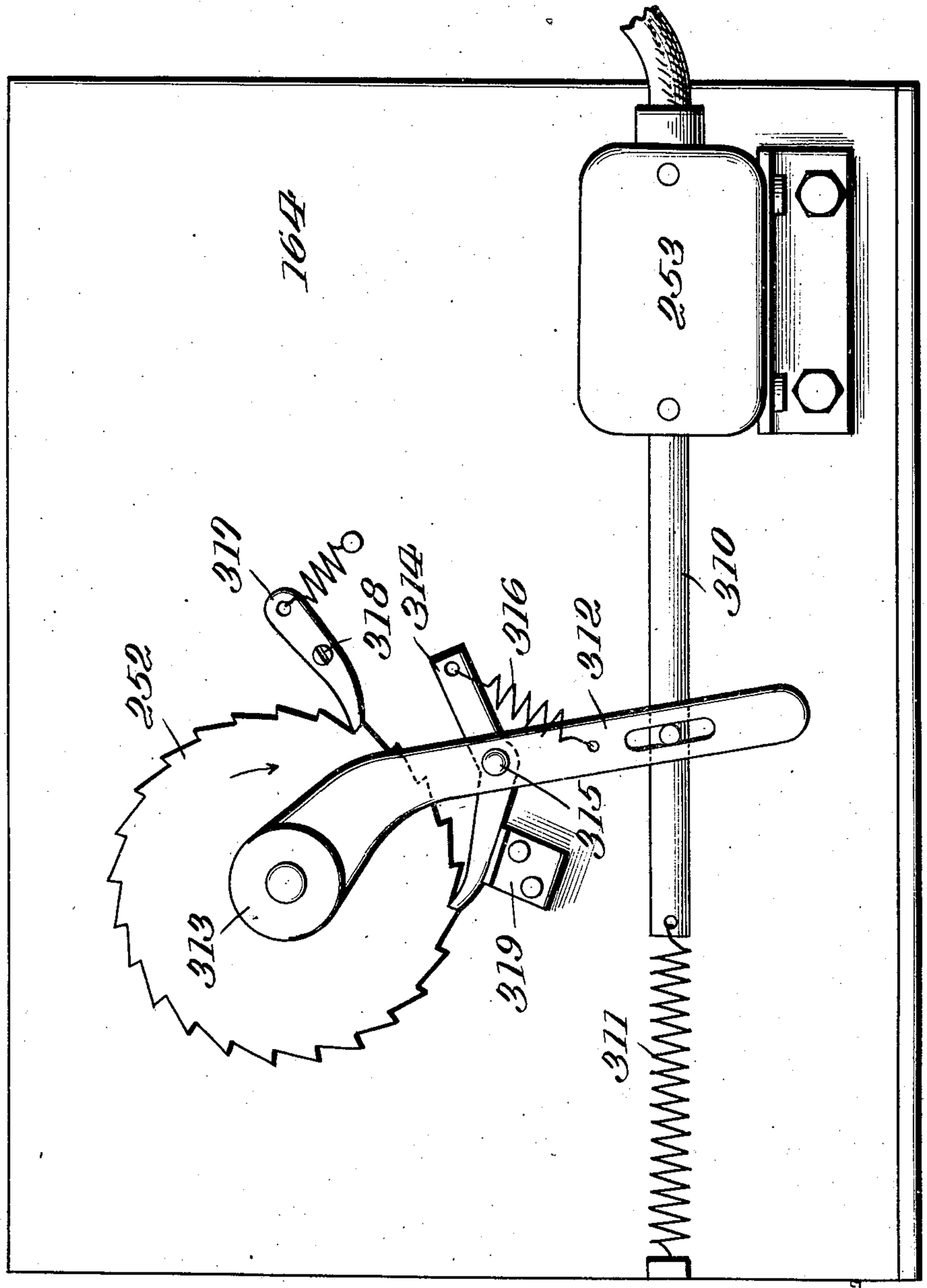
Fig. 26.



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Patented Oct. 25, 1949

2,486,350

UNITED STATES PATENT OFFICE

2,486,350

BAG STRINGING MACHINE

Edward E. West, Richmond, Va.

Application June 21, 1944, Serial No. 541,431

29 Claims. (Cl. 112—2)

1

This invention relates to improvements in bag stringing machines.

The principal object of the present invention is to provide improved bag supporting, gripping, turning and delivering mechanism for bag stringing machines, and is an improvement over my Patent No. 2,374,572, dated April 24, 1945.

Another object is the provision of improved bag supporting, gripping, bag opening and delivering mechanism, having means associated therewith for automatically stopping the machine, at various stations, to prevent improperly strung bags from passing through the machine.

Another object is to provide an improved bag stringing machine incorporating automatic stopping means for stopping the machine at various stations, and combined automatic bag turning and needle inspecting means for rejecting improperly strung bags.

A further object of the invention is to provide means associated with the stringing needles for supporting the bag while the latter is being stretched on the needles and turned right side out.

A further object of the invention is to provide means for turning the bag right side out with a minimum of strain on the gripping action of the bag hem grippers.

Another object of the present invention is to provide bag supporting, gripping and turning mechanism for bag stringing machines which will operate with maximum speed and efficiency.

A further object of my invention is to provide improved and more accurately operating inspection means at the bag turning and stringing station for detecting and rejecting improperly strung bags.

Another object is to provide means for rolling back or turning the hem portion only of the bag right side out preliminary to stringing and thereafter to completely turn the body of the bag.

A still further object is to so combine the bag inspection and bag turning means that these two operations are simultaneously accomplished.

Still another object is the provision of an improved bag stringing machine having bag delivering and automatic counting mechanism associated therewith for counting a predetermined number of properly strung bags being positioned within the bag receptacle.

Still another object is to provide means for partially turning the mouth end of the bag right side out to facilitate proper entry of the bag turning arm between the rolled back hem and the wall of the bag during the final turning operation.

2

In the machine of my aforesaid pending application hemmed bags are fed in chain connected form from a source of supply to a horizontally disposed feeding and cutting mechanism which engages the hems of the successively fed bags, severs the connecting seam threads and carries successive bags to one pair of horizontally disposed rotatable bag receiving grippers at the bag gripping and turning station, there being four radially extending pairs of bag receiving gripping members mounted upon a rotating turret head. The bags are then gripped and turned right side out preparatory to being rotated, one step, to a vertical stringing position or station, where they are strung with conventional draw strings, a pair of stringing needles being provided for this purpose. As the bags were not positively supported and held taut by the needles during the turning of the bag, undue stress was placed on the bag grippers thus resulting in many inaccurately positioned bags reaching the stringing station. A bag rejection mechanism is associated with the stringing needles so that if the needles fail to enter and pass through the bag hems, the improperly strung bag will be rejected. As this inspection operation was effected independently of and after the turning of the bag right side out, in the machine of my copending application, it slowed the operation of the machine and was therefore objectionable. Furthermore, the complete turning of the bag at the bag receiving station objectionably slowed the gripping and positioning of the hem in stringing position. It was also found that due to the necessity of speeding up the turning operation, the turner arm was caused to hit the bag so hard that the hem would frequently be pulled loose from the gripper jaws.

According to the present invention the foregoing objections are obviated by rolling back the hem, then stringing the bag and simultaneously turning the big right side out, while the bag is being turned and positively supported in stretched condition and by providing the bag turning mechanism with bag inspection means so that the bag will be automatically and accurately inspected during stringing and while the bag turning operation is being performed.

These and other objects and advantages will be apparent as the specification is considered in connection with the accompanying drawings, wherein:

Figures 1 and 1*a* constitute a plan view of the complete bag stringing machine having parts broken away for clarity, showing the relative po-

sitions of the feeding, gripping, turning, stringing and bag delivering mechanism;

Figure 2 is an enlarged elevation of the bag feeding carriage, bag grippers and turning members, partly in section and taken on the line 2—2 of Figure 1*a*;

Figure 3 is a plan view, partly in section, of the turret head and the bag hem grippers, on the line 3—3 of Figure 5;

Figure 4 is a side elevation of the turret head, bag grippers, string knotters, bag delivering member and associated operating mechanism, partly in section and taken on the line 4—4 of Figure 1 which is a portion of the line 2—2 of Figure 1*a*;

Figure 5 is an enlarged view, similar to Figure 4, showing the bag grippers operating cam, one of the bag grippers, a knotter and needle inspecting and knot testing mechanism;

Figure 6 is a side elevation of the needle inspection mechanism;

Figure 7 is a view similar to Figure 6 but partly in section and looking in the opposite direction to that of Figure 6, the bearing and bearing support also being shown in dotted lines;

Figure 8 is a section on line 8—8 of Figure 1, showing the operating mechanism for actuating the knotter, bag delivering paddle and releasing the bag grippers;

Figure 9 is a section on the line 9—9 of Figure 1 which is a portion of the line 2—2 of Figure 1*a*, showing the bag hopper, and bag rejection solenoid;

Figure 10 is a front elevation of the stringing machine, looking in the direction of the arrow 10 of Figure 1*a*, showing the main driving mechanism and associated operating cams and levers;

Figure 11 is a side elevation of the clutch release solenoid and associated operating linkage;

Figure 12 is a diagrammatic view of the automatic stop mechanism for stopping the machine at the various feeding, turning, gripping and knotting stations;

Figure 13 is a diagrammatic view of the automatic bag rejecting and counting mechanism for counting the properly strung and rejecting the improperly strung and/or knotted bags;

Figure 14 is a plan view of one pair of grippers and the bag pushing and bag opening fingers, in the positions they assume when a bag is gripped and the mouth of the bag is opened preparatory to folding back the hem;

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

Figure 16 is a side elevation of one pair of the gripper jaws in the position they assume when the hem of the bag has been folded back and the mouth portion of the bag turned right side out by the combined action of the grippers and hem folding turner member;

Figure 17 is a view similar to Figure 15 but showing the position assumed by the hem gripper and the hem folding turner member at the completion of the hem folding or turning operation;

Figure 18 is a perspective view showing the needle saddle and needle supporting block and the relative positions assumed by the needles and bag turning arm at the completion of the forward threading stroke of the needles and the working stroke of the bag turning arm;

Figure 18*a* is a detail view of the needles;

Figure 19 is a detail plan view of the needle supporting block;

Figure 20 is a perspective view of one of the pair of knot testers;

Figure 21 is a perspective view of a portion of the bag, after being turned right side out and strung;

Figure 22 is a plan view of the bag delivering paddle; Figure 22*a* is a plan view of the left hand knotter partly broken away and Figure 22*b* is a plan view of the right hand knotter partly broken away.

Figure 23 is a side elevation of the bag delivering paddle and associated operating and bag rejecting mechanism showing the paddle in full line open position, and in the right hand dotted line position showing the lower paddle jaw as it starts to open;

Figure 24 is a side elevation of the bag rejecting mechanism, and a portion of the delivering paddle showing the paddle jaws in bag rejection position;

Figure 25 is a side elevation, similar to Figure 23, showing in dotted lines the bag paddle movable jaw in open or bag releasing position; and

Figure 26 is a side elevation of the bag counting mechanism for counting properly strung bags.

Referring more particularly to the drawings, wherein like reference characters refer to like parts throughout the several views, the numeral 1 designates a substantially flat, rectangular feed or transfer plate which is rigidly supported by suitable brackets 2 (see Figure 2), secured to the side wall 4 of the main machine frame 3. A pair of spaced, longitudinally extending, bag guide runners 5, suitably secured by screws or the like 6 to the top face of the plate 1, cooperate with the plate to provide a guide or runway along which chain connected, hemmed bag blanks 7 are fed from a source of supply, not shown. A pair of forwardly extending, substantially flat, spaced spring fingers 8 (see Figures 1*a* and 2) secured at their rear ends to the runners 5, as at 8', lightly rest upon the top surfaces of the bag blanks 7 and serve to retain the same in proper alignment, as the bag blanks are fed along the feed plate 1, between the runners 5.

The thread connected bag blanks 7 are pushed forwardly along the feed plate 1 by a pair of spaced, forwardly and downwardly extending, relatively flat, bag pusher fingers 9, secured by bolts 10 to the bottom face of a pair of blocks 11 carried by the outer ends of a pair of laterally extending rods 12, projecting through a longitudinal guide slot 13 in the side wall 4. The rods 12 are fixedly mounted within a vertical disposed block 14, slidably arranged in the guide slot 13. This structure, as well as the following feeding mechanism is described in detail, in my Patents Nos. 2,374,571 and 2,374,572, dated April 24, 1945. The fingers 9 extend underneath and into the top hem 16 of the bag blank 7 (see Figs. 14 and 15) and the same are reciprocated forwardly, relative to the stationary feed plate 1, to advance the bag blank thereon, by means of a vertical lever 17 (see Figure 2) pivotally connected, at its upper end, to an arm 14' connected to the block 14 and, at its lower end, to the frame 3. A cam roller 18, carried by the lever 17, rides in a cam groove 20 in the side face of a cam disc 19, shown in Figure 2, mounted on a transverse drive shaft 21 journalled in the frame 3, and a gear 22 on shaft 21 (see Figure 1*a*) meshes with a gear 24, on a main longitudinal drive shaft 23. Rotation of the cam 19 actuates the lever 17 and reciprocates the block 14 in the guide slot 13 whereby the pusher fingers 9 are moved forwardly on the feed plate 1, and thereby move or advance the foremost bag blank 7, of

the chain of bags, intermittently beneath a pair of cutters, presently described.

An electric motor 180, of conventional construction and controlled by a switch 181, is suitably mounted on the base frame and constitutes the source of power for operating the machine (see Figures 10 and 12). The drive shaft 182, of the motor, carries a pulley 183 which is drivingly connected, by a belt 185, with a pulley 184, loosely sleeved on a transverse shaft 186 which is journalled in bearing 187' on the base. A suitable clutch 187, of conventional construction, sleeved on the shaft 186 and attached to the pulley 184, frictionally engages with the side face of a clutch disc 188, mounted on the shaft 186. The clutch 187 is slidably moved into and out of driving engagement with the clutch disc 188 by any suitable means, such as a yoke member 189 pivotally mounted as at 191, in a bracket 190. The outer end of the yoke 189 is pivoted to the lower end of an upstanding rod 192, in turn connected at its upper end, to the end of a trip arm 193. The trip arm 193 is pivoted, adjacent one end as at 194, to the side of the frame, and its other end is formed with a taper 195 (see Figure 11) which is adapted to normally engage with a recess 197 in the upper end of an arm 196, in turn pivoted, as at 196', to the side of the machine frame. The lower end of the arm 196 is pivoted to an armature or plunger 198 of a clutch release solenoid 199, mounted on the frame and of conventional construction, hereinafter described. The free end of the trip arm 193 is adapted to be engaged by the lower end of a vertically disposed rod 200, mounted in a bracket 201, on the side of the frame, and movable vertically into engagement with the end of the trip arm 193, against the tension of a coil spring 202, to depress the tapered end 195 of the trip arm 193, into locking engagement with the arm 196. In this position the clutch 187 is in engagement with and drives the clutch disc 188. The sprocket 203, as shown in Figure 10, mounted on transverse shaft 186 and connected to the clutch disc 188 by pins or the like (not shown) is drivingly connected by a flexible chain 205, with a sprocket 205', mounted on the end of a shaft 207 of a conventional gear reduction unit 206. The shaft 207 is drivingly connected by means of the gearing of this unit to a second shaft 208, which carries a sprocket 209 and serves to drive a sprocket 210 on the main longitudinal drive shaft 23 (see Figure 10) through a flexible chain 211. Thus the main drive shaft 23 of the stringing machine is driven by the motor 180, and the clutch mechanism permits of the drive shaft being automatically disengaged, at various stages of the bag stringing should a bag be improperly fed, gripped, turned and/or strung, as will be later described.

A forwardly extending, relatively flat, bag opening finger 25, as best shown in Figure 2, is secured to each inner end of a pair of top and bottom rock shafts 26, journalled in a pair of laterally extending bearings 27, carried by the block 14 and a downwardly depending arm 28, integrally formed thereon. The bearings 27 extend through the slot 13 and a second slot 13'. Fixed to the extended outer ends of the rock shaft 26 are a pair of segment gears 29, in mesh with each other, with the upper segment gear having a forwardly extending, substantially horizontally disposed trip arm 30, suitably secured thereto. The arm 30 is provided with a beveled or forwardly extending and upwardly sloping bottom face 31 which is adapted to engage with and ride over a

roller 32, carried by a laterally extending stub shaft 33, shown in Figure 1a, journalled in a bearing 34 secured to the side frame wall 4. Forward travel of the block 14, due to the rotation of cam 19, causes the pair of pusher fingers 9 to enter into or underneath the top hem 16 adjacent the side edges thereof, and the opening fingers 25 to enter into or underneath the top and bottom hems 16 and 35 intermediate the side edges of the hems. During the forward travel of the block 14, the beveled face 31 of arm 30 slides over the roller 32 thereby raising or elevating the arm 30, and rocking the top rock shaft 26 and segment gear 29 in a clockwise direction, viewing Figure 2, which in turn rocks the lower segment gear 29 and rock shaft 26 in an opposing or counter-clockwise direction, thus causing the fingers 25 to open or expand the mouth of the bag.

Fixedly secured to a collar 36 on the inner end of the top rock shaft 26 is a forwardly and downwardly extending, relatively flat, tongue 37, as best shown in Figure 2, having the lower end thereof bent, as at 38. The tongue 37 substantially overlies and is normally spaced from the top bag opening finger 25, and the bent end 38 of the latter engages with the upper face of the top bag hem 16 (see Figures 14 and 15), when the mouth end of the bag has been expanded to open position by the bag opening fingers 25, as best shown in Figure 15. An upstanding lug 39 is carried by a stub shaft 40 journalled in the end of a forwardly projecting arm 41, which is fixed to a horizontal cross rod 42 mounted in a vertical bracket 43 (see Figure 1a), on the frame and the side wall 4. The lug 39 is normally retained in vertical position by means of a spring or the like 44, connected to the lug and cross rod 42. As the bottom bag opening finger 25 enters the bottom bag hem 35, and coacts with the top opening finger to open the mouth end of the bag, the bottom hem 35 is pushed, by the bottom finger 25, into a groove or slot 46 in the rear face 45 of the lug 39 and is momentarily clamped or positioned therein, as best shown in Figure 15. Thus, the tongue 37, bears upon the upper face of the top bag hem 16, and the lug 39 engages the bottom hem 35, preventing the hems from slipping or otherwise being dislodged from the respective bag opening fingers 25. This is a desirable and important feature because it assures of the bag mouth being held in open position to permit of the bag being turned right side out.

During the forward travel of the block 14 in the guide slot 13, the bag pusher fingers 9, having been inserted within the hem 15, push the bag forwardly along the feed plate 1 and advance the hemmed mouth thereof into a pair of grippers 60—62, mounted on a rotating turret head, presently described (see Figures 3, 4 and 5). The bag opening fingers 25, having been inserted in the top and bottom hems 16 and 35, are moved in opposing directions by the rock shafts 26, as hereinbefore described, to expand or open the mouth of the bag, after the same has been gripped or clamped by the turret head grippers 60—62, so that the hem and the mouth portion of the bag may be partially turned right side out, in a manner hereinafter described, to expose the outside wall of the bag hem, preparatory to the stringing step.

While the foremost bag blank 7 of the chain of bags is being advanced along the feed plate 1, by the pusher fingers 9, it is necessary to sever the connecting bag threads. Thus a pair of sub-

stantially L-shaped bag cutters **47**, extend upwardly and are vertically movable through guide slots **48**, in the feed plate **1**, as shown in Figures 1*a* and 2, adjacent the forward ends of the bag guide runners **5**, and are movably connected to the forward ends of a pair of rods **49**. These rods are fixed at their rear ends to a rock shaft **50**, in turn journalled in suitable blocks **51**, secured to the underside of plate **1**. The cutters are provided with suitable cutting edges, not shown, so that when the rock shaft **50** and rods **49** are rocked downwardly, the cutters **47** are likewise moved downwardly through the guide slots **48**, until their respective cutting edges coact with cutting edges, see Figure 1*a*, on the upper ends of the slots **48** and thereby shear or sever the connecting bag threads. The rock shaft **50** extends through an opening in the side wall **4** of the machine frame, above the guide slots **13'**, and is pivotally moved or rocked, during the reciprocation of the feeding carriage, by virtue of a trip mechanism corresponding substantially in structure with that illustrated and described in my pending application Serial No. 357,457, now Patent No. 2,374,571 previously referred to. The bag pusher fingers **9** and opening fingers **25** enter the top and bottom hems **16—35** of the bag blank **7**, while the latter is stationary on the feed plate **1**, the cutting of the threads being effected thereafter while the bag is in motion. In other words, as a bag, the hems of which are engaged by the fingers **9** and **25**, reaches a point beneath and slightly to the rear of the thread cutters, the cutters sever the bag threads connecting that bag with the next succeeding or following bag. This operation is repeated during each forward stroke of the feeding carriage. When the connecting bag threads have been severed, the pusher fingers **9** deliver the foremost bag to the gripping means **60—62**, which serves to grip and support the bag in position while the mouth of the bag is being turned back upon the body of the bag to expose the outside of the hem for stringing. The turret head then successively rotates the bag to a vertical stringing station where it is strung and turned right side out. After these operations have been completed the bag is carried by the turret head to a horizontal station, where the strung and turned bag is removed therefrom and delivered to a hopper **111**. The turret head is intermittently rotated, to carry the bag grippers to the various stations, by any suitable means, such as a Geneva movement, not shown, corresponding in structure with the Geneva mechanism of my Patent No. 2,274,622.

At this point, provision is made for automatically stopping the machine, if the supply of bags runs out or a bag is improperly fed along the feed plate **1**, thus preventing the continued operation of the stringing mechanism without a bag being acted upon. For this purpose, one of the flat, metal, spring bag tensioning fingers **8**, secured to the rear ends of the bag guide runners **5**, on the feed plate **1**, is provided with an electrical connection (see Figure 12) to be later more particularly described. During the feeding of the bags along the feed plate, by the feeding carriage, if the pusher finger **9** fail to pick up a bag, due to the supply thereof being exhausted, the bag tensioning finger **8**, which is ordinarily insulated from the plate by the bag material, will make a metal to metal contact with the feed plate **1**. The flattened ends of the springs **8** are of sufficient length to always bear or rest on one or the other of the connected bag blanks so the springs will not engage and make a metal to metal contact with the feed plate **1**. In other words, if the flattened ends of the springs **8** are engaged by any part of a bag, the same will be spaced or elevated above the face of the feed plate and no metal to metal contact is made therebetween. On the other hand, if the supply of bags runs out and the pusher fingers fail to pick up and properly deliver a bag beneath the springs **8**, either one or both of the springs **8** will, of course, drop into contact with and make a metal to metal contact with the plate thereby closing the circuit. The electric circuit is thus closed and the stop mechanism is operated to disengage the clutch **187** and to stop the machine thereby enabling the operator to remedy the defect in the bag feeding mechanism, before resuming operations. Likewise, the circuit will be immediately closed should an improperly fed or positioned bag pass between the spring fingers **8** instead of underneath the latter.

The bag holding turret head (see Figures 3, 4 and 5) comprises a transverse shaft **52**, journalled in the spaced side walls **4—4'** of the machine frame. A pair of spaced sleeves **53** are mounted upon, and keyed to the shaft **52**, each of the sleeves being provided with four stub arms **54**, arranged in pairs, that is, the oppositely disposed arms of the respective sleeves constitute a pair. The outer ends of the arms **54** are squared or enlarged, as at **55**, and bores **56** extend therethrough, within which are fixedly mounted bushings or sleeves **57**, as best shown in Figure 5. A tube **58**, sleeved within each of the bushings **57**, carries a gear **59** and a laterally and rearwardly extending jaw or finger **60**, and a rod **61**, having a corresponding laterally and rearwardly extending jaw or finger **62** is within the tube **58**. The rod **61** moves vertically within the tube **58** and the lower end thereof seats upon the upper end of a coil spring **61'**, positioned in the tube. Vertical pins **63**, fixed in the upper end of the tube **58**, slidably project through openings in the enlarged upper end of the rod **61** to guide the latter during its vertical movement within the tube **58**, and to assure that the top jaw **62** is accurately aligned with the bottom jaw **60**.

The enlarged upper end of the rod **61** is hollowed, as at **64** (see Figure 15), to receive the rounded lower end **66** of a downwardly depending rod **65**, carried in the outer end of an arm **67**, pivoted as at **68** to the stub arm **54**. The inner end of the arm **67** is formed with an offset **69** and a taper or point **70**. The offset and tapered end of the arm extends through an opening **71** in the lower end of the stub arm and is adapted to engage with an annular cam track **73** on the inner face of one of two cam discs **72**, sleeved on the turret head shaft **52**.

The two cam discs **72** are secured together and held in spaced relation by screw **74** (see Figures 4 and 5). Fixedly secured to the inner faces of the cam discs, are a pair of spaced, parallel side plates or arms **77**, as best shown in Figures 1, 3, 4 and 5, connected at their lower ends by a cross rod **78**. The cross rod **78** of the arm is adapted to be engaged by the bent upper end **80** of a vertically disposed lever **79** (see Figure 4) carried by the inner end of a horizontally disposed stub shaft **81**, projecting laterally from and journalled in the spaced side walls **83** of a cam box **82** (see Figure 10), mounted on the main frame **3**. The stub shaft **81** is rocked through the medium of

an upstanding lever 84, pivoted at its upper end to the lower end of a link 85, the latter in turn being pivoted at its upper end to a vertically disposed lever 86. The lower end of the lever 86 is fulcrumed to a block 88 in the box 82, and the lever 86 carries a cam roller 89 (see Figures 1*a* and 10) which rides in a cam groove 91 formed in one face of a cam disc 90, carried by the transverse drive shaft 21. Upon clockwise rotation of the cam 90, (as viewed from the right side of Figure 10), the stub shaft 81 is rotated in a corresponding clockwise direction, through the connecting levers and links 86, 85 and 84, whereby the vertical lever 79 is rocked forwardly, or in a clockwise direction as viewed from the right side of Figure 10, to cause the bent upper end 80 thereof to engage the cross rod 78 of the arms 77, and rock the arms 77 and cams 72 in a corresponding clockwise direction. It will, of course, be understood that when viewed from Figure 4, the shaft 81 and lever 79 will rotate in a counter-clockwise direction thus causing the arms 77 and cams 72 to be rotated in a corresponding or counter-clockwise direction. Rotation of the cams 72 causes the arms 67 to be rocked about their pivots and the outer ends thereof to be moved downwardly thereby pushing the rods 65 against the upper ends of the rods 61. The rods 61 are thus forced downwardly in the tubes 58 against the tension of springs 61', and the top gripping jaws 62 are moved downwardly against and in gripping position with respect to the bottom jaws 60. This results in the gripping jaws 60—62 engaging with and gripping the sides of the top and bottom bag hems 16—35, as best shown in Figure 14. With the bag hems in this gripped position, the bag opening fingers 25 are expanded to open the mouth of the bag, to permit of the side hem grippers being rotated to a position on the inside of the bag, as presently described, and as best shown in Figures 16, 17 and 18.

When an opened bag is gripped and supported in substantially horizontal position, by the pairs of gripping jaws 60—62, and the latter are about to be rotated, the body of the bag is engaged by a curved preliminary turner member or rod 92 (see Figure 2), which forces a portion of the body of the bag through the mouth of the bag and partially turns the bag right side out, while the hem of the bag is being turned by the grippers. The preliminary turner member 92 is adjustably secured, by bolts or the like 93, to the curved upper end of a lever 94, which is carried by the inner end of a stub shaft 95, journalled in the side walls 83 of the cam box 82. The shaft 95 is rocked by a vertical lever 96 pivoted, at its upper end, to a link 97 in turn pivoted to the upper end of a lever 98. The lower end of the lever 98 is journalled in a block 99, in the cam box, and a cam roller 100 (see Figures 1*a*, 2 and 10), mounted on the lever 98, rides in a cam groove 101 in the side face of the cam disc 90. Rotation of the cam 90, in a clockwise direction, actuates the lever 98, link 97, lever 96 and rocks the shaft 95 so that the lever 94 and preliminary turner member 92 are first swung upwardly and forwardly in an arc and then returned to Figure 2 position. The upper end of the member 92 is thereby moved upwardly through a longitudinal slot 102' (see Figure 1*a*) in the forward end of the feed plate 1, into engagement with the bottom face of the gripped bag, to the rear of the bottom hem 35 and intermediate the pairs of side hem gripping jaws 60—62. Continued travel of the member 92

to the end of its upward and forward or working stroke, causes that portion of the body of the bag adjacent its mouth to be pushed forwardly through the mouth which has previously been expanded or opened and gripped by the pair of bag opening fingers 25, and the tongue 37 and lug 39 (see Figures 15 and 17). Further rotation of the cam 90 returns the turner member 92 to its original or Figure 2 position.

In the event the member 92 misses the closed end of the opened bag or otherwise fails to properly turn the hemmed portion of the bag partially right side out, or if a bag has not been fed by the fingers 9 so as to present a bag to be acted upon, provision is made for automatically stopping the machine, at this station, to enable the operator to remedy the trouble or to remove the bag from the machine. Thus, an upstanding spring steel, leaf contact 215 (see Figures 4 and 12) is secured by a screw 216 to the bottom face of block or arm 41 and normally insulated from the machine by the bag cloth on the preliminary turner member 92 (see Figure 2). If the mouth end of the bag is not properly opened by the opening fingers 25, and the member 92 should miss the bag, the head of the turner member 92 will engage and make a metal to metal contact with the spring contact member 215. This completes the stop motion circuit, hereinafter described, and particularly illustrated in Figure 12, to disengage the clutch members 187—188. However, if the turner enters the bag and the latter is partially turned, at the forward end of the preliminary turning stroke, the turner will be covered by the bag and insulated from the contact 215 so that no metal to metal contact is made therewith.

Rack bars 102 (see Figure 3) are employed to rotate the side hem grippers about their axes in turning the bag hem. These bars are slidably mounted in longitudinal slots 103 in the outer ends of each of the turret head stub arms 54, and the racks 104, on the outer ends thereof, extend through slots or grooves 105, in the sides of the squared ends 53 of the stub arms 54, and engage with the gears 59 (see Figure 5) on the tubes 58. The rack bars 102 are moved inwardly through the slots 103 and 105 to rotate the gears 59, by means of cam rollers 106, on the inner ends thereof, which ride in cam grooves 107, as shown in Figures 3 and 5, in the sides of the cam discs 72. While the preliminary turner member pushes the closed or bottom end of the bag toward and partially through the open mouth thereof, the feeding carriage begins its return movement thus withdrawing the fingers 9 and 25 from the top and bottom hems 16—35 and permitting the rotation of the pairs of gripper jaws 60—62 inwardly towards each other. This movement of the grippers turns back or folds the hem and exposes the reversed right side thereof and also slightly pulls or pushes the forward portion of the body of the bag through the mouth. At the same time the mouth of the bag will be pulled or stretched taut and in position to be strung. This action, which takes place, during the pushing of the closed end of the bag partially through the mouth thereof, by the preliminary turner member 92, results from the rotation of the cams 72, and the curvature of the cam grooves 107 thereon, acting on the cam rollers 106 to pull the rack bars 102 inwardly through the slots 103 and 105. This movement of the rack bars 102 causes the racks 104 to rotate the gripper tube gears 59 (see Figure 5) in opposing directions. Thus the gripper jaws 60—62 are correspondingly rotated in

clockwise and counter clockwise directions respectively (viewing Figure 3), from their normal extended positions, on the outside of the turret arms **54**, to positions on the inside of the arms, and within the partially turned bag, as the turner member **92** reaches the end of its working stroke, as best shown in Figure 17, wherein the right side or outside walls of the hems are partially exposed and the bottom end of the bag forced partially through the mouth thereof. In order to assure of the hems being properly positioned for stringing, it is essential that the grippers **60—62** uniformly and securely grip the bag hems. Thus, in the event the grippers **60—62** fail to properly grip the hems, provision is made for automatically stopping the machine to enable the operator to remove the bag therefrom. A pair of upstanding, inwardly bent, flat, spring contact fingers **212** are connected to the ends of two forwardly extending blocks **213**, carried by the horizontal cross rod **42**, which fingers are normally insulated from the machine frame by the bag cloth (see Figures 1*a* and 2). The fingers **212** are positioned in the path of travel of and are adapted to be engaged by the gripper jaws **60—62**, when the latter have been rotated to their gripping positions on the inside of the turned bag. That is, if either one or both of the pairs of gripper jaws **60—62** fail to engage with and grip the side hems of the bag, a metal to metal contact is made with one or both of the contact fingers **212**. It will, of course, be understood that if the bag is properly gripped and the grippers are covered by the cloth, due to the proper partial turning of the bag right side out, no contact is made with the fingers **212**. If a metal to metal contact is made therewith the fingers will be grounded to the machine thus completing the circuit to the stop motion mechanism and disengaging the clutch members **187—188**, as more fully described hereinafter.

The turret head is now rotated, approximately one quarter of a revolution to Figure 5 position, in any desired manner, such as that described in my Patent No. 2,274,622, to move the side hem grippers **60—62** with a bag gripped and supported therein, from the horizontal feeding to a vertical stringing station. As the turret head rotates, the continued rocking of the cams **72** causes the closed gripper jaws **60—62** to complete their substantially 180° arcuate movements, from normal extended positions, to positions substantially parallel to the inner sides of the turret arms **54**, with the hem rolled or turned. Thus, when the arms 54 reach the vertical stringing station, the bag will be vertically supported from the side hem grippers with the mouth of the bag extending downwardly between the arms **54**, in position for stringing (see Figures 4 and 6).

In the vertical stringing position, the grippers **60—62** will have stretched the hemmed mouth of the bag until the hems are substantially parallel and are aligned with a pair of parallel horizontally disposed needles **108** (see Figures 1, 4 and 5). The needles together with their operating mechanism, which are particularly shown and described in my Patent 2,274,622, January 23, 1945, based on application Serial No. 250,223, filed Jan. 10, 1939, Reissue Patent No. 22,596 thereof, dated Jan. 23, 1945, based on application for reissue December 11, 1942, Serial No. 469,042 and Patent No. 2,367,986, January 23, 1945, are provided with draw strings and are operated in the same manner and by the same mechanism disclosed in my prior patent and applications and therefore detailed drawings and description of the needles and cooperating parts may be dispensed with. Suffice to say that the needles, as partly shown in Figures 1, 18, 18*a*, comprise pointed shank members **311'**, reciprocably mounted in tubular sleeve members **312'** for opening and closing the needle jaws **313'**, formed by the ends **314'** of the sleeves and the rear faces **315'** of the enlarged pointed ends **316'**, of the pair of needles **108**, and that the ends of draw strings **110** are adapted to be clamped in the jaws **313'**. The sleeve members **312'** are rigidly supported at their rear ends by and fixed in a needle saddle **317'**, suitably secured by screws **318'** to the top of a needle carriage **109** suitably mounted for reciprocal movement on the top plate **109'** of the machine. The rear ends of the pointed shank members **311'** are fixed in a small block **360**, suitably mounted on the carriage **109**, for slight sliding movement relative thereto. Block **360** is inwardly actuated against the tension of springs **361** mounted on posts **362** by means of a small cam **363** carried by one arm of a crank **364**. The other arm of crank **364** carries a roller **365** periodically actuated by a lifting arm **366**. The needle carriage **109** is reciprocated back and forth by the action of a suitably actuated arm **367**, in turn pivoted to the rear end of the needle carriage. The mechanism and operation is the same as in my prior patent except that in the latter the needle carriage is slidably mounted for slidable movement, on a pair of horizontally disposed rods, whereas, in the present construction, the carriage **109** is slidably mounted in tracks **368**, fixed to the flat top plate **109'**. The needles as a whole are thus suitably mounted for reciprocation, and the jaws are opened and closed in timed relation with the operations of the side bag hem grippers, so as to receive and carry the draw strings through the parallel hems of the vertically disposed bag. Due to the fact that the hem of the bag is turned or rolled rearwardly upon the body of the bag, before and during movement of the bag to the stringing position, the two part needles **108** enter into the outer face of and pass through the hems on the outside thereof.

As illustrated in Figures 18 and 18*a* the needles grip the ends of a draw string **110** and carry the same forwardly through the hem of the bag, whereupon, the jaws of the needles will open to release the gripped ends of the string. The ends of the second draw string **110** are now fed to the needle jaws which will thereafter close and the needles will start on their return stroke to pull the ends of the second string rearwardly through the bag hem, all as more particularly described and shown in my patent No. 2,274,622.

During the bag stringing operations the partially turned bag is turned completely right side out by means of a combined bag turner and inspecting device **320**. This device comprises a curved rocker arm **321**, fixed at one end to one end of a short transverse shaft **322**, rotatably mounted in a bearing **323** in turn supported intermediate its ends in a bracket or arm **324** which projects rearwardly from the inner side wall of cam box **82**, and is secured thereto by means of bolts **324'**. A substantially vertically disposed slightly curved bag turner arm **325** is secured to the outer end of the arm **321** by means of bolts **326** or other suitable fastening means. Fixed to and projecting rearwardly from that end of the short transverse shaft **322**, opposite the end to which the rocker arm **321** is attached, is a short

crank arm 328, for a purpose presently described (see Figures 6 and 7).

The rocker arm 321 is actuated by means of a plunger rod 327 to lower the bag turning arm into contact with the partially turned or reversed closed end or bottom of the bag 7, upon each revolution of a cam 153, the throw of arm 325 being sufficient to completely turn the bag right side out.

Thus the short crank arm 328 connected to and extending rearwardly from the short transverse shaft 322 is pivotally connected at its free end to a headed pin or shaft 329, rotatably mounted in a bearing block 330, adjustably fixed to the reduced upper end 331 of the rod 327, by means of a set screw 310. The headed pin 329 extends loosely through a slot 309 formed in crank arm 328, and is held therein by a cotter pin 329'. The lower end 332, of the rod 327, which is also reduced in diameter, passes through a rocking sleeve 333 and carries at its extremity a roller 334, adapted to be engaged by the cam face 335 of cam 153. The rocking sleeve 333 is formed with a stub shaft portion 336 which is rotatably mounted in a flanged bearing 337, in turn mounted on the side wall of gear box 82, by means of bolts 338. Thus when the cam 153 is rotated in a clockwise direction, viewing the machine from the left, the cam face 335 engages the roller 334, and causes the plunger rod 327 to be elevated through bearing 337, against the tension of a coil spring 339. This spring is connected at its upper and lower ends respectively to the rod 327 as at 327' and to a transverse shaft or rod 341, as at 342. Supports or brackets 343, secured to the walls of the cam box 82, by bolts 344, support the rod (only one bracket 343 being shown). The movement of rod 327 just described rocks the shaft 322 in a clockwise direction, viewing the left hand side of the machine, and causes the rocker arm 321 and its bag turning arm 325 to swing downwardly, the rock sleeve 333 being rocked slightly on its pivot in an obvious manner. This operation is timed to start just as the needles complete their stroke through the bag hems and continues while the needles are being withdrawn from the hems and the strings are being knotted.

Owing to the fact that the closed end or bottom of the bag has been partially pushed toward or through the open mouth thereof by the preliminary turning arm 92, the bag can be and is supported in an upstanding or vertical position by the hem grippers, without danger of any part of the bag interfering with the proper functioning of the descending arcuately moving bag turning arm 325, which must accurately engage the bottom portion of the bag to force the same completely through the mouth thereof, thus completely turning the bag right side out. When the bag has been completely turned the coil spring 339 reverses the movement of shaft 322 and the arm 325 will be withdrawn from the turned and strung bag. At the end of this return stroke the lower end of the enlarged intermediate portion of the plunger rod 327, engages the upper end of the rocking sleeve 333 thus setting these parts in proper position for the next cycle.

It will be noted that the partial or preliminary turning of the bag 7, by the preliminary turning member or rod 92, and the gripper fingers 60—62, in effect, reduces the length of the projecting bottom end portion 377 of the bag sufficiently to enable the latter to remain substantially upright, when the bag has been moved to stringing and turning position. Consequently this unturned

portion will not flop over into a position where it might obstruct free entrance of the turner arm 325, between the rolled back hem portion and the body of the bag. This action is further assured by reason of the fact that the preliminary turner rod 92 compresses and stiffens the side walls of the bag sufficiently to resist their tendency to collapse.

As previously stated herein it is essential that the bag be held taut during the turning thereof by the turner arm 325. This is accomplished to a considerable extent by means of a needle supporting member or block 370, which is suitably mounted on the frame of the machine, in line with the path of travel of the needles 108. This block is formed with beveled recesses 371 in its front face 372, leading to a pair of spaced semicircular channels 373, formed in the side walls 374 of a downwardly extending slot 375. Upon completion of the forward working stroke of the needles (see Fig. 18), the pointed ends thereof will be guided into and snugly received in the channels 373, by the beveled recesses, and will be rigidly supported therein during the downward stroke of the turning arm 325, it being understood that these operations take place substantially simultaneously. Consequenly the needles will not sag under the impact of the turner member but will effectively assist the turner fingers in supporting the bag in properly stretched taut condition. The needle supporting block is cut away at the rear of slot 375 and channels 373 to provide a chamber 376, to facilitate the operation of the knotter mechanism about to be described.

After the draw strings 110 have been carried through the hems 16—35 of the bag, in the vertical stringing station, they are knotted by a pair of knotters 132 and 132', mounted on either side of the turret head. As two draw strings 110 are fed to the needles, on the forward and return strokes thereof, it will be understood that the right hand knotter 132', viewing Figures 1 and 22, will operate to form a knot in one draw string, introduced through the hems on the forward stroke of the needles, and the left hand knotter, 132 viewing the same figures, will correspondingly knot the string, drawn rearwardly through the hems on the return stroke of the needles. Thus, knots are formed on the respective ends of the draw strings. The knotter mechanism generally resembles the knotters, described and illustrated in my Patent No. 2,274,622, now Reissue Patent No. 22,596 with the addition of an automatic stop means associated therewith for stopping the machine in the event the knots are improperly formed on the strings and become tangled in the heads of the knotters. Suffice to say that each of the knotters 132 and 132' comprise hollow knotter rods 133 and 133' (see Figures 1, 4, 5 and 22) slidably positioned within sleeves 134 and 134' fixedly secured in gear casings 135 and 135' (see Figures 4 and 22) mounted on blocks 136 and 136' secured to the top frame plate 109 (see Fig. 1). The inner end of the knotter rods 133 and 133' are formed with curved, pointed hooks 137 and 137' which serve to engage the elevated string 110 and wind or loop the same around the head or inner end of rods 133 and 133', during the knotting operation, the inner end of the sleeves being cut away, as at 138 and 138', to provide clearance for the knotter hooks.

Each of the knotter rods 133—133' is rotated by means of gear teeth 139 and 139', formed in the knotters 132—132' which mesh with rack bars 140 and 140' (see Figures 1, 4, 5 and 22).

The left hand knotter rack bar 140, viewing the rear of the machine, that is, the left side of Figures 1 and 22, is horizontally disposed and is pivoted to the upper end of a vertical lever 141 (see Figures 1 and 10), fulcrumed intermediate its ends to the machine frame. A cam roller 142, mounted on lever 141, rides in a cam groove 144 in a cam disc 143 carried by the main longitudinal drive shaft 23. On the other hand the right hand knotter rack bar 140', is vertically disposed and is pivotally connected to the upper end of a vertical link 145 which is pivotally connected at its lower end to one end of a horizontal lever 145', fulcrumed to the side wall 4' of the machine frame, and carrying a cam roller 146 which rides in a cam groove 148 in the face of a cam disc 147 (see Figure 1) mounted on the traverse drive shaft 121. Thus, the knotter rods 133 and 133' are rotated, in clockwise and counterclockwise directions, respectively, to form the loops of the knots.

The knotter rods 133—133' are reciprocated through the sleeves 134—134' to advance the hooks 137—137' into a position adjacent to and in engagement with the strings, positioned in the needles, and then to withdraw the strings outwardly, while being rotated, so that the rods will loop or wind the strings around the heads thereof. This reciprocation of the rods 133—133' is accomplished by vertically disposed levers 149 and 149' suitably connected, at their upper ends, to the knotter rods through the medium of offset yoke members 350—350' bolted to the levers (see Figure 1, 4 and 22). The levers 149—149' are mounted on bushings 400 and 400' rotatably sleeved on horizontal stub shafts 150 and 150', journalled in the upper end of the machine frame, which bushings 400—400' are suitably connected to and rotated by means of vertical levers 151 and 151' having cam rollers 152 and 152', on the lower ends thereof. The cam rollers 152 and 152' ride in cam grooves 154 and 154' in the faces of cam discs 153 and 153' on a tranverse drive shaft 121, journalled in the main frame. Rotation of the cams 153—153' rock the levers 151—151' and reciprocate the knotter rods 133—133' forwardly and rearwardly in sleeves 134—134'. At the ends of the respective forward strokes, the hooked ends 137—137' of the knotter rods will engage with and hook the ends of the strings in the needles and the rods will be retracted. During the return strokes of the rods 133—133', the latter are rotated, in the manner described in my previously mentioned application, Ser. No. 250,223, whereby the strings are wound around the heads of the knotters.

Knotter pins 155 and 155' extend slidably but non-rotatably through the hollow knotter rods 133—133' and are formed with curved inner ends 156—156', see Figure 22. The knotter pins 155—155' are slidably connected, at their outer ends, to the upper ends of vertically disposed levers 157 and 157', fixedly secured to bushings 401 and 401' rotatably sleeved on the ends of horizontal stub shafts 158 and 158', journalled in the upper end of the frame, parallel to the shafts 150—150' as best shown in Figures 1, 4 and 22. The bushings 401—401' are suitably connected to and rotated by vertical levers 159—159' having cam rollers 160 and 160' thereon which ride in cam grooves 161 and 161' in the faces of the cam discs 153 and 153', mounted on the transverse drive shaft 121. The levers 159 are thereby rocked and the knotter pins 155 and 155' are reciprocated forwardly through the knotter rods 133—133' so

that the curved ends 156—156' thereon engage the strings, and rearwardly draw the ends of the strings through the loops, formed on the heads of the knotter rods, thereby completing the formation of the knots.

In the knotting mechanism of my Patent No. 2,274,622, now Reissue 22,596 it was necessary to provide string pickers for elevating the strings from the needles and holding the same in the path of the knotter rods, on both the left and right hand sides of the machine. This has proved objectionable and unsatisfactory because it slowed down the knotting operation of the left hand knotter and made it impossible to speed up the stringing mechanism to an extent when it would string the desired number of bags. It was discovered that by lowering the left knotter rod 133, viewing Figures 1 and 22, to a point closer to and above the path of travel of the stringing needles, that the knotter hook 137 would engage with and pick up the end of the string from the needles, on the return stroke thereof, without the benefit of a string picker. The elimination of the string picker, on the left side of the present stringing machine, increases the speed of the latter and results in a greater number of bags being strung.

The knotter pins 155—155', which pull the ends of the strings through the loops formed by the knotter hooks 137—137' are loosely sleeved through members or offsets 345 and 345' on the upper ends of the vertical knotter pin operating levers 157—157'. Collars 217''—217''' fixedly mounted on the pins 155—155' are engaged by these offset portions or members 345 and 345' on the upper ends of the levers 157—157' and permit of the levers pushing the pins through the knotter rods 133—133' into engagement with the strings. Coil springs 218 and 218' are mounted on the outer ends of the respective knotter pins 155—155', intermediate collars 217—217' on the ends thereof and the offset portions or members 345 and 345' on the upper ends of the vertical levers 157 and 157' (see Figures 1, 4 and 22). The tension of the springs 218—218' against the upper ends of the vertical levers 157—157', is sufficient to permit of the rocking of the levers 157—157' and the reciprocation of the knotter pins 155—155' to normally pull the ends of the strings through the loops formed by the knotter rods 133—133'. However, in case the curved ends of the knotter pins 155—155' become tangled in with the strings, or stray pieces of strings become lodged and jammed the upper ends of the levers 157—157' are permitted to move relatively to the knotter pins 155—155' and the collars 217'' and 217''' against the tension of the springs 218—218' thereby preventing the pins from being forceably pulled therethrough with resultant breakage or other damage. That is to say, the levers 157—157' will continue to move and the springs 218—218' will be compressed, if the jamming of the knotter rod is sufficient to prevent the rods 133—133' from following their normal movement. Such movement of the knotter pins 155—155' makes a metal to metal contact with a pair of bent, spring, metal fingers 219 and 219', mounted on the upper ends of the levers 157—157' and normally insulated from the pins 155—155', and one or both of the collars 217—217', so that the metal contact fingers 219 become grounded and complete the circuit to the stop motion relay operating coil, as presently described. This results in the clutch release solenoid 199 (see Figure 11) being energized to disengage the clutch members 137—188, as particularly shown in Figure 9.

Upon completion of the stringing and knotting operations, the turret head is further rotated, one quarter of a revolution, to move the turret bag grippers and strung bag to a horizontal releasing and removing station. It is now necessary to open the gripping jaws 60—62 to permit of the removal of the strung bag therefrom and the delivery of the same into the bag receptacle or hopper 111. Thus a rearwardly and upwardly extending paddle or arm 112 is secured to the end of a stub shaft 113, journalled in the side frame wall 3 (see Figures 1, 3 and 9). The paddle 112 is formed with an enlarged, relatively flat, top plate or jaw 114, on the upper or inner end thereof, having a cooperating gripping jaw 115 pivoted thereto, as at 116, as best shown in Figures 4, 23, 24 and 25. An outwardly extending tail 117, formed on the lower jaw 115, connected to the paddle 112 by a spring 117', is adapted to be engaged by an inwardly extending, curved arm 118, carried by a stub shaft 118', journalled in the frame wall 3, and tripped against the tension of spring 117', to closed gripping position relative to the flat top plate 114. The stub shaft 118' is rotated, to rock the arm 118 downwardly into engagement with the tail 117, for tripping the tail and moving the lower jaw 115 to closed bag gripping position against the flat top plate 114, as shown in full lines on Figure 4 and dotted lines on Figure 23, by means of a flexible chain 119 (see Figures 1 and 8), travelling over a sprocket 120 thereon and a sprocket 122 carried by the transverse drive shaft 121. The shaft 121 is driven by a gear 123 which meshes with a gear 124, on the main longitudinal drive shaft 23. The paddle 112 operates by oscillating to the right between the extreme positions shown in full lines in Figure 23 and the dotted line position of Figure 25. Thus movement of the paddle 112 downwardly in an arc, to remove a properly strung bag from the turret grippers 60—62 and carry the same to the hopper 111, is effected by a gear 125 on the paddle shaft 113 which meshes with and is driven by a rack 126' on a vertically disposed rod 126 (see Figure 8). The rod 126 is pivotally connected, at its lower end, to a horizontal arm 127, in turn fulcrumed to the machine frame, and actuated by a cam roller 128' carried by the arm 127, which rides in a cam groove 130', in the side face of a cam disc 129, mounted on the transverse drive shaft 121 (see Figure 1).

During the downward movement of the paddle 112, from its normal upwardly extending position, indicated in full lines in Figure 23, to a substantially horizontal position, as illustrated in full lines in Figures 4 and 25, where the flat top plate 114 thereof engages the topmost side of the horizontally disposed bag, the lower gripping jaw 115 is in the expanded or open position shown in dotted lines to the right of Figure 25. When the top plate 114 engages the top face of the bag, between the edges thereof gripped by the turret grippers, the stub shaft 118' will have rotated the inwardly extending curved arm 118 downwardly into engagement with and will have tripped the tail 117, against the tension of toggle spring 117', so that the lower gripping jaw 115 is tripped and elevated, by the action of arm 118 and toggle spring 117', from the substantially vertical dotted line position at the right of Figure 25 to the horizontal full line position in that figure, and into gripping engagement with the under face of the bag whereby the bag is clamped between the top plate 114 and the jaw 115. This tripping of jaw 115 to closed position moves the

spring 117' past dead center position so that it now holds the clamp jaw 115 in closed position.

At this point, that is, when the bag has been gripped by the paddle 112, the bag grippers 60—62 are opened, to release the side edges of the bag hems, by virtue of the action of the cam tracks 73 on the tapered ends 70 of the arms 67. Thus, the curvature of the cam tracks 73 is such that the tapered ends 70 ride out of engagement with raised or bumped portions 73', on the cam tracks, as best shown in Figure 5, whereby the tension of the springs 61' is sufficient to force the rods 61 downwardly. The top gripper jaws 62 are thus moved out of gripping engagement with the bottom gripper jaws 60 and the bag is released from the jaws 60—62. As the gripper jaws 60—62 are actuated to open position, the rack bars 102 are acted upon by the cam grooves and are pushed downwardly or outwardly through the longitudinal slots 103—105. The gears 59 and tubes 58 are thereby rotated in opposing directions, that is, clockwise and counterclockwise, respectively, viewing Figures 1, 3 and 4, moving the pairs of gripping jaws 60—62 to their normal, extended, bag receiving and gripping positions, on the outside of the turret arms 54. With the gripper jaws opened and released from their grip on the side edges of the bag hems, and swung to their normal bag receiving positions, and the paddle gripping jaws 114—115 in gripping position on the mouth of the bag, in the horizontal full line position shown in Figure 25, the movement of the paddle is continued downwardly and forwardly, in an arc, between the turret arms 54. When the paddle 112 has been rocked downwardly to the substantially downwardly depending Figure 24 position, adjacent and to the rear of the open inner end of the longitudinally disposed, longiturinal bag hopper 111, which is pivotally mounted on a horizontal shaft 247, mounted in a pair of forwardly extending brackets 129' (see Figures 8 and 9) secured to the end wall 4'' of the machine, for a purpose presently to be described, it is necessary to open the paddle gripping jaws 114—115 to release the bag therefrom.

As best shown in Figures 4, 9, 23, 24 and 25, a laterally extending trip arm 130 is carried by a collar 131 loosely sleeved on the paddle stub shaft 113, at a point below and spaced from and in the path of travel of the paddle 112. The trip arm 130, which is normally positioned in the path of travel of the tail 117, abuts and engages the curved or humped portion 128 of the rearwardly and upwardly extending tail 117 of the lower paddle jaw 115, and moves the same from its closed full line Figure 24 position to the left hand dotted line position in Figure 25, so that the lower jaw 115 is moved slightly away from the upper jaw 114 a sufficient distance to disengage or release the bag from the jaws. During the continued downward and forward arcuate movement of the paddle 112, from the substantially downwardly depending dotted line position in Figure 23 to the forwardmost left hand dotted line position of this figure, the trip 130 remains in contact with the tail 117 so the latter, due to the movement of the paddle, is moved about its pivot 116 into fully cocked or open position, and the released or freed bag is carried or pushed through the open end of and into the bag hopper 111. In other words, the lower paddle jaw 115 is first moved slightly to free or release the gripped bag and is thereafter moved to fully cocked or open position, by the action of the trip 130 on the tail 117, to receive another

bag, when the paddle 112 is returned to elevated position. After the hemmed bag has been removed from the open jaws 60—62, the turret arm 54 continues to rotate to a downwardly depending, vertical position, and thence to the horizontal feeding station, where the jaws are in extended and open position to receive another hemmed bag.

As hereinbefore stated, provision is made for automatically stopping the stringing machine, at different positions, upon failure of the various mechanism to operate properly. Thus, when the supply of bags gives out or bags are improperly fed along the feeding plate; a bag is improperly fed into the bag grippers; upon the failure of the preliminary hem turning arm to engage the closed end of a bag; upon the failure of a bag to be turned right side out, when the bags are improperly strung or upon the jamming of the string knotters, the stop mechanism functions to disengage the clutch members 187—188 and stop the bag stringing mechanism.

Referring particularly to Figure 12, the stop motion equipment consists of a 60 cycle step-down type transformer 162, of the 220 volt, 60 cycle step-down type, mounted on a panel, not shown, in a box 164, secured to the side wall of the machine (see Figure 1*a*). This transformer 162 is supplied with current from a 220 volt source of power, not shown, controlled by a switch 165, in a switch box 166, secured to the side wall (see Figure 1). One line of the 6 volt side of the transformer is grounded to the machine frame, and a wire 168 is connected to one terminal 169 of the 6 volt operating coil 171 of a single pole, single throw, normally open relay 170 mounted on the panel. The other terminal 172 of the coil 171 is connected to a wire 173 to a terminal junction point 174 which in turn is connected to the feeding plate contact 8, gripper contact fingers 212, turner contact 215, and knotter contacts 219 219' by wires 300, 302, 303, 304 and 305 respectively. Should contact be made with the stop motion contacts, the latter become grounded to the frame of the machine, completing the circuit to the operating coil 171. This energizes the coil 171 and causes the contacts 176 and 177 of the relay 170 to close, which action completes the circuit through a wire 178 to and energizes the 220 volt 60 cycle operating clutch release solenoid 199 and thence back to the 220 volt side of the transformer 162 through the wire 149, thus completing the circuit. The solenoid armature 198 is thereby actuated and the arm 196 is moved about its pivot and the upper and thereof is released from locking engagement with the tapered end 195 of the trip arm 193. This operates the lever 192 and moves the yoke 189 and releases the clutch member 187 which permits of the continued running of the motor without operating the stringing mechanism. This enables the operator to make the necessary adjustments or to remove the defective bag from the machine.

It should be noted that while during the rotation of the turret head the bag holding arms 54 and the levers 67 engage the free ends of the spring contact fingers 212 with a brushing contact, the contact arm or timer 254 (see Figs. 12 and 13) only completes or closes the circuit in which the spring fingers are included by the engagement with and closing of contact switch 254', where the turret head is at rest and the hem grippers 60—62 are being rotated. Thus the operation of the machine is not interrupted or stopped each time the fingers 212 are touched or brushed by the parts 54 and 67. In other words the engagement of these parts one with the other does not effect the operation of the machine, and the timer is employed to cut the current on and off merely because this proved more expedient than moving the fingers back out of the line of travel of the turret parts when the turret head is rotating.

As previously stated, a bag rejection mechanism is associated with the stringing needles 108 so that if the needles fail to enter and pass through the bag hems, during the stringing strokes of the needles, or the string knotters fail to tie one or both knots, the improperly strung and/or knotted bag will not be gripped and delivered to the bag hopper 111, but will be dropped onto a curved baffle plate 390 (see Figure 4) and thence passed out of the machine as presently described. The needles are inspected or tested by means of a plurality of downwardly depending spring metal contact fingers 220, preferably four in number, secured to the inner end of the bag turner arm or blade 325, by means of screws 325' (see Figures 6 and 18). These contact fingers are bent and flared, as at 223, to from two restricted contact points 224 which fit over and in snug sliding engagement with the needles to make metal to metal contact therewith during the rocking of the rock arm 321, if one or more of the needles fail to enter the hems.

A 220 volt-60 cycle operating solenoid 230 is mounted on the front of the machine frame and the vertically disposed armature or plunger 231 thereof is pivotally connected, as at 232, to the outer end of a downwardly and outwardly depending lever 233, formed on the collar 131 sleeved on the stub shaft 113, as best shown in Figures 4, 8, 9, 23, 24 and 25. The lever 233 is normally retained in lowered position against a stop 233' on the frame 3 by means of a pull spring 233'', connected thereto and to the frame. The trip arm 130, which is carried by the collar 131, is thus disposed in the path of travel of the tail 117 of the delivering paddle gripping jaw 115. Thus when the paddle is rocked downwardly, in an arc, and the bag is properly strung and gripped by the paddle, the lower gripping jaw 115 is tripped and swung downwardly about its pivot, in a clockwise direction viewing Figures 4, 23 and 24, so that the jaw 115 is moved out of gripping engagement with the top jaw 114 into expanded open or cocked position and the bag is released therefrom and positioned in the hopper 111, as previously described.

In addition to the needle inspection and bag rejection mechanism, just described, a pair of knot testers are provided for assuring that the knots, tied by the knotters, are properly formed. The knot testers, best shown in Figures 4 and 20, consist of a pair of upwardly and rearwardly extending, substantially flat plates 234, suitably mounted, as at 235, on the top of the frame on either side of the turret. The upper end of each of the plates 234 is curved or rounded and inset, as at 236, to provide a string receiving recess 237 which converges into a downwardly extending, angular slot 238, formed with an enlarged lower end 239. The lower end 241 of a smaller contact plate 240, the upper end of which corresponds substantially in shape with the upper end of the plate 234, is pivotally mounted on a cross pin 243, positioned in the recessed lower end of plate 234. The contact plate 240 is formed with a relatively short slot 244, overlying and aligned

with the lower end of the angular slot 238, and a downwardly depending tail 245 is provided thereon. As the strings are knotted by the knotters 132—132' and the bag grippers 60—62 are rotated from the vertical stringing to the horizontal bag removing and delivering station, the ends of the strings 110 are pulled into the recessed upper ends 237 of the plate 234 and slide downwardly through the angular slots 238 into the enlarged lower ends 239 thereof. If the knots have been properly formed in the strings, the continued movement of the turret and grippers, causes the strings and the knots thereon to be pulled or drawn through the openings 239. If the knots, being pulled or drawn through the openings, are loosely formed and oversized, the knots will be of larger diameter than that of the openings and will frictionally engage with the walls of and lodge in the openings. This lodging or sticking of the knots in the openings 239, necessarily increases the tension on the draw strings and results in an additional or supplemental desirable pull being exerted on the knots. Thus, the knots are caused to be uniformly drawn or tightened and properly decreased in size sufficiently to permit of the same passing freely through the openings. These knotted bags are then delivered to the hopper 111.

Even after being uniformly tightened, during their passage through the openings 239, the knots will be larger than and will become lodged in the slots 244 of the small contact plates 240. The rotation of the turret and grippers results in a pull being exerted on the strings, so that the knot will bear against the inner face of and will swing the contact plate, about its pivot 243, against the tension of a suitable coil spring 246, arranged thereon and as best shown in Figures 5 and 20. This lateral and inward swinging movement of the plate 240 moves the tail 245 thereof out of engagement with one of a pair of spring metal contacts 300, mounted on the top frame, as shown in Figure 4, and breaks the contact therewith and permits of the properly strung and knotted bag being delivered into the bag hopper 111, as hereinafter described. On the other hand, if the knotter 132, for example, has failed to properly tie the knot, the unknotted draw string 110 will loosely and freely pass through the opening 239 and slot 244, without moving the contact plate 240 or disturbing the contact between the tail 245 thereof and the metal contact 300. Thus, if the tail 245 of the knot tester contact plate 240 remains in contact with the metal contact 300, current flows through the bag rejection solenoid 230, as presently described, thereby raising the armature 231, from its normal depending Figure 23 position, to its elevated Figure 24 position, which in turn lifts the lever 233 and moves the trip arm 130 upwardly so that the same will not act on the cam face 128 of the lower paddle gripping jaw 115 so as to cock or move the latter to fully expanded or open position. Therefore, as the bottom jaw 115 has not been actuated to open bag receiving position, the tail 117 thereof, upon the return of the paddle 112 to elevated bag engaging and gripping position, will not be arranged in the path of travel of and will not be engaged and tripped by the curved arm 118, and the bottom gripping jaw 115 will remain in closed position relative to the upper jaw 114. Thus, the improperly strung bag will be engaged by the closed gripping jaws 114—115 of the paddle 112, at the horizontal station of Figure 23, and the bag will be rejected. In other words, the gripping paddle 112 will simply bear against the top face of the horizontally disposed bag and will pull or kick the bag downwardly onto the curved baffle plate 390 (see Figure 4) and out of the machine, in a manner hereinafter more fully described.

A counting mechanism is also associated with the needle inspecting and knot testing mechanism, and the bag hopper 111, just described, so that only those bags which are properly strung and knotted are automatically counted as they are positioned in the bag hopper 111. The hopper is pivotally mounted on the shaft 247, mounted in the angle brackets 129' on the forward end of the machine frame, as hereinbefore referred to and as best shown in Figures 8 and 9. The underside of the hopper is pivotally connected, adjacent its inner end, to the upper end of a lever 249, pivoted at its lower end to the upper end of a vertically disposed armature or plunger 251 of a hopper solenoid 250, mounted on the front of the frame. Referring to Figures 13 and 26, the counting mechanism comprises a more or less conventional 25 point ratchet relay 252, purchased from the manufacturer and mounted on the panel of the box 164 of the present machine, and equipped with a 220 volt operating coil 253 and a timer arm 254 carried by the transverse drive shaft 23, the operation of which will be presently described.

The electrical needle inspecting, knot testing and bag counting mechanism consists of the 220 volt line switch and the 220 to 6 volt transformer 162, a needle tester-interlocking relay 256, as best shown in Figure 13, mounted on the panel, previously mentioned, and equipped with a 6 volt operating coil 257 and a 6 volt reset coil 258, a knot tester interlocking relay 259, having a 6 volt operating coil 260 and a 6 volt reset coil 261, and the previously described needle tester fingers 220 and knot testers 234.

If the needles are not in the hems of the bag, the needle fingers 220 will become grounded on the needles, completing the 6 volt circuit, illustrated in Figure 13, from one side of the 6 volt winding of the transformer 162 through wires 262 and 263 to and through the operating coil 257, of the relay 256, and thence through wire 264 to the needle fingers to ground and thence through the frame of the machine back to the other side of the 6 volt winding of the transformer 162. Thus, current flows through the coil 257 which opens the contacts 265, of the needle tester relay 256, and closes the contacts 266 thereof. The closing of the contacts 266 completes the circuit from one side of the 220 volt line through wires 267 and 268 and contacts 266, and wires 269 and 270 to the bag rejection solenoid 230, thence through a wire 271 back to the other side of the 220 volt line. This allows current to flow through the bag rejection solenoid 230 thus raising the armature 231, see Figure 9, which in turn lifts the lever 233 and moves the trip arm 130 upwardly so that the same will not be engaged by the cam face 128, of the lower paddle gripping jaw 115. Therefore the gripping jaw 115 is not moved to fully open or expanded bag receiving position and the bag is not thereafter gripped by the delivering paddle jaws 114—115, during the movement of the gripper from the vertical stringing to the horizontal delivering stations. Consequently upon resumption of the paddle movement, the bag released or freed by the opening of the grippers 60—62, instead of being delivered to the hopper, will be

moved downwardly by the paddle 112 or dropped onto the curved baffle plate 390, Figure 4, and thence passed out of the machine. In other words, the improperly strung bag is rejected by the machine, and the opening of contacts 265 prevents the rejected bag from being counted as presently described. The tail 117 of clamping jaw 115 engages the trip member 130 on each working stroke regardless of whether the clamp or jaw 115 is or is not gripping a bag. The extent of throw or swing of the paddle 112, is always the same, that is, of sufficient length to permit of the paddle discharging a bag, assuming the clamp 115 has closed on one. However, in the event the next or succeeding bag, then at the stringing and knotting station, has not been properly strung or the draw string properly knotted, that bag will be rejected, that is, will be deposited upon the baffle plate 390, instead of being gripped by the clamp jaw 115. At the same time the trip 130 will be swung to the left so that only the end of tail 117 of clamp or jaw 115 will engage the trip. Consequently the movement of jaw 115 will only be sufficient to relieve the pressure on the clamped bag to release the same at the end of the working stroke but not sufficiently to fully open the jaw 115. Therefore after the perfect bag has been deposited in the hopper 111, the paddle member returns to bag receiving position but of course on its next working stroke, instead of picking up another bag, it will merely aid in disposing of the defective or improperly strung or knotted bag. The detecting circuits are now reset automatically, and the trip 130 will have been moved to the normal position in which the cam portion 128 rides over the trip and moves the jaw 115 to fully open or bag receiving position. The empty paddle and its jaw 115 will receive and clamp the next succeeding bag at the horizontal station on its next working stroke assuming of course that the bag defecting circuits have not again been closed in the manner previously described.

By referring to the diagram, shown in Figure 13, it will be noted that contacts 272 on the knot tester relay 259 perform the same function as contacts 266 on the needle tester relay 256. That is, the bag is rejected, when a knot has not been tied, by completing the circuit through wires 270 and 271, as explained above. However, where the strings have been properly knotted or loosely knotted and later tightened, the knot tester plates 240 will be swung about their pivots by the action of the knots lodged in the slots 244 thereof. This completes the circuit from one side of the 6 volt transformer 162, through the wires 262, 273, 274 and 275 to the operating coil 260 of the knot tester relay 259. The operating coil 260 is connected through wires 276 and 277 to the two knot tester contacts 300 and thence to the ground and through the frame of the machine back to the other side of the 6 volt transformer 162. This allows current to flow through operating coil 260 which opens the contacts 272 and closes contacts 278. Upon the opening of contacts 278, the bag is counted, provided it is not rejected, as presently described. If either or both of the knots are missing, the 6 volt circuit will not be completed through the knot tester plates 240 and the bag will be rejected and consequently not counted. After this action has taken place, the contact arm 254, carried by the end of the transverse drive shaft 23 and rotating therewith, closes a

contact 280, which completes the circuit from one side of the 6 volt winding of the transformer 162, through the wires 262, 273, 274 and 281 to the reset coil 258 of the needle tester relay. The relay is connected through wires 282 and 283 to contact 280 and ground, and then through the machine frame back to the other side of the 6 volt winding of the transformer 162. This also completes the circuit from one side of the 6 volt winding of the transformer by means of wires 262, 273 and 284 to the reset coil 261 of knot tester relay 259, and through wires 285 and 283 to contact 280 and ground, and thence through the machine frame back to the other side of the 6 volt winding of the transformer 162. Current thereby flows through reset coils 258 and 261 which resets the interlocking relays 256 and 258, respectively, for another cycle of the machine.

The 25 point counting ratchet relay 252, as particularly shown in Figure 26, advances one point or step for each revolution of the machine, providing contacts 265 and 272, on the needle tester and knot tester relays 256 and 259, respectively, are closed which, as explained above, will occur if a properly strung and knotted bag has been produced. This is accomplished by the closing of a contact 286 by the contact arm 254, on the transverse shaft 23, once for each revolution of the machine. The closing of contact 286 completes the circuit, from one side of the 220 volt line through wires 287 and 288 to contacts 273, on knotter tester relay 259, and thence through wire 289 to contacts 265, on needle tester relay 256. The contacts 265 are connected by wire 290 with contacts 286, and by wire 291 to the operating coil 253 of the ratchet relay 252. Wires 292 and 293 connect the operating coil 253 to the other side of the 220 volt line, allowing current to flow through the operating coil 253, which steps up the ratchet 252 one point, in an obvious manner. That is to say, when the coil 253 is energized, the armature or plunger 310 is pulled inwardly against the tension of the coil spring 311, as shown in Figures 13 and 26. This armature, being loosely connected to the lower end of an arm 312 which is journalled on the shaft 313, on which the ratchet 252 is mounted, inward movement of the armature 310 causes the arm 312 to be moved in a corresponding direction, as best shown in Figure 26. At the same time a pawl 314, pivoted at 315 to the arm 312, will be moved in an anti-clockwise direction viewing Figure 26, into cocked position or into engagement with the next succeeding tooth of ratchet 252, against the tension of spring 311. A small coil spring 316 serves to maintain the pawl 314 in engagement with the ratchet 252, the ratchet being prevented from rotating in an anti-clockwise direction by a keeper pawl 317, pivoted to the panel 164, as at 318. After the contact 286 has been broken, the armature 310 will be pulled outwardly on its working stroke, by the action of spring 311, to cause pawl 314 to advance one step or notch. This movement is limited by a stop member 319, mounted on the panel, which is engaged by the actuating pawl 314, upon completion of the working stroke. This cycle is automatically repeated for each properly strung bag delivered into the hopper 111. On the twenty-fifth step, the contact arm 294 on the ratchet relay 252 makes contact with the contact 295 thereon and completes the circuit from one side of the 220 volt line, through wires 287 and 296 to contact 295, thence through wires 297 to the bag hopper solenoid 250, and through conduits 298 and 293 back to the

other side of the 220 volt line. Current thus flows through the hopper solenoid coil 250 which actuates the armature 251 thereof and pulls or tips the inner end of the bag hopper 111 downwardly momentarily, through the link 249, so that the top edge of the twenty-fifth bag, being delivered into the hopper, will extend above the tops of the other bags, as best shown in Figure 9, whereupon the hopper moves back to its normal, substantially horizontal plane.

Having thus described my invention what I claim is:

1. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means having means gripping the side edges of the bags for turning the bag hems right side out for stringing, means associated with the hem reversing means for engaging the body of the bag adjacent the hemmed mouth thereof intermediate said gripped side edges for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means operable during the stringing operation, and means for feeding bags to said hem reversing means.

2. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for turning the hems right side out for stringing, means associated with the hem reversing means for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means operable during the stringing operation, and means for feeding bags to said hem reversing means.

3. A machine for stringing bags having hems at their mouth ends, comprising hem reversing means for supporting successive bags and for turning the hems thereof right side out for stringing, means associated with the hem reversing and bag supporting means for partially turning the body of the bag right side out, means for completing the turning of the bag body right side out, means for inserting draw strings in the reversed hems of said bags during the completion of the turning of the bag body and while supported by said hem reversing means, and means for feeding bags to said hem reversing means.

4. A machine for stringing bags having hems at their mouth ends, comprising hem reversing means for supporting successive bags and for turning the hems thereof right side out for stringing, said means being movable from a horizontal to a vertical position, means for feeding bags to said first mentioned means when the latter is in a horizontal position, means associated with the hem reversing and bag supporting means for partially turning the body of the bag right side out when said hem reversing and supporting means is in a horizontal position, means for completing the turning of the bag body right side out when said hem reversing and bag supporting means has been moved to a vertical position and means for threading draw strings through the hem in the last mentioned position.

5. The subject matter of claim 4 in which the completion of the turning of the bag body and the threading of the draw strings through the hems are effected substantially simultaneously.

6. The subject matter of claim 4 in which the turning of the hem and the partial turning of the bag body right side out are effected substantially simultaneously.

7. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means having means for gripping the side edges of the bag for turning the bag hems right side out for stringing, means associated with the hem reversing means for engaging the body of the bag adjacent its mouth intermediate said side edges for partially turning the body of the bag right side out, means operable during the stringing operation for completing the turning of the bag body, means associated with said last mentioned means for detecting an improperly strung bag, and means for feeding bags to said hem reversing means.

8. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for turning the bag hems right side out for stringing, means associated with the hem reversing means slidably engageable with the bag body for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means being operable while the hems are being strung, means associated and operated in timed relation with said last mentioned means for detecting an improperly strung bag, and means for feeding bags to said hem reversing means.

9. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for turning the bag hems right side out for stringing, means associated with the hem reversing means for partially turning the body of the bag right side out, pivotal means operable during the stringing operation for completing the turning of the bag body, and means for feeding bags to said hem reversing means.

10. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for supporting successive bags and for turning the bag hems right side out for stringing, means associated with the bag hem supporting and reversing means for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means operable during the stringing operation and comprising an arcuately movable arm adapted to engage the closed end of the partially turned bag body and force the said closed end completely through the open mouth of the bag.

11. A machine for stringing bags having hems at their mouth ends, comprising hem reversing means for supporting successive bags and for turning the hems thereof right side out for stringing, said means together with the bags supported thereby being movable from a bag receiving to an elevated bag stringing position, means for feeding bags in a horizontal plane to said first mentioned means when the latter is in a bag receiving position, means associated with the hem reversing and bag supporting means for partially turning the body of the bag right side out while the hem reversing means is in bag receiving position, pivotal means for completing the turning of the bag body right side out, said pivotal means adapted to engage the closed end of the bag and force the same downwardly through the hemmed and turned mouth of the bag when the latter is in an elevated position, and means for threading draw strings through the bag hem in the last mentioned position.

12. A bag stringing machine designed to handle bags received wrong side out, said machine

having a bag receiving position and a bag stringing position, means for partially turning the body of the bag right side out, grippers for gripping the bag in the receiving position and movable with the gripped bag from the receiving to the stringing position, said grippers cooperating with said first mentioned means for turning the bag hems right side out for stringing, draw string inserting means, additional means for completely turning the body of the bag right side out while gripped and supported by said grippers in stringing position, means for actuating the draw string insertion means to insert draw strings in the turned hem of the bag while supported by said grippers in said last mentioned position, and means for delivering successive bags to said grippers.

13. A bag stringing machine designed to handle bags received wrong side out, said machine having a bag receiving position and a bag stringing position, means for partially turning the body of the bag right side out, grippers for gripping the bag in the receiving position and movable with the gripped bag from the receiving to the stringing position, said grippers cooperating with said first mentioned means for turning the bag hems right side out for stringing, draw string inserting means, additional means for completely turning the body of the bag right side out while gripped and supported by said grippers in stringing position, means for actuating the draw string insertion means to insert draw strings in the turned hem of the bag while supported by said grippers in said last mentioned position, means for delivering successive bags to said grippers and knotters for tying the respective draw strings after threading of the latter through the successive bags by said draw string threading needles.

14. A machine for stringing bags having hems at their mouth ends, a pair of needles for threading draw strings through the hems, hem reversing means for turning the bag hems right side out for stringing, means associated with the hem reversing means for partially turning the body of the bag right side out, means for operating the needles, means engaging the body of the bag for forcing the closed end of the bag through the mouth thereof and completing the turning of the bag body, means for supporting the needles against sagging during the threading of the draw strings in the needles and the completion of the turning of the bag body right side out, and means for feeding bags to said hem reversing means.

15. A machine for stringing bags having hems at their mouth ends, reciprocable needles for threading draw strings through the hems and means for operating the said needles, hem reversing means for turning the hems right side out for stringing, means associated with the hem reversing means for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means operable during the stringing operation, means for supporting the free ends of said needles during the complete turning of the bag body, and means for feeding bags to said hem reversing means.

16. A machine for stringing bags having hems at their mouth ends, comprising hem reversing means for supporting successive bags and for turning the hems thereof right side out for stringing, means associated with the hem reversing and bag supporting means for partially turning the body of the bag right side out, means for completing the turning of the bag body right side out, a pair of needles, and means for operating

the said needles for inserting draw strings in the reversed hems of said bags during the completion of the turning of the bag body and while supported by said hem reversing means, and rigid means for supporting the free ends of said needles upon completion of their threading operation and means for feeding bags to said hem reversing means.

17. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for supporting successive bags and for turning the bag hems right side out for stringing, means associated with the bag hem supporting and reversing means for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means comprising an arcuately movable arm adapted to engage the closed end of the partially turned bag body and force the said closed end completely through the open mouth of the bag and means for rigidly supporting the draw string threading means during the working stroke of said arm.

18. A bag stringing machine designed to handle bags received wrong side out, said machine having a bag receiving position and a bag stringing position, means for partially turning the body of the bag right side out, grippers for gripping the bag in the receiving position and movable with the gripped bag from the receiving to the stringing position, said grippers cooperating with said first mentioned means for turning the bag hems right side out for stringing, needles for inserting draw strings in said hems, a needle supporting block in the path of movement of said needles for receiving and supporting said needles, means for completely turning the body of the bag right side out while the bag is gripped and supporting by said grippers in stringing position and while said needles are supported in said block, means for actuating the needles to insert draw strings in the turned hem of the bag while supported by said grippers in said last mentioned position, and means for delivering successive bags to said grippers.

19. A machine for stringing bags having hems at their mouth ends, needles for threading draw strings through the hems, hem reversing and supporting means for gripping and turning the bag hems right side out for stringing, means associated with the hem reversing and supporting means for partially turning the body of the bag right side out, needle supporting means slidably engaged by said needles for supporting the same at the end of the working stroke of said needles, means for completing the turning of the bag body while the bag hem is gripped and supported by said hem reversing and supporting means and while said needles are supported by said needles supporting means, and means for feeding bags to said hem reversing means.

20. The method of stringing hemmed bags comprising feeding a bag, then gripping the bag, then turning the hemmed mouth of the bag right side out and moving the body and closed end of the bag partially through the turned mouth thereof, preliminary to stringing the same, then stringing the hems of the bag right side out and simultaneously moving the closed end of the bag completely through the mouth thereof.

21. The method of stringing hemmed bags comprising the steps of feeding a bag, then gripping the bag and turning the gripped hemmed mouth of the bag right side out and moving the

body and closed end of the bag partially through the turned mouth thereof, preliminary to stringing the same, then reciprocating a pair of needles through the turned hems of the bag to string the bag while simultaneously moving the closed end of the bag completely through the mouth thereof, and supporting the free ends of the needles during the stringing step.

22. A machine for stringing bags having hems at their mouth ends, means for threading draw strings through the hems, hem reversing means for turning the bag hems right side out for stringing, bag turning means associated with the hem reversing means movable toward the bag hem and between the turned hem and body of the bag into engagement with the bag body for forcing a portion of the body of the bag through the mouth thereof and, a second bag turning means movable in the same general direction as said first mentioned bag turning means, relative to the bag, into engagement with the closed end of the bag for pushing the said closed end and body completely through the mouth of the bag, and means for feeding bags to the hem reversing means.

23. The subject matter of claim 22 in which means is provided to cause substantially simultaneous completion of movement of the closed bag end through the mouth and threading of the draw strings through the hems.

24. A machine for stringing bags having hems at their mouth end, means for threading draw strings through the hems, hem reversing means for turning the bag hems right side out for stringing, means associated with the hem reversing means for partially turning the body of the bag right side out, means for completing the turning of the bag body, said last mentioned means being operable while the hems are being strung, means carried by the last mentioned means for detecting an improperly strung bag, and means for feeding bags to said hem reversing means.

25. A machine for stringing bags having hems at their mouth ends, reciprocable needles for threading draw strings through the hems, means for partially turning the bag right side out, an additional means for completing the turning of the bag body, means for operating said additional means when the stringing needles are in the hems, rigid means for supporting the free ends of the needles during the operation of the said additional means, and means for feeding bags to said additional means.

26. A machine for stringing bags having hems at their mouth ends, hem reversing means for turning the hems right side out for stringing, means for threading draw strings through the turned hems, means associated with the hem reversing means for partially turning the body of

the bag right side out preliminary to stringing, means entirely separate from said last mentioned means and operable after the operation of the means for partially turning the bag body is completed for completing the turning of the partially turned and strung bag body, and means for feeding bags to said hem reversing means.

27. A machine for stringing bags having hems at their mouth ends, hem reversing means for turning the hem portions only right side out for stringing operable before the bag body is turned, means associated with the hem reversing means for partially turning the body of the bag right side out preliminary to stringing, means entirely separate from said last mentioned means and operable after the operation of the means for partially turning the bag body is completed for completing the turning of the partially turned and strung bag body, means for threading draw strings through the turned hems operable at the same time as the means for completing the turning of the partially turned bag body, and means for feeding bags to said hem reversing means.

28. A machine for stringing bags having hems at their mouth ends, said machine having a stringing position, means for threading draw strings through the hems, hem reversing means for turning the hems right side out for stringing, means for partially turning the body of the bag right side out operable before the bag reaches the stringing position, means for completing the turning of the bag body at said stringing position, said last mentioned means operable when the bag reaches and while in the stringing position, and means for feeding bags to said means for partially turning the bag body and to said means for completing the turning of the bag body.

29. A machine for stringing bags having hems at their mouth ends, hem reversing means for turning the hems right side out for stringing, means for threading draw strings through the turned hems, means associated with the hem reversing means for partially turning the body of the bag right side out preliminary to stringing, means additional means operable during the string operation and after the operation of the means for partially turning the bag body is completed for completing the turning of the partially turned bag body, and means for feeding bags to said hem reversing means.

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