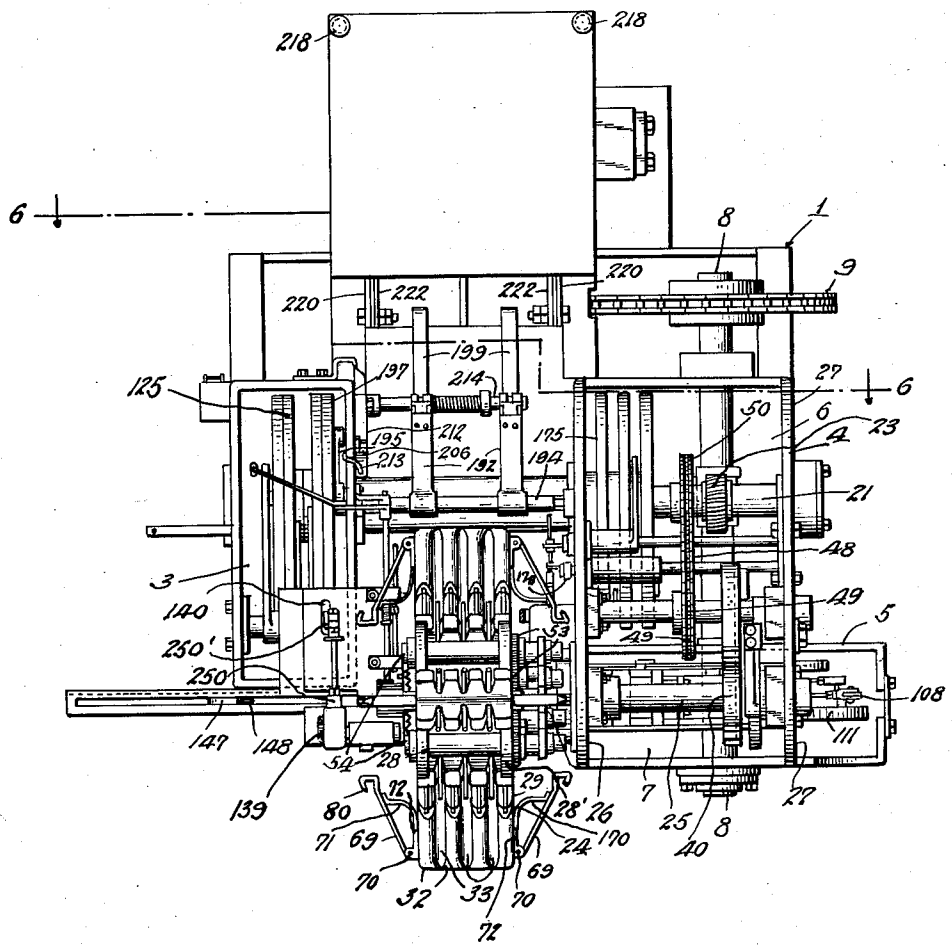
June 13, 1950 E. E. WEST 2,511,658

BAG STRINGING MACHINE

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Fig. 1.



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BY Edward E. West

Fisher, Moses & Moore

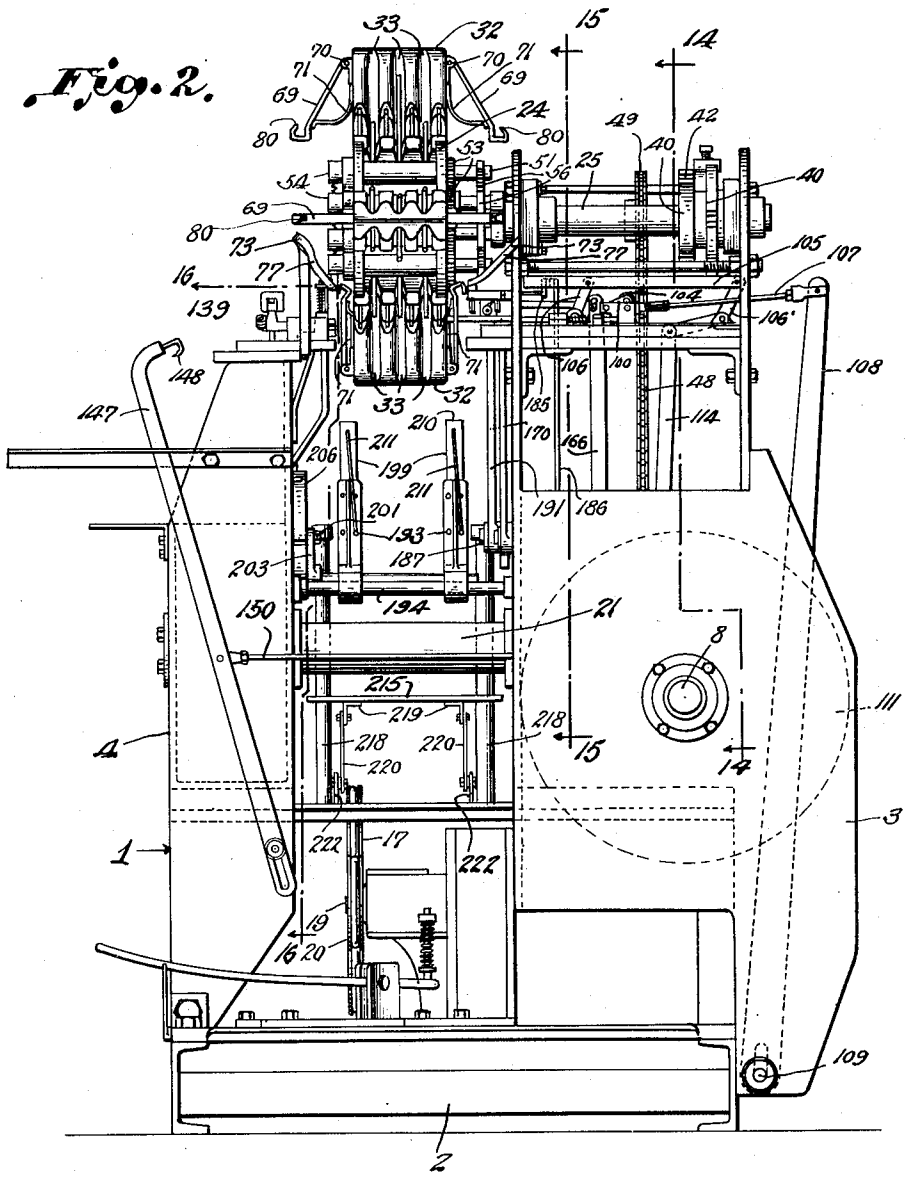
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BAG STRINGING MACHINE

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Fig. 2.



INVENTOR.

BY Edward E. West

Fisher, Moser & Moore

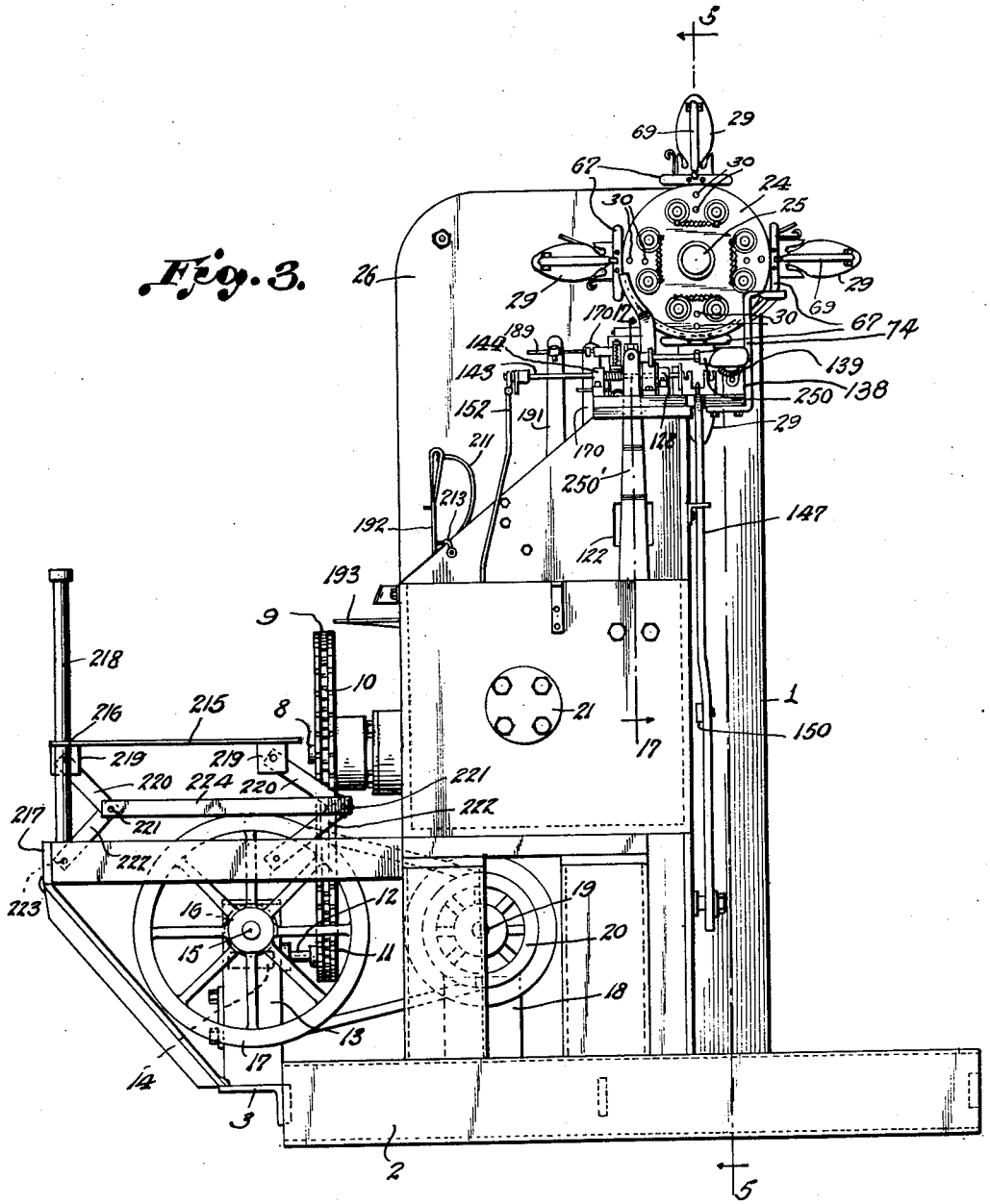
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BAG STRINGING MACHINE

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Fig. 3.



INVENTOR.

BY Edward E. West

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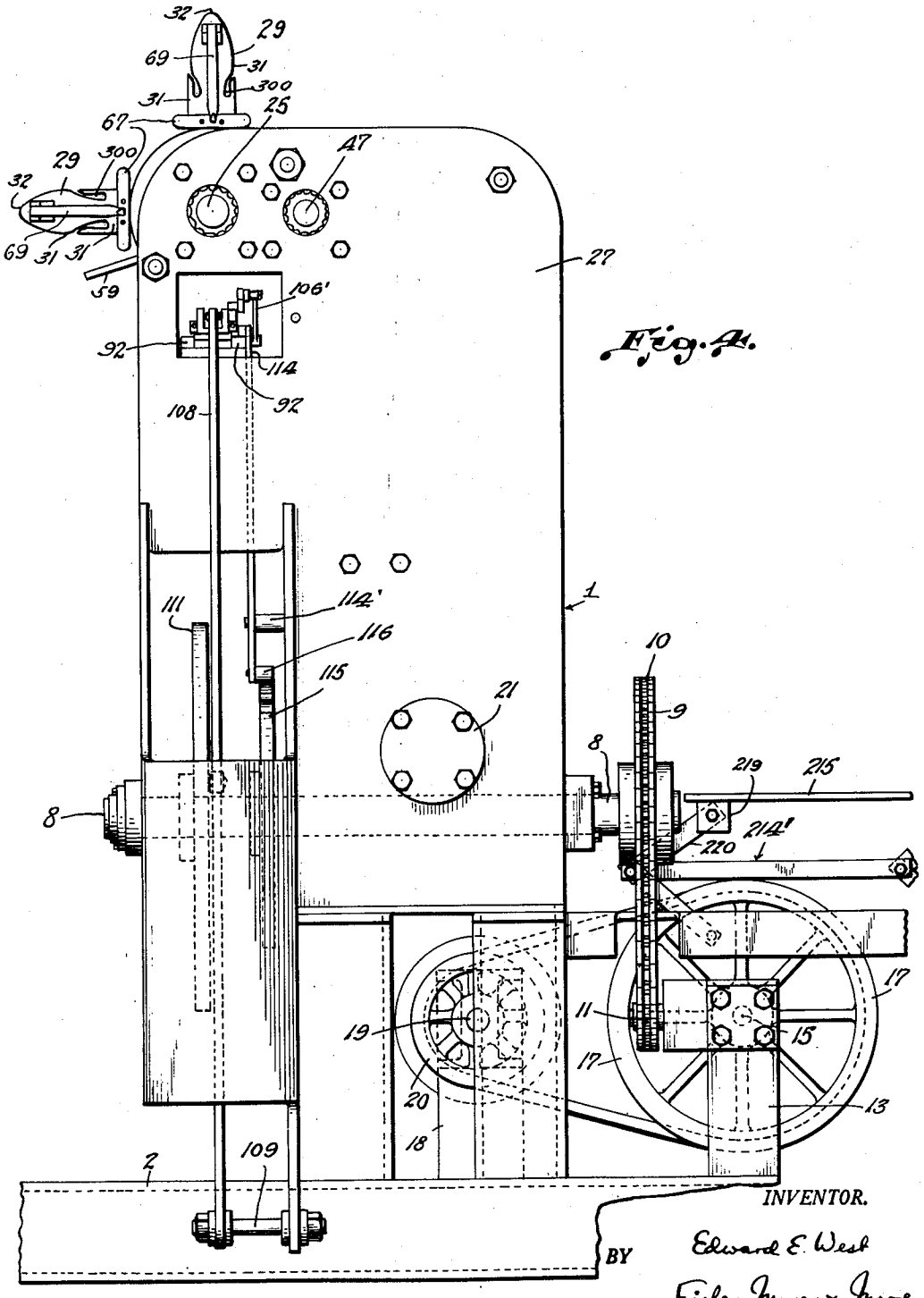


Fig. 4.

INVENTOR.

BY Edward E. West

Fisher, Mosser & Moore

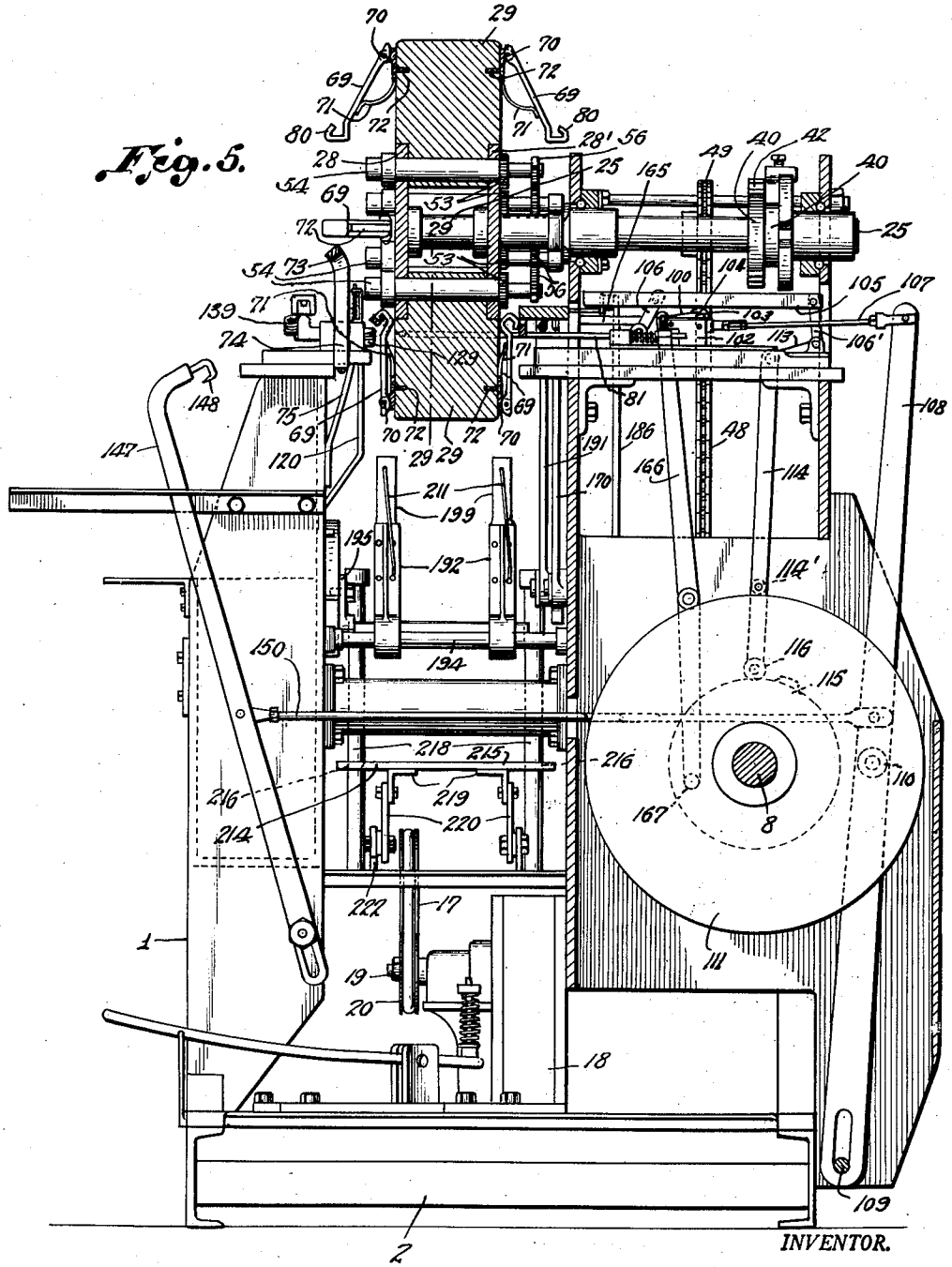
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BAG STRINGING MACHINE

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Fig. 5.



INVENTOR.

BY Edward E. West

Fisher, Moore, & Moore

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BAG STRINGING MACHINE

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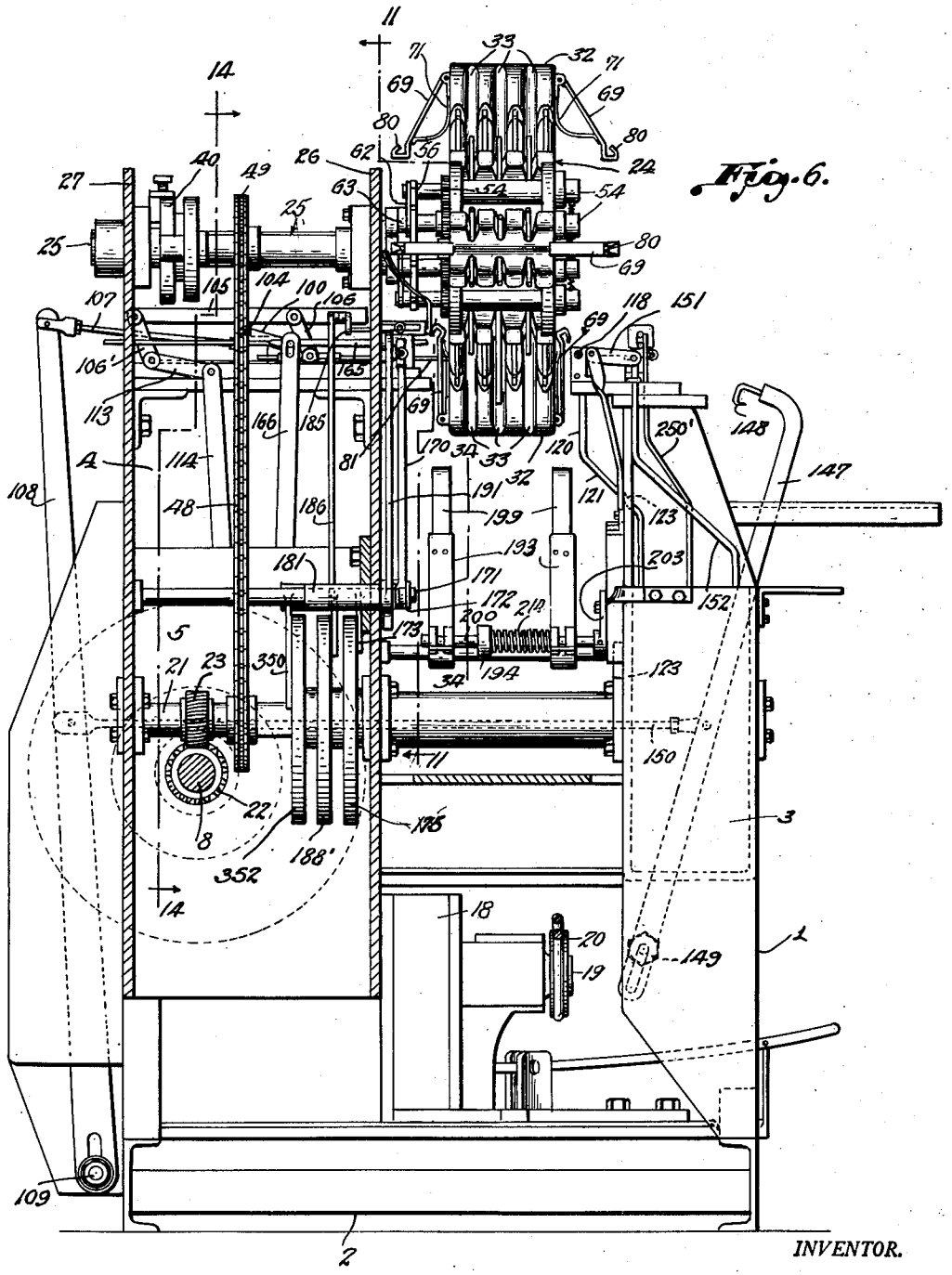


Fig. 6.

INVENTOR.

BY Edward E. West

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BAG STRINGING MACHINE

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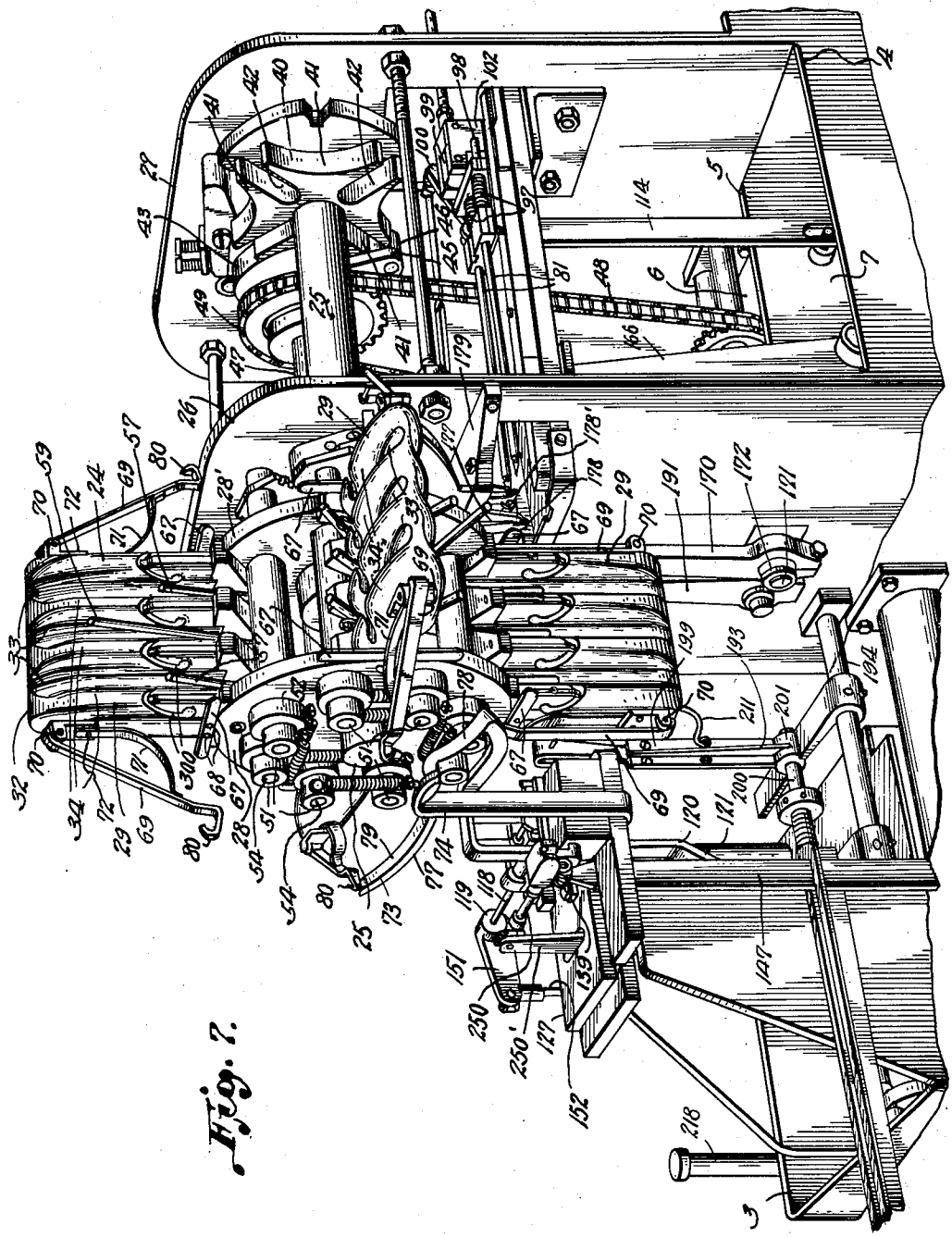


Fig. 7.

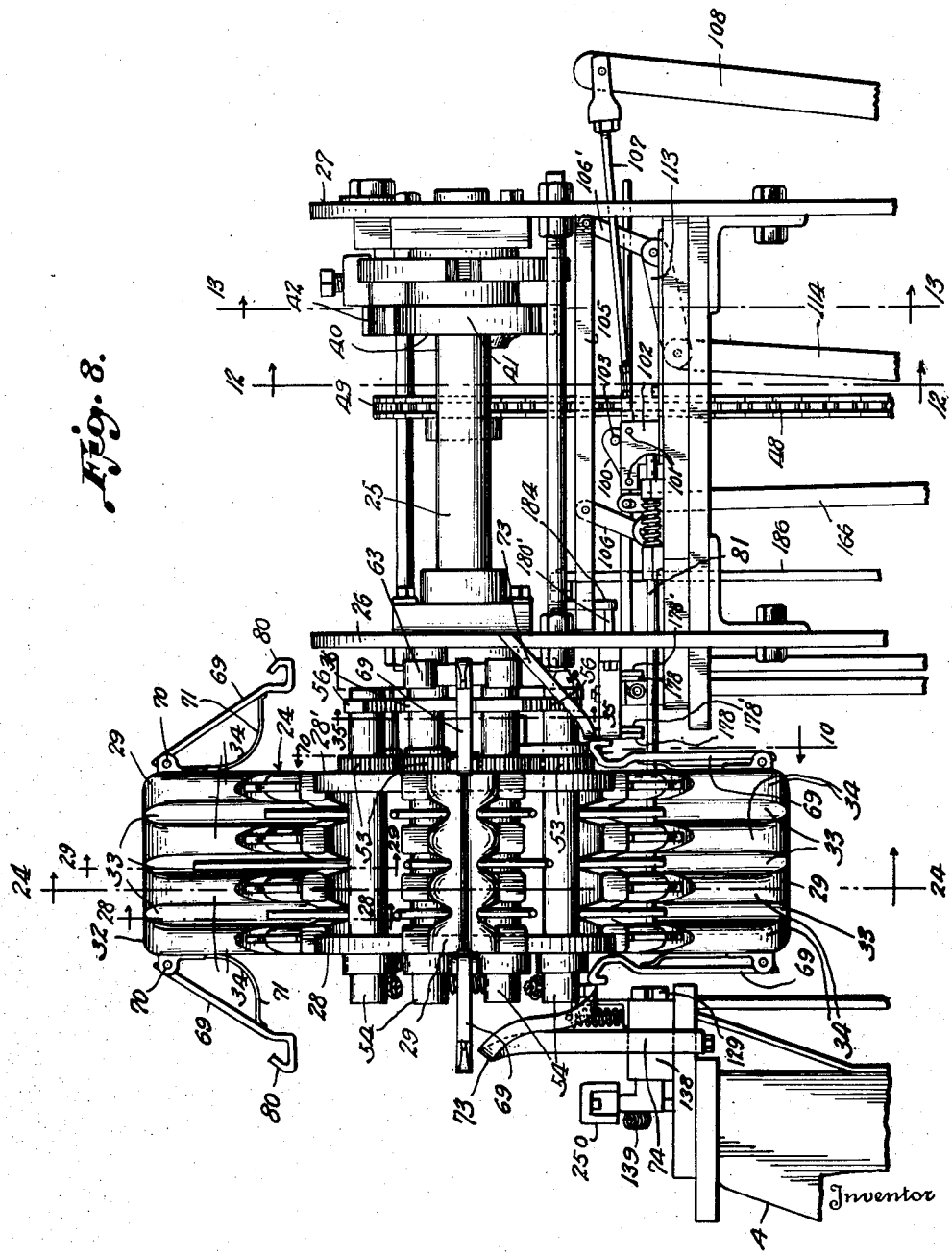
INVENTOR.
Edward E. West
BY
Fisher, Moser & Moore
ATTORNEYS

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Fig. 8.



Inventor
Edward E. West
By
Fisher, Mason & Morse
Attorneys

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BAG STRINGING MACHINE

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Fig. 9.

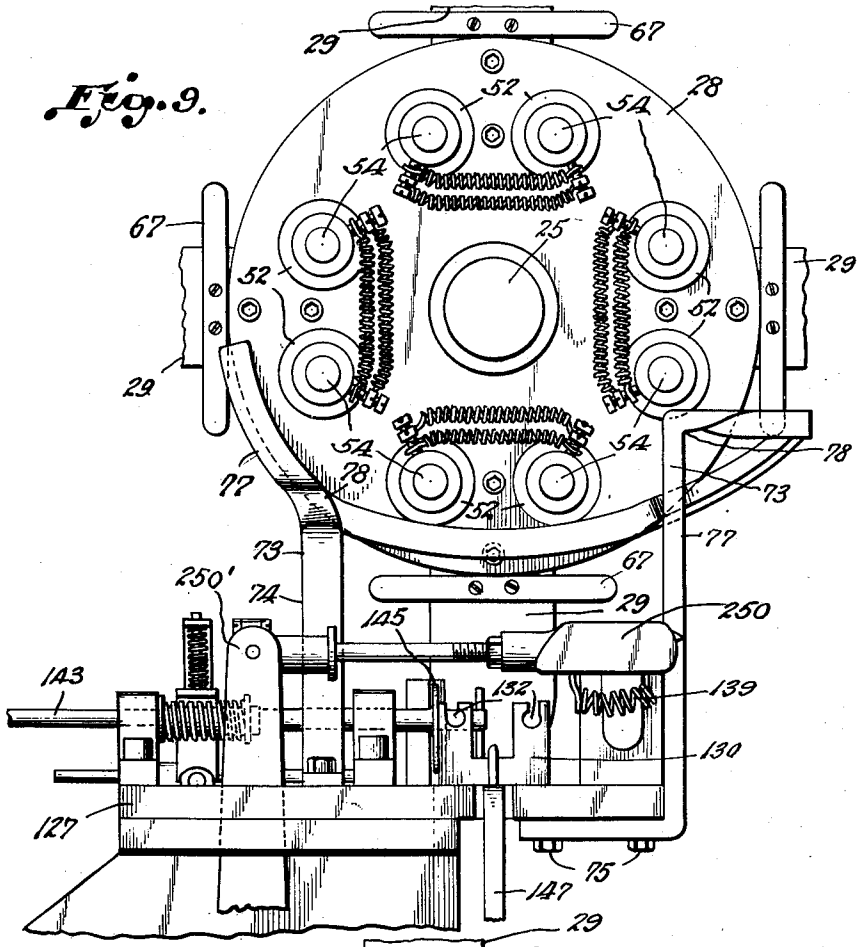
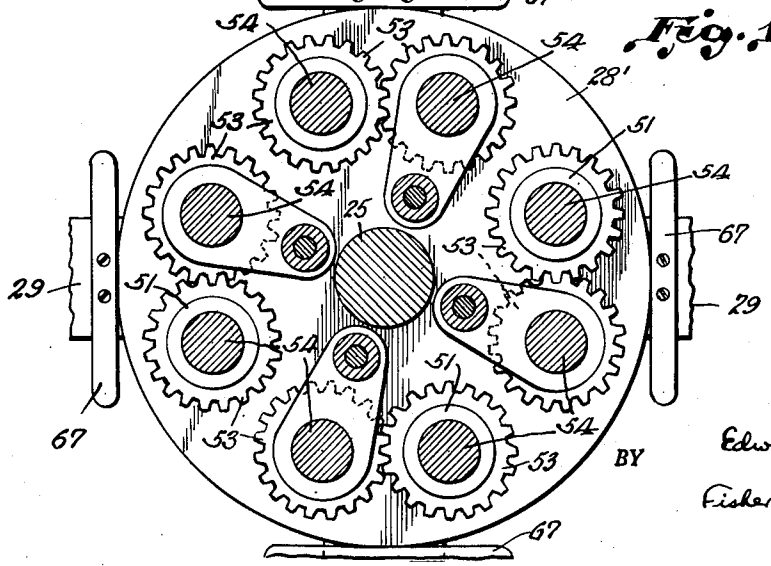


Fig. 10.



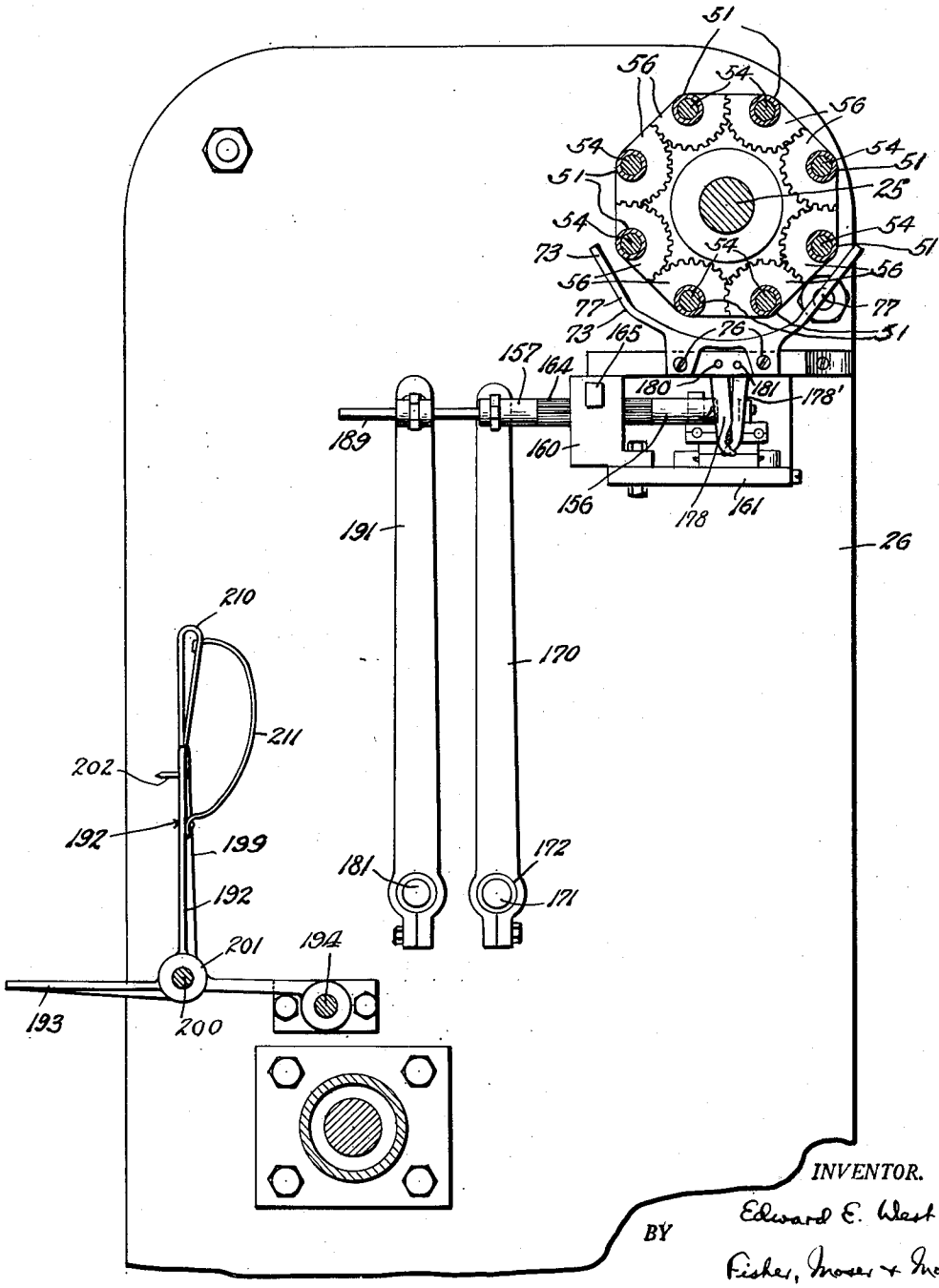
INVENTOR.
Edward E. West
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Fig. 11.



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Fig. 12.

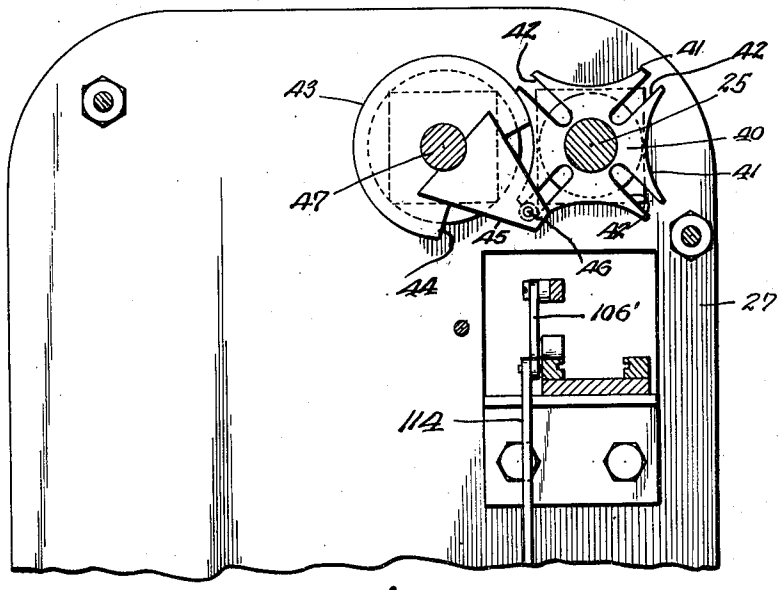
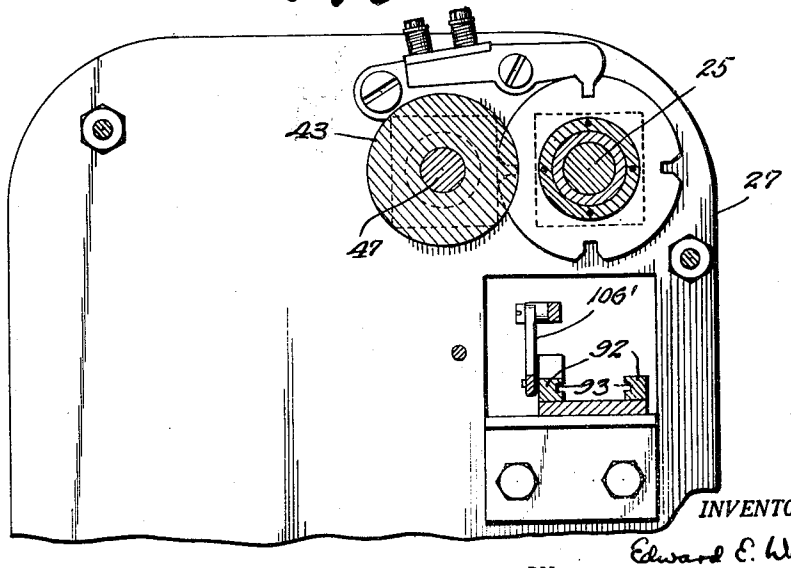


Fig. 13.



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Fig. 14.

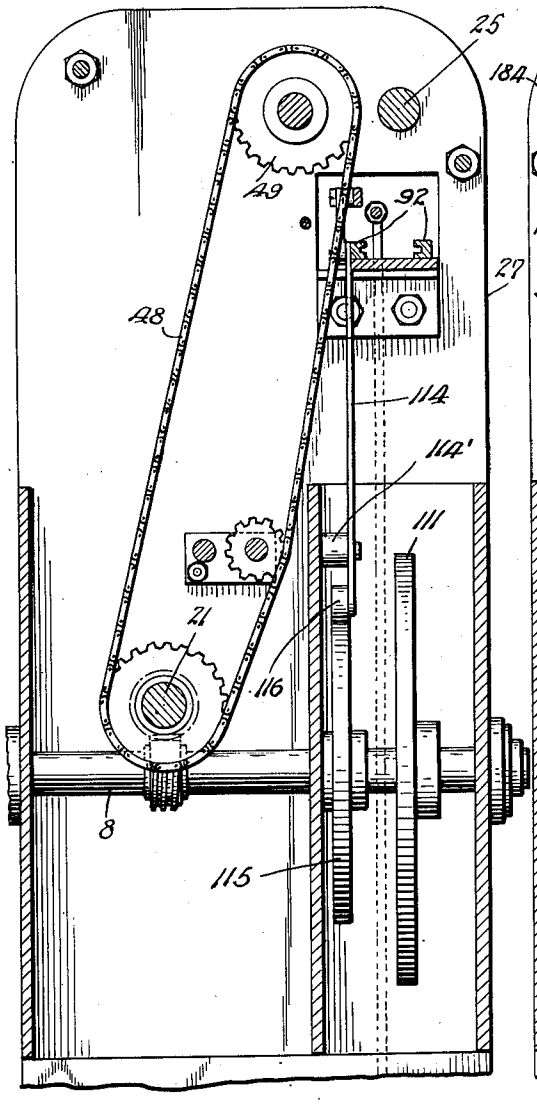
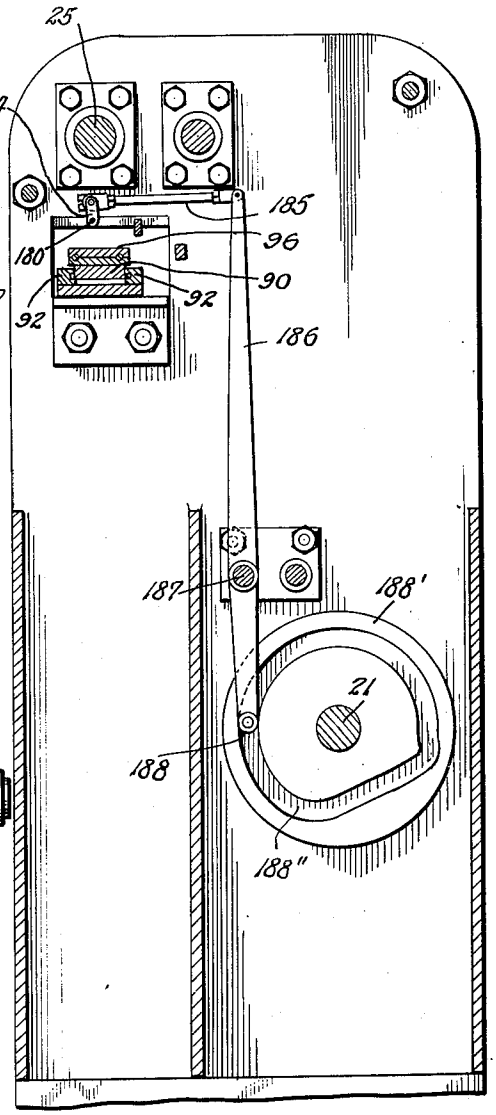


Fig. 15.



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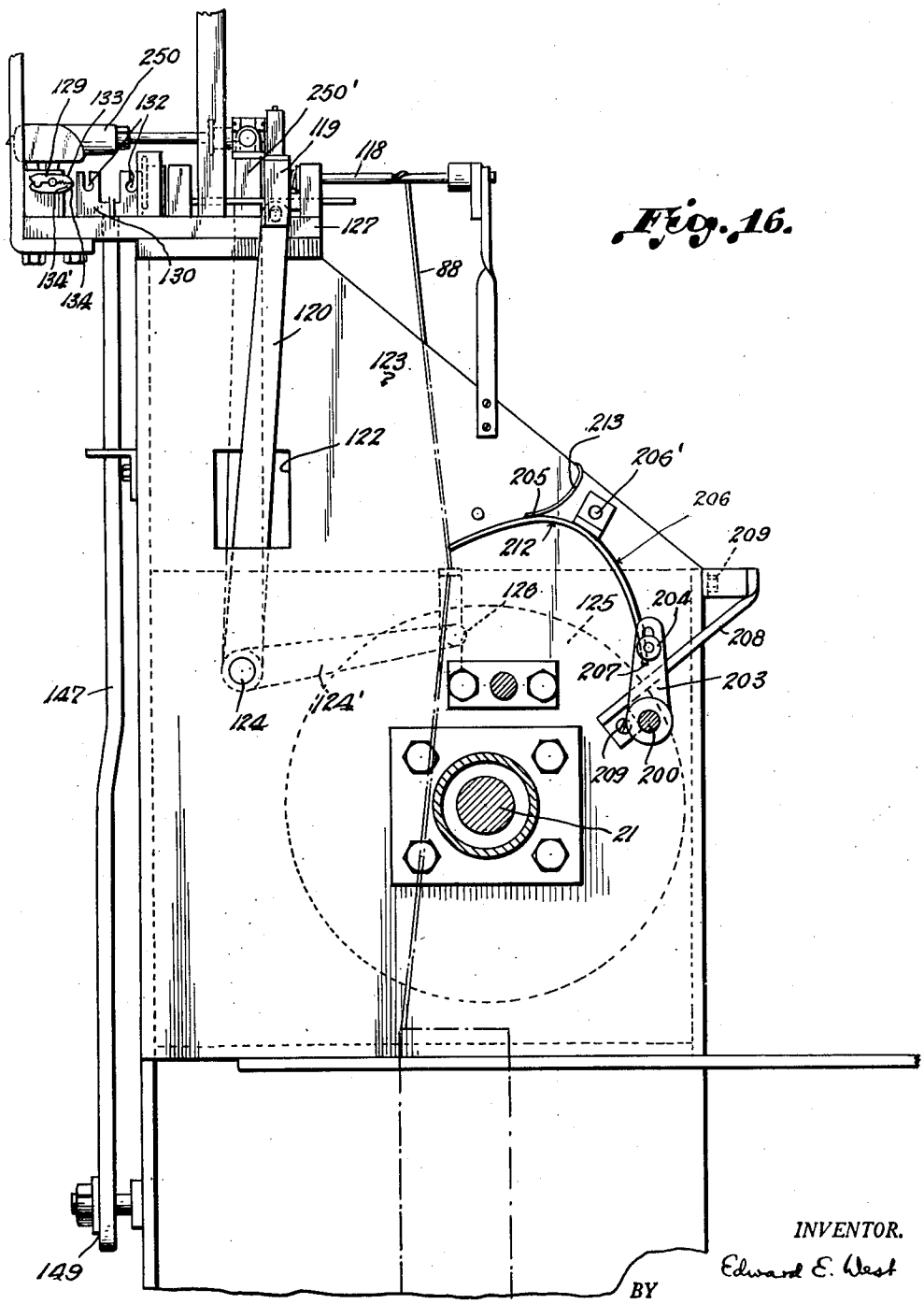


Fig. 16.

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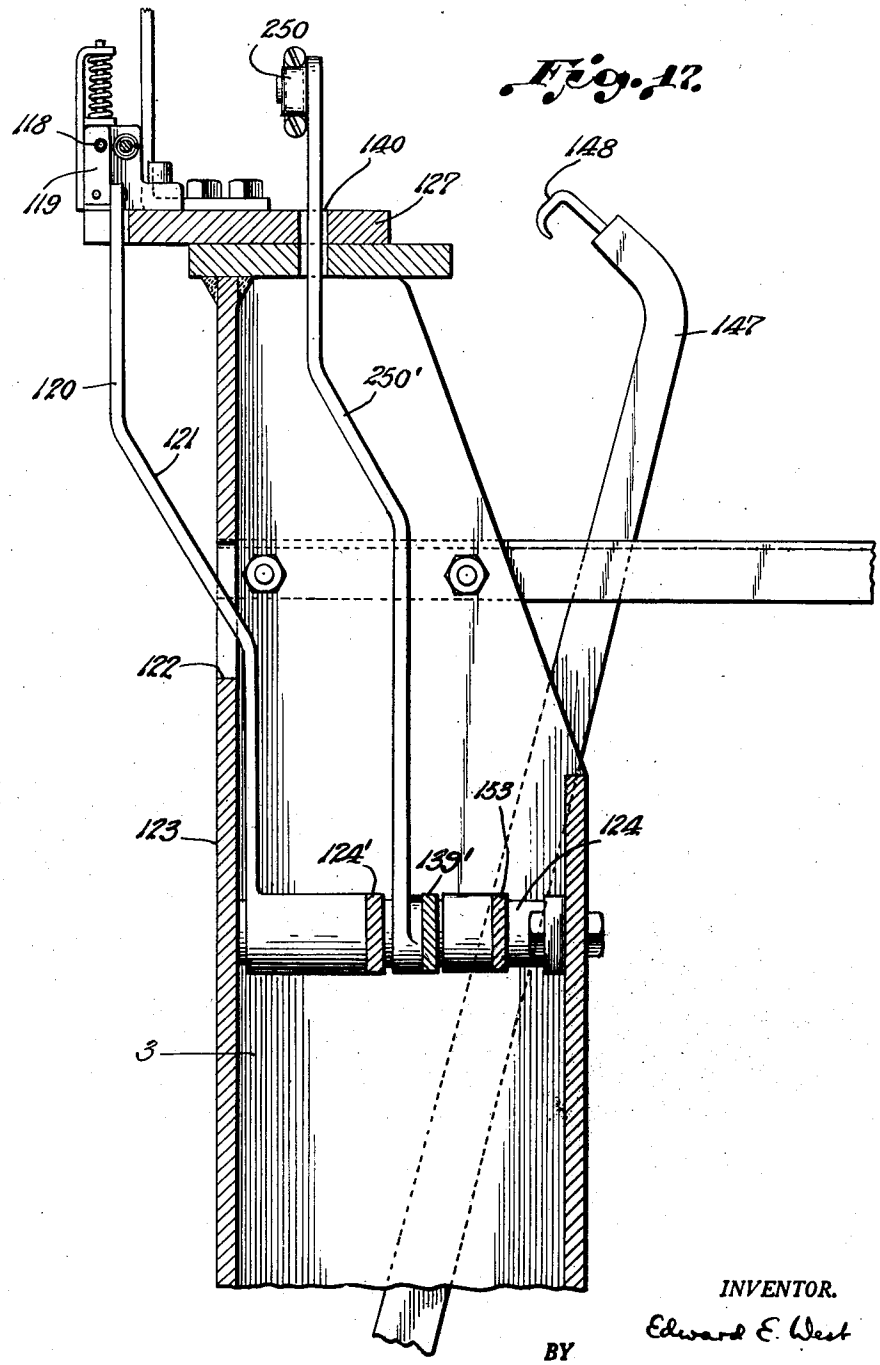


Fig. 17.

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BAG STRINGING MACHINE

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Fig. 18.

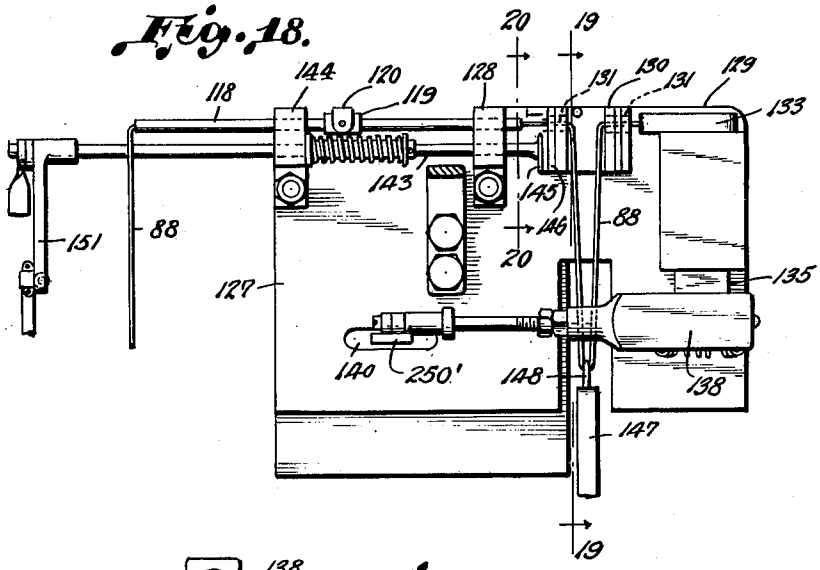


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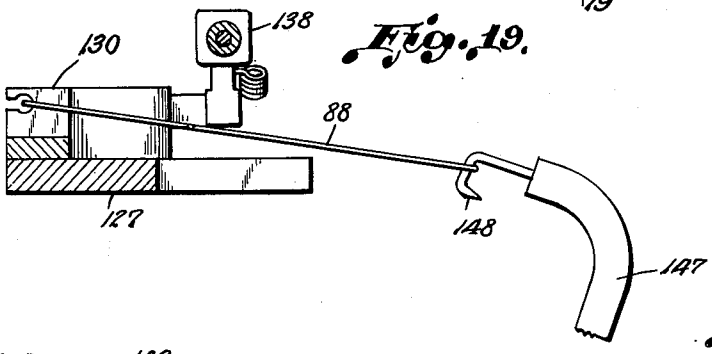


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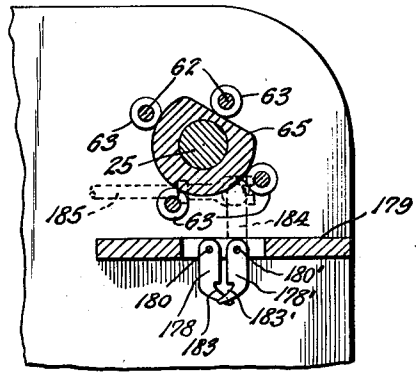
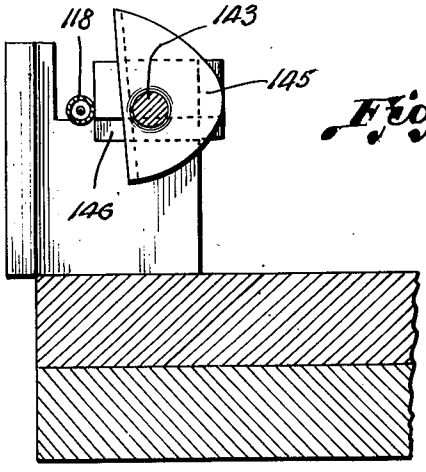


Fig. 20.



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Fig. 21.

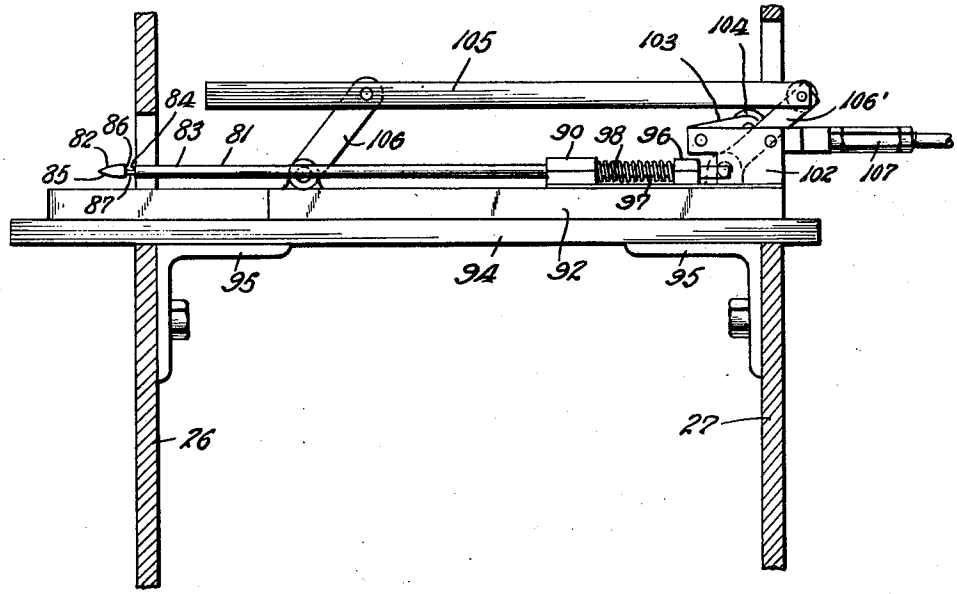


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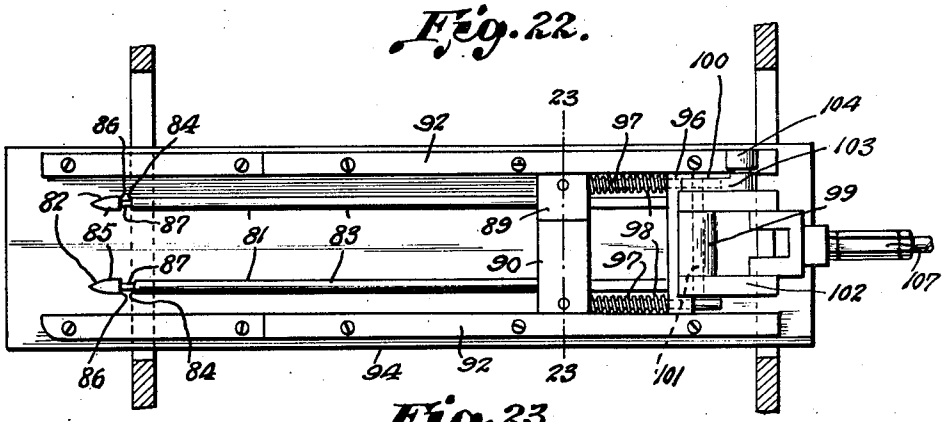
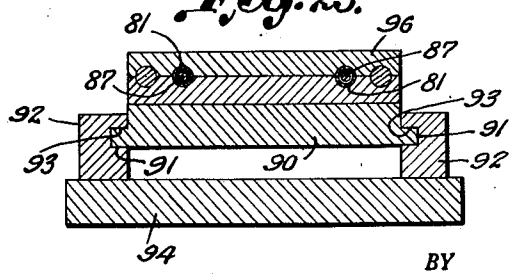


Fig. 23.



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Fig. 24.

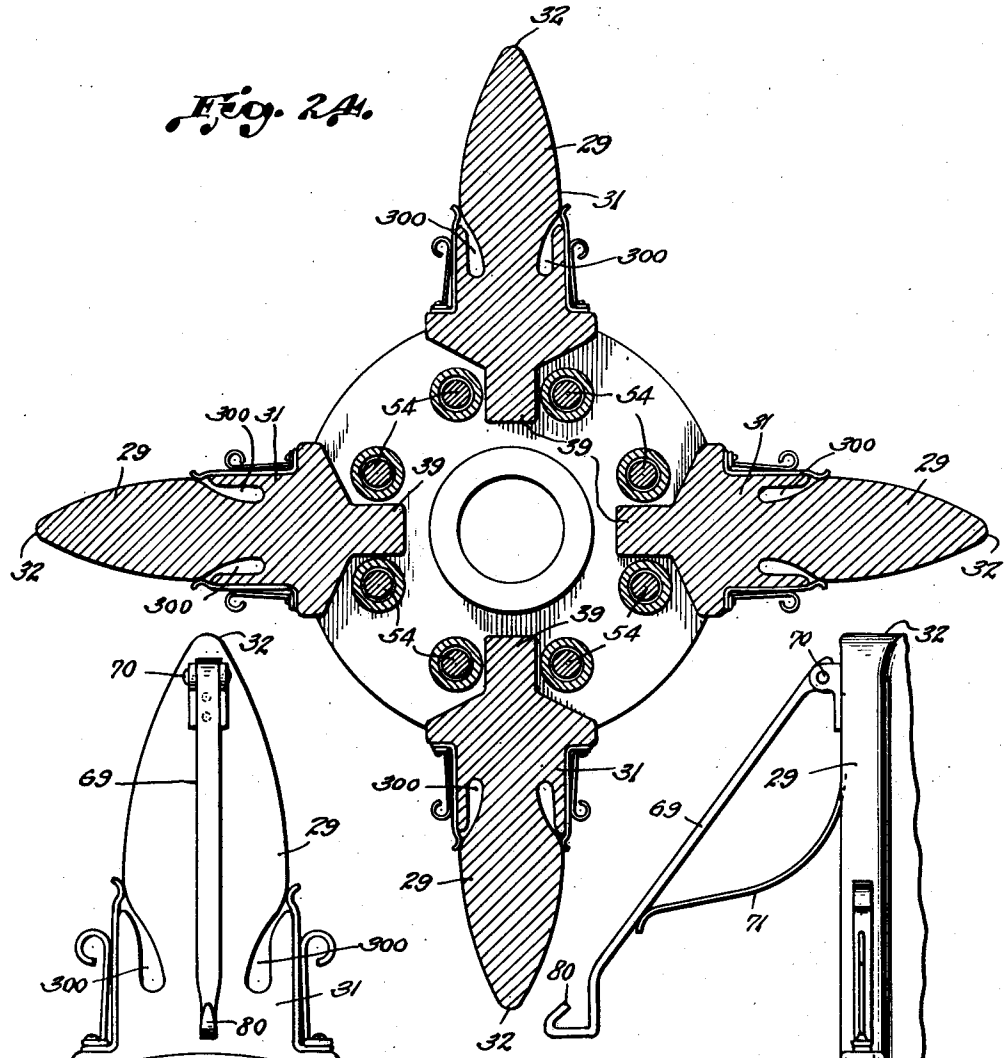


Fig. 25.

Fig. 26.

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Fig. 29.

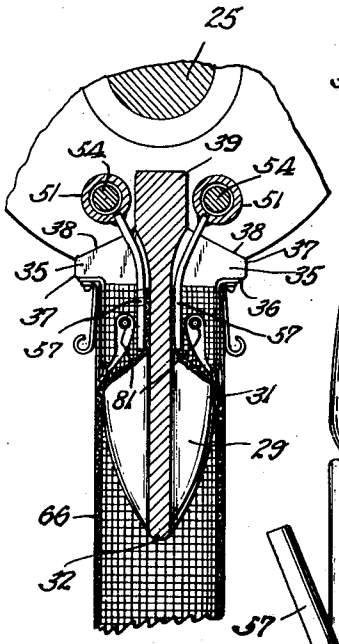


Fig. 27.

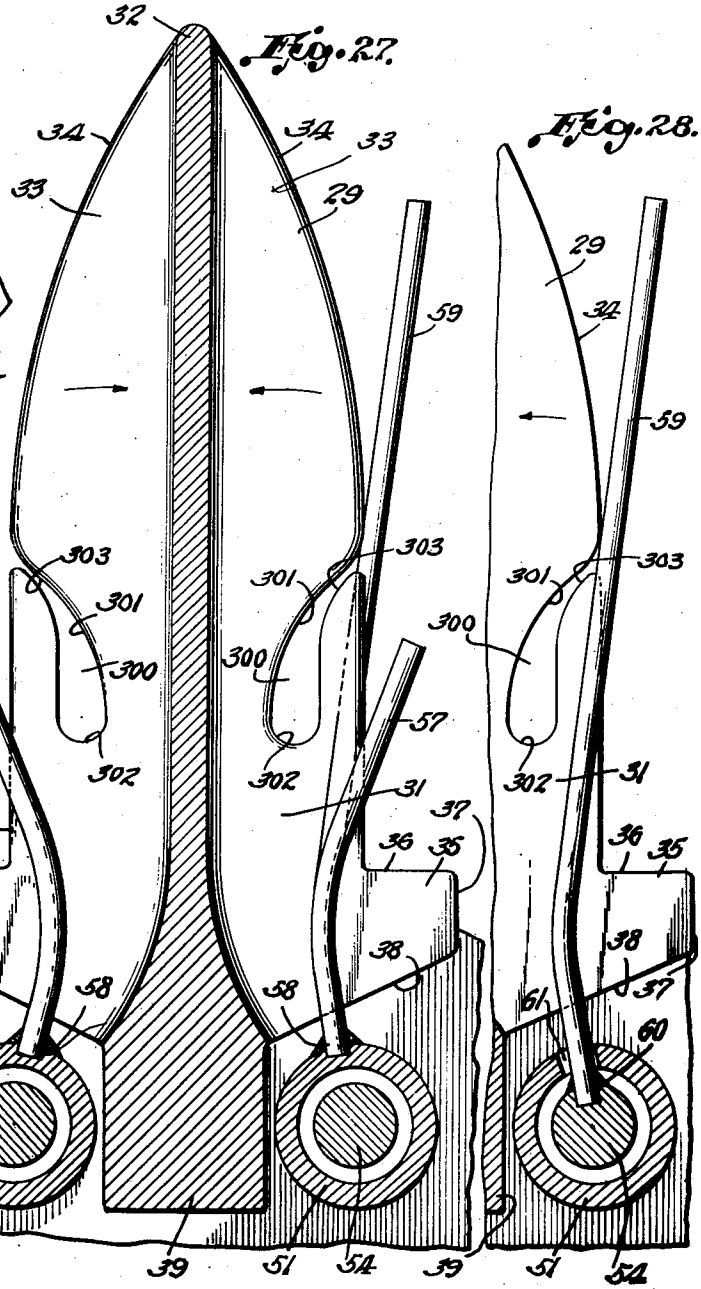


Fig. 28.

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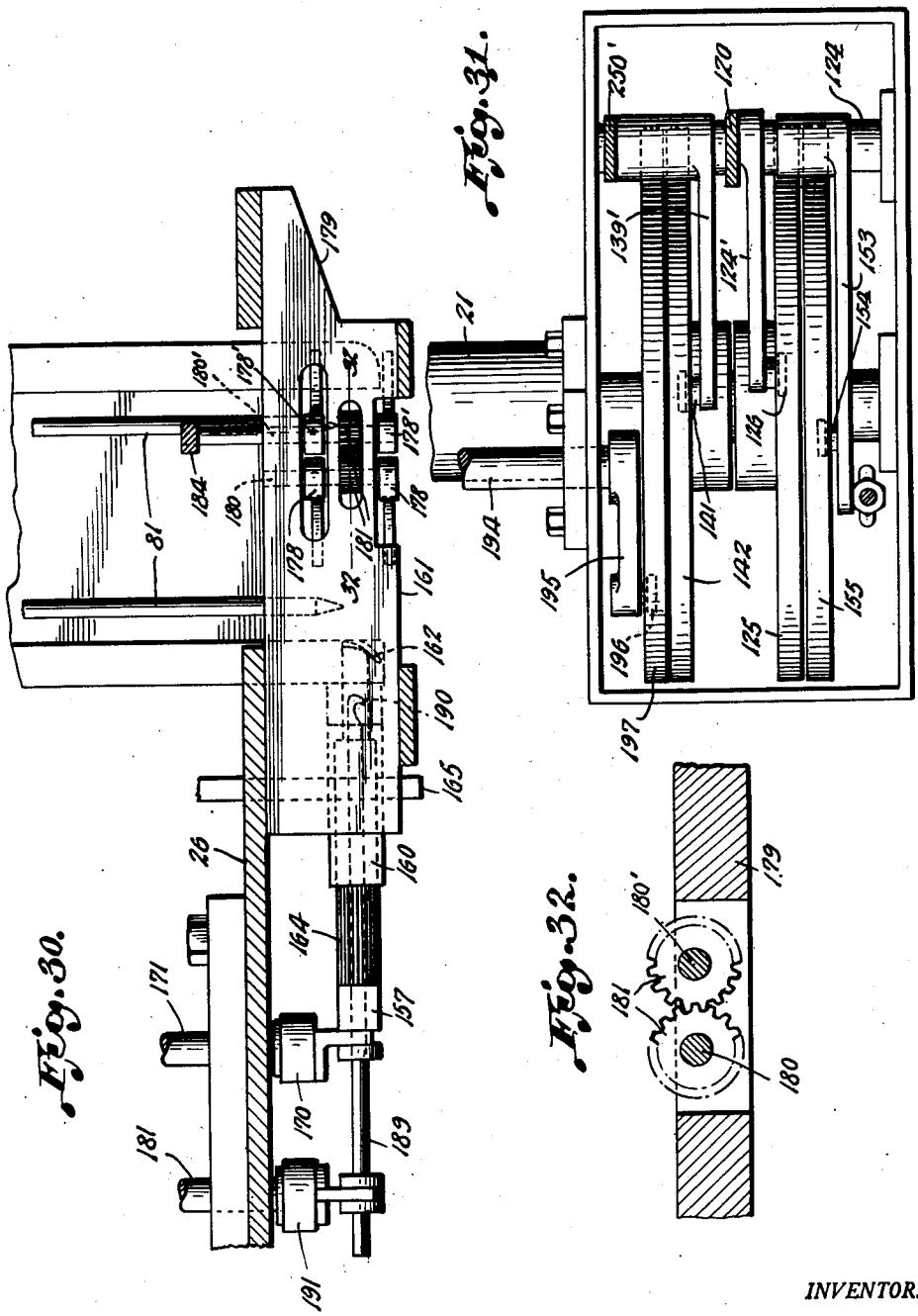
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Fig. 33.

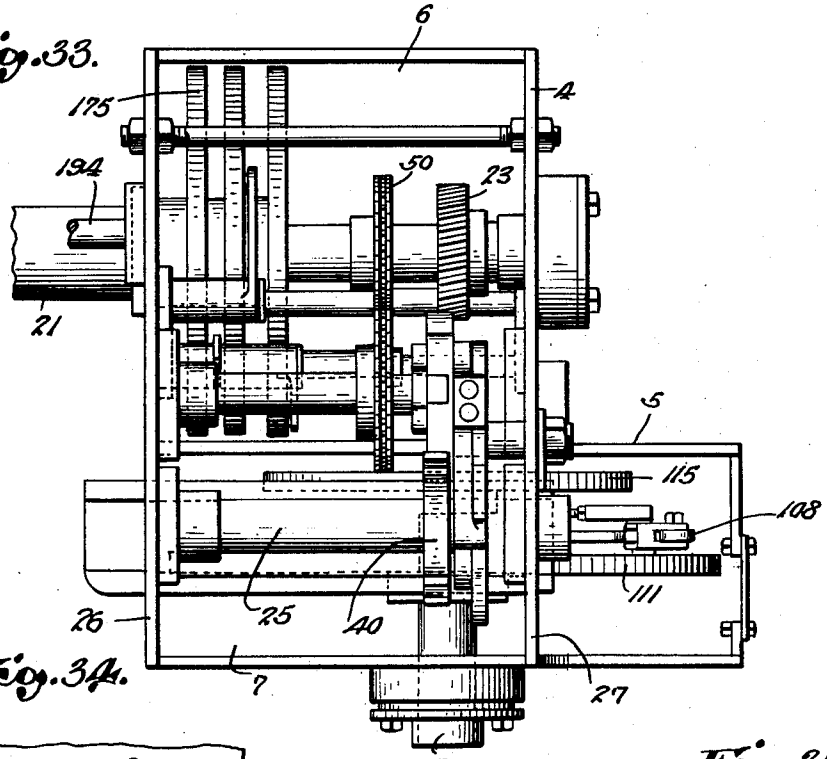


Fig. 34.

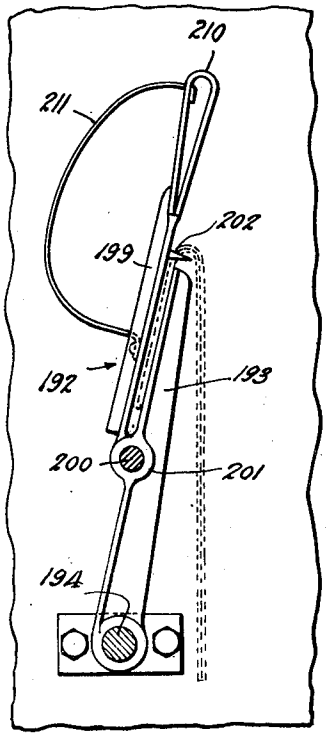
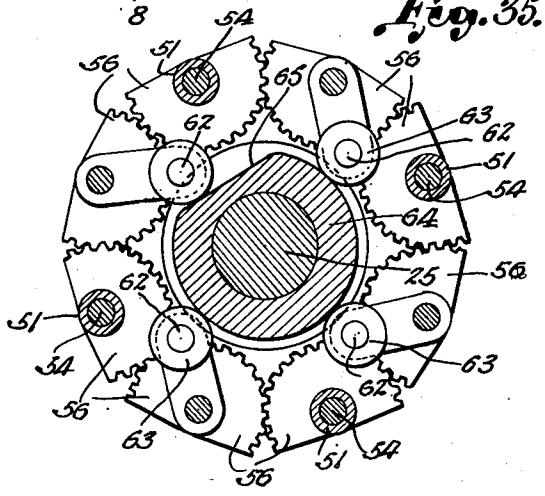


Fig. 35.



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Fig. 37.

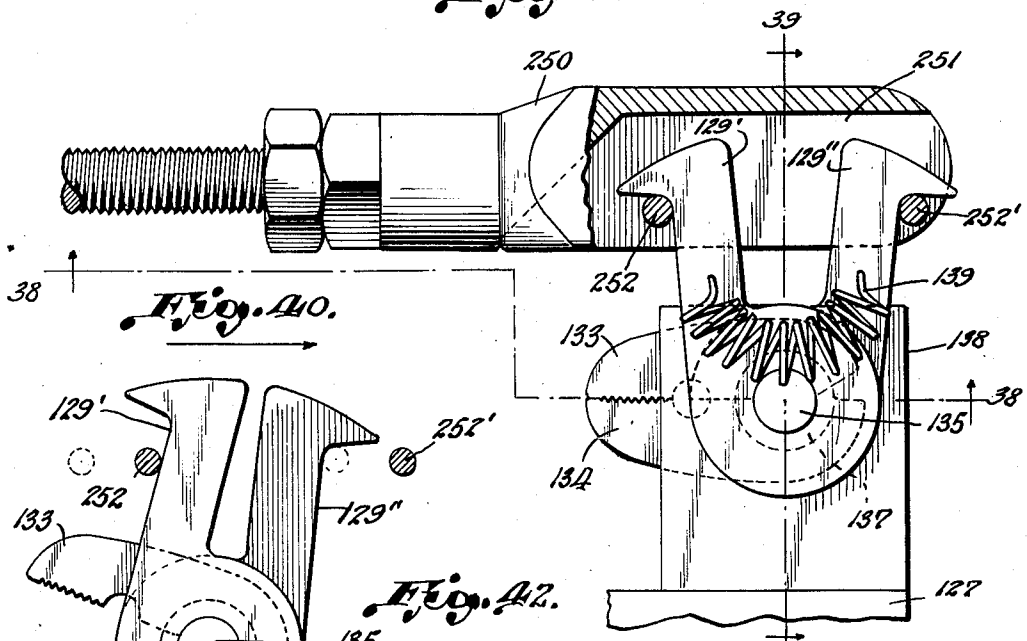


Fig. 40.

Fig. 42.

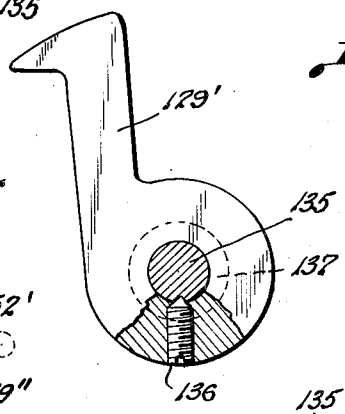


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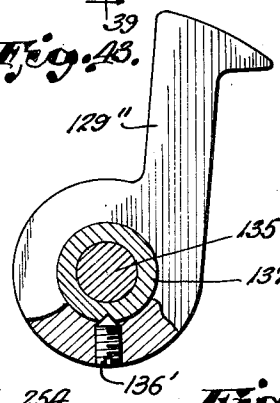


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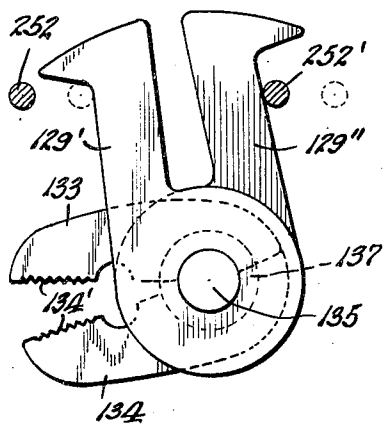
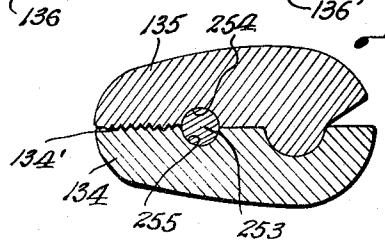


Fig. 44.



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Fig. 38.

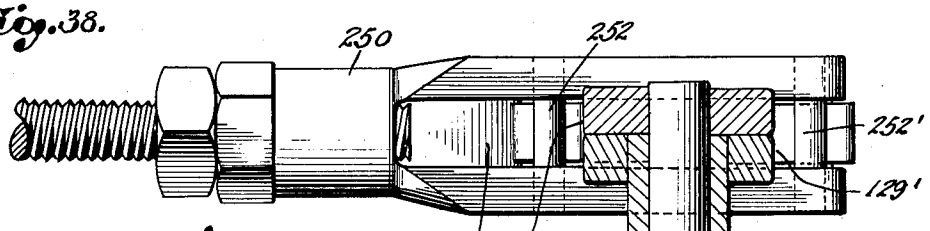
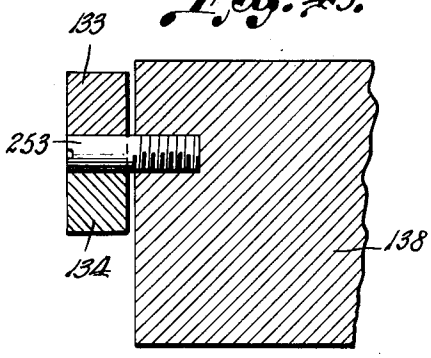


Fig. 45.



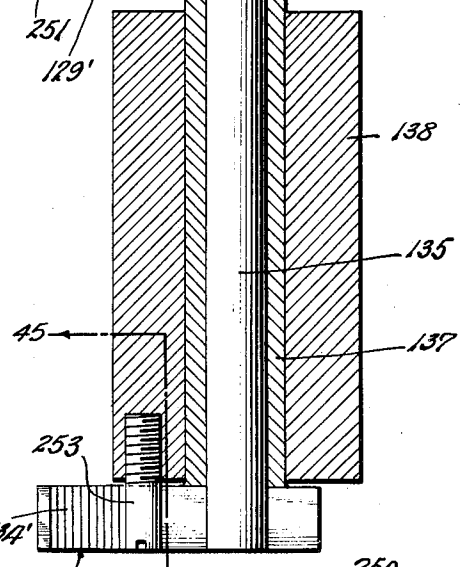


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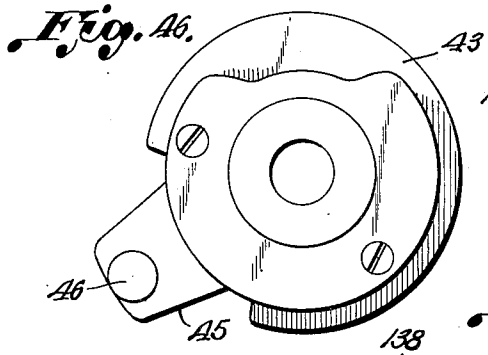
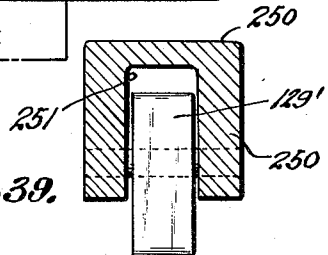
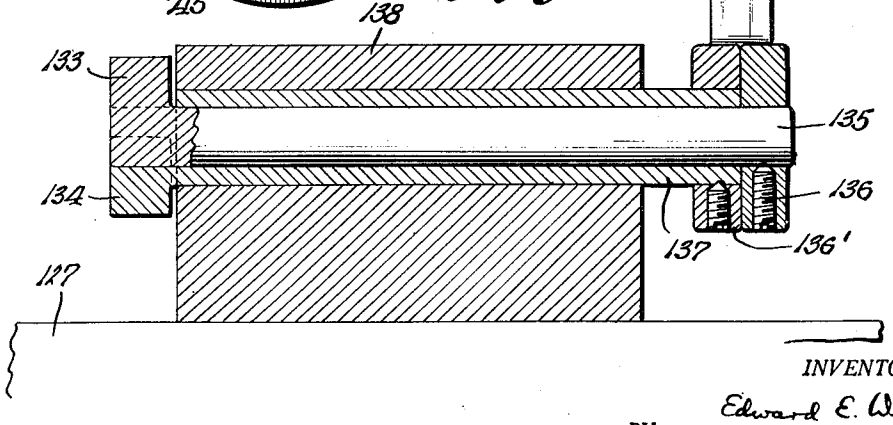


Fig. 39.





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Fig. 49.

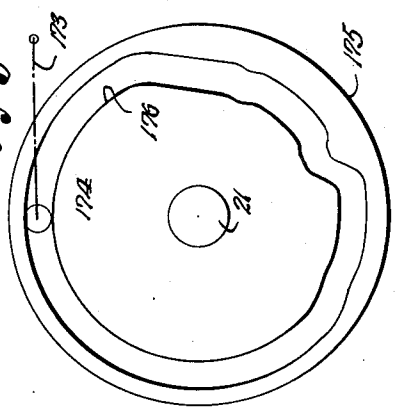


Fig. 52.

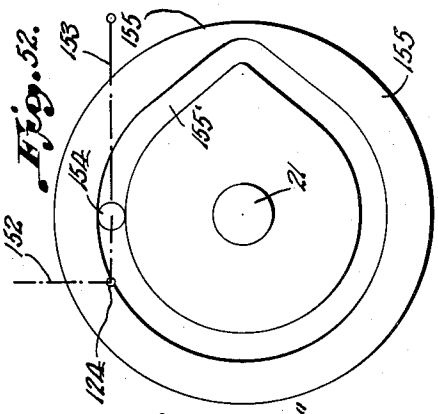


Fig. 48.

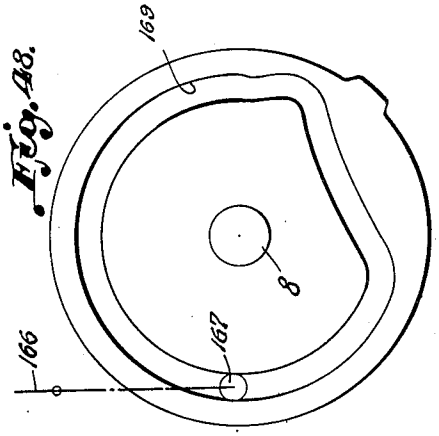


Fig. 51.

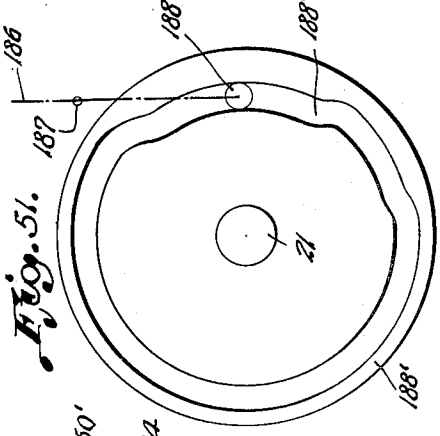


Fig. 47.

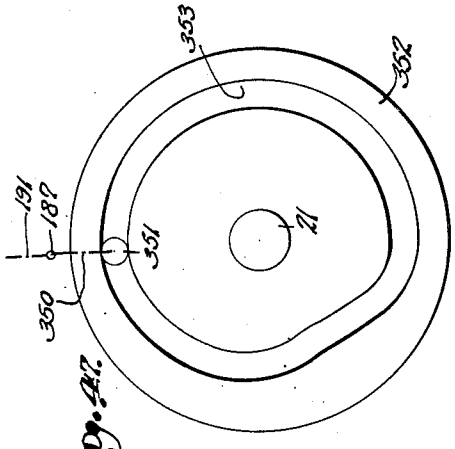
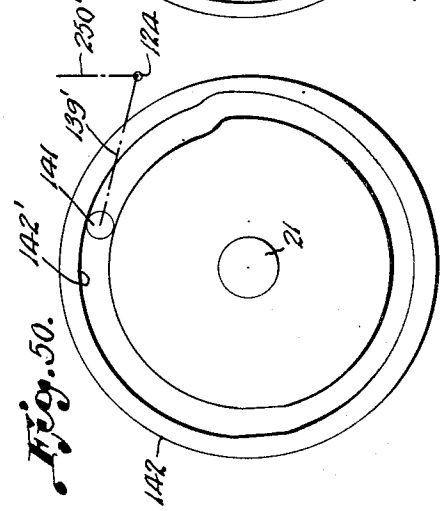


Fig. 50.



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Fig. 53.

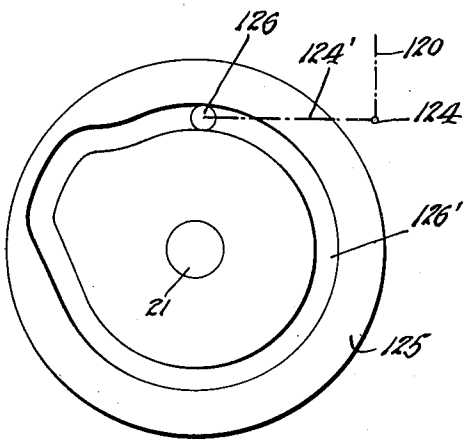


Fig. 54.

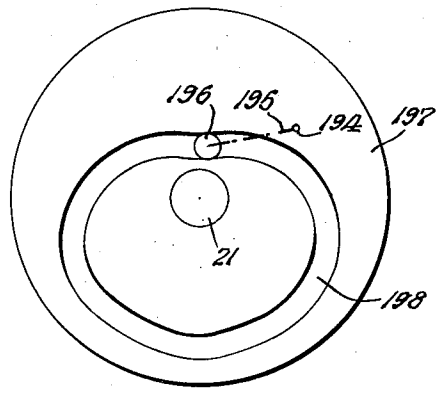
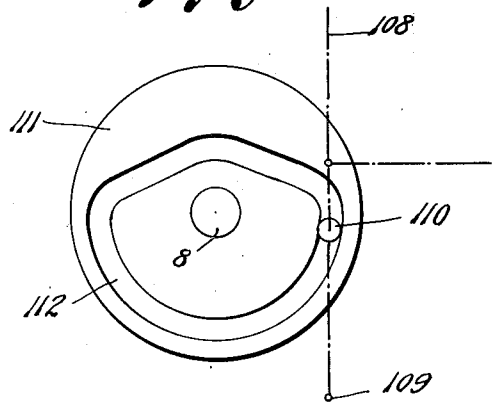


Fig. 55.



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UNITED STATES PATENT OFFICE

2,511,658

BAG STRINGING MACHINE

Edward E. West, Richmond, Va.

Application November 14, 1947, Serial No. 785,968

13 Claims. (Cl. 112—2)

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The present invention relates to a machine for automatically stringing netted or open mesh bags for produce and the like.

It is necessary in using woven netted or open mesh bags for perishable products, such as, fruit and vegetables, to place draw strings in the open mouths thereof so that the bags may be closed when filled. Heretofore, it has been the practice to place the draw strings in such bags by entirely hand methods, but such methods have proved unsatisfactory and costly. In the first place, it is impossible to uniformly string netted bags by hand because the loop of the string will vary in length. If the loop of the string is too short, the strung bag will be subjected to either too much stress when the bag is placed on the automatic filling or packaging machine which results in the string and/or bag being torn or weakened. On the other hand, if the string loop is too long, the bag mouth may not be uniformly and securely closed when the draw string is pulled to closed position in the packaging machine, and the filler may have a tendency to work its way out of the openings left in the mouth thereof. It has also been the practice to weave the draw string through the mouth of the bag while the latter is still in the loom, that is, to weave the string therein. This has been unsatisfactory in that there is no way of providing a uniform length of string, that is, a string which will properly close the mouth of a bag, while the bag remains in the loom which often results in the mouth end of the bag being puckered and partially closed after the string is woven therein. The stringing operation also has a tendency to interfere with the normal operation of the loom.

It is, therefore, the principal object of this invention to provide a novel automatic machine for uniformly stringing netted or open mesh bags.

A further object is the provision of automatic means for uniformly stringing netted bags, knotting the draw strings, and removing the strung bags preparatory to being filled.

Another object is to provide an automatic machine for supporting and operating upon three netted bags simultaneously, so that one bag is being arranged in gripped position preparatory to stringing, a second bag is being strung, and a third bag is being removed from the machine and stacked in position to be received by an automatic filling or packaging machine.

Still another object is the provision of a novel means for supporting and puckering or pleating the open mouth of a netted bag preliminary to stringing. A still further object is to provide

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novel means for stringing and knotting netted bags.

Another object is the provision of novel means for removing the strung bags from the machine and arranging the same in counted stacks.

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

Figure 1 is a plan view of the complete bag stringing machine, showing the relative positions of the bag supporting, stringing, knotting, bag removing and stacking mechanisms;

Figure 2 is a front elevation of the complete bag stringing machine;

Figure 3 is a side elevation of the complete bag stringing machine;

Figure 4 is a side elevation of the complete bag stringing machine;

Figure 5 is a front elevation, of the machine showing the bag supporting turret head and part of the frame partly in section taken on the line 5—5 of Figure 3;

Figure 6 is a rear elevation of the machine, partly in section and taken on the line 6—6 of Figure 1;

Figure 7 is a perspective view of the complete bag stringing machine, viewed from the front;

Figure 8 is a front elevation of the bag supporting turret head and associated stringing and knotting mechanisms;

Figure 9 is a side elevation of the bag supporting turret head and associated string, feeding, gripping and cutting mechanisms, with portions thereof broken away, as viewed from the left side of the machine;

Figure 10 is a section on the line 10—10 of Figure 8, showing part of the gear mechanism for operating the bag pleating members;

Figure 11 is a section on the line 11—11 of Figure 6, showing part of the gear mechanism for operating the bag pleating members, the knotter mechanism, and the bag removing member;

Figure 12 is a section on the line 12—12 of Figure 8, showing the Geneva bag supporting head operating mechanism;

Figure 13 is a section on the line 13—13 of Figure 8, showing part of the Geneva mechanism;

Figure 14 is a section on the line 14—14 of Figures 2 and 6, showing a portion of the drive mechanism;

Figure 15 is a section on the line 15—15 of Figure 2, showing the cam, lever and link for operating the string gatherers;

Figure 16 is a side elevation, partly in section

on the line 16—16 of Figure 2, showing the string feeding, gripping and cutting mechanisms;

Figure 17 is a section on the line 17—17 of Figure 3, showing the string looper, and part of the mechanism for operating the string feeding and gripping mechanisms;

Figure 18 is a plan view of the string feeding, gripping, cutting and looping mechanism;

Figure 19 is a section on the line 19—19 of Figure 18, showing the string guiding block and string looper;

Figure 20 is a section on the line 20—20 of Figure 18, showing a portion of the string feeding tube and cutter mechanism;

Figure 21 is a front elevation of the needles and operating mechanism therefor;

Figure 22 is a plan view of the needles and operating mechanism therefor;

Figure 23 is a section on the line 23—23 of Figure 22, showing the needle saddle;

Figure 24 is a section on the line 24—24 of Figure 8, showing the bag supporting forms;

Figure 25 is a side elevation of one of the bag supporting forms and associated stretcher arm;

Figure 26 is a front elevation of a portion of one of the bag supporting forms, showing the associated stretcher arm in expanded position;

Figure 27 is a section on the line 27—27 of Figure 8, showing a portion of one of the bag supporting forms and part of the associated pleating mechanism;

Figure 28 is a section on the line 28—28 of Figure 8, showing a portion of one of the bag supporting forms and one of the associated pleating fingers;

Figure 29 is a section on the line 29—29 of Figure 8, showing a portion of one of the bag supporting forms with a bag supported thereon in stringing position;

Figure 30 is a plan view of the knotting mechanism and associated string gatherers and portions of the needles;

Figure 31 is a plan view of a portion of the horizontal driven shaft and some of the operating cams mounted thereon;

Figure 32 is a section on the line 32—32 of Figure 30, showing the gears for actuating the string gatherers;

Figure 33 is a plan view of some of the main longitudinal and horizontal driven shafts, the turret head shaft, and some of the operating cams mounted thereon;

Figure 34 is a side elevation of the bag removing member, partly in section and taken on the line 34—34 of Figure 6;

Figure 35 is a section on the line 35—35 of Figure 8, showing part of the gear and cam mechanism for actuating the bag pleating fingers;

Figure 36 is a section on the line 36—36 of Figure 8, showing portions of the pleating fingers and string gatherers operating mechanisms;

Figure 37 is a side elevation of the string gripper operating mechanism, partly broken away and in section;

Figure 38 is a section on the line 38—38 of Figure 37;

Figure 39 is a section on the line 39—39 of Figure 37;

Figure 40 is a side elevation of the string grippers and actuating levers, showing the grippers in string receiving position;

Figure 41 is a side elevation of the string grippers and actuating levers, showing the grippers in string releasing position;

Figure 42 is a side elevation of one of the gripper actuating levers, partly broken away and in section;

Figure 43 is a side elevation of one of the gripper actuating levers, partly broken away and in section;

Figure 44 is a cross section through the string gripping jaws;

Figure 45 is a section on the line 45—45 of Figure 38;

Figure 46 is a side elevation of part of the Geneva operating mechanism;

Figure 47 is a diagrammatic face view of the cam on the horizontal driven shaft for reciprocating the knotter pin;

Figure 48 is a diagrammatic face view of the cam on the main longitudinal driven shaft for rotating the knotter rod;

Figure 49 is a diagrammatic face view of the cam on the horizontal driven shaft for reciprocating the knotter rod;

Figure 50 is a diagrammatic face view of the cam on the horizontal driven shaft for actuating the string gripper;

Figure 51 is a diagrammatic face view of the cam on the horizontal driven shaft for actuating the string gatherers;

Figure 52 is a diagrammatic face view of the cam on the horizontal shaft for actuating the cutting knife rod;

Figure 53 is a diagrammatic face view of the cam on the horizontal driven shaft for reciprocating the string feed tube;

Figure 54 is a diagrammatic face view of the cam on the horizontal driven shaft for rocking the bag removing member; and

Figure 55 is a diagrammatic face view of the cam on the main longitudinal driven shaft for reciprocating the needle carriage.

Before discussing the structural details of the present mechanism, the general operation thereof will be briefly discussed. Thus, it will be understood, from the following detailed description, that an operator places the open mouth of a netted or open mesh bag on a horizontally disposed bag supporting member of a rotating turret head having four gripping members thereon, the mouth end thereof is engaged by gripping elements and the mouth puckered or pleated preliminary to stringing; the turret head is rotated ninety degrees to carry the bag gripper and bag to a downwardly extending vertical position where the puckered mouth is provided with a draw string and the latter is knotted; and a further ninety degree rotation of the turret delivers the strung and knotted bag to a horizontal position where the bag is removed, counted, and stacked in position to be placed in an automatic filling or packaging machine.

Referring more particularly to the drawings, wherein like reference characters designate similar parts throughout the several views, the numeral 1 denotes a main frame, mounted on a base 2, and comprising two spaced vertical cam boxes 3 and 4, the latter of which is divided by a wall 5 into two cam compartments 6 and 7. Extending longitudinally through and suitably journalled in the cam box 4 is a main drive shaft 8 carrying a sprocket wheel 9 on the extended inner end thereof. The sprocket wheel 9 and shaft 8 are rotated in a clockwise direction, viewing Figure 6, by a chain or the like 10 which travels over a small sprocket wheel 11 (see Figures 3 and 4) carried by a longitudinal stub shaft 12 journalled in a gear box 13 suitably mounted

on the base 2 of the frame 1. A worm 14, formed on the shaft 12 drivingly engages with a worm 16 on a horizontal stub shaft 15 journalled in and extending laterally from the gear box 13. A pulley wheel 17 mounted on the extended end of stub shaft 15 is drivingly connected with a shaft 19 of a suitable source of power, such as an electric motor 18 supported on the frame base 2, by a pulley 20, as best shown in Figures 3 and 4. Extending transversely through and suitably journalled in the spaced cam boxes 3 and 4 is a horizontal driven shaft 21 which is arranged above and at right angles to the main driven shaft 8. The horizontal shaft 21 is drivingly connected with the shaft 8 by helical gears 22 and 23 on the shafts 8 and 21 respectively. Various driving cams and associated mechanisms, hereinafter to be described in detail, are mounted on the longitudinal and horizontal driven shafts 8 and 21.

Rotating bag holding turret head (Figures 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 24, 27 and 28

The purpose of this mechanism is to provide a means, such as a rotating turret head 24, having a plurality of bag supporting members for receiving netted bags in a horizontal position and for intermittently rotating the bags to a downwardly depending vertical stringing position, thence to a horizontal position where the strung bags are removed from the head and delivered to a stacking mechanism, and thence to an upwardly extending vertical idle position, after which the head is further rotated to return the bag supporting members to the first mentioned horizontal bag receiving station in position to receive another bag for stringing. It will, of course, be understood from the following description that while one bag is being positioned by an operator on the turret head, the preceding bags are simultaneously being strung and removed therefrom, so that the turret head simultaneously accommodates three netted bags for the purposes herein set forth.

The rotating bag holding turret head 24 is mounted on a horizontal shaft 25, suitably journalled in the spaced walls 26 and 27 of the cam box 4 and projecting laterally from the wall 26 adjacent the upper end thereof. The bag holding turret head 24 comprises two spaced annular plates or discs 28—28' to which are suitably secured, by screws or the like 30 as shown in Figure 3, four spaced radially extending bag supporting arms or forms 29 which extend transversely across or bridge the plates 28—28' and project radially therefrom at four equally spaced intervals. As each of the arms is identical, it is necessary to describe only one thereof. Thus, each arm 29, as best shown in Figures 24 to 28, consists of a relatively thick body portion 31 which tapers gradually outwardly in cross section and terminates in a relatively narrow rounded or flattened outer end, as at 32. Three uniformly spaced, somewhat U-shaped parallel grooves 33, see Figures 1, 2, 6 to 8, are formed in each side of the body portion 31 which grooves 33 extend longitudinally from the base to the reduced outer end thereof. It will thus be seen that the grooves 33 are separated from each other by four somewhat rounded ribs or projections 34 extending longitudinally from end to end thereof. The lower ends of each of the ribs 34 terminate in four outwardly extending enlargements 35 having flattened upper and outer faces 36 and 37 respectively, the undersides of

which enlargements slope downwardly or inwardly, as at 38, to a relatively short base extension 39, as best shown in Figures 27 and 28. Needle openings 300 extend horizontally through each of the ribs 34 between the upper and lower ends thereof, which openings taper upwardly and outwardly, as at 301, to provide openings for the passage of the stringing needles through both ribbed sides of the bag forms 29. Access to the openings 300 is afforded by downwardly and inwardly flared slots 303 to permit of the removal of the string, which has been placed in the mouth of the bag during the stringing operation, when the bag is withdrawn from the bag forms 29. It will be understood that more or less grooves may be provided in the bag arms 29 so that bags of different widths may be puckered, as presently described.

The bag holding turret head is intermittently rotated to carry the bag holding arms or forms 29 to the various stations, by means of a Geneva mechanism. A Geneva gear 40, keyed to one end of the turret head shaft 25, is formed with radial portions 41, four in number, separated by radial slots or grooves 42, the faces or slots of these grooves being arcuate, as shown in Figures 7 and 12. Cooperating with this Geneva gear 40 is a circular disk 43, cut away at 44, and having a radially disposed arm 45 provided with a Geneva driving pin 46. The disk 43 is mounted on a horizontal shaft 47 journalled in the spaced walls 26 and 27 of the cam box 4. The shaft 47 is rotated by a sprocket chain 48 which travels over sprockets 49 and 50 on the shaft 47 and the horizontal driven shaft 21, respectively. As the horizontal shaft 21 is geared to the main longitudinal shaft 8, it will be seen that normally the circular periphery of disk 43 engages one of the arc-shaped sectors 41 of the Geneva gear 40 and, once in each rotation of the shaft 47, the Geneva pin 46 will engage one of the radial slots 42 and move the Geneva gear 40 one quarter of a turn. Each step by step movement imparted to Geneva gear 40 causes the turret head to rotate one quarter of a revolution thus moving the first receiving arm or form 29 from a horizontal to a downwardly depending or vertical stringing position, and thence to a horizontal delivering station, and finally to an upwardly extending vertical or idle position.

Puckering or pleating fingers are associated with each of the bag supporting forms 29 for engaging with a bag positioned thereover and causing the mouth end thereof to be puckered or pleated in such a manner that the stringing needles enter and deliver a string through the pleated portions of the bag. As best shown in Figures 7 and 10, the fingers are mounted, as hereinafter described, on a series of eight tubular shafts 51, journalled in and extending between the spaced turret head plates 28—28' in pairs on either side of the base extensions 39 of each of the four bag supporting forms 29. Stop collars 52 are mounted on the ends of the shaft 51 projecting through the plates 28, and gears 53 are fixedly secured to the ends thereof extending through plates 28'. As the gears 53 of each pair of shafts are in mesh with each other, as shown in Figure 10, it will be seen that the shafts 51 on either side of each supporting form 29 will be rotated in opposing directions, in a manner and for a purpose to be presently described. A shaft 54, sleeved within each of the shafts 51 and provided with a stop collar 55 on one end thereof, projects at one end through the gears

53 and a segment gear 56 is fixedly mounted thereon. The segment gears 56 are in mesh with each other, as best shown in Figures 11 and 35. As best illustrated in Figures 27 and 28, two spaced, vertical, slightly curved fingers or pins 57 are suitably mounted, as at 58, on the upper portions of each of the shafts 51, and an intermediate, correspondingly shaped, finger or pin 59 is mounted, as at 60, in each of the inner shafts 54 and project upwardly through an aperture 61 in the shaft 51. Thus, three fingers 57 and 59 are arranged on either side of each of the bag forms 29, and the fingers are so spaced with respect to each other that they are adapted to be rocked, as hereinafter described, into and out of the previously described U-shaped grooves 33 in each side of the bag forms so that each side of the mouth end of a bag is forced into the grooves 33 in the bag forms 29 and caused to be puckered or pleated. Thus, one of the shafts 54 in each pair of shafts extends through the segment gear 56 thereon and has a laterally extending arm 62 (see Figure 35) suitably secured to the end thereof. A cam roller 63, mounted on the end of each arm 62, engages with and rides over a flattened face 65 on a cam 64 mounted on the turret shaft 25, as best shown in Figure 35, during the rotation of the latter in a clockwise direction viewing Figure 11. By reference to Figures 7, 27 and 28, it will be noted that the centermost finger 59 mounted on the inner shaft 54 arranged on the right side of each bag form 29, viewing Figures 27 and 28, is substantially longer than the two other fingers 57 to assure of the underside of the bag being properly supported when the bag is being placed on the form.

As the centermost fingers 59 are mounted on the inner shafts 54 which are actuated by the cam construction just described it will be understood that, after a bag has been manually sleeved by an operator over a horizontally disposed bag form 29, and during the rotation of the turret shaft 25 and the bag form 29 from the horizontal feeding station to the downwardly extending vertical stringing station, the centermost fingers 59 will first be rocked inwardly in opposed directions (see the direction arrows of Figure 27) slightly ahead of the fingers 57 until the fingers 59 engage the sides of the bag and force the same into the middle grooves 33 of the bag form 29. During this movement of the shafts 54, the shafts 51 are also rotated, as previously described, so that the fingers 57 are also rocked in opposed directions, viewing Figures 27 and 28, into engagement with the bag and force the bag material into the two remaining bag form grooves 33. By virtue of this arrangement and operation of the fingers 57 and 59, it will be understood that the sides of a bag will be uniformly positioned within the bag form grooves 33 without any danger of becoming jammed or unevenly placed therein.

To position a bag 66 on the turret head, the machine operator grasps a bag with both hands and inserts the open mouth over the horizontally disposed bag form 29 and pushes the same thereabout until the end of the bag abuts two metal stops 67, Figure 7, secured to the sides of each of the bag forms 29 adjacent the lower ends thereof, as at 68. The mouth of the bag is held in a more or less stretched position on the bag form 29 by a pair of stretcher arms 69 which are pivotally mounted at their upper ends, as at 70, to the upper ends of the bag forms at the sides thereof. Leaf springs 71 secured to the sides

of the bag forms 29, as at 72, engage the undersides of the stretcher arms 69 and normally cause the latter to be deflected outwardly, as best shown in Figures 5, 7 and 26. Thus, when the bag is positioned on the horizontally disposed bag form 29, as just described, the stretcher arms 69 will engage the inside of the bag and stretch the mouth end laterally in an obvious manner. As it is necessary to move the stretcher arms 69 inwardly during the puckering or pleating of the mouth of the bag prior to the stringing of the latter, two substantially U-shaped cam tracks 73 are arranged on either side of the turret head, with the cam track on the left side of the turret, viewing Figure 7, being supported on the frame by posts 74 secured to the frame, as at 75, and the cam track on the right side being bolted or otherwise suitably secured to the frame, as at 76 (see Figure 11). Each of the cam tracks has two upwardly extending curved leg portions 77 which extend upwardly and are slightly offset as at 78, to provide curved cam surfaces 79 with which the hooked or bent lower ends 80 of the stretcher arms 69 frictionally engage during the travel of the bag forms 29 from the horizontally disposed bag receiving station to the downwardly disposed stringing station, and thence to the horizontally disposed bag removing station. Thus, it will be seen that during the movement of the form 29 from the receiving to the stringing stations, the hooked lower ends 80 of the arms 69 will ride downwardly over the cam surfaces 79 of the cam tracks 73 so that the arms 69 will be deflected inwardly into positions substantially parallel with the side edges of the bag form, when the latter is in its stringing position. It will, of course, be apparent that, during the travel of the turret and bag form 29 from the stringing to the bag removing stations, the hooked ends 80 of the arms 69 will ride upwardly over the cam surfaces 79 of the cam tracks 73 so that the stretcher arms 69 will resume their deflected or expanded positions preparatory to another bag being assembled on the bag form.

In the downwardly extending vertical position of the bag form 29, the mouth end of the bag 66 will be aligned with a pair of parallel horizontally disposed needles 81. The needles together with their operating mechanism which are particularly shown and described in my tobacco bag stringing patents Reissue 22,596 and 2,367,986 and my pending application Serial No. 541,431, filed June 21, 1944, now Patent 2,486,350, dated Oct. 25, 1949, are provided with a draw string and are operated in much the same manner and by the same mechanism disclosed in my prior patents and application and, therefore, detailed drawings and description of the needles and operating parts will be dispensed with. Suffice to say that the needles, as best shown in Figures 5, 6, 7, 21 and 22, comprise pointed shank members 82, reciprocably mounted in tubular sleeve members 83 for opening and closing the needle jaws 87, formed by the ends 84 of the sleeves and the rear faces 86 of the pointed ends 85 of the pair of needles 81, and that the ends of a draw string 88 are rigidly supported at their rear ends by and fixed in a needle saddle 89 suitably secured to the top of a needle carriage 90. The needle carriage is provided with laterally extending side flanges 91 which interfit in grooves 93 (see Figure 23) formed in a pair of spaced parallel tracks 92 fixed to the upperside of a flat top plate 94 mounted on and suitably secured to supporting brackets 95 carried by the cam box walls 26 and

27. The rear ends of the pointed shank members 82 are fixed in a small block 96, suitably mounted on the carriage 90 for slight sliding movement relative thereto. Block 96 is inwardly actuated against the tension of springs 97 mounted on posts 98 by means of a small cam 99 carried by one arm 101 of a crank 100. The arm 101 is rotatably mounted in a block 102 mounted on the needle carriage 90. The other arm 103 of crank 100 carries a roller 104 periodically actuated by a horizontally disposed arm 105 which is pivotally mounted on the top plate 94 by links 106—106' so that the arm is vertically movable relative to the plate 94 as presently described. The needle carriage 90 is reciprocated back and forth by the action of a suitably actuated arm 107, in turn pivoted at its one end to the rear end of the carriage block 102, and the outer end of the arm 107 is pivoted to the upper end of a vertically disposed lever 108 which is pivotally mounted at its lower end, as at 109, to the machine frame. A cam roller 110 (see Figure 5) is mounted on the lever 108 and rides in a cam groove 112 in the side face of a cam 111 mounted on the main longitudinal driven shaft 3. The curvature of the cam groove 112, as shown in Figure 55, is such that as the cam is rotated, the roller 110 will be acted upon and the lever 108 and arm 107 will be rocked and the needle carriage 90 reciprocated. During the reciprocation of the needle carriage, the needles are moved to open and closed positions to receive and clamp a draw string and thereafter release the same after the string has been delivered through the bag by the needles by the action of the horizontally disposed arm 105 on the crank 100. The arm 105 is raised and lowered by means of an offset arm 113 (see Figure 8) connected to the rearwardmost link 106' and pivotally connected to the upper end of a vertical lever 114 which is journalled on the frame, as at 114'. A cam roller 116, carried by the lower end of lever 114 rides on the periphery of a cam 115 on driven shaft 8. The curvature of the cam 115 is such that rotation of the cam 115 causes the lever 114 to be rocked and the arm 105 to be raised and lowered to open and close the needles.

With the bag positioned on a bag form 29 and the latter in the downwardly depending vertical stringing position, the puckering and/or pleating fingers 57 and 59 are actuated, as previously described, to force the bag material in the bag form grooves 33 and cause puckers or pleats to be formed in the sides of the bag. The needles 81 are then brought into play and, on the forward stroke of the needle carriage, the pointed shanks 82 thereof pass through the netted material of the bag 66 and thence through the openings 300 in bag form ribs 34 and the puckers or pleats in the bag mouth. In other words, each needle 81 passes through each side of the bag and passes out the opposite side thereof. After the needles have passed through the bag mouth on the forward stroke, it is necessary to feed a string into the needle jaws so that the string will be drawn through the bag on the rearward stroke of the needles. Thus, as best shown in Figures 7, 16 and 18, a horizontally disposed string feeding guide tube 118 through which extends a string 88 drawn from a suitable source of supply such as a roll, not shown, is fixedly mounted adjacent its rear end in a block 119 which is pivotally connected to the upper end of a vertical lever 120 which is offset, as at 121, to pass through an opening 122 in the side wall 123 on the cam box 3, and the lower end of which is fulcrumed on a shaft 124 in the cam box and is connected to an arm 124'. A cam roller 126 carried by the arm 124' rides in a cam groove 126' in one side face of a cam 125 (see Figures 1, 31 and 53) mounted on the horizontal driven shaft 21. The curvature of the cam groove 126' is such that rotation of the cam 125 rocks the lever 120 and reciprocates the string feeding guide tube 118 horizontally through a guide block 128 on a top supporting plate 127, suitably mounted on the upper end of the cam box wall 123, and across the needles 81 to carry the string 88 thereacross into position to be gripped by a string gripper 129. During the reciprocation of the string guide tube 118 across the needles, the former passes through aligned slotted openings 131 (Figure 18) in a needle guide block 130 fixedly mounted on the top supporting plate 127. A pair of longitudinal openings 132 are also formed in the guide block 130 for guiding the needles 81.

The gripper 129 and associated operating mechanism is substantially the same as that shown and described in my Bag making, stringing and tagging machine, Reissue Patent 22,596, so it is not believed necessary to describe and illustrate the same in detail herein. Suffice to say, the gripper 129 includes a pair of upper and lower gripping jaws 133 and 134 having coacting serrated gripping faces 134', as best shown in Figures 37 to 45. The lower jaw 134 is fixedly secured to the inner end of a hollow shaft 137 sleeved over a shaft 135, with the hollow shaft 137 in turn journalled within a bearing block 138 on the plate 127, and the upper jaw is fixedly secured to the inner end of shaft 137. Two upstanding levers 129' and 129'', having oppositely extending hooked upper ends, are fixedly connected to the outer ends of shafts 135 and 137, respectively, by means of screws 136 and 136' and the levers are normally retained in spaced apart relationship, as shown in Figure 37, by a spring 139. The hooked upper ends of the levers 129'—129'' extend into a slot 251 in a horizontally disposed rod 250 and respectively engage with pins 252 and 252' mounted in slot 251 of rod 250 which is pivotally connected to the upper end of a vertical lever 250' (Figure 17) extending through a slot 140 in the supporting plate 127. The lever 250' is fulcrummed on the shaft 124 and is connected to an arm 139'. A roller 141 carried by the lever 139' rides in a cam groove 142' of a cam 142 (see Figures 31 and 50) mounted on the horizontal driven shaft 21, and the contour of the cam groove is such that, during each rotation of the cam, the rod 250 is reciprocated to actuate the gripping jaws. A stop pin 253 (Figure 44) mounted in the end of bearing block 138 extends into and coacts with notches 254 and 255 in the upper and lower gripping jaws 133 and 134. Thus, when the rod 250 is pushed forwardly, the pin 252 rocks the lever 129' and the shaft 135 so that the upper jaw 133 is elevated to raised open Figure 40 position relative to the lower jaw 134, during which movement of the jaw 133, the stop pin 253 will act as a stop and prevent upward movement of the lower jaw 134, in an obvious manner. When the upper gripping jaw 133 has been raised to open position, the string guide tube 118 will be reciprocated forwardly to a position adjacent the gripping jaws and the string 88, projecting from the end thereof, will be projected into the open jaws. Continued rotation of the cam 142 results in the rod 250 being reciprocated rearwardly which moves the pin 252 rearwardly so that the action of spring 139 rocks the lever

129' and shaft 135 rearwardly so that the upper jaw 133 is lowered to string gripping Figure 44 position relative to the lower jaw 134 and the end of the string 88 is gripped by the jaws. When the string tube 118 has been retracted across the needles, the string drawn outwardly in the form of a loop, the needles brought into position and the needle jaws 87 thereof opened, and the cutters moved downwardly to press the string into the jaws of the needles, as presently described, the continued rearward movement of rod 250 causes the pin 252' to rock the lever 129'' and shaft 137 rearwardly so that the lower jaw 134 is rocked downwardly away from the upper jaw 133, as best shown in Figure 41. During this movement of the lower jaw 134, the stop pin 253 bears against and holds the upper jaw 133 stationary, so that the string is released by the jaws simultaneously with which movement the needle jaws close on and clamp the string.

A cutter rod 143, lying approximately parallel with the string guide tube 118, is journalled adjacent its ends in blocks 128 and 144 on supporting plate 127, as best shown in Figures 3, 18 and 20. The forward end of the rod 143 is provided with a laterally extending movable cutter blade 145 which coacts with a stationary blade 146 on the top plate 127 in cutting the string fed across the needles by guide tube 118, after the string has been gripped by gripper 129 and pulled outwardly by a bent string hook 148 formed on the upper end of a vertical lever 147. The lever 147 is pivoted at its lower end, as at 149, to the machine frame, and is pivotally connected intermediate its ends to an arm 150 which in turn is pivoted to the vertical needle saddle actuating lever 108. Thus, the lever 147 and string hook 148 are reciprocated simultaneously with the lever 108 and needle saddle so that the hook 148 is moved laterally in a clockwise direction, viewing Figure 5, and engages with the string 88 intermediate the needle jaws 87, whereupon movement of the lever 147 in the opposing direction pulls the string outwardly to form a loop. The cutter rod 143 is rocked in its bearings to move the cutter blade 145 downwardly into cutting engagement with the fixed blade 146 to sever the string by means of a crank arm 151 connected to the rear end thereof and to the upper end of a vertically disposed lever 152. The lower end of lever 152 is fulcrumed on the shaft 124 in the cam box, and is connected to an arm 153. A roller 154, carried by arm 153, engages with and rides in a cam groove 155' in the face of a cam 155 (see Figures 31 and 52) mounted on the horizontal driven shaft 21. The curvature of the cam 155 is such that the lever 152 and crank arm 151 are rocked to actuate the cutter rod 143 to sever the string S.

When the string has been gripped by gripper 129 and the string guide tube 118 retracted across the needles 81, the string hook 148 will draw the string outwardly to provide the necessary length of string. During this operation, the needles have reached the end of their forward stroke and the jaws 87 thereof are opened and positioned in alignment with the string guide tube 118 and string gripper 129, at which time the gripper and cutter 145 simultaneously move downwardly a relatively short distance thereby carrying or placing the string in the open jaws 87 of the needles, at which time the needles are actuated to cause the jaws 87 to close upon and grip the string and the movable cutter blade 145 is actuated to engage the stationary blade 146 and the string is severed or sheared. During this movement, the gripper 129 is actuated to free or disengage the string. The needles are now in position to move rearwardly and carry the string through the bag into position to be acted upon by a string knotter 156 for knotting the free ends of the string.

The knotter mechanism generally resembles one of the knotters described and illustrated in my bag stringing machine patents Reissue 22,596 and 2,374,572. Suffice to say that the knotter 156, as best shown in Figures 11 and 30, comprises a hollow knotter rod 157 slidably positioned within a bearing 160 secured to a plate 161 attached to the side wall 26 of the vertical cam box 4. The inner end of the knotter rod 157 is formed with a curved pointed hook 162 which serves to engage the string 88 and wind or loop the same around the head or inner end of rod 157 during the knotting operation.

The knotter rod is rotated by means of gear teeth 164, formed on the knotter rod 157, which mesh with a horizontally disposed rack bar 165 (Figures 5 and 6). The rack bar 165 slidably extends through the upper end of the block 160 and the wall 26 of the cam box 4 and is pivotally connected to the upper end of a vertical lever 166 fulcrumed intermediate its ends to the machine frame. A cam roller 167, mounted on the lower end of lever 166, rides in a cam groove 169 in the cam 115 carried by the main longitudinal driven shaft 8, so that the lever 166 is rocked to actuate the rack bar 165 and rotate the knotter rod 157 to form the loop of the knot.

The knotter rod 157 is reciprocated through the bearing 160 to advance the hook 162 into position adjacent to and in engagement with the string 88 positioned in the needles, and then to withdraw the string outwardly, while being rotated, so that the rod will loop or wind the string around the head thereof. This reciprocation of the rod 157 is accomplished by a vertically disposed lever 170 pivotally connected at its upper end to the knotter rod 157. The lever 170 (Figures 6 and 11) is mounted on a bushing 172 fixed on a stub shaft 171 journalled in the walls 26—27 of the cam box 4. A lever 173 carried by the bushing 172 has a roller 174 on the lower end thereof which rides in a cam groove 176 in the side face of a cam 175 (Figure 49) mounted on the horizontal driven shaft 21. Rotation of the cam 175 rocks the lever 170 and reciprocates the knotter rod 157 forwardly and rearwardly in bearing 160. At the end of the forward stroke, the hooked end 162 of the knotter rod will engage with and hook the string 88 adjacent the ends thereof in the needles and the rod will be retracted.

In order to assure of the hooked end 162 of the knotter rod engaging with and hooking both ends of the string, adjacent the ends thereof, two spaced pairs of downwardly depending scissors like string gatherers or clamps 177 are arranged on the sides of the knotter rod 157. As best shown in Figures 2, 7, 8 and 36, each string gatherer 177 embodies a pair of movable fingers 178—178' carried by a pair of shafts 180—180' journalled in a bracket 179 attached to the inner wall 26 of the cam box 4. The lower ends of the fingers 178—178' are provided with string engaging recesses 183—183', and the shafts 180—180' are drivingly connected together by gears 181 (Figures 30 and 32) arranged in the bracket 179. The end of one shaft 180 projects through the cam box wall 26 and is provided with an upwardly extending arm 184 (see Figure 15) pivoted at its upper end to a link 185, the other end of which is pivoted to the upper end of a vertical lever 186.

As shown in Figures 15 and 51, the lever 186 is fulcrumed to a stub shaft 187 journalled in the walls 26—27 of the cam box 4, and the lower end of the lever 186 carries a cam roller 188 which rides in a cam groove 188'' in the side face of a cam 188' on the horizontal driven shaft 21. Thus, it will be understood that the string recesses 183—183' of the fingers 178—178' engage the string 88 and, upon rocking of the fingers 178—178' as described above, are caused to gather or draw the string together to assure of the same being engaged and hooked by the knotter hook 162 adjacent their ends. During the return stroke of the rod 157, the latter is rotated, in the manner described in my previously mentioned Reissue Patent 22,596 whereby the string is wound around the head of the knotter.

Knotter pin 189 slidably but non-rotatably extends through the hollow knotter rod 157 and is formed with a curved inner end 190. The knotter pin 189 is slidably connected at its outer end to the upper end of a vertically disposed lever 191 fixedly secured to the end of a stub shaft 181 journalled in the walls 26—27 of the cam box 5, parallel to the stub shaft 171. A lever 350 fixed on stub shaft 181 has a roller 351 which rides in a cam groove 353 in the side face of a cam 352 (Figures 6 and 47) mounted on the horizontal driven shaft 21. The curvature of the cam groove is such that the lever 191 is rocked and the knotter pin 189 reciprocated through the knotter rod 157 so that the curved end 190 thereon engages the string and rearwardly draws the ends thereof through the loops formed on the head of the knotter rod 157 thereby completing the formation of the knot. During the knotting operation, the needle jaws are actuated to open position to release the ends of the strings and the stringing and knotting is completed.

Upon completion of the stringing and knotting operations, the turret head is further rotated one quarter of a revolution to move the bag supporting form 29 and strung bag to a horizontal releasing and removing station. During this travel of the bag form, the bag engaging pins 57 and 59 are rocked to their open positions, as previously described, and the bag is engaged by a bag removing member 192 which removes the same from the bag supporting form 29 and delivers it to a stacking table, to be hereinafter described, where the strung bags are arranged in a stack of a predetermined number of bags preparatory to being stored or filled.

The bag removing member 192 comprises a pair of spaced substantially flat, relatively short clamping fingers 193 carried by a shaft 194 journalled in the cam box walls 26 and 27. The shaft 194 is rocked through the medium of a crank arm 195 having a roller 196 thereon which rides in a cam groove 198 in a cam 197 (Figures 1 and 54) mounted on the horizontal driven shaft 21. Two spaced substantially flat, relatively long gripping arms 199 are carried by a shaft 200 which is journalled in bosses 201 on the arms 193 substantially intermediate their ends. The upper ends of the gripping arms 199 project beyond the upper ends of the fingers 193 and are formed with two bag engaging pins 202 (Figure 34) on the rear faces of each of the arms. A crank arm 203, formed on one end of the shaft 200, carries a roller 204 which rides above the curved upper face 206 of a substantially flat arcuate spring pressed cam plate 205 pivotally mounted, as at 206', on the cam box wall 27. The rear end of the cam plate 205 is bevelled and cut away, as at

207, to facilitate the crank arm roller 204 riding off the end thereof and engaging with a fixed substantially flat sloping cam plate 208 suitably secured, as at 209, to the cam box walls. The upper ends of the gripping arms 199 are rounded, as at 210, and the forward faces thereof have curved wire guides 211 secured thereto so that the arms 199 will freely pass the downwardly depending free end of the bag during the travel of the bag supporting form 29 from the stringing to the removing stations. Viewing Figure 11, it will be seen that in the lowered position of the bag removing member 192, the fingers 193 extend rearwardly, and the gripping arms 199 extend substantially vertically. In these positions, the cam roller 204 of the crank arm 203 will be disposed beneath the rear end of the pivoted cam plate 205, having passed over the upper face and cleared the end thereof and engaged the fixed cam plate 208. During the rotation of the cam 197, the shaft 194 will be rotated to rock the bag removing member 192 upwardly and arcuately over the underside 212 of the cam plate 205. As the roller 204 reaches the inner end of the cam plate 205, it will urge or tilt the end upwardly against the tension of a spring 213, so that the roller 195 will ride off the end thereof. As the roller 194 clears the end of the cam plate 205, the action of a spring 214 (Figures 1 and 6) coiled on the shaft 200 will move the gripping arms 199 to closed gripping position relative to the fingers 193 so that a bag will be gripped or clamped between the opposed flat faces thereof.

From the foregoing, it will be understood that in the lowered position of the bag removing member 192, the fingers 193 and arms 199 will be in expanded or open position. As the member 192 is rocked upwardly simultaneously with the rotation of the turret head and bag supporting form 29, the fingers 193 will be substantially vertical and the gripping arms 199 will extend forwardly and will lie to the rear of the bag supported on the bag form 29 and dangling therefrom. As the bag engaging pleating pins 57 and 59 have been rocked to their open positions, the rocking movement of the gripping arms 199 causes the bag engaging pins 202 to extend into the bag so that the bag is pulled off the bag supporting form 29 and carried upwardly until the bag is gripped between the gripping arms 199 and fingers 193. Continued movement of the bag removing member 192 carries the gripped bag upwardly and rearwardly, until the crank arm cam roller 204 rides past the rear end of the pivoted cam plate 205 and engages with the fixed sloping cam plate 208 and rides downwardly thereover which forces the crank arm 203 upwardly and rocks the shaft 200 to move the gripping arms 199 away from and out of gripping engagement with the fingers 193. During this movement of the gripping arms 199, the bag will be caused to slide downwardly along the downwardly sloping fingers 193 and to be positioned flatly on the flat top plate 215 of a horizontally disposed vertically movable stacking table 214' (Figure 4).

The flat top plate 215 is formed with openings 216 through which extend two posts 218 carried by a rearwardly extending horizontal supporting frame 217, suitably secured to the rear of the machine frame. Pivotally secured to bosses 219, formed on the underside of the top plate 215, are the upper ends of four downwardly and forwardly extending toggle arms 220 which are pivoted at their lower ends, as at 221, to the upper ends of four upwardly and forwardly extending toggle

arms 222. The toggle arms 222 are pivotally connected, as at 223, to the supporting frame 217, and the toggle arms 220 and 222 are connected together by cross arms 224. Normally the top plate 215 will be arranged adjacent the upper ends of the posts 218. As the completely strung bags are stacked on top of each other upon the plate 215, the weight of the bags will move the pairs of toggle arms 220—222 and cause the plate to be moved downwardly in an obvious manner. It will be apparent that the plate and toggle arms can be so adjusted that a predetermined number of bags, such as fifty or one hundred, will be piled thereon by the time the plate reaches its bottommost position, at which time the stack of bags can readily be removed therefrom by the operator.

After the bag is removed from the rearwardly extending horizontally disposed bag form 29, rotation of the turret head moves the form to the vertical idle position, preparatory to being rotated through another approximately ninety degrees into the horizontal bag receiving position. As the turret head and associated puckering, stringing, knotting and bag removing operations are synchronized and function in timed relation with each other, it will be apparent that while the operator is placing one bag on a bag form, the preceding bags are being respectively removed from the bag form and strung, so that the three main operations of applying and puckering or pleating a bag, stringing and knotting, and removing a strung bag are taking place simultaneously.

Having thus described my invention, what I claim is:

1. A machine for stringing bags comprising a movable bag holder having means thereon for supporting a plurality of bags for stringing, means associated with said bag holder for puckering the bag, stringing needles and needle operating mechanism for entering the needles through the puckered portion of said bag, means for threading said needles with string, and means for knotting the ends of said string and means for moving said bag holder successively from a horizontal bag receiving station to a vertical stringing station and a horizontal bag removing station, all of said means being synchronized and operable in timed relation to each other.

2. A machine for stringing bags comprising a rotatable bag holder having means thereon on which a plurality of bags are positioned for stringing, means associated with said bag holder for puckering the bag thereon, stringing needles and needle operating mechanism for entering the needles through the puckered portion of said bag, means for threading said needles with string, means for knotting the ends of said string and means for removing the strung bag from said bag holder all of said means being synchronized and operable in timed relation with each other.

3. A machine for stringing bags comprising a rotatable bag holder having bag supporting members thereon for positioning bags for stringing, means associated with said bag supporting members for puckering the bag, stringing needles and needle operating mechanism for entering the needles through the puckered portion of said bag, means for threading said needles with string, means for knotting the ends of said string, means for removing the strung bag from said bag holder and means for stacking said bags all of said means being synchronized and operable in timed relation with each other.

4. A machine for stringing bags comprising a rotatable bag holder having a plurality of bag supporting members thereon for simultaneously supporting a plurality of bags, means associated with said members for puckering the mouth ends of said bags, stringing needles and needle operating mechanism for entering the needles through the puckered mouth portions of said bags, and means for threading said needles with a string, all of said means being synchronized and operable in timed relation with each other.

5. A machine for stringing bags comprising a rotatable bag holder having a plurality of radial bag supporting members thereon for simultaneously supporting a plurality of bags, means associated with each of said members for puckering the mouth ends of said bags, stringing needles and needle operating mechanism for entering the needles through the puckered mouth portions of said bags, and means for threading said needles with a string, means for rotating said bag supporting members successively from a horizontal bag receiving station to a vertical stringing station and a horizontal bag removing station, all of said means being synchronized and operable in timed relation with each other.

6. A machine for stringing open mesh fabric bags comprising a rotatable bag holder for supporting a bag for stringing, stringing needles having gripping means thereon, and needle operating mechanism for entering the needles through the puckered portion of said bag and actuating said gripping means, means for threading the gripping means of said needles with a string, and means for knotting the ends of said string, all of said means being synchronized and operable in timed relation with each other.

7. A machine for stringing open mesh fabric bags comprising a rotatable bag holder having a plurality of spaced radial bag supporting members thereon for simultaneously supporting a plurality of bags positioned on said members, means for rotating said bag holder, oscillating means associated with each of said members, and means for actuating said oscillating means for puckering the mouth ends of said bags, stringing needles and needle operating mechanism for entering the needles through the puckered mouth portions of said bags, means for threading said needles with a string, and a single knotting means for knotting the ends of said string, all of said means being synchronized and operable in timed relation with each other.

8. A machine for stringing open mesh fabric bags comprising a rotatable bag holder having a plurality of spaced radial bag supporting members thereon for simultaneously supporting a plurality of bags positioned on said members, means for rotating said bag holder, oscillating means associated with each of said members, and means for actuating said oscillating means for puckering the mouth ends of said bags, means on said holders for holding said bags thereon, stringing needles and needle operating mechanism for entering the needles through the puckered mouth portions of said bags, means for threading said needles with a string, and a single knotting means associated with said needles for knotting the ends of said string, all of said means being synchronized and operable in timed relation with each other.

9. A machine for stringing bags comprising a rotatable bag holder for supporting a bag for stringing, means for rotating said bag holder, means associated with the bag holder for pucker-

ing the bag, stringing needles having gripping means thereon, and needle operating mechanism for entering the needles through the puckered portion of said bag and actuating said gripping means of said needles with a string, a single knotting means for knotting the ends of said string, and oscillating means for removing the strung and knotted bag from said bag holder, all of said means being synchronized and operable in timed relation to each other.

10. A machine for stringing bags comprising a rotatable bag holder for supporting a bag for stringing, means for rotating said bag holder means associated with the bag holder for puckering the bag, stringing needles having gripping means thereon, and needle operating mechanism for entering the needles through the puckered portion of said bag and actuating said gripping means, means for threading the gripping means on said needles with a string, a single knotting means for knotting the ends of said string, and an oscillating member having gripping means thereon whereby the strung and knotted bag is gripped and removed from said bag holder, all of said means being synchronized and operable in timed relation to each other.

11. A machine for stringing bags comprising a rotatable bag holder having a plurality of bag supporting members thereon for simultaneously supporting a plurality of bags sleeved thereover, means for rotating said bag holder, means associated with each of said members for puckering the mouth ends of said bags on said members, stringing needles and needle operating mechanism for entering the needles through the puckered mouth portions of said bags, means for threading the needles with a string, means for knotting the ends of said string, means for removing the strung bags from said supporting members, and means for rotating said bag holder and said members successively from a horizontal bag receiving station to a vertical stringing station and a horizontal bag removing station, all of said means being synchronized and operable in timed relation to each other.

12. A machine for stringing bags comprising a rotatable bag holder for supporting bags for stringing, means for rotating said bag holder, shafts associated with said bag holder, puckering fingers carried by said shafts, and means for oscillating said shafts and fingers relative to said

bag holder for puckering the bags, stringing needles having gripping means thereon, and needle operating mechanism for entering the needles through the puckered portion of said bag and actuating said gripping means, means for threading the gripping means of said needles with a string, a single knotting means associated with said needles for knotting the ends of said string, and an oscillating member mounted on the frame having gripping means thereon for gripping and removing the strung and knotted bag from said bag holder, all of said means being synchronized and operable in timed relation to each other.

13. A machine for stringing bags comprising a rotatable bag holder having a plurality of bag supporting members thereon for simultaneously supporting a plurality of bags, means for rotating said bag holder, oscillating means associated with said members for puckering the mouth ends of said bags on said members, stringing needles having gripping means thereon and needle operating mechanism for entering the needles through the puckered bag mouth and actuating said gripping means, means for threading the gripping means of said needles with a string, a single rotating knotting means associated with said needles for knotting the ends of said string, an oscillating member mounted on the frame having gripping means thereon for gripping and removing the strung and knotted bag from said bag supporting members, a vertically movable table associated with said oscillating member, said table being coordinated with said member whereby a predetermined number of bags will be stacked thereon by said member, all of said means being synchronized and operable in timed relation with each other.

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