April 8, 1924.

1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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24 Sheets-Sheet 1

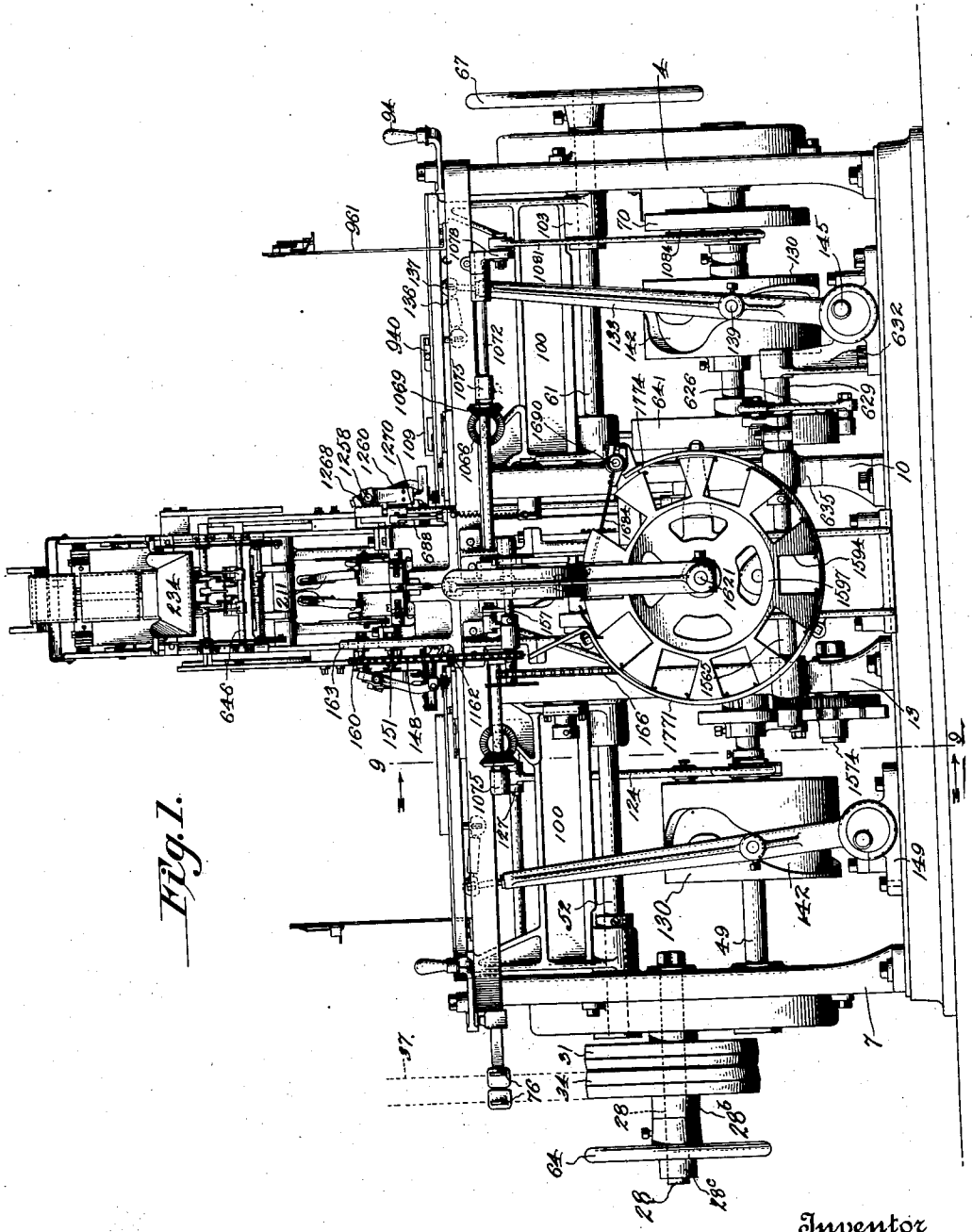


Fig. 1.

Inventor
John T. Dalton,

By his Attorneys
Meyers, Cavanaugh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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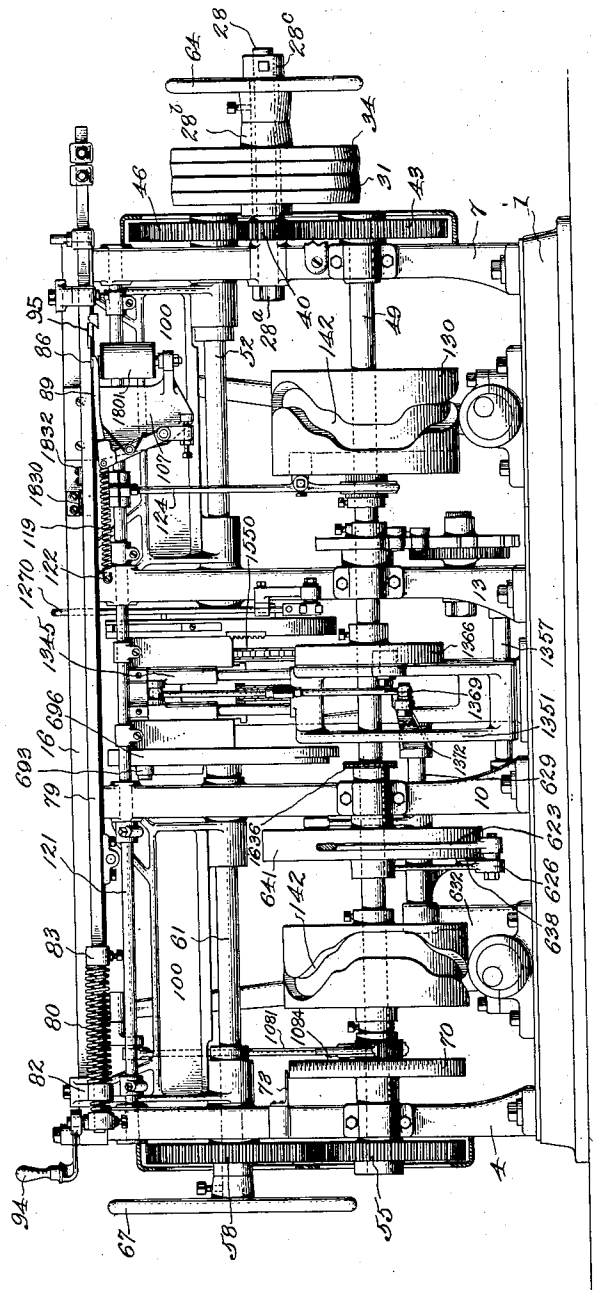


Fig. 2.

Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924.

1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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24 Sheets-Sheet 3

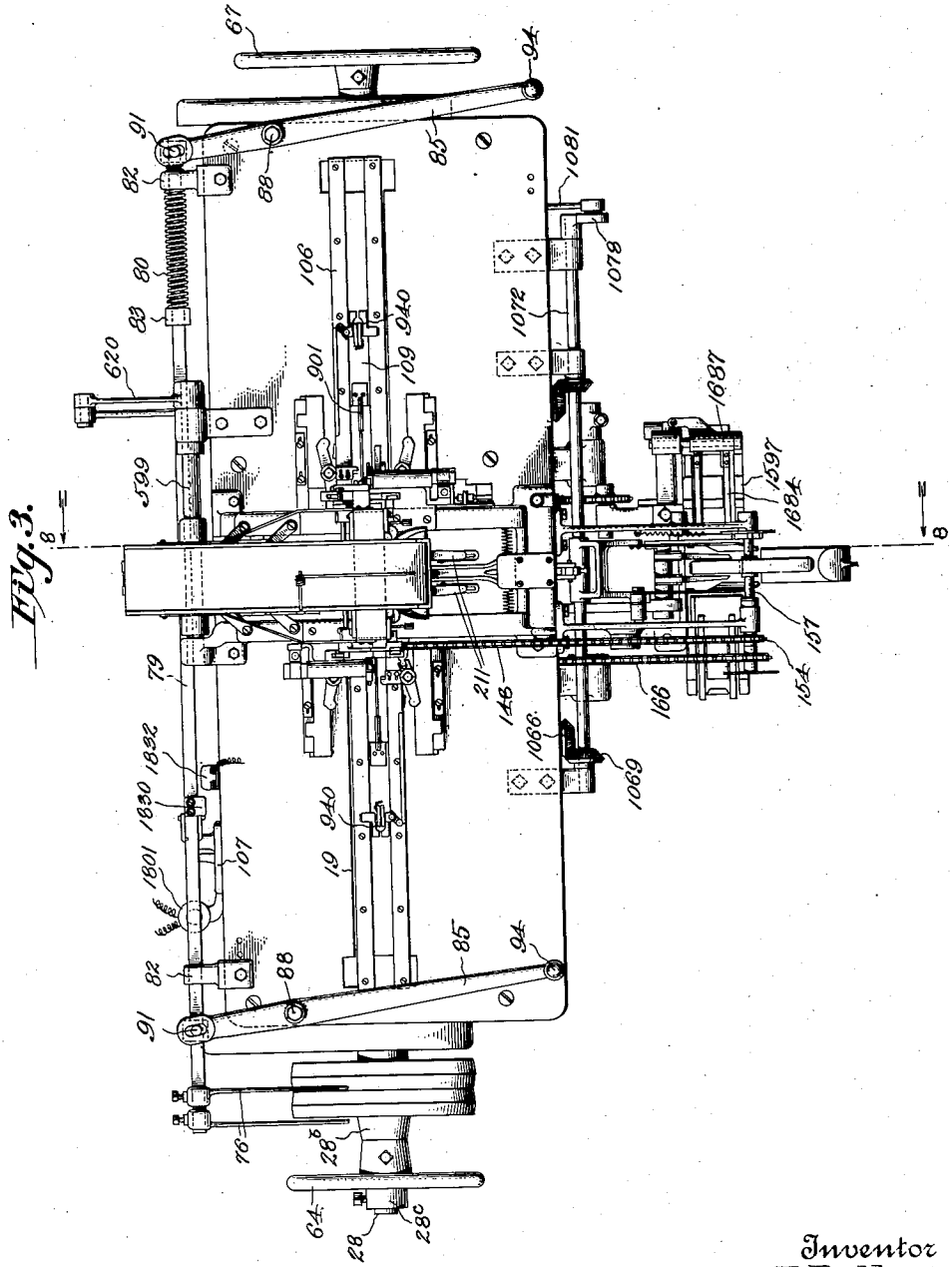


Fig. 3.

Inventor
John T. Dalton,

By his Attorneys
Meyers, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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Fig. 29.

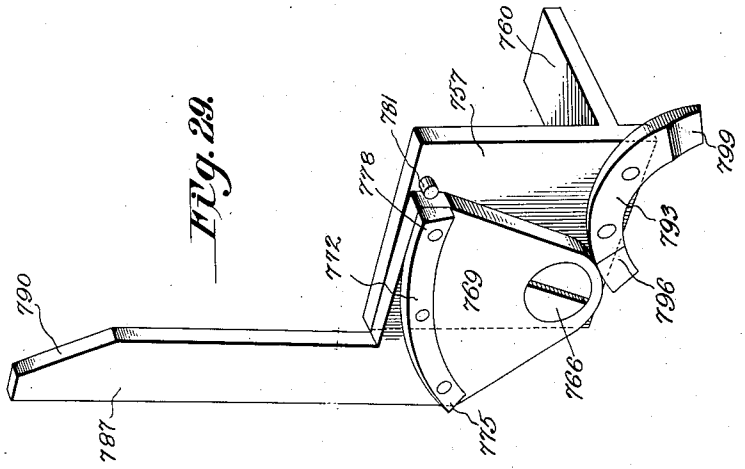
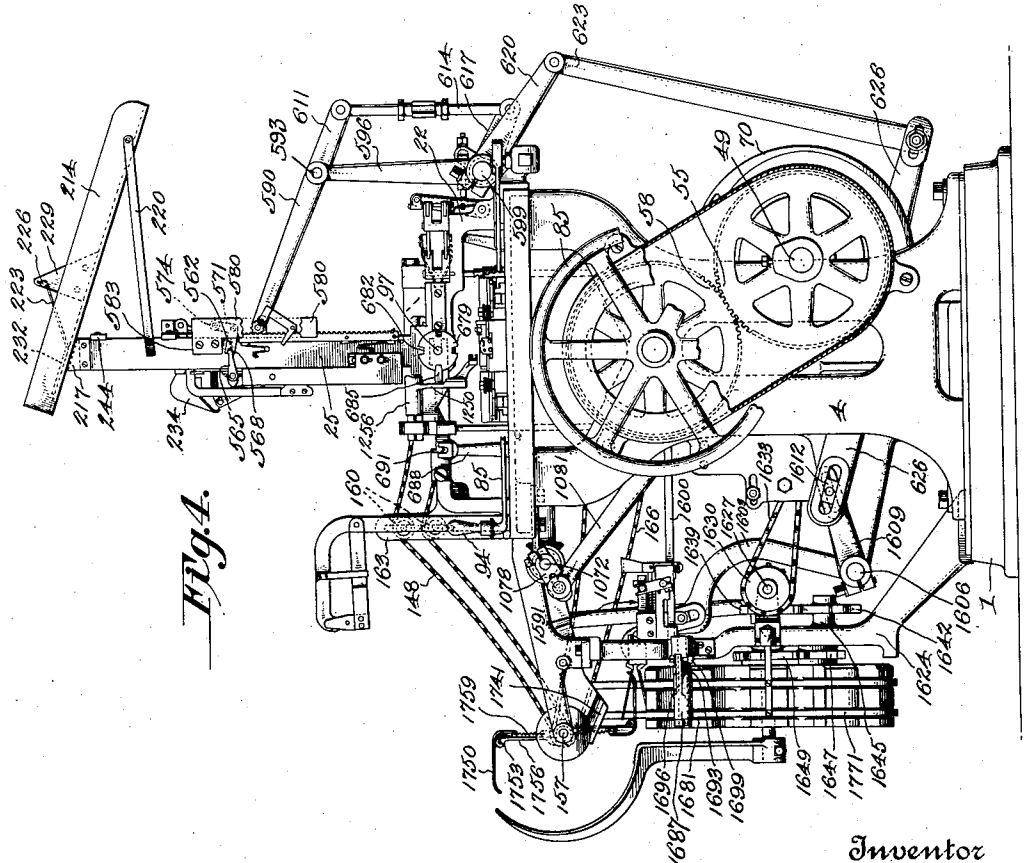


Fig. 4.



Inventor
John T. Dalton,

By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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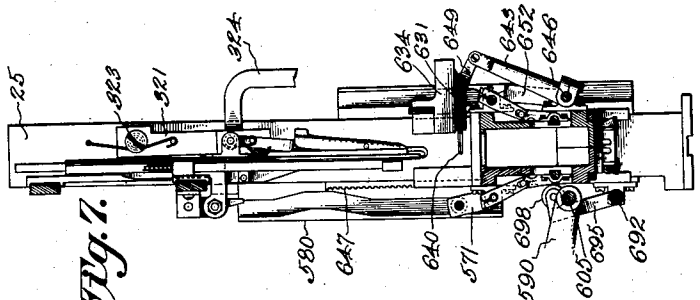


Fig. 7.

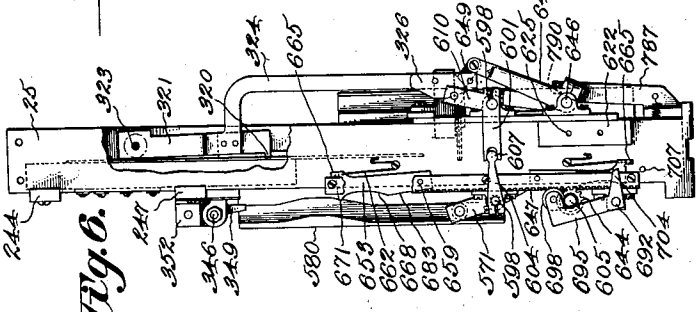


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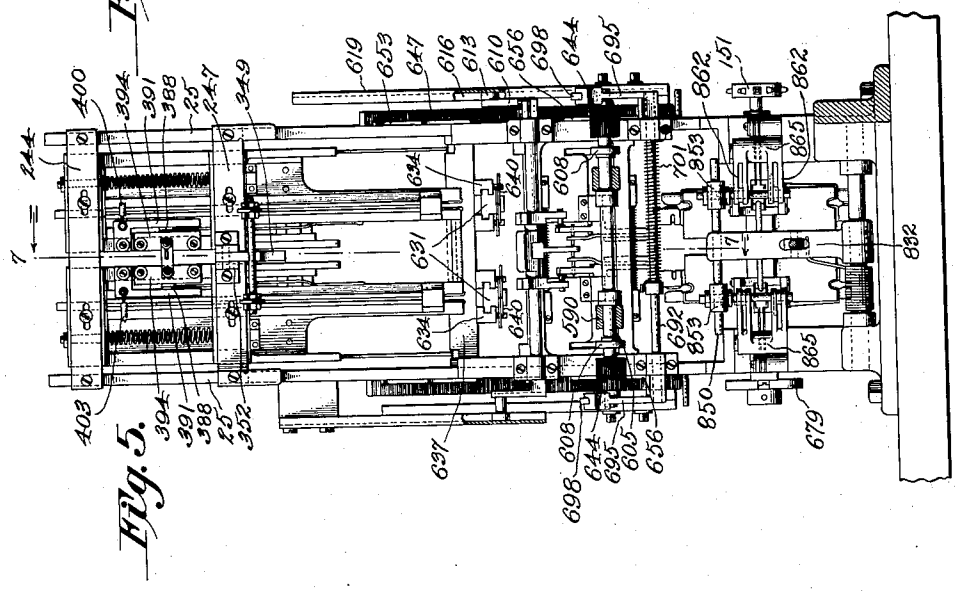


Fig. 5.

Inventor
John T. Dalton,
By his Attorneys
Meyers, Cavanagh, Whitehead & Hyde

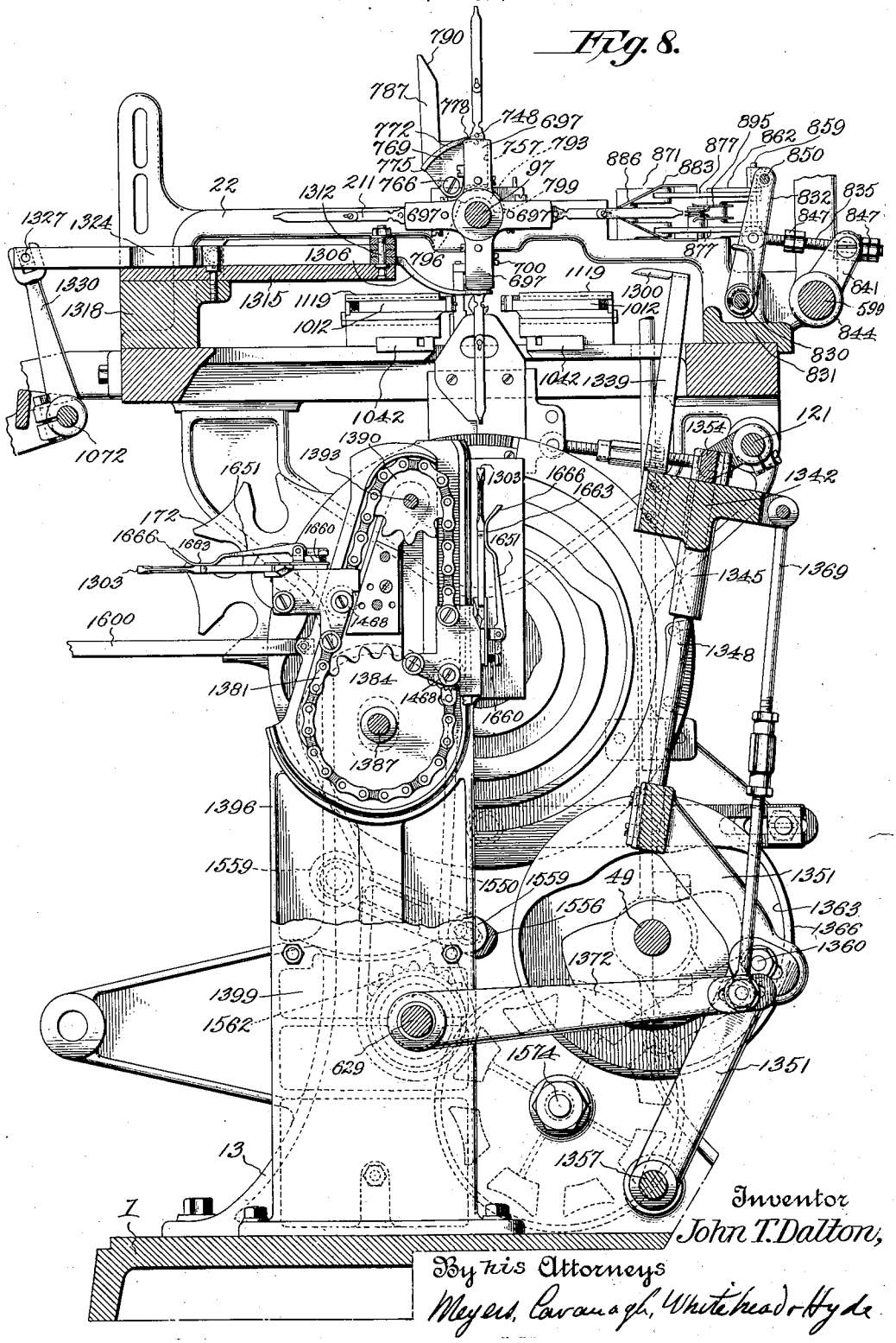
April 8, 1924. 1,489,663

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Fig. 8.



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John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

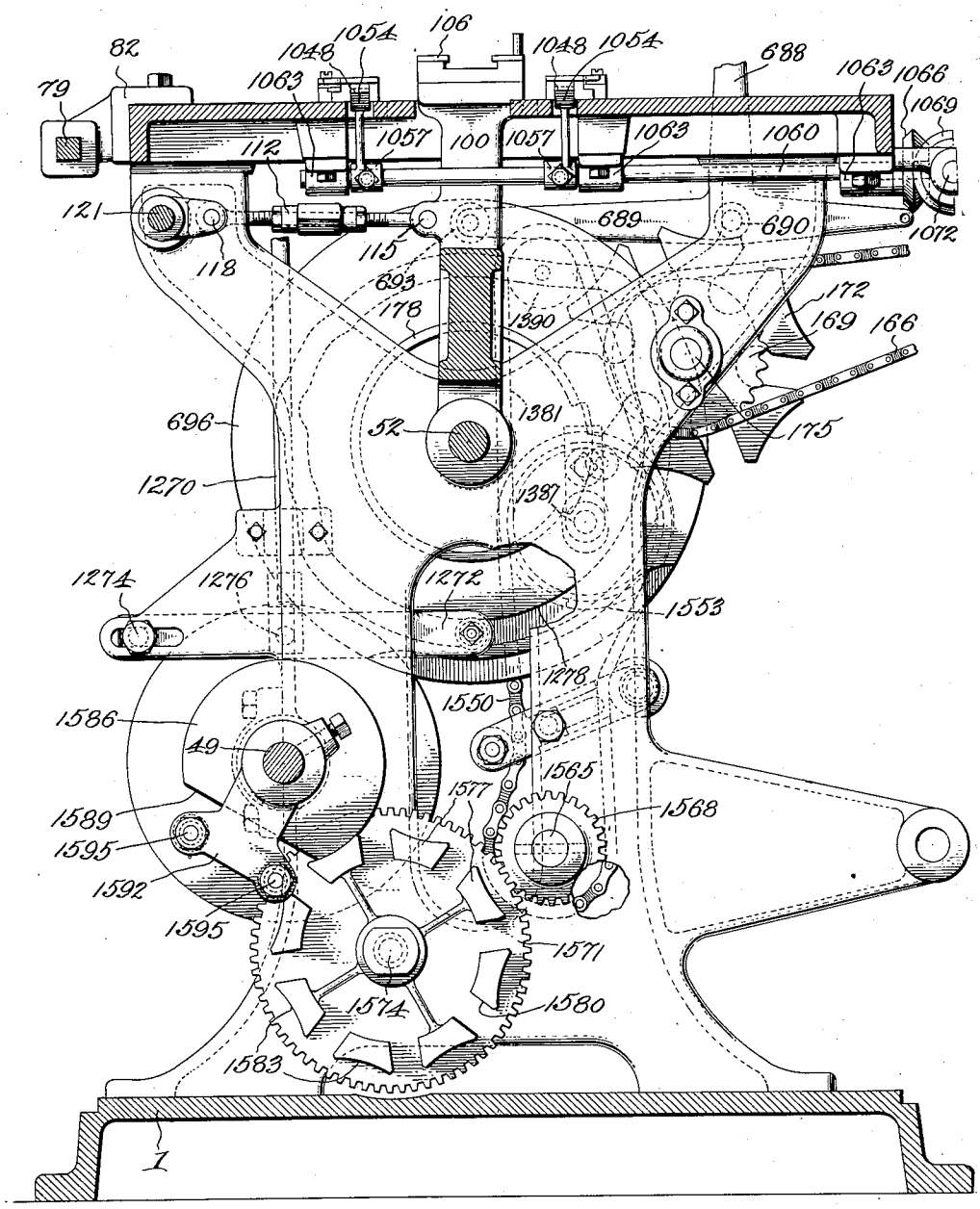
April 8, 1924. 1,489,663

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Fig. 9.



Inventor
John T. Dalton,
By his Attorneys
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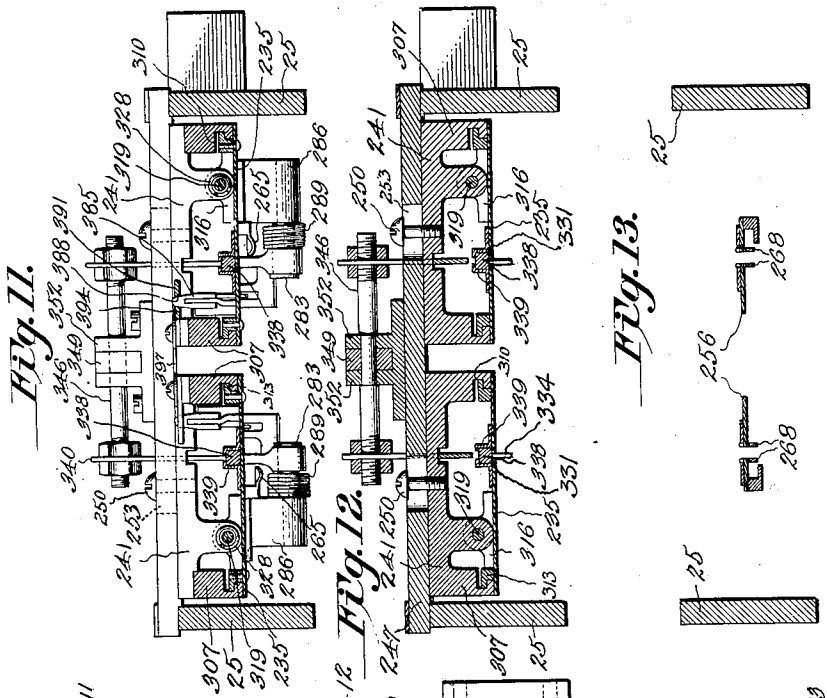


Fig. 11.

Fig. 12.

Fig. 13.

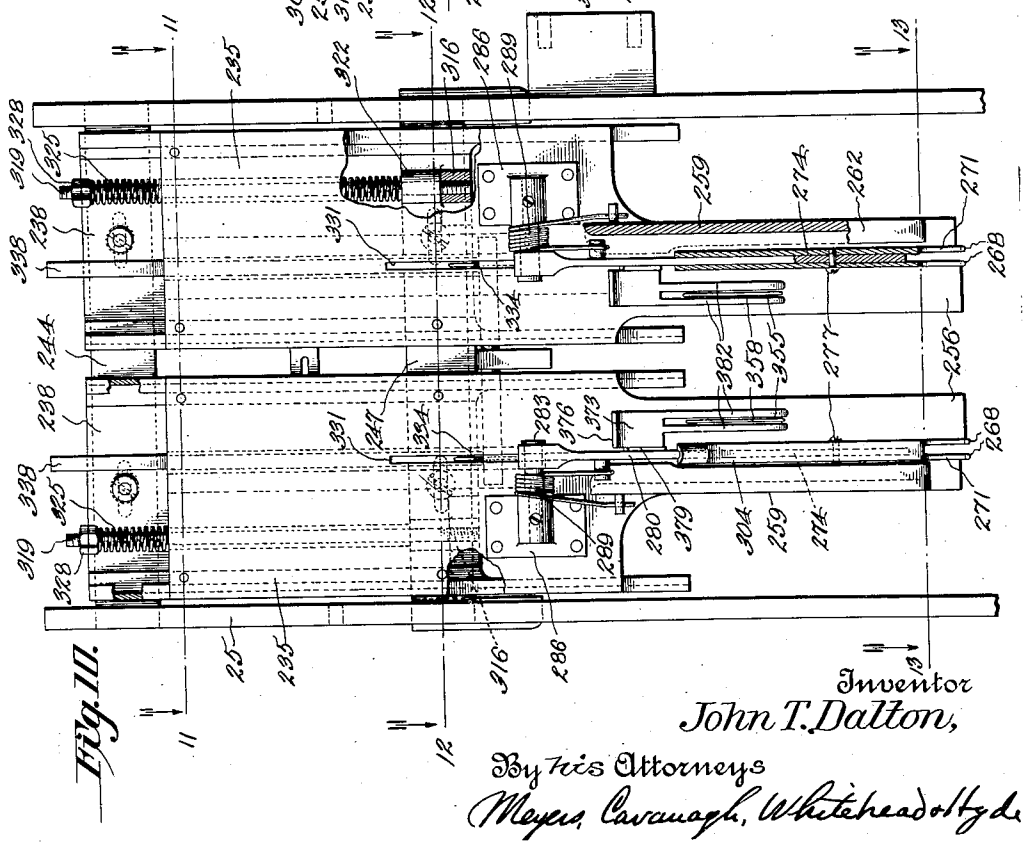


Fig. III.

Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

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Fig. 15.

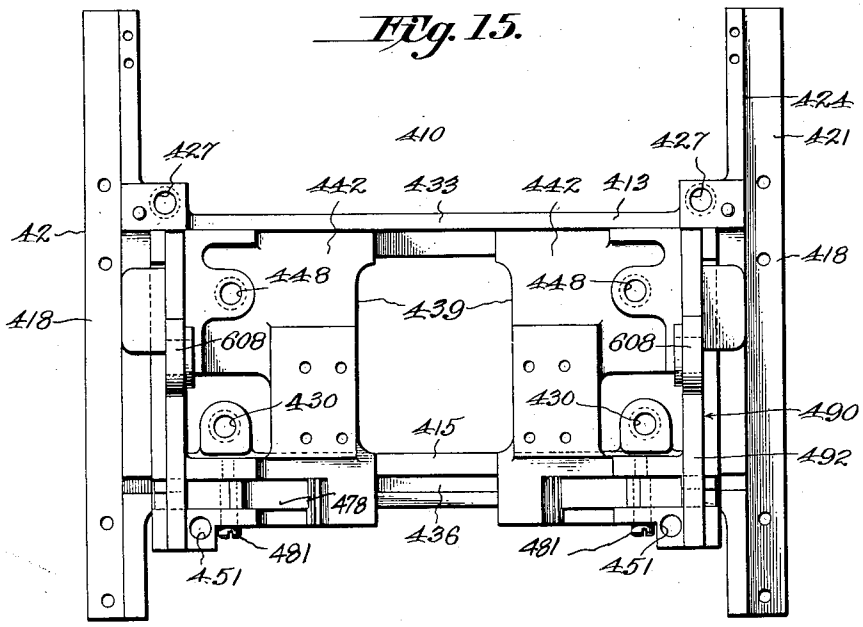
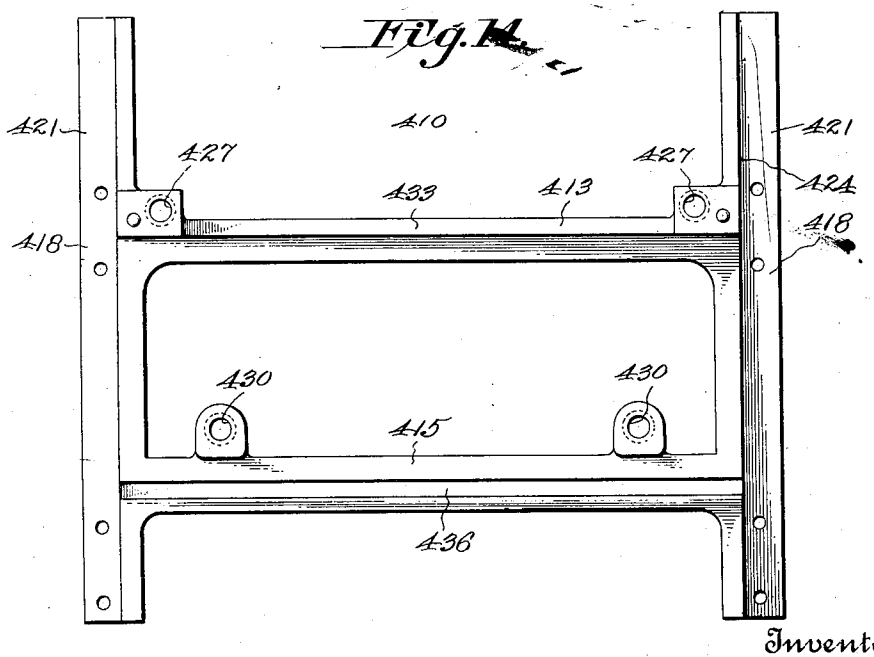


Fig. 14.



Inventor
John T. Dalton,

By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

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Fig. 16.

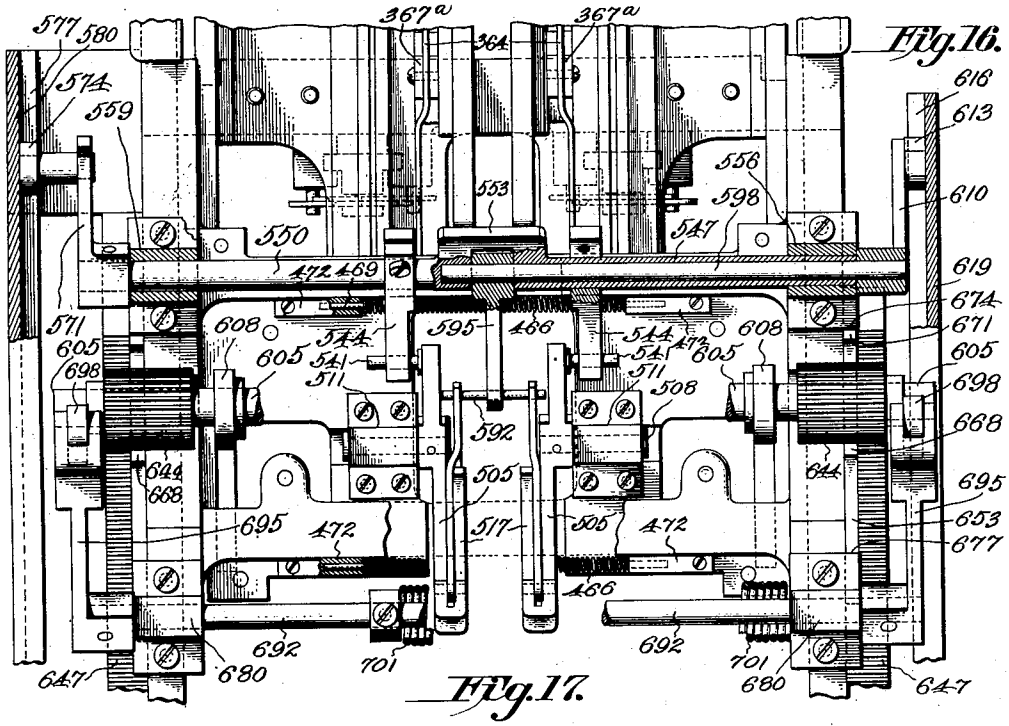
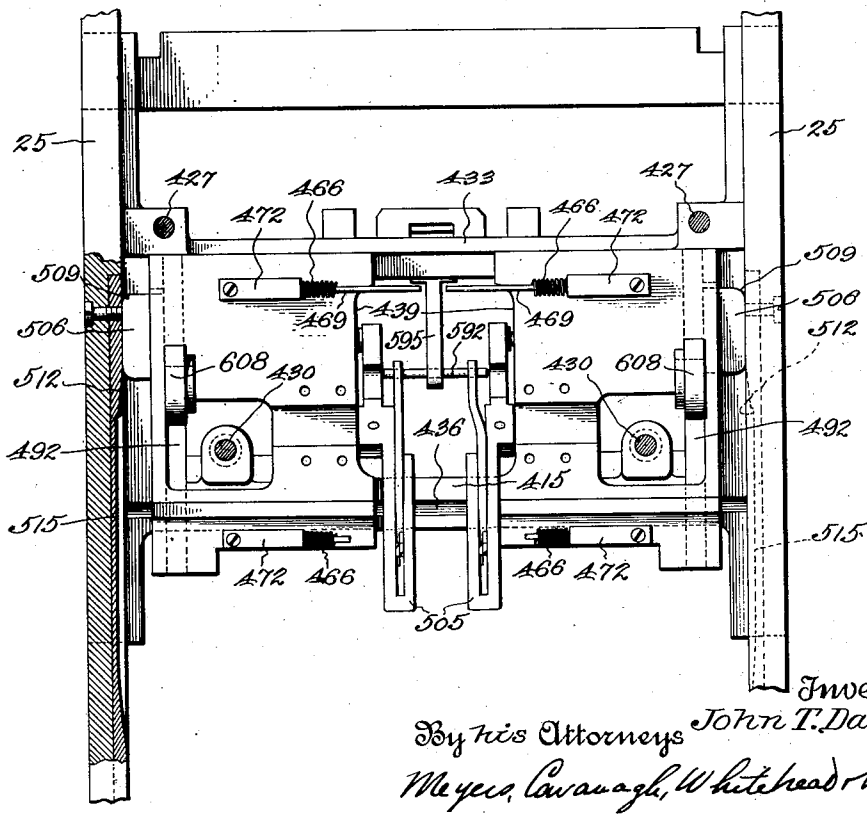


Fig. 17.



Inventor
John T. Dalton,
By his Attorneys
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April 8, 1924. 1,489,663

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BAG STRINGING MACHINE

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Fig. 18.

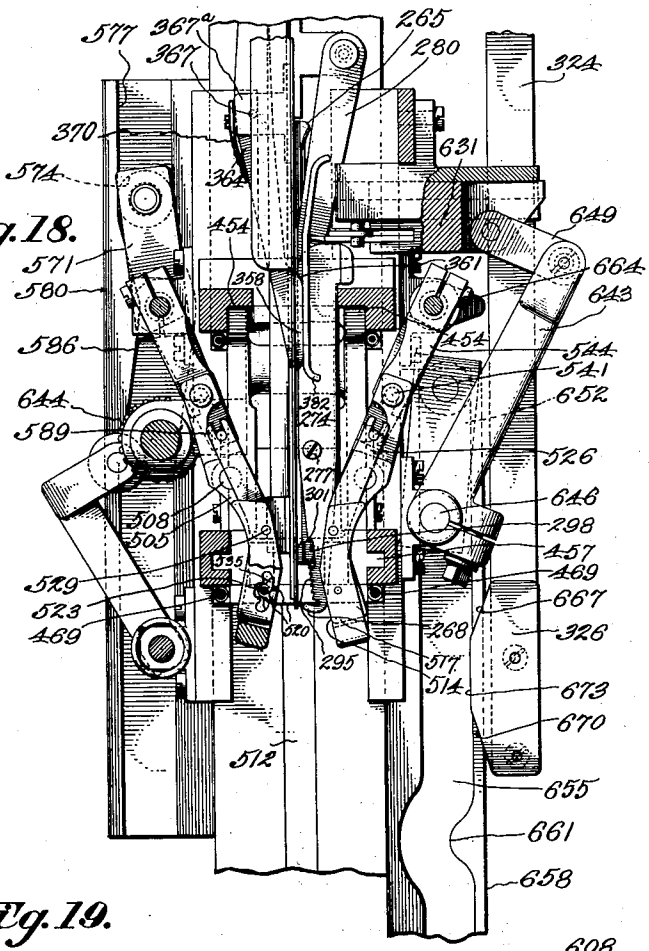
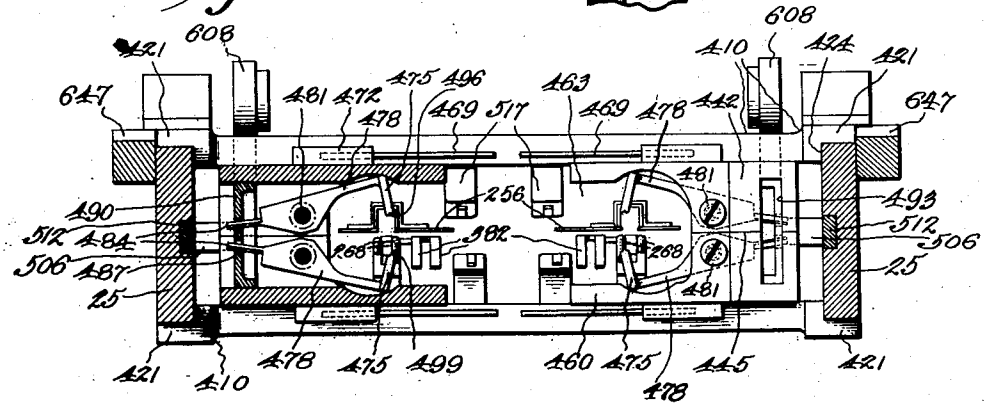


Fig. 19.



Inventor
John T. Dalton,
By his Attorneys
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April 8, 1924.

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BAG STRINGING MACHINE

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Fig. 30.

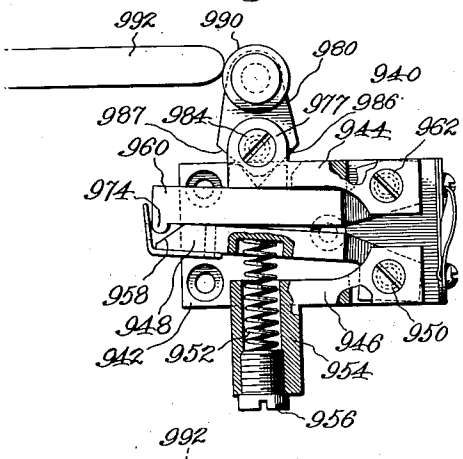


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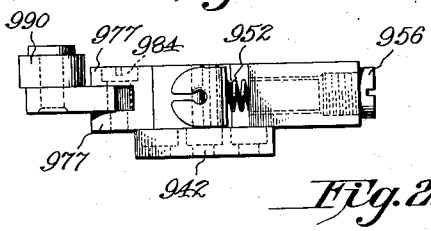


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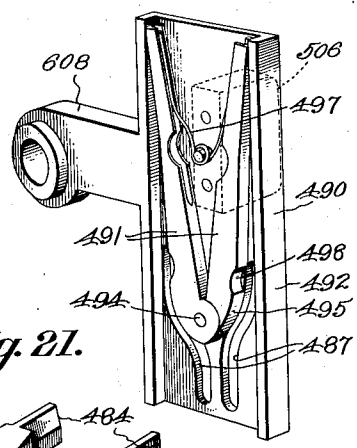


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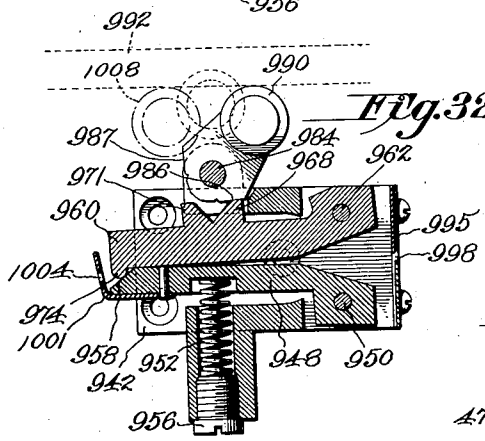


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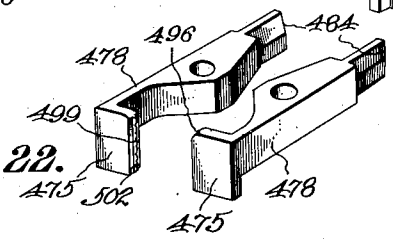
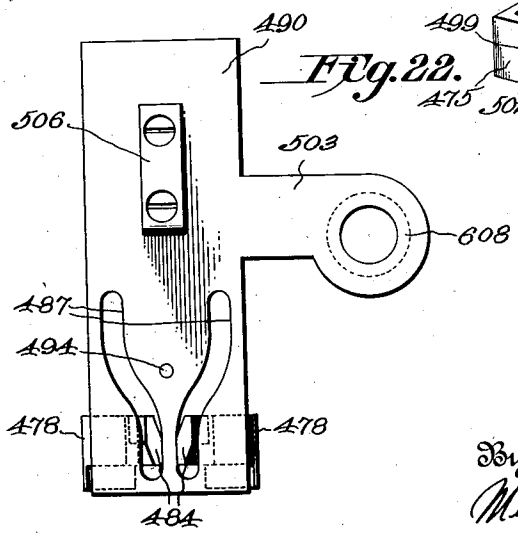


Fig. 22.



Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

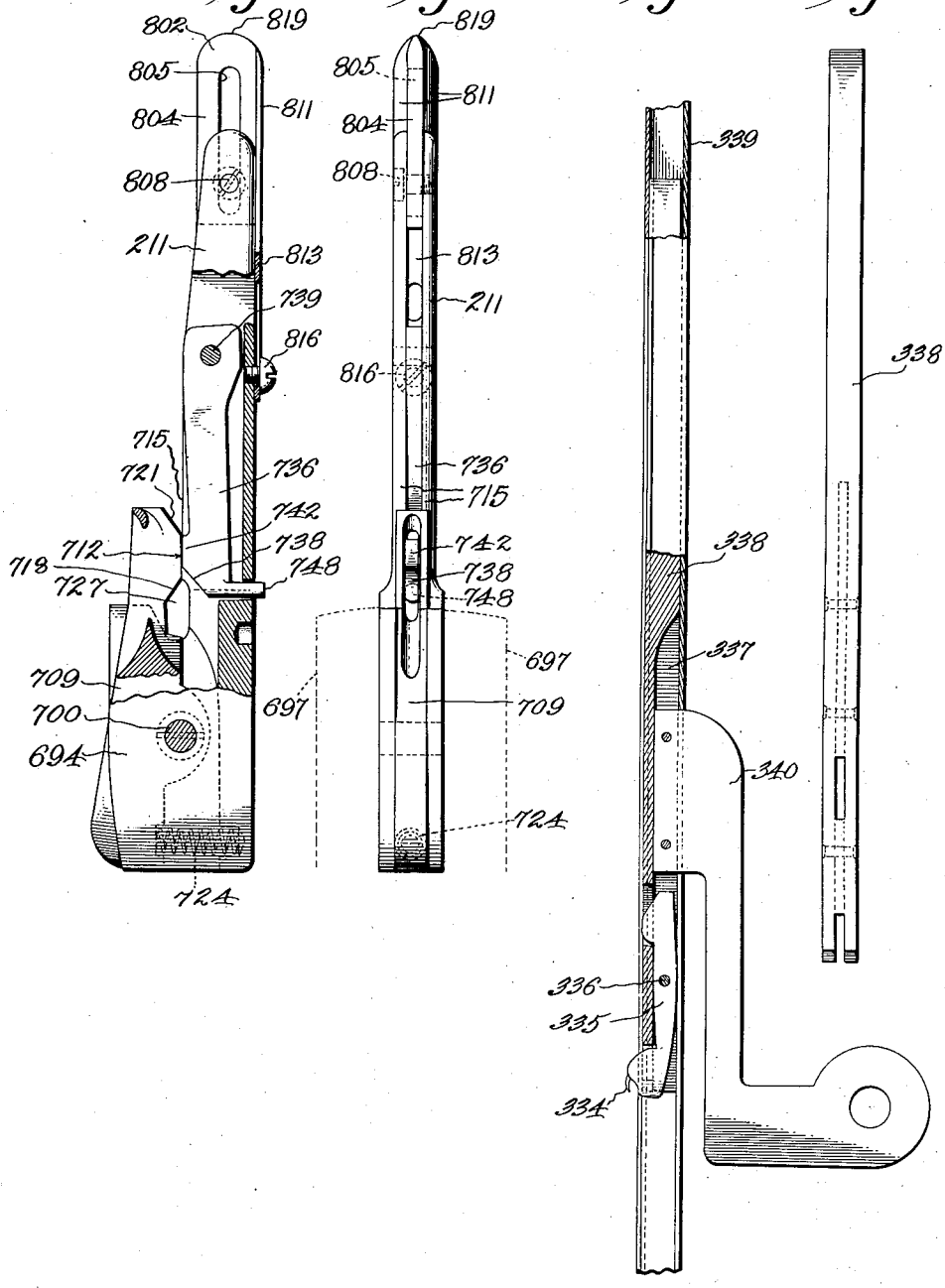
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J. T. DALTON

BAG STRINGING MACHINE

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Fig. 33. Fig. 34. Fig. 23. Fig. 24.



Inventor
John T. Dalton,

By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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Fig. 25.

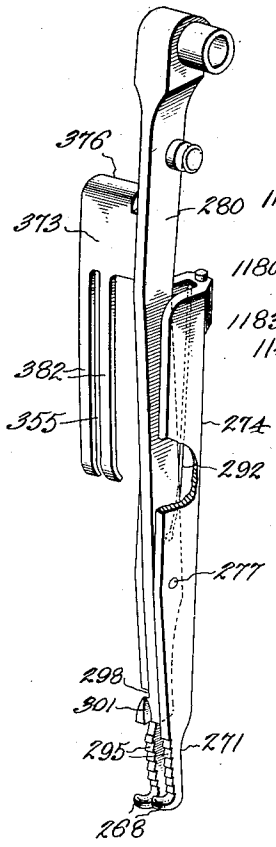


Fig. 47.

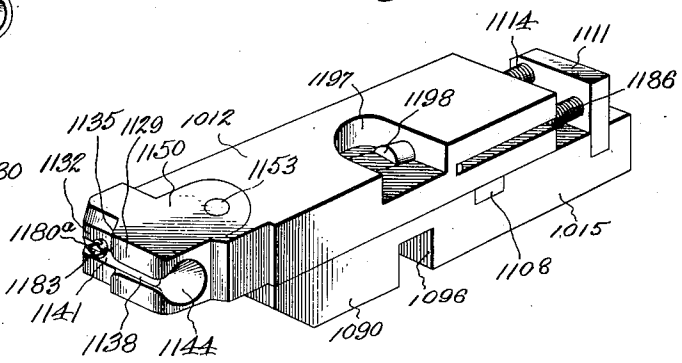


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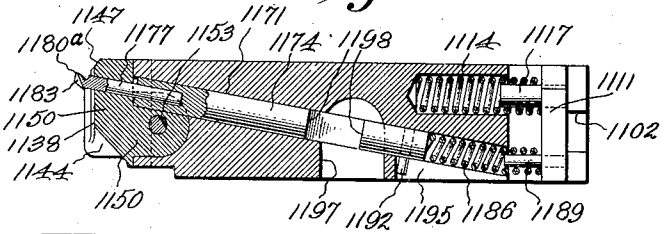


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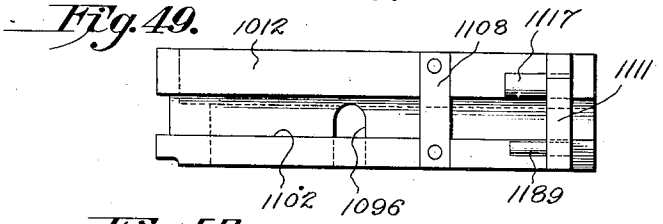


Fig. 51.

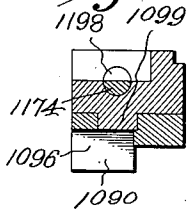
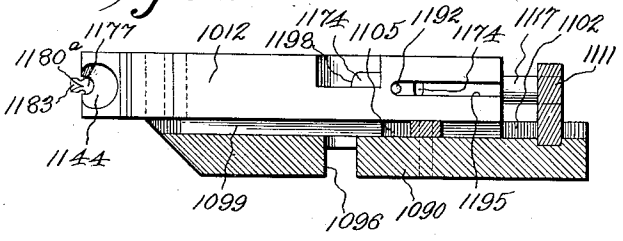


Fig. 50.



Inventor
John T. Dalton,
By his Attorneys
Messrs. Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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Fig. 52.

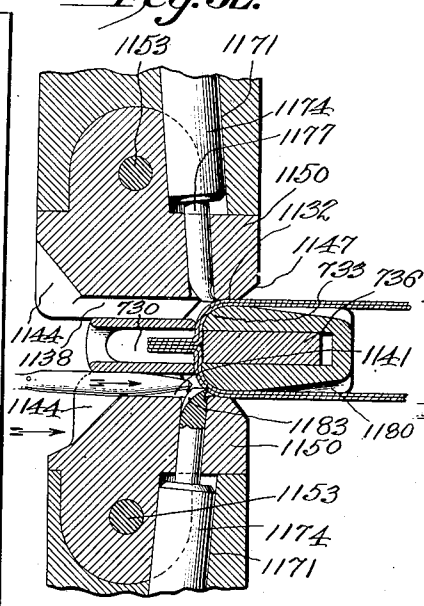
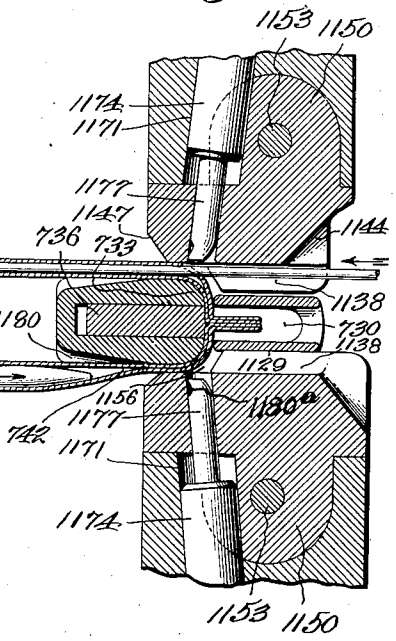


Fig. 53.



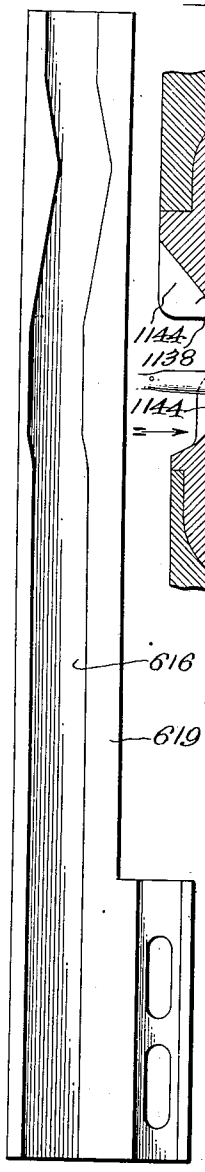


Fig. 28.

Fig. 26.

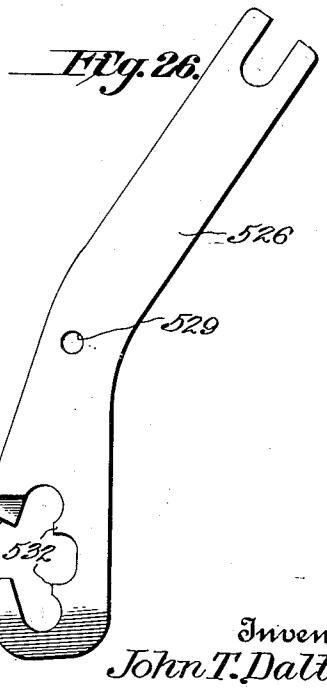
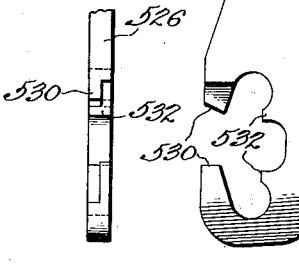


Fig. 27.



Inventor
John T. Dalton,
By his Attorneys
Meyers, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

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Fig. 35.

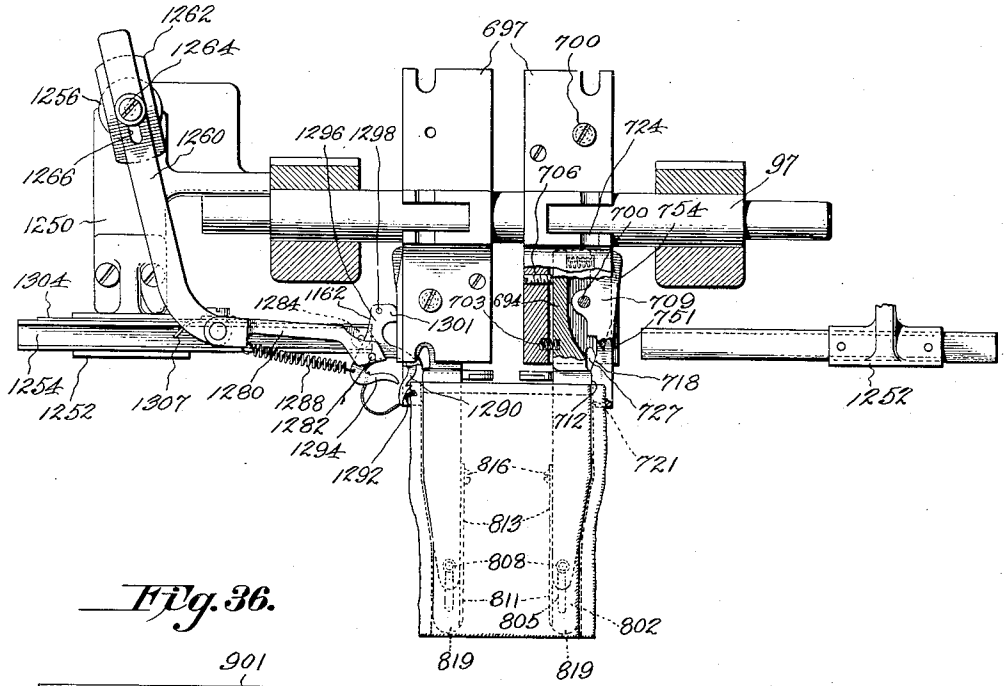


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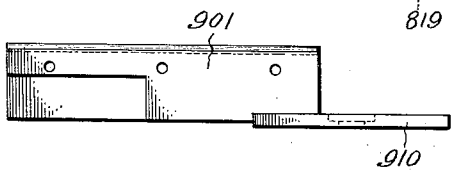


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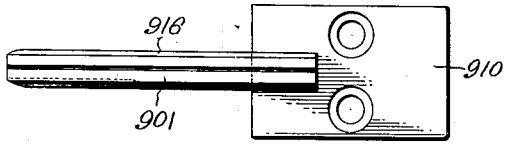
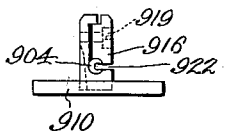


Fig. 38.



Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924.

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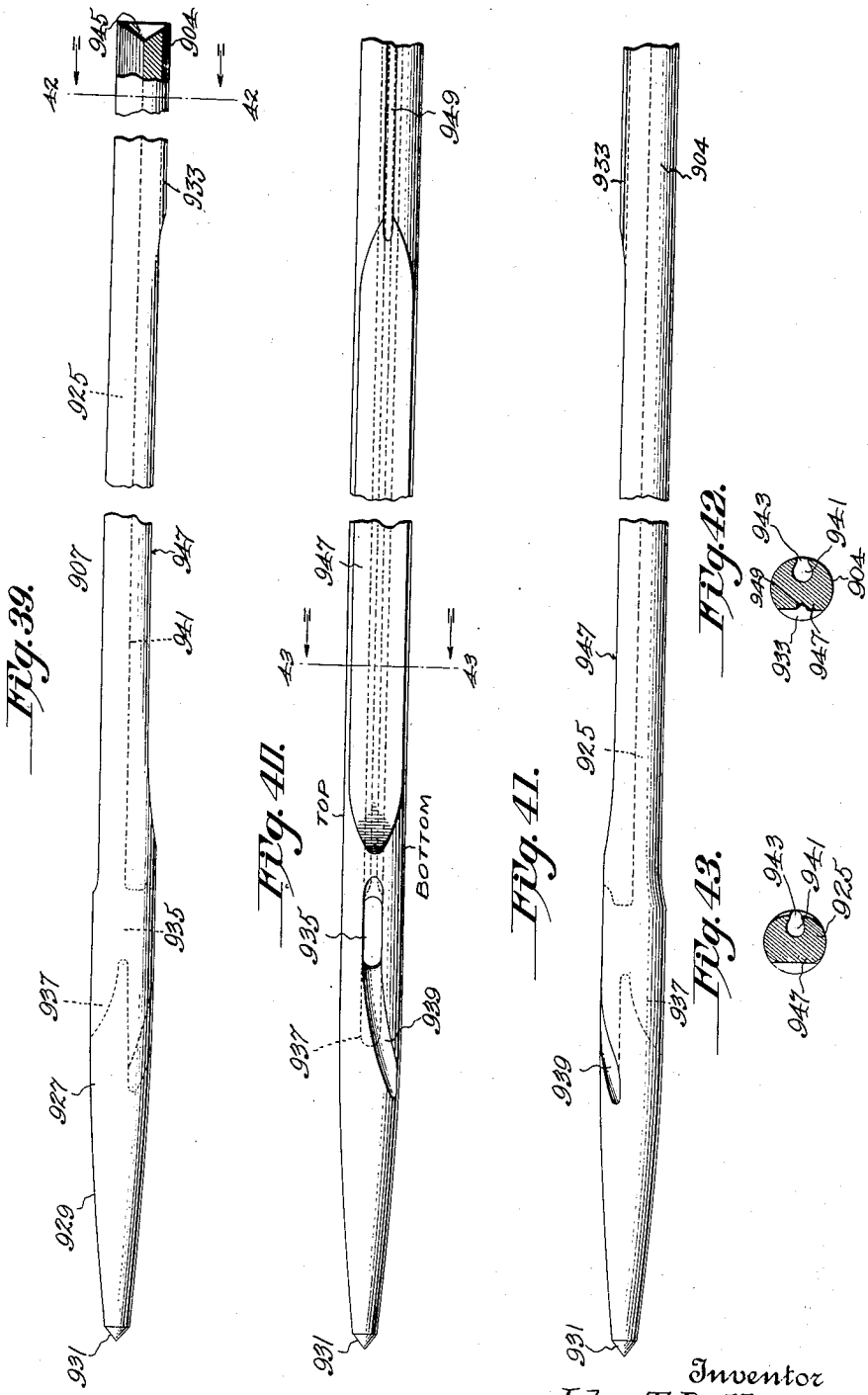


Fig. 39.

Fig. 40.

Fig. 41.

Fig. 42.

Fig. 43.

Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Boyd

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J. T. DALTON

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Fig. 44.

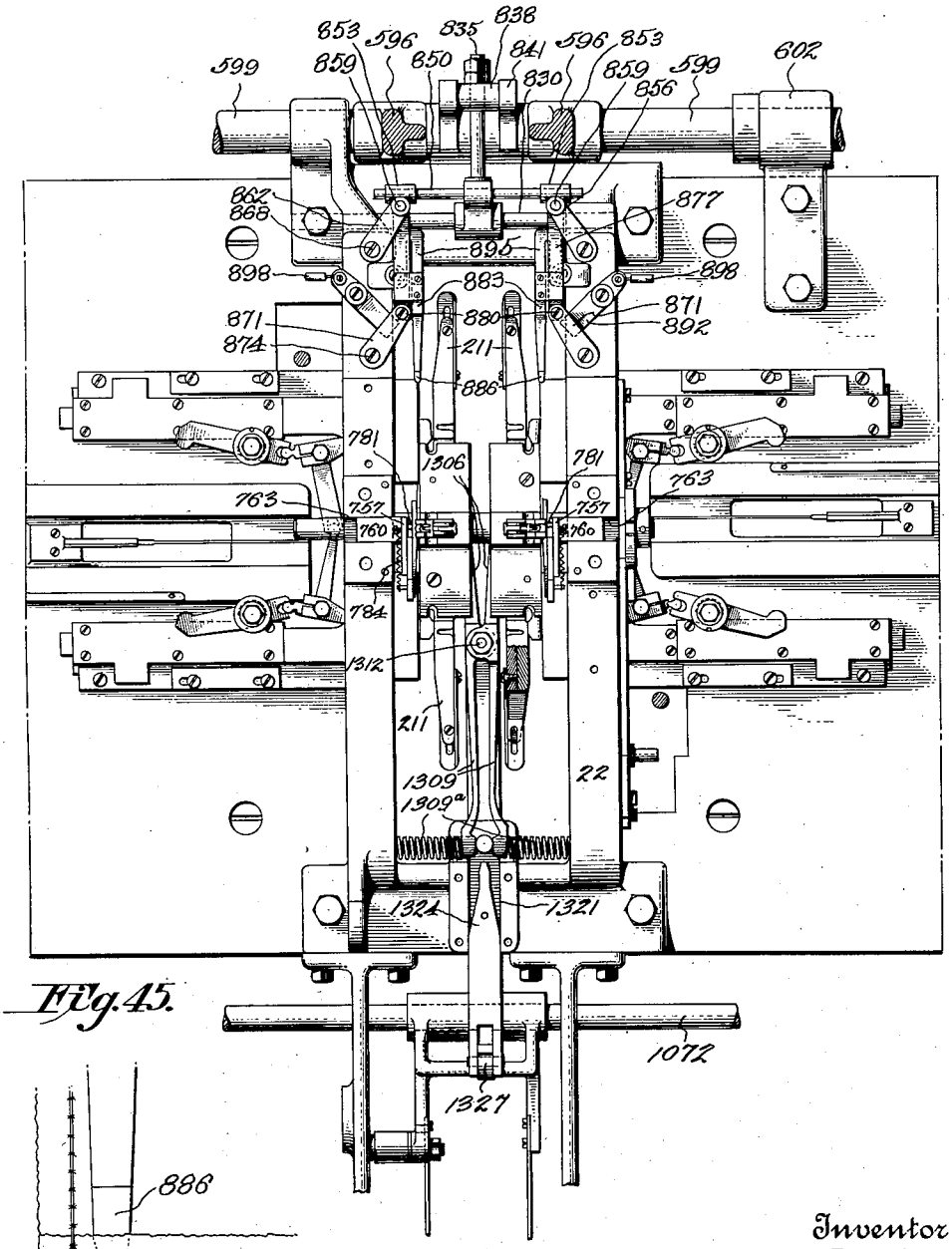


Fig. 45.

Inventor
John T. Dalton,

By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

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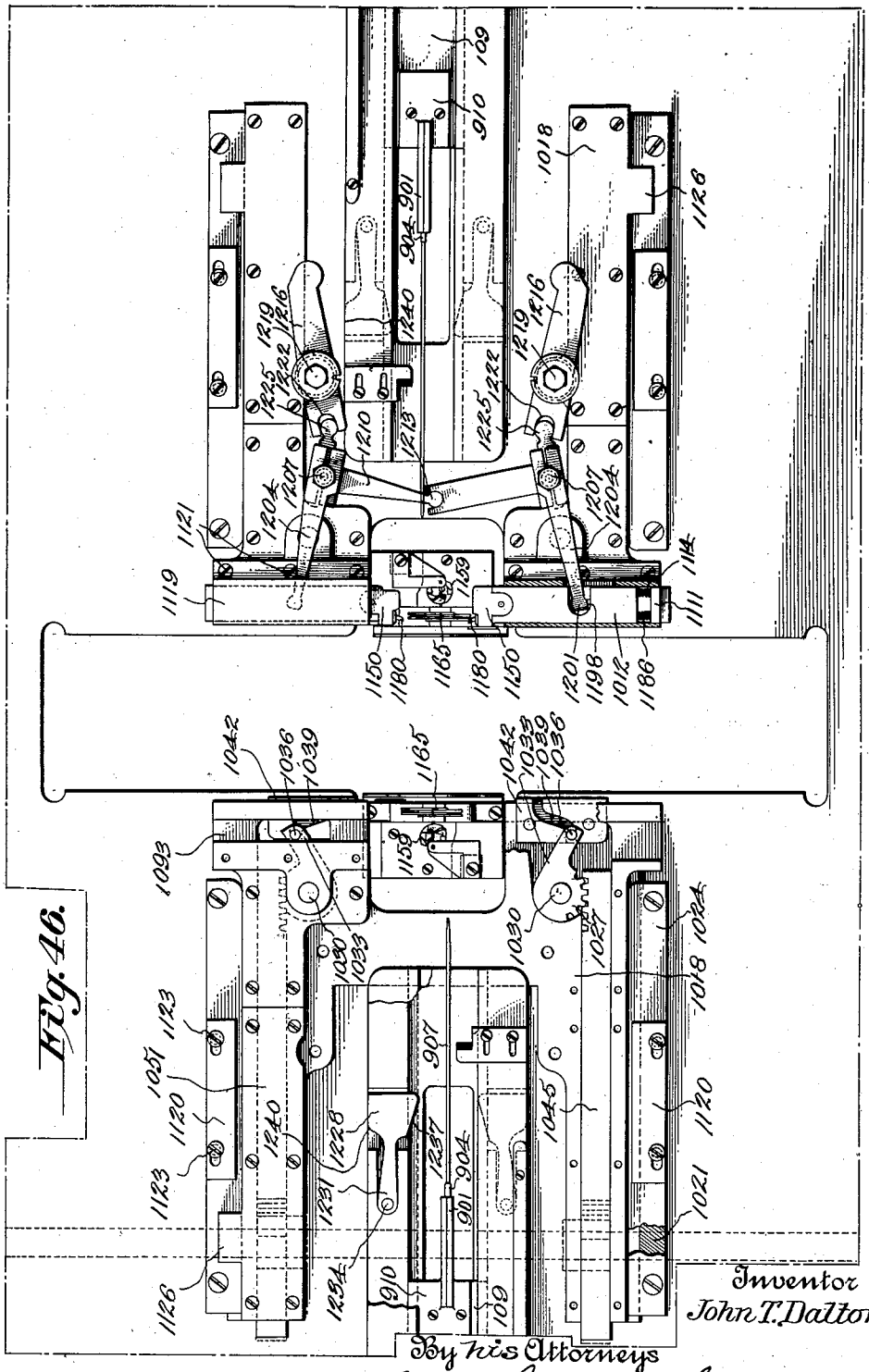


Fig. 46.

Inventor
John T. Dalton,
By his Attorneys
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J. T. DALTON

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Fig. 54.

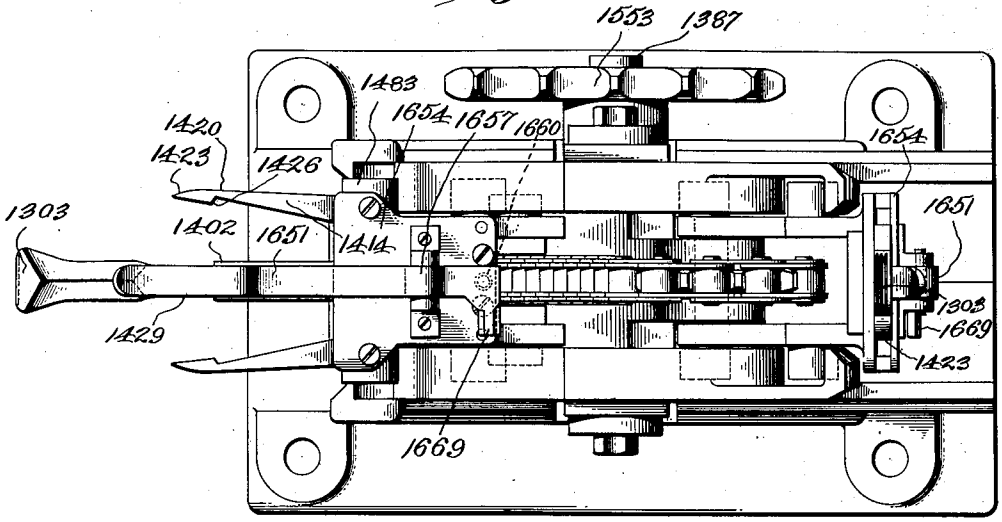


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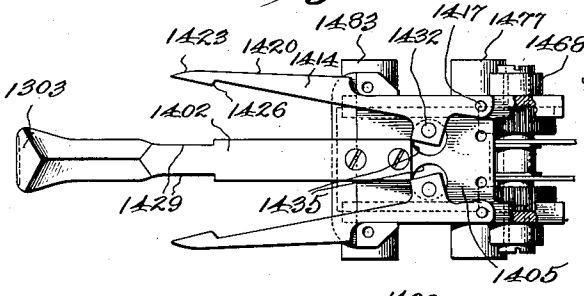


Fig. 57.

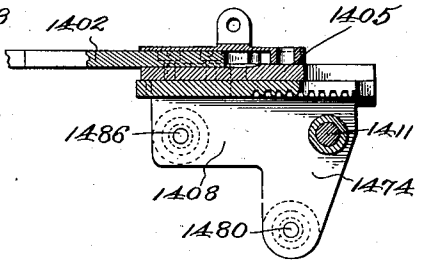


Fig. 56.

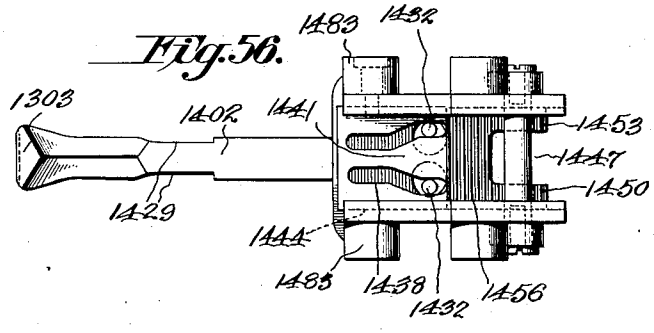


Fig. 58.

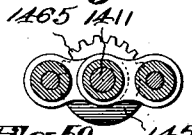
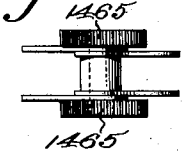


Fig. 59.



Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde.

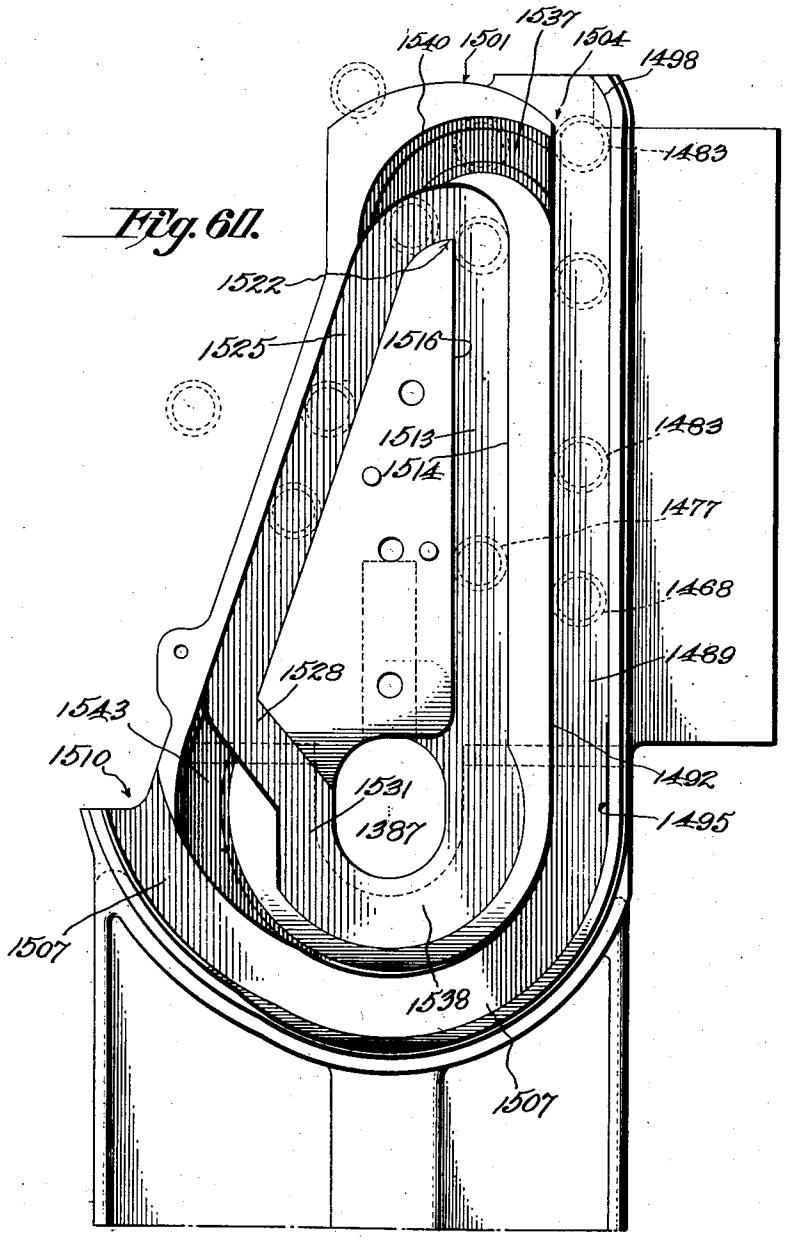
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J. T. DALTON

BAG STRINGING MACHINE

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Fig. 61.



Inventor.
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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Fig. 61.

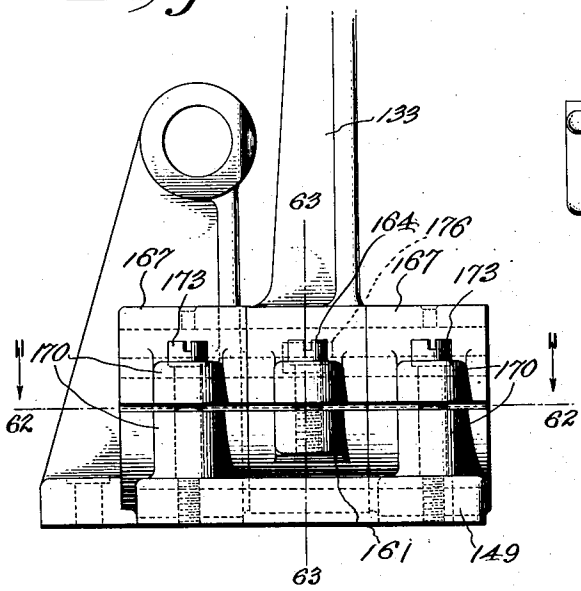


Fig. 62.

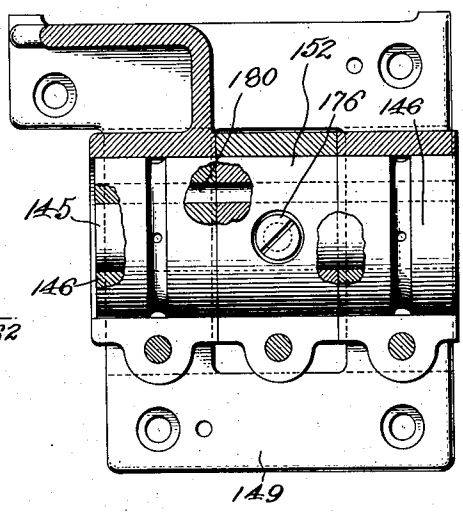


Fig. 63.

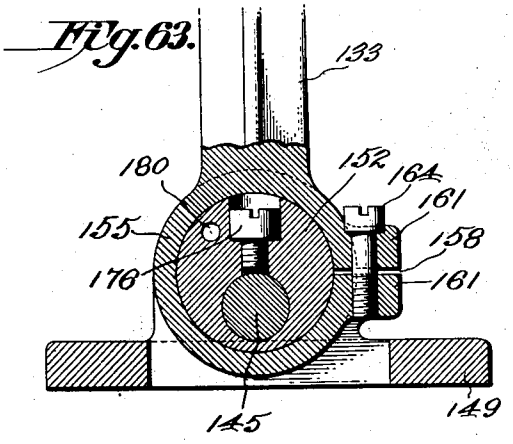
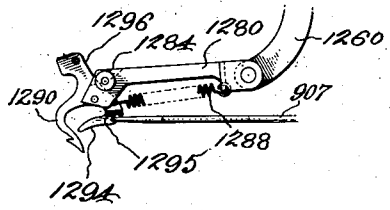


Fig. 64.



Inventor
John T. Dalton,
By his Attorneys
Meyer Cavanagh Whitehead & Hyde

April 8, 1924. 1,489,663

J. T. DALTON

BAG STRINGING MACHINE

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Fig. 65.

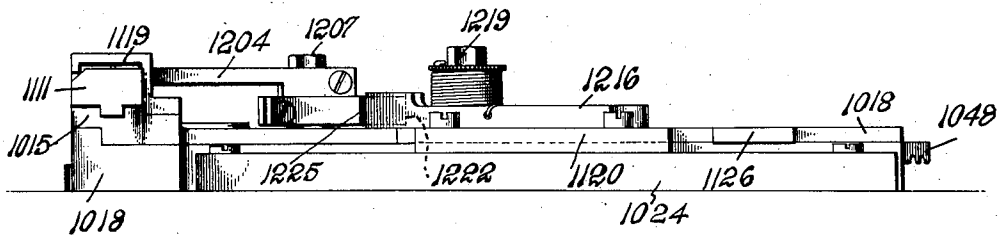


Fig. 66.

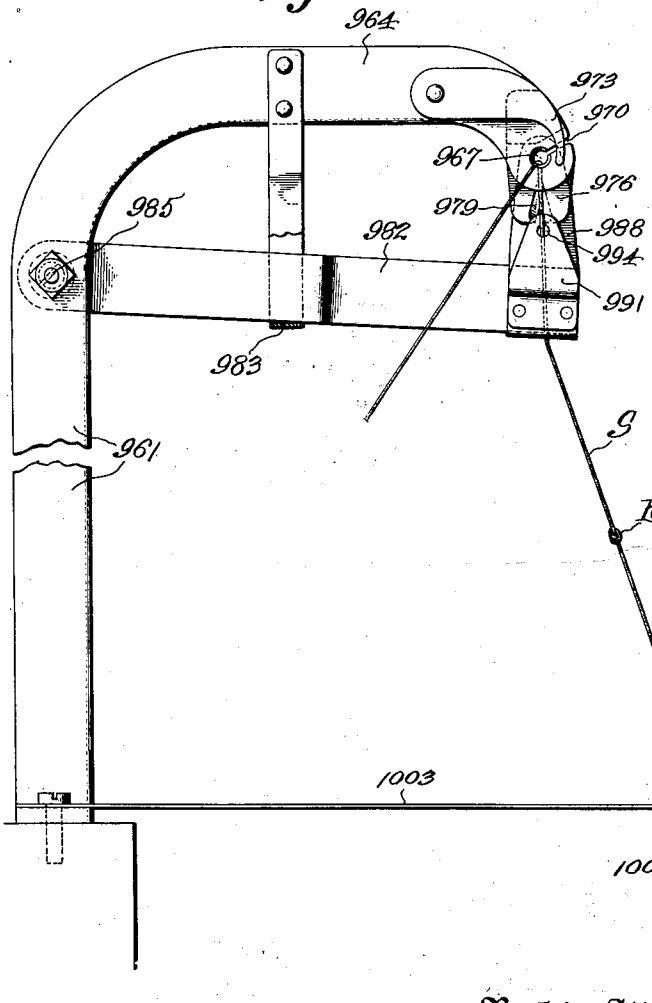
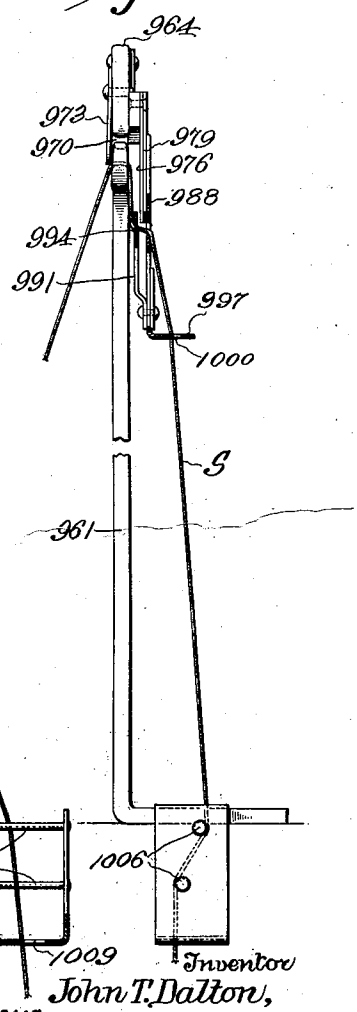


Fig. 67.



Inventor
John T. Dalton,
By his Attorneys
Meyer, Cavanagh, Whitehead & Hyde.

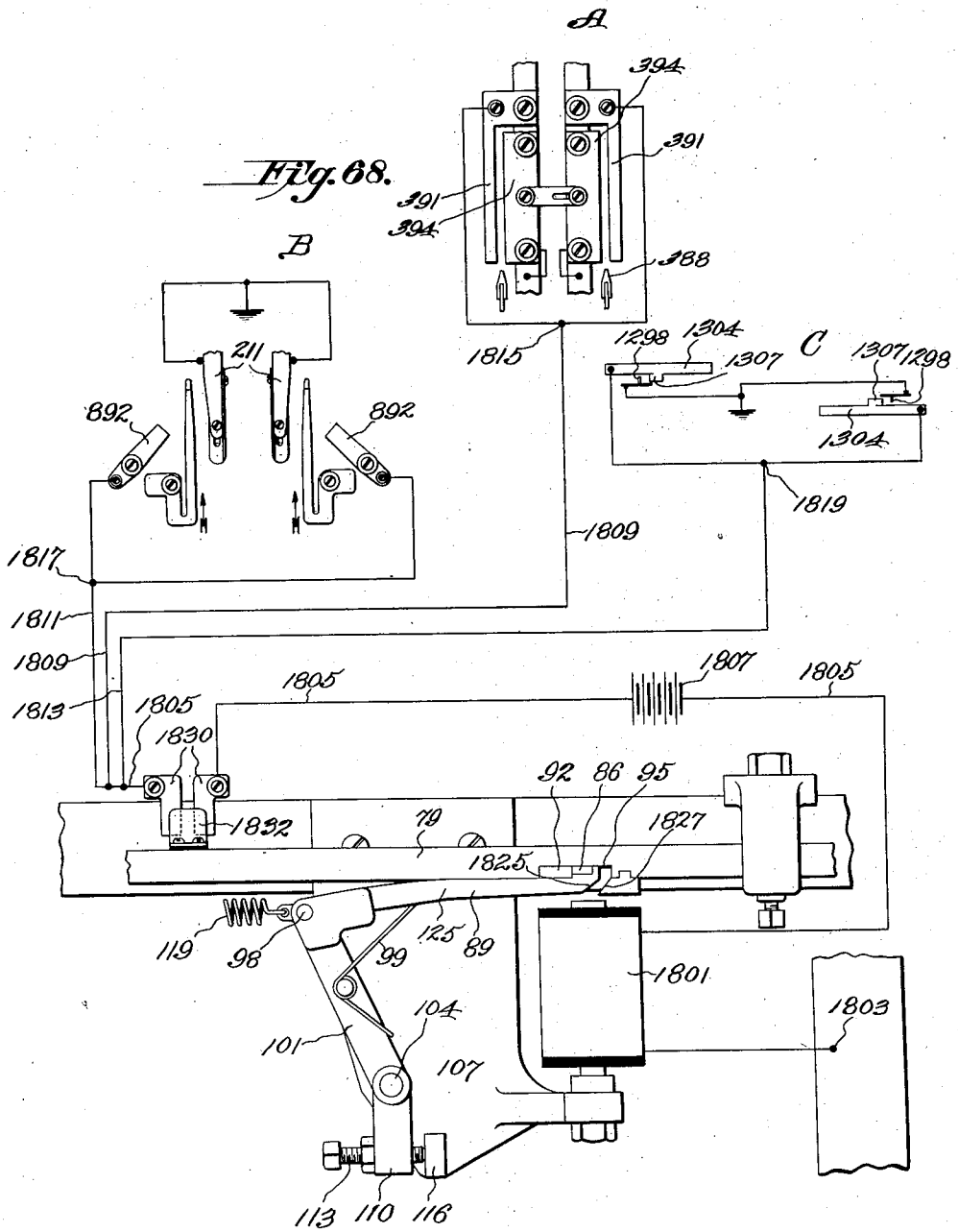
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J. T. DALTON

BAG STRINGING MACHINE

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Fig. 68.



Inventor
John T. Dalton,

By his Attorneys
Meyers, Cavanagh, Whitehead & Hyde

Patented Apr. 8, 1924. 1,489,663

UNITED STATES PATENT OFFICE.

JOHN T. DALTON, OF DURHAM, NORTH CAROLINA, ASSIGNOR TO GOLDEN BELT MANUFACTURING COMPANY, OF DURHAM, NORTH CAROLINA, A CORPORATION OF NEW JERSEY.

BAG-STRINGING MACHINE.

Application filed September 17, 1921. Serial No. 501,358.

To all whom it may concern:

Be it known that I, JOHN T. DALTON, a citizen of the United States, and resident of Durham, in the county of Durham and State of North Carolina, have invented certain new and useful Improvements in Bag-Stringing Machines, of which the following is a specification.

My invention relates to machines of the general character disclosed in my prior Patent No. 1,036,973, August 27, 1912, for automatically inserting draw strings in bags.

A principal object of the present invention is to greatly increase the output of the previous machine.

Other objects are to reduce the cost of construction of the machine, to simplify and improve its general organization and the construction and arrangement of parts and the various combinations of parts which are included in the entire machine, for the sake of improvement of the mechanism from a purely mechanical point of view, and for the sake of improved functioning of the machine in its manipulation of the strings and bags, so that the machine operates more smoothly and effectively with a reduced amount of breakage and fewer stops for adjustment, and the bag handling and stringing operations are performed more quickly and accurately, producing more perfectly strung bags with a reduced number of discards for imperfect work, as well as a much larger output in a given time.

Another object is to provide adjustments at various points to permit the handling of bags of different sizes.

Another important object is to provide means for automatically stopping the machine upon the occurrence of abnormal conditions, such as improper feeding or positioning of the bags, or breakage or running out of the string at one or a number of places in the machine.

Another object is to provide against feeding kinked or knotted string to the needles.

The foregoing and other objects of the invention are accomplished by the mechanism which is here shown and described as a representative embodiment of the invention.

Machines constructed substantially in accordance with my previous patent, above-identified, are capable of stringing a large number of bags per day by entirely automatic operations, the output of such machines under favorable conditions being from eight to nine thousand bags in a ten-hour day.

A principal object in the design of the patented machine was to reduce the cost and increase the production volume of strung bags for tobacco or other commodities in comparison with hand methods or semi-automatic machines produced by others, such machines generally falling into the classes of bag turning and stretching, usually without any automatic bag feed, and of bag stringing, usually without either automatic bag or string feed. Similarly, the principal economic purpose of the present invention is to substantially increase the output of the previously patented machine, and this has been accomplished by an entire reorganization of the structure, so that while the machine in general operates upon a similar plan, an immense number of structural changes have been made, with the result that the output of the machine has been practically doubled, so that under ordinary conditions the machine substantially as herein disclosed produces by entirely automatic operations from 16,000 to 18,000 perfectly strung bags in a ten-hour day. This result is of immense importance, since the output obtained from a given investment in factory space and wages, and the same or a smaller investment in the machine, is practically doubled. While certain of the other results accomplished by the invention, in view of the importance of the principal result above described, are to a certain extent subordinate, yet they are of great importance since they include the simplification and improvement of the structure and functions of the machine, both with regard to the mere mechanical cooperation of its parts with each other, and with regard to the operations actually performed upon the bags, with accompanying reduction in the cost of the machine and its component parts, reduced expense and a reduction of idle time for repairs and adjustments.

Certain features of the invention, such as the automatic stop devices and the string

knot eliminating feature, are not embodied in any form in the previous patent or machines made in accordance with it.

The characteristics and advantages of the invention are sufficiently further explained in connection with a detailed description of the accompanying drawings, which show the exemplifying structure above referred to. After considering this embodiment it will be evident that numerous changes may be made in the general organization, as well as in parts and sub-combinations of parts, within the principles of the invention, and I contemplate the employment of any structures which are properly within the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevation of a machine embodying the invention.

Fig. 2 is a rear elevation with parts above the table removed.

Fig. 3 is a top plan.

Fig. 4 is a right hand end elevation.

Fig. 5 is a rear elevation of the feed mechanism.

Fig. 6 is a right hand elevation of the same.

Fig. 7 is a vertical section at 7—7, Fig. 5.

Fig. 8 is a vertical section approximately in the plane 8—8, Fig. 3, with some parts removed.

Fig. 9 is a vertical section approximately in the plane 9—9, Fig. 1.

Fig. 10 is an enlarged front elevation of the upper part of the feed frame and associated parts.

Fig. 11 is a horizontal section at 11—11 Fig. 10.

Fig. 12 is a horizontal section at 12—12, Fig. 10.

Fig. 13 is a horizontal section at 13—13, Fig. 10.

Fig. 14 is an enlarged elevation of the feed carriage frame.

Fig. 15 is a similar view of the feed carriage frame with the laterally movable gripper blocks and feed grippers in position and with other parts removed.

Fig. 16 is an enlarged view partly in rear elevation and partly in section of the feed carriage and lower ends of the bag guide plates and adjacent parts.

Fig. 17 is a detail of the feed carriage with some parts in section.

Fig. 18 is a vertical transverse section through the feed carriage.

Fig. 19 is a horizontal section of the feed carriage and frame.

Fig. 20 is a perspective detail of one of the bag feed gripper cam plates.

Fig. 21 is a perspective detail of a pair of feed grippers in their approximate relation to the cam plate of Fig. 20.

Fig. 22 is a side elevation of the feed gripper cam plate.

Fig. 23 is a vertical sectional detail enlarged, of the bag feed starting mechanism.

Fig. 24 is a detail of one of the supporting bars of the same.

Fig. 25 is a perspective detail, enlarged, of one of the bag feed stops, and associated parts.

Fig. 26 is an enlarged side elevation of one of the opener gripper operating levers.

Fig. 27 is an edge view of the lower end of the same.

Fig. 28 is an elevation of one of the gripper actuating cams.

Fig. 29 is a detail of the bag holder arm and gripper operating cams.

Fig. 30 is a view partly in plan and partly in section of one of the string feed grippers.

Fig. 31 is a side elevation of the same.

Fig. 32 is a horizontal section of the same.

Fig. 33 is a view partly in elevation and partly in section of one of the bag holder arms and grippers.

Fig. 34 is a side elevation of the same.

Fig. 35 is a detail of one of the loopers and associated mechanism in operative relation to a bag supported by a pair of bag holding arms.

Fig. 36 is a side elevation of a needle holder.

Fig. 37 is a plan view of the same.

Fig. 38 is an end elevation of the same.

Fig. 39 is a top plan view of a needle with one end in section.

Fig. 40 is a side elevation of the same.

Fig. 41 is a bottom plan of the needle.

Fig. 42 is a section at 42—42, Fig. 39.

Fig. 43 is a section at 43—43, Fig. 40.

Fig. 44 is a plan view with some parts in section of the central portion of the machine above the table, with the feed frame moved, showing mainly the bag holder shaft and arms, bag adjusting mechanism, and guide block operating mechanism.

Fig. 45 is an explanatory detail of the operation of the bag adjusting pushers.

Fig. 46 is an enlarged detail view of the guide blocks and their operating mechanism.

Fig. 47 is a perspective view of one of the guide blocks and its slide.

Fig. 48 is a vertical horizontal section of a guide block resting on its slide.

Fig. 49 is a plan view of one of the slides with the guide block removed.

Fig. 50 is a side elevation of a guide block resting on its slide, which is shown in section.

Fig. 51 is a transverse section of a guide block and slide.

Fig. 52 is a horizontal section, enlarged, of a bag holding arm with one side of a bag in position and the two co-operating guide blocks in operative position.

Fig. 53 is a similar view of the bag arm and guide blocks complemental to the parts

shown in Fig. 52, but with the needles in another operative position.

Fig. 54 is a plan view of the turner head mechanism.

Fig. 55 is a detail in elevation of one of the turner heads and associated stretcher arms.

Fig. 56 is a similar view with the stretcher arms and other parts removed.

Fig. 57 is a vertical section of the turner head frame and adjacent parts.

Figs. 58 and 59 are details of the stretcher operating mechanism.

Fig. 60 is a side elevation of one of the side plates of the turner head frame.

Fig. 61 is a side elevation detail of one of the adjustable eccentric fulcrums of one of the needle carriage operating levers.

Fig. 62 is a section at 62—62, Fig. 61.

Fig. 63 is a vertical section at 63—63, Fig. 61.

Fig. 64 is a detail of one of the loopers and its link in operative relation to a needle.

Fig. 65 is a side elevation of one of the needle guide block carriers and associated parts.

Fig. 66 is an end elevation of one of the string cutters.

Fig. 67 is a side elevation of the same.

Fig. 68 is a view, mainly diagrammatic, of the automatic stop mechanism and circuits, the shiftable starting bar, latch and magnet being shown in approximately correct form and relation.

In my prior patent above identified, bags are supplied to the stringing machine in what may be conveniently described as chain form, as they come from the bag making machine. That is, the bags are arranged in a series, or chain, spaced apart approximately regularly, but with slight space-variations, the open hemmed end of one bag following the closed bottom end of the preceding one, the bags being connected in a chain by the continuous side seam threads. The hems are completely formed and stitched and the bags are "inside out". The characteristics of the bag chains are sufficiently further described in the patent.

In the preferred mode of operating the patented machine the bag chains were wound upon reels and supplied from the reel to the machine, which automatically advanced the bag chain, placed successive bags on bag holding arms of a rotary bag carrier, severed the seam-threads to free the bag from the chain, accurately adjusted the position of the bag on the arms, rotated the carrier to stringing position, inserted the strings by the operation of two reciprocating needles which moved simultaneously through the opposite neck hems of the bag, each needle carrying the free end of one of the cords through one of the hems; these free ends were gripped and held while the needles retreated and reversed their positions; loopers caught the respective strings near opposite side edges of the bag; the needles then advanced, each needle going through the hem opposite to the one which it previously penetrated; grippers then caught continuous portions of each string adjacent to the needle eye; the needles again retreated free from the bag while the two free ends of each of the strings then held by one of the gripping devices were formed into a knot and the strings were cut at the proper point.

The present machine operates on the same general plan, but with important changes in structure and function at almost every point, as fully explained in the detailed description. The general structure and operation will now be briefly explained, pointing out incidentally some of the more important differences.

The bags are supplied in chain form, as above described, but are placed in folded layers in boxes so that the folds constituting the pile in which each bag chain is formed will readily straighten out as the bag chain is advanced. The bag chain is led up and through an elevated feed trough and down over guide plates to a reciprocating feed carriage. The guide plates and other parts of the feed mechanism are made adjustable to accommodate bags of different dimensions. A hand starting device is associated with the feed plates to advance the first bag of a chain to the initial feed position or to similarly advance a bag whenever the feed is interrupted for any reason. The feed carriage is provided with bag feed grippers and bag opener grippers, as in the prior patent, but instead of mounting the opener grippers on members which are vertically movable in relation to the carriage, both the feed grippers and opener grippers are mounted on gripper blocks which are immovable vertically in relation to the carriage, but are mounted to move laterally therein, and the gripper operating mechanism and other parts of the carriage mechanism are materially simplified and improved. As the bag is fed down in the carriage, its mouth is stretched and opened and the bag is then placed on an upwardly directed pair of holding arms, which is one of a radial series of pairs of arms carried by a bag holder shaft. After the carriage retreats the bag is advanced to an intermediate position where pushing devices engage under the hem edges of the bag and push it to proper position on the arms. The arms then carry the bag forward by a part-rotation of the bag holder shaft to a dependent position and in this position needle guide blocks are brought into operative relation with the arms and bag, the guide blocks and their operating mechanism differing radically from similar parts of the

prior patent, as explained hereafter. The needles then perform the stringing operations, in conjunction with loopers which have improved features, particularly secondary hooks or supporting arms to support the formed loops at each side of the bag and also members to engage the knot which has been formed in the other string at the same side of the bag, during the beginning of the stripping operation. The bags are then removed from the holding arms by entirely novel mechanism comprising intermittently operated turner heads moving in a circuitous course and a co-operating stripper which also moves in a substantially circuitous course, the combined action of these devices being to turn the bag right side out and place it over a turner head as it is removed from the arms; and the turner head then quickly moves it to a point remote from the arms and places it in horizontal position for transfer. Associated with the turner heads is bag stretching mechanism, which stretches the bag just after it is removed from the holding arms and before it reaches the transfer position. Transfer mechanism now takes the bag from a turner head and delivers it to one of a series of pockets in a receiving wheel, and after a predetermined number of bags are placed in a pocket the receiving wheel is advanced one step to receive another definite number of bags. The means for intermittently moving the receiving wheel comprises two Geneva mechanisms acting in series, as more fully described hereafter. Associated with the transfer mechanism and receiving wheel are improved devices for wiping or pressing the bags down into the receiving pockets.

Arranged adjacent to or in cooperation with the bag feed guide plates, the adjusting pushers and the loopers, are detecting devices or other elements forming a part of automatic stop mechanism which promptly stops the machine upon the occurrence of an irregularity, either in the feeding or positioning of a bag or in the proper supply of a string, as more particularly described hereafter.

String cutters are located anterior to the string feed grippers of the needle mechanism and these cutters operate automatically upon the approach of a kink or knot to cut the string and thus prevent the supply of knotted or kinked string to the string feed grippers or needles.

General structure.

A base plate 1, Figs. 1 to 4, supports end standards or uprights 4 and 7, and intermediate standards or uprights 10 and 13. A table 16 rests on these various uprights. The table has a longitudinal opening 19 with lateral enlargements sufficiently mentioned hereafter. On the table is a bridge-like frame-work 22, which supports the bag-holding arm shaft 97 and associated parts, and uprights 25 of the bag feed mechanism.

On frame upright 7 a stub shaft 28 is secured by a nut 28^a. A sleeve 28^b rotates on the stub shaft and carries a fast pulley 31 and a loose pulley 34, to adapt the machine for drive by a belt 37 from a countershaft, although evidently any other convenient drive, such as an individual motor drive, may be employed. Sleeve 28^b also carries a pinion 40, engaging gears 43 and 46, of larger diameter, and carried respectively by shafts 49 and 52, each of which runs in suitable bearings in standards 7 and 13. Sleeve 28^b is secured for rotation on the stub shaft 28 by collar 28^c. Shaft 49 runs straight through the machine and is also supported in bearings on standards 4 and 10, and adjacent to standard 4 this shaft is provided with a gear 55, engaging a gear 58 on a shaft 61 in axial alinement with shaft 52 and supported in bearings in standards 4 and 10. The gear arrangement is such that suitable speed reduction is obtained from the driving to the driven shafts and shafts 52 and 61 turn in opposite directions at the same speed. The arrangement of parts so far described is similar to that in the previous patent.

For convenience in the original set-up and adjustment of the machine and for turning it over slowly for subsequent adjustments or observation of operation, the primary drive sleeve 28^b is provided with a hand wheel 64; and shaft 61 is provided with a hand wheel 67 of larger diameter. The gear reduction as between hand wheel 64 and the driven shafts permits the machine to be turned over with moderate physical exertion and the direct connection of hand wheel 67 to one of the driven shafts permits the machine to be turned over faster and also permits certain of the shafts to be turned when others are disconnected. To facilitate adjustments, also, one of the shafts, such as shaft 49, is provided with a cam body 70, which also serves as an index wheel provided with a peripheral scale, and a pointer 73 located on a fixed support, such as standard 4, adjacent to the scale, enables the workman to easily check up different positions of shaft 49 corresponding to the proper positions of other parts in their operative cycles.

For conveniently starting and stopping the machine, belt shifting mechanism is provided, comprising a fork, consisting of two blades 76 adjustably secured on a shifter bar 79 of square cross-section, arranged to reciprocate in brackets 82 bolted to the table. The bar is desirably moved by either of two levers 85, one near each end of the machine, and each fulcrumed on a screw stud 88 engaging in the table, and provided

with a slot engaging a pin 91 on the bar, and also provided with a handle 94 convenient to the operator at the front of the machine. Other details of the shifting mechanism are described later.

Adjacent to the table surface needle carriages 109 are arranged to reciprocate to carry the needles through the bag hem, and to shift laterally to direct each needle successively to the two hems of the bag. Guide blocks 1012, (Figs. 46 to 51) are provided to accurately guide the needles. Loopers 1162 (Figs. 35 and 64) are provided to form the string loops. Stripping and turning mechanism (Figs. 8, 54 to 60) is provided to remove the bag from the holding arms after stringing, and transfer mechanism 1591, Fig. 4, is provided to transfer the bags to a rotary pocketed carrier or receiving wheel 1597 (Fig. 1).

Bag feed.

Mechanism for feeding bags successively to the holding arms is shown in Figs. 5, 6, 7 and 10 to 19.

The four pairs of holding arms 211 and the manner of supporting them on shaft 97, are in general similar to the prior patent. Details of the holding arms and related mechanism will be described hereafter.

The chain of connected bags is led up from a suitable container, such as a box, not shown, at the rear of the machine, through a trough 214 supported at the top of uprights 25 by brackets 217 and struts 220. A tensioning device is provided to slightly retard bag movement through the trough, consisting of a rod 223, pivoted at 226 on a bracket 229 secured to one side member of the trough. The rod has an angular portion and a straight portion 232 which overlies the bags and by gravity presses the bags moderately against the bottom of the trough. From the front end of the trough the bags pass, as best shown in Figs. 1, 5, and 10 to 12, behind or "under" a guard plate 234 and over the front faces of flat guide plates 235, which are secured to cross pieces 238 and 241; and these cross pieces are in turn adjustably secured to rear cross plates 244 and 247, fixed on the uprights 25, by screws 250 passing through slots 253 in cross pieces 244 and 247, respectively, so that the cross pieces 238 and 241, with their plates, may be moved laterally to accommodate bags of different widths. Plates 235 have narrowed bottom extensions 256, and from a point slightly above the upper ends of these extensions the side edges of the bags pass through channels provided at the outer edges of the extensions, consisting of perpendicular side members 259 and inwardly projecting narrow plates 262 which are parallel to the plate extensions 256 and spaced away from them a moderate distance, sufficient to freely accommodate the side edges of the bags outside the side seams. The upper ends of the plates 262 are flared outward slightly as indicated at 265, Fig. 11.

As the chain of bags moves down over the guide plates the hem edge of each bag is positioned substantially in line with the lower ends of the plate extensions 256, and is there retained by stop-hooks 268 which extend below the hem edge of the bag and the lower ends of the plate extensions. The bag pauses at this point until a feed carriage which runs on uprights 25 is elevated, and grippers in the carriage seize the bag to move it down; and the upward movement of the carriage prior to the gripping action retracts the hooks 268 to permit the bag to move when the carriage descends. As the bag is pulled down by the carriage it pulls with it the succeeding bags in the series; at the proper moment the hooks move again into the path of the hem edge of the next succeeding bag and stop it at the proper point. The construction and operation of the bag feed carriage are detailed hereafter.

The stop-hooks are desirably arranged in two pairs, one pair of hooks for each of the guide plate extensions, and the hooks of each pair are spaced apart a moderate distance so as to embrace freely between them one of the continuous side seams of the bag series. Conveniently the hooks are formed on extensions 271 of the side plates of a member 274 of channel cross section. Each of these channeled members is pivoted at 277 on an arm 280, and the arm is in turn pivoted on a stud 283 fixed in a bracket 286 secured to the appropriate guide plate. Each arm 280 is urged to move toward the guide plate by a spring 289 coiled about its pivot axis and having its ends engaging pins secured to the arm and to a fixed point respectively, and the channel member 274 is urged to move in relation to arm 280 so that the hooks 268 tend to approach the guide plate, by a spring 292 (Fig. 25) located within the channel of member 274 and bearing against the edge of arm 280. The inward edges of the channel member adjacent to the hooks are provided with bag gripping serrations 295 which yieldingly clamp the bag margin against the faces of the plates. The lower end of arm 280 is provided with a small laterally extending lug 298, accommodated by a recess in the adjacent side plate of member 274, and the inner face of this lug is adapted to urge the bag against the plate with spring pressure as the bag moves down in the feeding action; and to enable the advancing edge of the bag to easily run under the lug, its upper edge is beveled outwardly as at 301. The smooth

outer faces 304 of the channel members 274, above the pivots 277, constitute cam surfaces engaged by a part of the feed carriage in its upward movement to rock the channel members on their pivots and retract the hooks from below the hem edge of the bag as shown in Fig. 18. When the hooks are retracted the lugs 298 remain in spring-pressed engagement with the face of the plate, and at each feeding action the advancing edge of a bag runs under the faces of these lugs and the lugs then apply a friction tension to the bag until it is positioned against the hooks, which return to active position during the downward movement of the carriage and before the advancing hem edge of the bag reaches the lower ends of the guide plate extensions.

When a bag is positioned on the hooks 268 the bag in advance of it has moved down over the holding arms of the rotary bag carrier almost to the limit of its movement and at about that moment it is desirable to apply tension to the side seams for the purpose of positively engaging the hem edge of the bag first mentioned on the hooks, and also to stretch the seam threads moderately for cutting. Cutters carried by the feed carriage then operate just below the hooks to sever the seam threads and free the bag which is located on the holding arms. Just after the threads are cut the carriage completes its downward movement and the bag last mentioned is moved down to final position on the holding arms. Since the feed carriage is positively driven, in order to apply the desired tension and at the same time to accommodate slight variations in the spacing of the bags, which may occur at either or both side-seam connections of any two adjacent bags, the guide plates and their associated bag-stop mechanism are desirably arranged for limited vertical movement independently of each other, and this movement is resisted by spring pressure which normally retains each plate in its uppermost position. For this purpose the plates are not rigidly connected to the cross pieces 238 and 241 previously mentioned, but are arranged to slide vertically in respect to them in the following way: The cross pieces carry side members 307 provided with undercut grooves 310 and in these grooves are located guide flanges 313 secured to the plates. Each plate is provided with a rearwardly extending lug 316 into which is screwed the lower end of a spring rod 319; and this rod passes up slidably through a lug 322 on cross piece 241. A helical spring 325 is located about the rod, and its lower end engages the upper face of lug 322 and its upper end is adjustably confined by nuts 328 screwed on the upper end of the rod. In this way each of the plates and its associated parts is normally retained in elevated position. Toward the end of each feed movement, just after the hem edge of a bag engages the hooks 268 and the bag in advance is being pulled down to its final position on the holding arms, the pull of the bag first mentioned on the hooks causes the plates to move down slightly and tension is applied to each seam-connection by the springs 325; the seam threads are then cut between the two bags and the plates and associated parts are returned to normal position.

To prevent the bag movement from pulling down the guide plates 235 and associated parts prematurely in any case, plate latches 320 are provided, carried by latch arm 321 pivoted at 323 to side members of the feed frame. These arms are in turn connected to outwardly offset operating arms 324, provided at their lower ends with cam plates 326 which are operated by the feed carriage as it nears the lower end of its stroke, to withdraw the latches 320 from under the adjacent edges of the guide plates; and thereafter the guide plates are free to move down at the proper moment, as previously described.

The invention provides means, which may be identified as a "feed starter", or by similar terms, for conveniently restoring the bag feed when it is interrupted by breaking of the seam threads or by running out of the string of bags. Each of the guide plates is provided with a slot 331 extending from a point distant from the hooks 268 considerably more than the length of one bag to the lower end of the plate extension; and this slot is substantially in line with the space between the corresponding pair of stop hooks. Through each of these slots projects a hook 334 which may be described as a "starting hook"; and these hooks are carried by lever arms 335 pivoted at 336, in channels 337 of squared rods 338 which are arranged to move vertically in guides 339 secured to rear surfaces of the bag guide plates 235. These rods have rearwardly projecting arms consisting of other plates 340 suitably curved and having their upper ends riveted in upper portions of the rod channels 337; and the lower ends of these arms are connected by a handle 346 and this is normally engaged by the hook of a latch 349 pivoted in a lug 352 secured to frame cross-piece 247. The latch has a spring urging it to engage the handle. When the feed is interrupted the operator brings forward a new string of bags or the foremost one of the broken string of bags, and engages the hem fabric of this bag with the hooks 334, at the same time releasing latch 349. The operator then pulls down handle 346 and the hooks carry the bag down over the faces of the guide plates during a descending movement of the feed carriage, until the chain of bags is prop-

erly repositioned for feeding; and then the starting hook mechanism may be returned to normal position; or if not returned by the operator, it will be returned by the next upward movement of the carriage; and thereupon latch 349 re-engages handle 346 and retains the bag starting mechanism until it is again released by the operator.

The machine is desirably provided with automatic stop mechanism for stopping it upon failure to properly feed or position bags at different positions in the machine and also upon occurrence of other irregularities. It is important to provide for stopping the machine if there is an interruption in the proper initial feed of the bags. Provision is made for this in connection with the guide plates as follows: At suitable points on the guide plate extension 256, the plates are provided with slots 355 and through each of these slots projects a bag detector or feeler blade 358. The upper end of this blade is curved or beveled as at 361 to enable the advancing edge of a bag to slide easily under it. These blades are carried by lever arms 364 pivoted at 367 in lugs 367a on the guide plates (Fig. 18). The levers are provided with springs 370 arranged to move the blades 358 outward, that is toward the observer in Fig. 10. Co-operating with the blades are guide plates 373 having outwardly flared upper ends at 376. These plates are secured by means of angle pieces 379 to the adjacent sides of arms 280, previously mentioned. The lower portion of each plate 373 is reduced in width and is separated by a slot into two fingers 382 which straddle the corresponding feeler blade. The length of each blade 358 is greater than the space between two adjacent bags in the chain, and when bags are feeding properly they pass between the plates 373 and plates 235 and run under the beveled upper ends 361 of the blades, and push the blades back so that the upper ends of the levers 364 are held near the rear faces of plates 235. The upper ends of these levers are provided with contact pieces 385 having tapered or wedge-shaped edges 388 and in the described lever position these edges are opposite to but retracted from adjacent edges of separate fixed contact members 391 and 394. These contact members as best shown in Figs. 5 and 11, are secured to rear faces of the inward guide plate frame members 307. The two contact plates 394 may be connected by a metal strip 397 and they may be grounded through the frame of the machine, or connected to one side of an electric circuit, while the other contact plates 391 are suitably connected by conductors 400 and 403 to the other side of the electric circuit, which is arranged as later described to operate suitable mechanism for stopping the machine when the circuit is closed, which occurs when there is a break in the bag feed at either side of the bag chain, sufficient to permit the corresponding blade 358 to project between the fingers 382. Thereupon the contact piece at the upper end of the corresponding lever 364 moves outward and enters the gap between the adjacent edges of contact plates 391 and 394 and closes the circuit to stop the machine. This will occur evidently if there is an entire failure of bag feed due to the string of bags which is being worked on coming to an end, or if the seam threads are broken at either or both sides, permitting the bags to separate far enough to allow the feeler blades to come forward in the manner described.

Bag feed carriage and related parts.

This carriage is built upon and around a main frame consisting of substantially similar front and rear sections 410, Fig. 14. Each of these sections has cross bars 413 and 415, and upright side members 418 which have flanges 421 adjacent to vertical shoulders 424. Each flange and shoulder slidably engage with the vertical outer edge and inner margin of one of the feed frame uprights 25. The pair of frame pieces 410 is secured together by bolts passing through suitable bolt holes 427 and 430. The main frame is thus arranged to slide vertically on the uprights 25. The cross bars 413 of the main frame are provided with inwardly projecting flanges 433 and the cross bars 415 are provided with inwardly directed grooves 436. Supported on these cross bars are two laterally movable blocks 439 which carry the bag gripping and mouth-separating members. Each block consists of two parts 442 which have inward abutting plane faces 445, and the two members of each block are secured together with these faces in contact by screws passing through holes 448 and 451. The upper forward and rear corners of each block are arranged to slide in the angular channels provided by the flanges 433 of main feed frame pieces 410, as indicated at 454, Fig. 18, and the forward and rear faces of each block near their lower ends are provided with ribs 457 arranged to slide laterally in the frame grooves 436. Each of the blocks is thus arranged to slide laterally in the main feed frame and is immovably held therein in respect to relative vertical movement. Each of the blocks 439 as viewed in plan, has inwardly projecting separated members 460, which form in connection with the bodies of the block pieces a yoke embracing a space 463 extending vertically through the feed frame and inward portions of the slidable blocks, this space being sufficient to accommodate the bag guide plate extensions 256 and a bag located thereon when the feed carriage is in its upward

position, as shown in Figs. 18 and 19. The blocks 439 are normally moved apart and held away from each other in the position shown in Figs. 17 and 19 by helical springs 466 held in place by small rods 469, these rods being located in sockets in lugs 472 secured to front and rear faces of each block near the top and bottom thereof, so that there are four of these retracting springs with suitable mountings. The gripper blocks are moved together against the action of the springs at suitable times by cam mechanism presently to be described.

Each block is provided with a pair of bag feed grippers 475, these being in the form of angular offsets on lever arms 478 pivoted on screws 481 inserted in the block members 442 from below, as shown in Fig. 15. Each of the lever arms has an extension 484 acting as a cam follower and located in a cam slot 487 of a cam plate 490 vertically movable in a suitable guide way formed for it in the corresponding gripper block by providing the respective block members with vertical channels 493 in which the cam plates are vertically movable. The lateral faces of the cam follower extensions 484 are arranged to easily follow the curved cam slots, as shown in the end views of these extensions in Fig. 22. When the cam plate is moved down in relation to the blocks 442 in which the levers 478 are pivoted, the diverging cam grooves commence to spread the cam followers apart and to bring the grippers 475 together. At a suitable point in the downward movement of the cam plate the followers 484 are yieldingly acted upon, to apply yielding pressure as the grippers engage the bag, by cam arms 491 located in a space provided on one side of the cam plate between its side flanges 492. These cam arms are pivoted on a pin 494 and have cam faces 495 adapted to engage the cam followers 484, which, when they approach these cam faces diverge at such an angle that they engage the yieldable faces 495 instead of the adjacent faces of the cam slots 487. The cam arms are acted upon by a spring 497 coiled about a pin engaging in the cam plate and having its ends located in channels in the inward faces of the upper ends of the cam arms. Toward the upper ends of the cam surfaces 495 depressions or notches 498 are provided so that when these notches come into engagement with the followers 484 the followers snap into them slightly and thus the parts are yieldingly held against relative movement at this point until the cam plate is definitely moved upward again in relation to the blocks 442, whereupon the notches are snapped away from the followers and the cam slots 487 then move the followers convergently to release the grippers. Each cam plate 490 is provided with an arm 503 extending through a vertical slot in a rearward face of block 442 and the ends of the two arms 503 are provided with short bearing sleeves 608 to receive a shaft 605 which moves the cam plates and also the entire feed carriage, as explained hereafter. Each cam plate also has on its outer upper face a lug 506 with rounded corners 509, and the outward face of each lug runs on a cam track 512, provided on the inner adjacent face of upright 25. This cam track has a depressed portion 515, the upper and lower ends of which are gradually sloped out to positions flush with the inner face of the upright. The blocks 442 are compelled to follow the cam tracks 512 by the springs 466 which continually urge the blocks apart. Accordingly just after the cam plates 490 have been moved down in relation to the feed carriage and the bags have been gripped by the feed grippers 475, the cam lugs 506 move out into the depressed portions 515 of the cam tracks and the blocks 442 separate so that the hem end of the bag is stretched between the two pairs of feed grippers. The bag is then in proper condition for engagement by the opening grippers later described, which seize the outer portions of the fabric of each hem and penetrate the two sides of the bag mouth. As the slidable blocks 442 move together again when the lugs 506 approach the lower ends of the cam depressions 515, the blocks are again moved convergently to relax the bag material between the points where it is held by the grippers 475. To insure the firm gripping of the bag, both with respect to lateral and vertical movement of grippers 475, the active inward vertical face of one of the grippers 475 of each pair is formed with a narrow groove 496 and the opposite gripper face is formed with a beveled edge 499 adapted to depress the bag material into the groove, and this edge is also desirably provided with serrations 502, Fig. 21. The gripping faces 496 and 499 extend a considerable distance vertically, and these gripping faces are arranged to move inward between the arms 271 and hooks 268, Figs. 10 and 19 and grip the bag in the space thus provided when the feed carriage is in its uppermost position, and the gripping members are brought together by downward movement of the cam plates 490 in relation to the feed frame. Provision is made for holding the feed frame stationary in its uppermost position, while the described movement of the gripper cam plates is effected and for also holding the feed frame stationary in its lowermost position while the cam plates 490 are moved upward relatively, to open the grippers, this mechanism being described hereafter.

The grippers just described may be desig-

nated as feed grippers in distinction from bag opening grippers now to be described. A pair of these opening grippers is carried by each of the gripper blocks 439. Each opening gripper is carried by an arm 505 provided with a pivot stud 508 arranged to oscillate in a bearing 511 secured to one of the block members 442. The arm pivots are placed widely apart and the arms of each pair converge inward and downward, and are provided with lower inward faces 514 which are closely adjacent to each other in vertical parallel positions when the arms are in gripping position and the hem portion of the bag is then closely confined between these faces. Each arm 505 is formed with an upturned parallel portion 517 providing a space between the arm and said portion, in which two gripper hooks 520 are pivotally mounted on a pin 523. The hooks are moved on the pivot so that their points alternately extend beyond the inner face 514 of the arm and approach each other and pinch a portion of the bag fabric between them, and are retracted back of the face 514 as shown in Fig. 18, by a lever 526 pivoted on a pin 529 which passes through the arm and parallel side piece 517. This lever has a space near its lower end substantially surrounding the hooks 520 and in this space are shoulders 530 adapted to engage the rear faces of the hooks to advance them for gripping, and the lever is also provided with shoulders 532 adapted to engage short arms 535, one of which extends substantially at a right angle from each of the hooks, to retract the latter. The shoulders mentioned are offset laterally so that each of them operates only upon one of the rear hook faces or upon one of the arms, and the hooks are in this manner operated substantially in scissors fashion.

Each of the gripper arms 505 has a portion extending above its pivot stud and in the end of this is secured a pin 541 engaged by a clevis in the end of an arm 544. The two arms 544 on the forward side of the feed carriage are mounted to oscillate on a common axis and the two arms on the rear side of the carriage are arranged to oscillate on another parallel common axis. Of the two arms at the rear side of the carriage as shown in Figs. 5, 16 and 18, one is adjustably clamped upon a sleeve 547, which is connected to a shaft 550 in axial alinement with the sleeve by a laterally offset member 553. The sleeve and shaft respectively oscillate in bearings 556 and 559 secured to side members of the main carriage frame. The two arms 544 at the opposite side of the carriage are similarly arranged, one on a sleeve 547 and the other on a shaft 550, and the sleeve and shaft are similarly mounted and connected. The two shafts 550 at opposite sides of the frame are connected to move together by arms 562 and 565, (Fig. 4), each of which is mounted on the end of one of the shafts and these arms extend toward each other adjacent to one of the fixed frame uprights 25, as best shown in Fig. 4, and are connected by a clevis formed in the end of one arm and a rounded end 568 of the other arm resting in the clevis. The shaft 550 at the rear of the feed frame is also provided with an upwardly directed arm 571, Figs. 6 and 16, and also shown in dotted lines in Fig. 4, which carries a cam roller 574 engaging a cam groove 577 in the inner face of a vertical cam plate 580, a part of which is broken away in Fig. 4, to show other mechanism. This cam plate is secured to the right hand frame upright 25, as viewed from the front of the machine, by screws passing through an offset portion 583 of the plate. A short distance below its upper end, the cam groove 577 has a lateral offset 586, so that after the feed carriage descends a short distance from its top position the cam roller is moved inward, and both the shafts 550 and their connected sleeves 547 are oscillated simultaneously, so that the lower ends of arms 544 move outward and the lower ends of the gripper arms 517 are brought into contact with the bag. At this moment the gripper hooks 520 are extended and brought together to grip the outer fold of the bag hem simultaneously at two separate points on each side of the bag by the following means: The hook operating arms 526 extend above their pivot points 529 and are provided with clevises 589. The two clevises of the pair of arms at one side of the feed frame are engaged by a pin 592 carried by the end of an arm 595, which is connected to a shaft 598 extending through one of the sleeves 547 previously mentioned in connection with the operating means for the gripper arms. The hub of arm 595 is accommodated between the inward end of the sleeve and the adjacent end of shaft 550 and the bore of sleeve 547 extends somewhat into the end of the shaft to provide a bearing for the end of shaft 598, which extends beyond the hub of arm 595; and the connecting member 553 previously mentioned bridges across this arm hub. Similarly, the two hook operating levers at the opposite side of the feed frame have their clevises engaged by a pin 592 similarly mounted on an arm 595 which is carried by a similar shaft 598. The two shafts 598 at opposite sides of the feed frame are connected to move together by arms 601 and 604, which extend toward each other near the left hand frame upright 25, as viewed from the front of the machine, and one of these arms is provided with a clevis in which engages a rounded end 607 formed on the other arm. One of the shafts 598 also has an upwardly

directed arm 610 provided with a cam roller 613 running in a cam groove 616, in a cam plate 619, Figs. 5 and 16, omitted in Fig. 6 for the sake of clearness, but arranged to be secured to a seat 622 provided on frame upright 25, by screws entering the screw holes 625, as shown in Fig. 6. The cam groove 616 is contoured so that the shafts 598 are oscillated to extend the gripping hooks just after the faces 514 of arms 505 have been brought together against the bag and so that the hooks continue to grip the bag margins adjacent to the hem, while the lower ends of the arms 505 are again separated by reason of the cam roller 574 passing away from the offset portion 586 of its cam groove and back into the long straight lower stretch of the cam groove. In this way the bag mouth is opened by the gripper hooks 520 and held open as the bag is passed down over the holding arms. At a suitable point in the downward movement of the feed carriage the hooks are retracted and release the bag.

The feed carriage is moved vertically by parallel levers 590 which are operatively integral and are fulcrumed at 593 (Fig. 4) in the upper ends of rock arms 596, which have hub sleeves oscillatably mounted on a shaft 599 which moves in bearings on brackets 602 secured to the table. The inward ends of the lever arms 590 have a bearing engagement with a transverse pinion shaft 605 which is mounted in bearings 608 formed in the outwardly extending ends of arms 503, previously mentioned, which are rigidly connected to cam plates 490, which move vertically in relation to the laterally slidable gripper block 442. Operatively integral with the levers 590 is an arm 611 connected by an adjustable link 614 to an arm 617 fixed to shaft 599. Adjustably fixed at one end of shaft 599 is a lever arm 620 and this is moved by link 623, the lower end of which is adjustably connected in a slot in the rearward end of a lever 626 which extends substantially across the machine as best shown in Fig. 4, and at a nearly central point is oscillatably mounted on a shaft 629. This shaft is carried by bearings at the upper ends of uprights 632 and 635 secured to the bed plate, the latter forming a part of the central standard 10. The lever has a cam follower 638 running in a cam track in the face of a circular cam body 641 fixed on shaft 49. In this way, once in each cycle of the machine the lever arms 590 are oscillated. and the cam plates 490 are moved up and down, and these cam plates after moving a short distance in relation to the feed carriage at each end of its stroke, carry the feed carriage with them through its predetermined range of movement. To provide for uniform movement of the two cam plates to which shaft 605 is directly connected, and for other purposes, shaft 605 is provided at each end with a pinion 644, and each pinion engages a vertical gear rack 647 secured to one of the frame uprights 25. The feed carriage is retained at each end of its stroke for a brief time while initial movement of the lever arms 590 is imparted to the cam plates through shaft 605, and then the carriage is released and moves through the rest of the stroke along with the cam plates; and provision is made to substantially lock these parts together after the initial relative movement is accomplished, and until the end of that stroke is reached. To lock the carriage at top and bottom position latch plates 653 are located, one near the upper end of each of the racks 647; and similar latch plates 656 are arranged, one near the lower end of each of the racks. These latches are accommodated in recesses formed in the inward surfaces of the racks. Each latch is pivoted to one of the frame uprights at 659 and is urged outward by a spring 662, and its outward movement is limited by a projection 665 engaging against an inward face of the adjacent rack. The outer face of each latch plate has a curved depression 668 and directly above this depression in the upper latches and directly below it in the lower latches is a tooth or latch member proper, 671. The upper latch teeth 671 are arranged to engage below a shoulder provided at 674 on the flanged base of the bearing 556 secured to the feed carriage main frame, as best shown in Fig. 16, and the lower latch teeth are arranged to engage above similar shoulders provided at 677 on the flanged bases of bearings 680 later referred to, which are also secured to the feed carriage main frame. The pinions 644 are relatively long, and portions of them run over the outer edges of the latch plates 653 and 656. As the pinion shaft travels upward, and approaches its uppermost position, the pinions first run upon the angular surfaces 683 of the upper latch plates directly below the curved depressions 668, and depress the latch plates against their springs 662. Shortly thereafter each pinion runs into the depression 668 of the adjacent latch plate, and the latch plates spring outward, and at about this moment the shoulders 674 secured to the main carriage frame are above the upper surfaces of the latch teeth 671 and are engaged by them; and the main carriage frame is then locked by the teeth against downward movement. When the lever arms 590 commence to move downward in the next cycle of the machine, the shaft 605 is first moved downward, carrying with it the cam plates 490, and after they have operated the bag feed grippers the pinions 644 run upon the projections of the latch plates at the bottoms of the depressions 668, and depress the latch plates,

and thereupon the main carriage frame is free to move down along with the pinion shaft and cam plates. Similarly, after the downward carriage movement, the main carriage frame is locked by the lower latches and in the next upward movement the pinion shaft first moves and releases the latches and then the carriage moves up along with the cam plates.

To prevent relative movement of the cam plates and the main carriage frame after the latter is unlocked, and especially to prevent such relative movement in the downward stroke of the carriage, where it might tend by gravity to run ahead of the pinion shaft and cam plates, the following devices are provided: The main carriage frame has a shaft 692 mounted in the bearings 680, just above mentioned. On the outer ends of this shaft are secured arms 695, which have angularly directed upper ends in which are mounted rollers 698, these rollers being arranged to engage the adjacent ends of pinion shaft 605. Shaft 692 is acted upon by a spring 701 so as to continually urge the rollers 698 inward, that is so that they move toward the right in Fig. 6. At least one of the arms 695 has a toe or inwardly projecting member 704 arranged to engage, near its lower limit of movement, a pin 707 fixed in the adjacent upright 25. As the carriage is moving down the rollers 698 are engaged above the pinion shaft 605 and are located inwardly somewhat beyond the shaft center, so that the main carriage frame is securely locked to and practically hangs upon the shaft, and cannot move in advance of it. As the downward limit of movement is reached the toe 704 engages pin 707 and this oscillates shaft 692 against its spring so that the rollers 698 are retracted and pinion shaft 605 is then free to move up in the next carriage stroke with no resistance from the rollers or with only slight resistance due to only a small sector of the inner face of of each roller engaging an outer portion of the pinion shaft. The upward movement of the pinion shaft first elevates the cam plates and releases the feed grippers and then the carriage moves up along with the the pinion shaft, and there is no considerable tendency for the carriage to move ahead of the pinion shaft; but any such tendency is resisted by the rollers engaging slightly below the center of the pinion shaft, as sufficiently indicated in Fig. 16, which shows the carriage in its uppermost position. In the first downward movement of the pinion shaft from the position shown in Fig. 16, the pinion shaft forces the rollers 698 outward, and then they spring into the position shown in Fig. 6 just as, or before, the main carriage frame is unlocked.

The feed carriage has cut-off mechanism for severing the side seam threads, which is in general similar to that shown in the previous patent. This mechanism is carried by cutter heads 631 arranged to reciprocate in channeled guides 634 carried by an upper cross piece 637 secured to the main carriage frame member 410 at the front side of the feed frame. The pivoted cutter blades 640, Figs. 5 and 18, are provided with suitable operating mechanism, substantially as in the previous patent so that when the cutter heads 631 are moved forward as the carriage approaches its lowermost position a pair of blades near each side of the carriage converge, and those of each pair seize between them one of the side seam threads between two bags, these threads being tensioned in a way previously described, and sever the threads, and thereafter the cutter heads are withdrawn in the upward movement of the carriage. The cutter heads are reciprocated by lever arms 643 adjustably secured on a shaft 646 carried in bearings at the front side of the feed carriage. The upper ends of these arms are connected by links 649 to the appropriate cutter heads. Shaft 646 is provided with an arm 652 having a cam roller running in a cam groove 655 in a vertical cam plate 658 connected to one of the stationary uprights 25; and the cam groove has a short offset portion 661 to advance and retract the slides as previously described.

The feed carriage toward the front side of the machine has rounded lugs 664, best shown in Fig. 18, arranged to operate the cam pieces 326 carried by arms 324 previously mentioned, which operate the latches for the vertically movable bag guide plates 235. Each cam piece has angular upper and lower faces 667 and 670, respectively, merging with a straight vertical face 673. Until the carriage approaches its lowermost position the bag guide plates are locked by the latches 320. At the proper moment the ends of lugs 664 strike beveled faces 667 of the cam pieces and move arms 324 outwardly and release the latches, to permit the guide plates and associated parts to move down by the pull of the bag located on the plates against the bag stop hooks. Upon return movement of the carriage the cam pieces are released from the lugs and the latches then drop into position below adjacent edges of the guide plates and lock them until the proper moment in the next cycle of the machine.

Bag holding arms and related mechanism.

The bag holder shaft 97 above mentioned is rotated intermittently by a chain 148 running on a sprocket 151 fixed to the shaft and also running over a sprocket 154 on a

shaft 157 which has other functions later described. Chain 148 also runs over guide rolls 160 supported on an upright bracket 163. Shaft 157 is driven by a chain 166 which runs over a sprocket on shaft 157 and another sprocket 169 secured to a Geneva wheel 172 located on a shaft 175 mounted in bearings in a part of standard 13. The peripheral arc-shaped sectors of this Geneva wheel cooperate with the periphery of a disk 178 carried by shaft 52 and the disk is provided with a pin to engage the radial slots of the Geneva wheel and move it one-sixth of a turn at each rotation of shaft 52, and the gear and chain connections are so proportioned and arranged that the bag holding arm shaft is moved one-fourth turn at each movement of the Geneva wheel 172.

There are four pairs of bag holding arms 211, the pairs of arms being spaced equally about the supporting shaft 97, as best shown in Fig. 8. Operations are performed upon or in relation to the arms in three of their positions, that is, the arms which are uppermost in Fig. 8, have the bag placed upon them as described previously; the shaft is then rotated so that those arms are rearward, or toward the right in Fig. 8, and in that position the bags are acted upon by pushing devices which insure their proper positioning on the arms; the shaft then rotates another quarter turn so that those arms are in the lowermost position of the figure and in that position the stringing operation is performed and the bag is stripped from the arms and in stripping is turned "right side out" over a turning head, which carries it to transfer devices which place it in a pocket of a multi-pocketed receiving carrier or wheel. The left hand position of the arms, pointing to the front of the machine in Fig. 8 is an idle position. In order to lock the arm shaft 97 firmly in position after each movement it is provided with a latch disk 679, Fig. 4, and this is provided with four notches 682. A bolt 685 is arranged to slide toward and from the shaft center and its end is slightly beveled to enter the notches. It is urged into contact with the periphery of the disk by a spring and is retracted at the conclusion of each bag feeding and stringing operation by a lever arm 688 which has a clevis embracing a stud 691 carried by an outward extension of the bolt. This lever arm 688 is connected to a lever 689 fulcrumed in the frame at 690 (Fig. 9) and this lever has a cam roller 693 engaging a cam track on the end of a circular cam body 696 carried by a shaft 61. Thus in each cycle of the machine the lever arm 688 is oscillated and after the bag holding shaft is moved a slight distance is returned and the bolt reengages with the next notch and again locks the bag arm shaft in position.

The main portion of each bag arm 211 (see Figs. 33, 34 and 35) has an enlarged inner end or base 694 of substantially rectangular outline and this base is mounted in a socketed lug 697, extending from shaft 97, on a pivot consisting of a screw 700 passing through the side plates of the lug. A spring 703 resting in sockets formed in adjacent faces of the arm base and the inner portion of lug 697, urges tthe outer end of the arm 211 to move outwardly, that is, so that the outer ends of the two arms of a pair tend to move apart. This movement is limited by a pin or screw 706 inserted in the lug and bearing against the arm base inwardly from the pivot. The arm and its base are slotted throughout a major part of their length and in an inward part of this slot is located a bag gripper body 709 which has a pivoted mounting on screw 700, this movement being to a certain extent independent of the movement of the arm. The outer portion of the gripper body is also channeled on its inward face producing two separated gripping faces 712 engaging against adjacent edges of the arm and the surfaces of the gripper faces adjacent to the gripping faces 712 are beveled as at 718 and 721. The gripper body is urged to move so that the gripping faces 712 engage arm faces 715 (Figs. 33 and 34), by a spring 724 confined between inner end portions of the arm base and the gripper body. The outer portions of the side members of the arm base at each side of the channel formed therein are cut so as to provide in conjunction with the adjacent beveled faces 718 of the gripper an aperture 727 adapted to be entered by one of a pair of stripper fingers which strip the bags from their arms and turn them over a turning head at the end of the stringing operation. A space 730 is provided between the gripper faces 712 by the channeling of the outer end of the gripper to accommodate the edges of the bag material which extend beyond the side seams at the hemmed end of the bag as best shown in Figs. 35, 52 and 53. The edges of the outer side portions of the arms are rounded as at 733 to smoothly hold and stretch the bag and especially provide a suitable surface to cooperate with the needle point as it passes just outside the grippers and engages the bag supported by the rounded surfaces of the arms, Fig. 52. Within the space provided by the channel in the arm is a gripper member consisting of a flat piece 736, Figs. 33 and 34. This may be called a safety gripper. Each of the members 736 is pivoted on a pin 739 and is provided with a lug or projection 742 which is the actual gripping member, and is also provided with a pin 748 extending through

the inward wall of the bag arm, and each gripper member is also provided with a beveled face 738. When the members 736 are moved to active position by devices acting on the ends of pins 748, as hereafter described, the gripper lugs 742 are pushed into the spaces between the side walls of pivoted grippers 709 and firmly grip both sides of the bag against the walls of the main gripper, and so prevents the side stitching of the bag from giving away when stretched. This gripping action also prevents the bag from ripping when the needle starts into the hem and so avoids breaking of needles from this cause. The safety grippers are released when the stripper hooks come into action and go back flush with the adjacent edges of the holder arms 211 so that the stripper hooks or fingers will not strike surfaces of the gripping lugs 742.

To provide for the necessary movements of the arms and grippers the arm bases have portions or members 751 extending laterally beyond the radial outer surfaces of the supporting lugs 697 and the gripper bodies 709 have inner end portions or members 754 also extending out beyond adjacent faces of the lugs. Cooperating with these members of the arms and grippers, at each side of the series of lugs is a stationary cam plate 757 supported by an angular foot 760 resting in a socket 763 provided for it in an upper portion of the bridge frame 22. Pivoted on this stationary plate at 766 is a movable cam body 769 having a cam face 772 in the form of a circular segment concentric with the center of shaft 97 and beveled inwardly from one end 775 to a point near the other end 778. Adjacent to this point the cam body is engaged by a stop pin 781, and a spring 784 normally holds the cam plate against this pin. The cam body is provided with an upwardly extending arm 787 having a beveled face 790, these faces of the two cam-arms being arranged to be engaged by shaft 646 of the bag feed carriage near the end of its downward movement. The cam surfaces 772 engage the surfaces 751 of the bag-holding arms, as the arms move up from the idle position, Fig. 8, toward the upper vertical position, and move the arms inward so that when the arms are in the uppermost position they converge considerably, as shown in Fig. 1 ready to receive the bag. As the bag is moved down toward its final position on the arms, shaft 646 strikes the beveled faces 790 (Fig. 6) and the cam bodies are rocked to the left as viewed in Fig. 8. The cam ends 778 are thus retracted from the arm surfaces 751 and the arms move quickly outward under the impulse of the springs 703 to stretch the bags and hold them firmly in position. As soon as the shaft 97 moves forward in the next positioning movement the cam bodies return to normal position.

Each cam plate 757 also has an arc-shaped cam surface 793, the forward end of which at 796 is beveled outwardly and the rearward end 799 is also outwardly curved or beveled. These cam surfaces engage the outer edges of gripper members 754 as each pair of arms approaches the uppermost position in Fig. 8, and move these members inward so that the gripping faces 712 of the grippers are retracted from the adjacent faces of the arms, ready to receive the advancing edge of the bag, as shown in Figs. 1 and 5. The gripper members 754 run on the main surfaces of the cams until the arms approach the rear horizontal position, as shown in Fig. 8, where the bags are additionally adjusted on the arms by pushing devices, and thereafter in the next movement of the arm shaft the members pass away from the main surfaces of the cams onto the rear beveled surfaces 799, and the grippers are released, so that the gripping faces 712 grip the bag hems adjacent to the side seams firmly against the arm surfaces 715. The bag is then securely held ready for threading when the arms reach the lower vertical position.

Each series of arm-carrying lugs 697 may be carried by a hub adjustably mounted on the shaft 97, to provide for bags of different widths, and other parts, such as the cam plates 757, may be similarly adjusted in the direction of the axis of the shaft, provision being made for this by the mounting of the angular plate feet 760 in the sockets 763. Otherwise the arm lugs 697 may be integral with the shaft 97, as shown, and a new shaft with the series of lugs properly spaced apart may be substituted, to suit the width of the bags to be strung. Since the machine is designed for very large quantity production, although provision is made for adjustment for different bag dimensions, the adjustments will not need to be changed frequently, and after the machine is once set up or adjusted for a certain bag size, it is usually run in that condition until a great many thousand bags have been produced. Therefore, the adjustment may be in certain cases by means of movable parts or otherwise by replaceable parts which have dimensions suitable for the different bag dimensions, as indicated previously and sufficiently explained hereafter in connection with other adjustments.

To adapt the arms for bags of different lengths, each arm is provided with an end piece 802 comprising a flat body 804, accommodated in the arm channel, and this body is provided with a slot 805 through which passes a screw 808, which engages the arm members of each side of the arm-

channel. The end piece also desirably has inner flanges 811 overlying the inner faces of the arm side members, and inward extensions of these flanges are formed into a plate 813 provided with a slot through which passes a screw 816 engaging a solid inner face of the adjacent arm. By loosening the screws 808 and 816 the end pieces may be moved in and out a suitable distance, and then secured by setting up the screws. The end pieces are usually adjusted for a bag of given length so that when the bag is fully in position, as shown in Fig. 35, the rounded outer ends 819 of the end pieces are in close proximity to the bag bottom.

Bag pushers and adjusters.

The arm shaft 97 is now rotated one-quarter turn, bringing a pair of arms carrying a bag to the rear horizontal position, Fig. 8. At this point the bag is additionally adjusted or pushed toward the inward ends of the arms, to insure that it is in proper position for stringing. The bridge frame work 22 supports a shaft 830 and an ascillating arm 832 extends up from the center of this shaft. A spring 831 urges the arm toward the right in Fig. 8. The arm is oscillated by a link 835 pivoted to the arm and extending through a block 838 which is rotatably mounted between short arms 841 extending upwardly from a hub 844 secured to shaft 599 of the bag feed carriage operating mechanism previously mentioned. The round link 835 slides freely through the block and is provided with two sets of adjustable stops consisting of nuts 847 screwed upon the link, so that lost motion is provided for the block between the two stops. Transversely mounted in the upper end of rock arm 832 is a rod 850 on which two sleeves 853 (Figs. 5 and 44) are slidably mounted. Each of these sleeves is united to another sleeve 856 having a vertical aperture and through this aperture passes a vertical rod 859 and this rod also passes through eyes fromed in the ends of two clevised arms 862 arranged one above the other in parallel relation and connected to a vertical hub 865, which is pivotally mounted on a stud 868 engaging in one of the bridge frame members 22. Substantially in line with this pair of arms on each of the frame members 22 is another pair of arms 871 similarly clevised and connected to a hub and this is pivotally mounted on a stud 874. A link 877 passes through the clevises of the two upper arms of each pair and a similar link passes through the clevises of the two lower arms of each pair and the links are pivotally connected in the ends of the four arms toward the rear of the machine by the vertical rods 859 previously mentioned, and are pivotally connected to the four inward arms by pivot pins 880. Each of the links 877 carries a pusher finger 883, the inward ends 886 of which are downwardly directed and then turned to a horizontal position so that there are thus provided two pairs of finger ends directed inward toward the center of the machine, the two finger ends of each pair being arranged respectively above and below the bag carried on the holding arms. These fingers are of thin sheet metal and, therefore, flexible so that they yieldingly engage the upper and lower outer surfaces of the bag. When shaft 599 is oscillated lost motion between the block 838 and the inner pair of stop nuts 847 is first taken up, and then arm 832 is moved inward against its spring, and the eight arms 862 and 871 are simultaneously oscillated by the link connections and the pusher fingers are moved in an arcuate course, first passing over the outer side edges of the bag and then inward to the position shown in Fig. 45, where they run under the free edges of the bag sides adjacent to the hem stitching, and then the further movement of the fingers pushes the bag definitely into place as far as it should go on the holding arms. At the proper time in relation to movement of the bag feed carriage, as controlled by shaft 599, block 838 is retracted by the arms 841, and arm 832 is retracted by its spring and the pusher fingers are withdrawn.

Provision is made at this point for detecting the absence of a bag from the holding arms, and since a bag may in some cases by erroneous action of the feed mechanism be placed over one arm and not over the other, provision is desirably made so that the absence of a bag over either of the arms may be detected and that in that case the machine will be automatically stopped so that unnecessary movement of improper action of the stringing mechanism may be avoided. For this purpose stationary electrical contacts 892 of flexible sheet metal are provided, usually a pair of these contact members in parallel relation located on each of the frame members 22. Movable flexible contact blades 895 are provided to cooperate with the fixed contacts, these being carried by the links 877, and one of the contact blades 895 of each pair is desirably in electrical connection with one of the pusher fingers 883. The two stationary contacts 892 of each pair are usually insulated from each other and from the frame of the machine, and are connected in the automatic stop circuit later more particularly described by conductors 898. The movable contacts may be grounded through the frame of the machine or may be insulated and have appropriate conductors in the other side of the stop circuit, as may be most desirable. The described mechanism acts so that when the pusher fingers move forward as previ-

ously described, if a bag is properly in position on either of the arms, the fingers are insulated from the corresponding holding arm by the bag material; but if a bag is not present at that point the electric circuit is closed through the fingers and through the movable and stationary contacts. The stop mechanism is thus operated, and the faulty condition is remedied by the attendant before the machine is again started. Many different mechanical and electrical arrangements may be made at this point to accomplish the desired result, the described mechanism being only one representative arrangement for this purpose.

After the pushing operation and withdrawal of the pusher fingers the arm shaft is again moved one-quarter turn and as the holding arms move away from this position the bag edge grippers 709 are released from their cams 793 and grip the bag in the manner previously described.

Stringing—Needle carriages and related mechanism.

The longitudinal opening 19 in the table accommodates the upright arms of needle carriage guide supporting frames 100, which are substantial duplicates. Each of these frames has bearing sleeves 103 journaled on one of the secondary drive shafts 52 or 61 so that the frame may oscillate to position its needle for the two successive strokes of each complete stringing operation. The uprights of each frame 100 carry longitudinal guides 106 and in these guides the reciprocating needle carriage 109 is mounted. The frames 100 are oscillated by adjustable links 112, each of which is pivotally connected at 115 to a lug on one of the frames and at 118 to a short arm secured to a longitudinal shaft 121 supported in bearings in uprights 4, 7, 10 and 13, and this shaft is oscillated by a link 124 pivotally connected to a short arm 127 secured to the shaft and having at its lower end a fork slidably engaging a block mounted on shaft 49 and also having a cam roller engaging a face cam in a cylindrical cam body 130 fixed on shaft 49. The needle carriages 100 are reciprocated by levers 133, each of which has its upper end connected by a short link 136 to a depending part of a carriage, and also has a cam roller mounted on a stud 139, engaging a cam groove 142 in the periphery of one of the cam bodies 130; and each lever is fulcrumed at its lower end on or about short shafts 145, (Figs. 1, 2, and 61 to 63). Each of these shafts passes through three circular eccentric blocks, two of these 146, being arranged for clamping in a base 149 secured to the base plate of the machine and the other, 152, being arranged between the two eccentrics 146, and embraced by the lower end of the lever, which is formed into a band 155 embracing the eccentric, and this band is split at 158 and provided with lugs 161 through which a screw 164 passes to tighten the band and secure the lever adjustably to the eccentric. The outer eccentrics 146 are adjustably clamped in the base 149 by means of bands 167 provided with lugs 170 and screws 173. The fulcrum shaft 145 may be secured nonrotatably in the central eccentric 152 by a set screw 176, the head of which is located in a countersink in the block. For adjusting the eccentrics each of them may be provided with a transverse hole 180 and these holes in all three eccentrics are alined with each other, as shown in Fig. 62. The eccentrics are adjusted to vary the throw of levers 133 and so to vary the throw of the needle, by inserting a rod through the alined holes 180 and rotating the eccentrics together, the effect of this being to raise or lower the axis of the shaft 145 without raising or lowering the lever cam roller engaging the cam slot 142 in the corresponding cam body 130 on shaft 49. The cam roller is thus always kept properly at the level of shaft 49, and the adjustment of the eccentrics in effect shortens or lengthens the lower section of the lever to change the lever ratio. When the eccentrics are properly adjusted the adjustment is secured by tightening screws 164 and 173 and the central eccentric 152 is then locked in the hub of its lever 133 and shaft 145 is locked to the eccentric by set screw 176, and the shaft turns in the two stationary eccentrics.

Since the needle carriages have both a longitudinal and transverse movement in relation to the upper ends of the levers 133, the links 136 have a complex movement and are, therefore, connected to the carriage and lever respectively by universal connections, such as ball sockets 137 formed on the ends of the links, cooperating with balls formed on the upper end of the lever extension and the depending carriage member, respectively.

Each needle carriage 109, which reciprocates in guides 106 has a socket 901 supported by a plate 910 screwed to the carriage to receive the enlarged base or butt end portion 904 of a needle 907. The socket has an open side and in this is located a clamping strip 916 held by screws 919 so that by loosening the screws the needle may be easily removed endwise and another inserted. A space 922 is provided between adjacent edges of the clamping strip and the socket so that the string may be passed back through this space in threading the needle.

Needles.

Each needle 907 has a long shank 925 of approximately round or oval cross section terminating at one end in a head 927 which is relatively short, and has its outer end formed with a gradual taper 929 leading to the point 931, which is considerably blunted or may

be, as shown, in the form of a steep-pitched cone. At the other end of the shank is the base or butt 904 of somewhat enlarged diameter, with one side 933 flattened to assist in properly locating the needle in its socket. The eye 935 passes through the inward portion of the head and has at one side a straight groove 937 in line with the axis of the needle, this groove gradually merging with the outer contour of the head, and at the other side the eye has an angularly directed curved groove 939, the end of which also merges into the contour of the head at substantially the beginning of the tapered portion, this groove serving to direct the short protruding end of the string at a downward and outward angle, which is most favorable to avoid other parts of the mechanism and to enter the knotter mechanism in the proper manner. From the eye to the end of the butt the needle is channeled at one side, providing a string passage 941, the bottom of which is substantially in the axis of the needle. The edges defining the opening of this channel approach each other so that while the inward part of the channel is sufficiently large to freely accommodate the string, the opening or slot 943 giving access to the channel at all points along the side of the needle is narrower than the normal diameter of the string. The end of the butt is countersunk at 945 to facilitate threading from the rear end. The needle may, however, be threaded first through the eye and then the string may be wedged into the forward end of the channel where the channel enters the eye, and pulled back through the channel opening all the way to the end of the butt, the needle socket providing an aperture 922 to accommodate the string in this threading operation. At the side opposite the channel opening the needle shank for a considerable distance back from the head is provided with a flat surface 947, to co-operate with the looper, and back of this flat surface the rounded surface of the shank is provided with a shallow channel 949 to accommodate the string.

The form of the needle may vary considerably, but the particular form described embodies several improvements over the needle structure disclosed in the prior patent, the nature and advantages of these improvements being sufficiently clear from the above description, and explanations elsewhere of the co-operation of the needle with other parts of the mechanism.

Each needle carriage also has a string gripper 940 in alinement with the needle holder, (Figs. 3, and 30 to 32). Each of these grippers has a base 942 secured to the needle carriage and on the base are upstanding side members 944 and 946. In the side member 946 a string clamping arm 948 is fulcrumed at 950 and this arm is engaged by a spring 952 located in a sleeve socket 954 of said member 946 and adjusted by a screw 956 inserted in the outer end of the socket. Arm 948 has a beveled end face 958. Opposed to arm 948 is another arm 960 pivoted in side piece 944 at 962. This arm has a channeled lug providing cam actuated projections 968 and 971, and the arm also has a rounded extension 974 cooperating with the beveled face 958 of arm 948. Side member 944 is provided with a lug 977 slotted to form a clevis in which a cam lever 980 is pivoted on a screw 984. The lever has two angularly arranged cam faces 986 and 987 to cooperate respectively with the arm projections 968 and 971. The lever also has a roller 990 cooperating with a cam rail 992 located on the needle carriage guide. The string is led between the arms 948 and 960 and is guided by plates 995 secured to the base 942, these plates being provided with eyes 998 to direct the string as it goes to the gripper and arm 948 is also provided with a guide plate 1001 having an eye 1004 through which the string passes to the needle. When the needle carriage is retracted the cam roller 990 confronts the rounded outward end of cam rail 992, and when the carriage begins to move forward the lever is moved to the position shown in Fig. 32 and is so retained by the cam roller running on the adjacent face of the cam rail until the carriage reaches the inward end of its stroke. During this movement the string is positively clamped between the rounded projection 974 and beveled face 958 and, therefore, is fed along with the carriage and needle. At the inward end of the carriage stroke the cam roller runs off the inward end of the cam rail and the string is released, and on the return movement of the cam roller asumes the position shown in dotted lines at 1008, Fig. 32. Owing to the relative distances of projections 968 and 971 from the pivot center of arm 960 the last described movement of the cam lever 980 moves the arm 960 a smaller distance than the first described cam action, and, therefore, the string is not clamped tightly on the return movement and slides between the arms with moderate tension caused by spring 952. A similar result can be obtained by properly shaping the angular cam faces of the cam lever or in other ways. The clamping effect can also be regulated to a great extent by adjustment of the spring.

The strings are led to the string grippers from any suitable spools or reels. Desirably the spools are placed in deep cylindrical tubs, one located at each side of the machine and the spool spindle is arranged vertically without any upper flange, so that the string runs freely from the stationary spool.

String cutters.

It is desirable to provide means to pre-

vent supplying improperly kinked or knotted strings to the needles and to prevent these kinked or knotted portions reaching the string grippers. For this purpose string cutters are provided, as best shown in Figs. 1, and 65 to 67. Each cutting device is located on an upright 961 secured to the table at one side. The upright has a horizontal upper member 964 in which is a string eye 967 provided with a threading slot 970. A string guard 973 extends across one side of this slot. At the other side of the upper member is connected a cutter plate 976, in the lower end of which is formed a cutter consisting of a V-shaped, sharp-edged notch 979. An arm 982 is pivoted to upright 961 at 985, and rests on a stop 983. This arm at its outer end carries an upwardly extending plate 988 which is arranged to slide against one face of the cutter plate; and the arm also carries another plate 991 arranged to move opposite the other face of the cutter plate. The two plates 988 and 991 are provided with opposite string holes 994. Arm 982 also has a horizontally bent piece 997 in which is a string hole 1000 large enough to freely pass the string S, but small enough to prevent passage of any considerable kink or knot. A string directing and tensioning device is provided consisting of an arm 1003, the outer end of which is bent into U-form, with cross pins 1006 and a string aperture 1009. The string coming up from the spool as previously described is passed through the aperture 1009 and about the tensioning pins 1006 in the manner shown in Fig. 66, then up through the hole 1000, through the opposite holes 994 and then through the eye 967. If the free end of the string is not available at this point a continuous stretch of string may be inserted through the slot 970 and under the guard 973. The string is then passed through the gripper and the needle. In operation as the string is drawn forward through the various apertures the pivoted arm 982 remains in its downward position against the stop 983 and the cutter is idle until a knot or kink K approaches the under side of plate 997. This knot cannot pass through the hole 1000 and, therefore, in the further movement of the string, arm 982 is elevated and the short stretch of string passing through holes 994 between plates 991 and 988 is carried into the V-shaped cutter and jammed into the base of this cutting notch and is severed by the sharp edges 979. Shortly after the string is cut off in this way and before the cut end reaches a point where the shortage of string would produce an imperfectly strung bag, the machine is automatically stopped by stop mechanism later described, which operates upon absence of the string at a certain point. The attendant, upon stoppage of the machine for this reason or upon noticing the action of one of the cutters, eliminates the knot or kink and restrings the cutting mechanism and needle.

Needle guide blocks and related parts.

The needle carriage frames 100 are oscillated substantially in the manner of the previous patent, although by improved mechanism, to bring the advancing needle in line first with one side of the bag and then with the other; and to properly guide the needle as it enters the hem in each of its strokes, needle guide mechanism is provided as follows: A pair of needle guide blocks 1012 is arranged at each side of the center transverse line of the machine as best shown in Fig. 46. The guide blocks of each pair have confronting faces arranged to co-operate with the surfaces of the bag-arm-grippers, or with bag surfaces located over the arm surfaces. Each guide block is arranged to reciprocate on a slide 1015, and the slide is in turn arranged to reciprocate on a portion of a slide carrier 1018. All these reciprocating movements are in the transverse direction of the machine and substantially in line with each other with respect to the two guide blocks and associated parts of each pair. The two guide block carriers 1018 are arranged to reciprocate lengthwise of the machine and are arranged substantially opposite to each other adjacent to the lateral enlargement of the table aperture 19 which accommodates the bag holding arms. Each carrier 1018 is substantially of U-shape and the outer edges of the two side members are engaged by vertical guide rails 1021 secured to the table and plates 1024 secured on these guide rails project above flanges formed on the edges of the carriers to prevent them from rising. In a recess near each side of the inward end of each carrier is a segmental pinion 1027 carried by a stud 1030 having bearings in the carrier. The body of this pinion is provided with an arm 1033 in the end of which is a stud 1036 engaging a cam groove 1039 in a cam body 1042 secured at a stationary point on the table. Each end of this cam groove has a short portion parallel to the longitudinal axis of the machine and these short portions are connected by a longer slightly curved portion, which is in general inclined at a moderate angle to the transverse axis of the machine. The teeth of each segmental pinion 1027 are operated by rack teeth formed in the adjacent side of a rack bar 1045, and the rack bar also has, extending for a considerable distance from its other end, rack teeth 1048 cut in its under surface. The rack bars are retained slidably in the carrier by removable top plates 1051. Each of the racks 1048 is engaged by a segment gear

1054 carried by a hub 1057, and the two hubs of the segment gears which operate the two rack bars 1045 of one of the guide block carriers 1018 are fixedly secured to a transverse shaft 1060 mounted in bearings 1063 secured below the table. The two shafts 1060 are each provided with a bevel pinion 1066 and these pinions are engaged by bevel gears 1069 on a longitudinal shaft 1072 carried in bearings 1075 secured to the table. The bevel gears 1069 are arranged at opposite sides of the centers of shafts 1060 so that when shaft 1072 is oscillated the two segment gears 1054 carried by one of the shafts 1060 are oscillated in one direction and the other segment gears are oscillated in the other direction so as to move the respective rack bars all toward the transverse center line of the machine. Shaft 1072 has a crank arm 1078, in the end of which is adjustably pivoted a link 1081, the lower end of which is forked to engage a block rotatably mounted on shaft 49 and has a cam follower at 1084 engaging a cam groove in the face of the circular cam body 70, previously mentioned. In this way in every cycle of the machine shaft 1072 is oscillated and rack bars 1045 are first moved inward to bring the needle guide blocks in proper relation to the bag to be strung and then after the stringing operation are moved outward again to take the guide blocks out of the path of the bag holding arms as they move in the next part rotation of shaft 97.

Each of the guide block slides 1015 previously mentioned, has a bottom angular rib 1090 engaging in a channel 1093 in the inward portion of one of the carriers 1018 and the slide also has a transverse slot 1096 in which the upper end of one of the studs 1036 carried by the arm of the corresponding segment pinion 1027 engages, this stud extending above and below the arm 1033 so that its lower end engages in the cam groove 1039, while its upper end engages the slide slot. Each of the guide blocks 1012 has a bottom angular rib 1099 located in a channel 1102 provided for it in the upper face of the slide. The guide rib 1099 is interrupted by a transverse slot 1105 into which projects a stop piece 1108 which transversely intersects the channel 1102 and the slot 1105 is of proper width to provide the necessary travel of the guide block in relation to the slide. The slide has an upstanding spring abutment 1111 near its rear end and a spring 1114 located in a hole bored in the rear end of the guide block engages against this abutment and urges the block to move inward. The end of the helical spring which bears against the spring abutment may be additionally held in position by a pin 1117 secured in the abutment. The guide block 1012 is secured on its slide by a cover plate 1119, Fig. 46, secured by screws 1121, and slotted to accommodate lever 1204. This cover plate is omitted in the detail Figures 47 to 51, for the sake of clearness. The described arrangement is such that when the rack bars 1045 are impelled forward by their segment gears the bearing studs 1030 of pinions 1027 cannot turn upon their axes by reason of the pins 1036 being located in the short outer longitudinal portions of the cam grooves 1039. The carriers 1018 are, therefore, advanced a short distance toward the transverse center of the machine, that is toward the edge of a bag carried by the lowermost pair of holding arms. The pins 1036 then come into the diagonal portions of the cam grooves and the pinions 1027 commence to turn, and the upper ends of the pins 1036 engaging in slots 1096, commence to move the slides 1015 of each pair toward each other while the inward ends of the slides and guide blocks at the same time travel slightly forward toward the transverse center line by reason of the slight angularity of the central portions of the cam grooves. Thereafter, the lower ends of the pins 1036 come into the inward short longitudinal portions of the cam grooves, and further rotative movement of the pinions ceases, and the two carriers and all four of the slides and their needle guide blocks move in lines parallel to the longitudinal axis of the machine, until the inward ends of the guide blocks are properly located against the bag. Provision is desirably made for stopping the inward movement of the carriers 1018 at the proper point and this is provided for by adjustable stop plates 1120 secured by screws 1123 passing through slots in the plates and engaging in the carrier holding down strips 1024. The ends of these stop plates are engaged at the end of the carrier travel by lugs 1126 extending from cover plates 1051.

Figs. 52 and 53 show the cooperation of the needle guide blocks with the bag arms and bag in stringing position. The inner end of each block has a vertical face 1129 adapted to engage on the outer face of one of the bag grippers and another vertical face 1132 offset from the first, an inward portion of which is adapted to engage the outer bag surfaces adjacent to the rounded edge of the bag arms. Between these two vertical faces which are located in longitudinal planes of the machine, is a diagonal vertical face 1135 arranged to fit against or lie close to an edge portion of the bag overlying the rounded surface of the arm. Running horizontally across the faces 1129 and 1132 is a needle groove or channel 1138 which is relatively deep where it passes across the face 1129, this portion of the groove being adapted to embrace substantially half the circumference of the cylindrical needle with a mod-

erately free fit, and the other portion of the groove 1141 passing across the face 1132 is relatively shallow and embraces only a small segment of the needle surface. Leading to the outer end of each of the channels 1138 is a countersink 1144 formed in the guide block constituting a tapered or funnel-like approach to the guide channel. At the opposite end of the channel the inner portion of the guide block is formed with a diagonal vertical face 1147 which serves to assist in guiding the needle to the inward end of the shallow channel portion 1141 when the needle approaches from that direction. Desirably the inner end of the guide block on which the different surfaces and channels just above described, are formed, is a separate piece 1150, which may be suitably hardened and machined, and this is inserted in a recess formed in the inward end of the main guide block and secured by a rivet 1153.

When the guide blocks have advanced to needle guiding position, the slides have moved inward to their prescribed limit, and the guide blocks yield back slightly against their springs 1114 and are firmly held by this spring pressure in the locations indicated in Fig. 52, A needle then advances at one side of the gripper and the needle point first runs into the funnel shaped countersink 1144 and is guided by it to the entrance of the guide channel 1138 and as it enters the channel, the inward face of the needle bears against the gripper, and the guide block is moved slightly farther back against its spring, and the spring pressure of the block is now exerted upon the needle to hold it in the proper path. The steeply tapered or slightly blunt needle point is then directed toward the outer bag fabric slightly inward from the outer side face of the holding arm, or so that the needle, so to say, bites slightly against the rounded outline of the bag produced by the form of the arm. The needle penetrates the outer hem fabric and is deflected sufficiently to avoid piercing the inner fabric and so passes on through the hem between the two portions of fabric which constitute the tubular hem. As the needle passes on toward the other edge of the bag, as shown in Fig. 53, it presses the outer bag fabric against the inward portion of the beveled face 1147* and in this way moves the adjacent guide block outward as the needle point enters the shallow channel 1141, the needle, of course, not being in direct contact with the channel surface, but running against the bag fabric which takes the form of the channel. In the position of the needle shown in Fig. 53 the point is approaching the tapered depression 1180 formed in the adjacent free face of the holding arm, the inner hem fabric is slightly depressed into this space and the needle point is thus deflected outward slightly without penetrating the inner fabric as it commences to operate the guide block in the manner just described. The needle passes on and perforates the outer fabric at about the point 1156 and goes on through the large channel 1138 of the adjacent guide block until it reaches the knotter mechanism 1159, which may be, so far as the present invention is concerned, substantially like that of the previous patent. The projecting end of the string S is seized by the knotter mechanism and the needle then retreats, leaving the string behind it in the hem. While one needle was moving as described, the other needle was, of course, performing the same movements through the hem at the other side of the bag. The needle is now shifted by movement of the needle carriage frame into alinement with the hem opposite to the one first penetrated, and as the needle again advances the string is caught by a looper 1162 which corresponds in general with the looper of the prior patent (although with certain improvements as explained hereafter) to form the string loop. The needle goes through the hem, carrying the second string through it, and cooperating with the guide blocks substantially in the same way as previously described, and the needle again reaches the same knotter mechanism which holds the free end of its string, and the string is again grasped by the knotter at a point adjacent to the needle eye and held; the knot is formed and the string is cut at the proper point by cutting mechanism 1165 which is constructed and operates, so far as the present invention is concerned, substantially as in the previous patent. During the first advance of the needle the string gripper positively grips the string and feeds it forward with the needle; as the needle retreats the positive grasp of the gripper is relaxed and the gripping surfaces slide back on the string with moderate spring pressure to sufficiently tension the string; at the second stroke of the needle the gripper again positively engages and draws a stretch of string from the reel. At the final retreating movement of the needle the positive grip is again released and the string is engaged with sufficient tension to retain it in the proper position in the needle after it is cut. In this last movement slack is created in the string between the gripper and the reel and more particularly between the gripper and the cut-off mechanism. This slack is taken up during the next forward stroke of the needle which is the first stroke of the next stringing cycle.

It is desirable to provide additional means to prevent the needle from breaking or tearing the fabric of the bag hem, when the needle in its first advance movement is ready to enter the hem of the bag. For

this purpose devices are provided for gathering or collecting several threads of the fabric and pulling them close together so that the fabric is strong enough at that point to hold the needle in place as it begins to enter the hem, and to prevent the needle from jumping outward and running along the outside of the hem. For this purpose in the present embodiment a circular hole 1171 is bored through the needle guide block and in this is placed a slidable rod 1174, the outward end of which is in the form of a pin 1177 of reduced diameter, passing through a hole of suitable size in the separate end piece 1150. This pin terminates in a "collecting" point 1180*a* and behind this point the material is cut away to provide an angularly arranged V-shaped groove 1183. The other end of the rod is engaged by a helical compression spring 1186 lying partly within the hole and having its outward end engaging against the spring abutment 1111 and held in place by a pin 1189. The rod has a stud 1192 extending through a lateral slot 1195 to prevent rotation. The guide block is provided with an aperture 1197 giving access to an intermediate part of rod 1174 and in this aperture the rod is provided with a shifting groove defined by shoulders 1198. In the shifting groove lies the rounded end 1201 of the shifting lever 1204 adjustably mounted on the upper end of a stud 1207 secured in the guide carrier. The two opposite shifting levers controlling the two collecting pins of each pair of guide blocks are connected to move together by arms 1210, one of which has a socket formed in its inward end and the other has a rounded end 1213, resting in the socket. To operate levers 1204, levers 1216 are provided, fulcrumed at 1219 on screws engaging the needle guide carrier. These levers have end sockets 1222 to receive rounded projections 1225 substantially in line with the adjacent levers 1204, and operatively connected to the latter. An operating lever 1216 is provided at each side of the needle carriage frame for each pair of guide blocks to enable the collecting points to be withdrawn in a convenient way by movement derived from the needle carriage, in the following manner: In the upper portion of the needle carriage frame at each side of the carriage guide channel is a cam head 1228 carried by an arm 1231 accommodated in a recess in the frame and pivoted therein on a pin 1234. This cam head has an inward angular cam face 1237 and an outward straight face 1240.

As the guide blocks come in position in relation to the bag arms, as shown in Fig. 52, previous to the first needle movement of the stringing operation, the points 1180 extend beyond the guide block faces 1132, and these points move into contact with the bag material in lines parallel to the long horizontal dimension of the bag, that is, parallel to the bag width, and engage the outer hem fabric at a point slightly to the left and inward from the positions of the points in the figure, and the slight further advance movement of the guide blocks, controlled by the movement of the pins 1036 in the inward straight portions of their cam grooves 1039, causes the points to "collect," or slightly pull and gather the fabric threads, producing a dent or opening at a point directly in line with the needle point. As the needle advances its point enters this impression or aperture in the material, which does not extend to the inner layer of fabric, and so the needle is easily guided into the hem sleeve without having to be directed against the rounded portion of the bag at an abrupt angle, and without the risk of being diverted outside the outer layer of fabric. At about this moment the needle point engages in the angular V-shaped groove 1183 and pushes back the collecting point with its carrying rod against the rod spring 1186. As the needle point in the same advance movement approaches the collecting point at the opposite end of the hem, that point is withdrawn by the advancing end of the needle carriage striking the angular cam faces 1237 of cam heads 1228, and the outer face 1240 of the head at the side of the carriage frame which is nearest the rounded end of one of the levers 1216 on the adjacent guide block carrier, by reason of the carriage frame being tilted to that side to direct the needle in the line of movement described, engages that rounded lever end and oscillates the lever; and so through the previously described linkage the levers 1204 are oscillated, the rods 1174 are pulled back and the collecting points are withdrawn so that they will not be encountered by the needle points. While it will be sufficient to withdraw only the two points, one near each end of the bag seam, toward which the needle point is at the moment advancing, there is no objection to withdrawing the other points at this time and by withdrawing them all together the structure and functions are considerably simplified. In the second advance movement of each needle the outer bag surface has already been punctured by the previous advance of the other needle and the function of the collecting points is of less importance on the second needle stroke.

At the completion of the stringing operations the guide blocks are withdrawn and the stripping and turning mechanisms take the bag from the holding arms. Before describing the stripping and turning operations the improved features of the looper

mechanism which acts during the stringing operations will be described.

Loopers.

The general construction and mode of operation of the loopers 1162 are similar to the previously patented structure, but with important improvements in details of construction and operation.

There is one looper mechanism at each side of the bag, corresponding with the general duplication of needles, needle guides, etc. Only one of them need be described. The bridge frame work 22 carries at one side a depending member 1250 and on this is secured a jaw shaped holder 1252 and in this holder is mounted a looper guide 1254 of channel section. Adjacent to the upper portion of the frame member 1250 is a sleeve 1256 in which is mounted an oscillating shaft 1258 which carries the main looper arm 1260. This arm 1260 is desirably located in a head 1262, secured or formed on the inward end of the shaft and provided with flanges between which the lever arm 1260 is movably located and secured by a screw 1264 passing through a slot 1266 and engaging in the end of the shaft. In this way the stroke of the main looper arm may be regulated. The outward end of shaft 1258 is provided with a pinion 1268 and this is engaged by a rack formed on the upper end of a vertical reciprocating rod 1270. This rod is actuated by a lever 1272, Fig. 9, having a sliding fulcrum on a stud 1274 and pivotally connected to the rod at 1276. The inward end of the lever has a cam roller engaging in a cam groove 1278 in the circular cam body 696, previously mentioned and the cam groove is so designed that the main looper arm or lever is oscillated in proper relation to needle movement to form the loop substantially in the manner set forth in the prior patent. Pivotally connected to the lower end of arm 1260 is a secondary arm or looper link 1280, and the looper 1162 is pivotally mounted on a pin 1282 in a clevis formed in the inward end of the link. A stud projects from one side of the link adjacent to the clevis and on this stud is a roller 1284 running in the channel 1254 so that the inward end of the link 1280 is maintained in substantially the same horizontal position as it travels back and forth in the movement of lever arm 1260. The looper is urged to rotate in a right hand direction from the position shown in Fig. 35, until checked by engagement with the bottom of the clevis by a spring 1288 tensioned between the outer end of the link and the looper. The looper comprises the main loop hook 1290, formed with an angular outer face 1292 which is a knot retaining member, as later explained; a secondary loop-hook or support 1294 terminates close to an inward face of the main hook, the space between the end of the support and the main hook being sufficient to permit passage of the string; and the looper also has an upward extension 1296 in which is a contact pin 1298, the purpose of which is later described, and this extension has an inwardly projecting lug 1301, the inward vertical face of which is arranged to cooperate with the adjacent face of one of the bag arm bases. One side of the secondary hook or loop support 1294 is beveled as at 1295, Fig. 64, and this beveled surface serves to deflect the point of the needle and properly guide the needle past the looper, as sufficiently indicated in that figure. When the needle retreats after first penetrating the bag hem, its point passes outwardly across the edge of the main looper hook 1290 and as the needle moves forward again in relation to the looper, the loop is formed at that side of the bag by the string being pulled into the main portion of the main hook, passing in doing so, the end of the support 1294. The tension of the string rotates the looper slightly on its pivot 1282 against the pull of spring 1288 and so holds the contact pin 1298 at substantially its greatest elevation. At the end of the stringing operation the looper is advanced so that the lug face 1301 engages the adjacent outer surface of the bag arm base, as shown in Fig. 35, and the hook surface 1292 is thus definitely urged into engagement with the knot which has been formed at the side of the bag in question by the action of the knotter. The knot is thus held firmly in place against the seam edge of the bag at the beginning of the stripping and turning operation. At this time the loop or continuous portion of the other string at the same side of the bag has been pushed back over the supporting arm 1294 in the position shown in Fig. 35 and the loop is thus properly supported and the looped string practically raised above the knot as the bag is stripped downward from its holding arms. As tension is exerted on the looped string it pulls out, off the supporting arm or hook 1294 and through the space between the end of this arm and the main hook, and close up against the side of the bag, and in this operation the looper may tilt on its pivot, the main arm 1260 being withdrawn sufficiently to permit this pivoting movement. The other functions of the looper are substantially in accordance with the previous patent and need not, therefore, be more particularly described.

To cooperate with the contact pin 1298 the channel guide 1254 has an insulated metal contact strip 1304 and this contact strip has an inwardly offset and angularly bent portion 1307. The contact strip 1304 is connected with a conductor, as more fully de-

scribed elsewhere in connection with the automatic stop mechanism and the circuits therefor, and the contact pin is in circuit with the opposite side of the automatic stop magnet circuit by grounding through the frame of the machine (or otherwise a separate conductor may be provided for the contact pin, and the pin may be suitably insulated). Whenever the string is properly fed to the needle and properly inserted in the looper the looper is maintained by the string tension, at times when it is adjacent to the contact strip, in such an upright position as previously described that the contact pin 1298 is held above and out of contact with the contact strip 1304; but if the string is absent or not placed in the looper, the looper spring rotates the looper sufficiently to bring the contact pin in contact with the contact strip. Thereupon the electric circuit is closed and the machine is automatically stopped. The angular portion 1307 of the contact strip prevents the contact pin from improperly running under the strip, since whenever it is depressed in the absence of a string it will run up over the angular portion 1307 in the inward movement of the looper.

Stripping and turning—Stripper-mechanism.

Immediately after stringing, stripping fingers 1300 and a turning head 1303 operate to remove the bag from the arms and at the same time turn it right-side-out. Both the strippers and the turner head have a part in these interrelated functions and their parts in it cannot be entirely separated, but for descriptive convenience and for convenience of identification in certain cases without implying any limitation for that reason, the fingers 1300 will be described principally as performing the stripping function and the heads 1303 will be described mainly as turning elements.

The stripper fingers are adapted to enter the spaces 727 provided between the grippers and the bag arms, previously mentioned, and by downward movement to engage upper edges of the seam end of the bag and strip it down off of the holding arms. Just before the stripping action begins the safety grippers 742 are in extended position gripping end portions of the bag hems against the side members of the main grippers 709, as previously explained, the safety grippers being held in active position during the stringing operation by the levers 1306, as best shown in Figs. 8 and 44, these lever members being curved downward in arc form and arranged to engage the inward ends of pins 748 of gripper members 736, as the pair of bag holding arms comes to stringing position, as shown in Fig. 8 and by a cam action on these pins to extend the safety grippers to active position. The levers have outward extending members 1309 and they are fulcrumed on a stud 1312 secured to a fixed frame plate 1315. The outward ends of the lever members 1309 are acted upon by springs 1309ª, so that the ends of the lever members 1306 are moved divergently for the purpose above described. After stringing and before the stripper fingers engage the bag to strip it from the holding arms the safety grippers 736 are withdrawn by a wedge cam 1324 moving between vertical guide surfaces 1321. The cam 1324 is reciprocated by a connection at 1327 to a lever arm 1330 adjustably secured on shaft 1072, previously mentioned. The movement of shaft 1072 is so timed by its cam mechanism, previously described, that somewhat before the stripper operates, arm 1330 moves inward (toward the right in Fig. 8) and advances the wedge cam 1324 between the adjacent ends of lever members 1309 and spreads these members against the action of their springs and at the same time the ends of the lever members 1306 are moved convergently and the safety gripper members 736 are then released and free to move inward in the channels in the holding arms 211 and free the bag hem ends; and also the force exerted by the levers 1306 tending to separate the two holding arms and stretch the bag is relaxed. In other words, the bag is now substantially free on the holding arms, except for the engagement of the main grippers 709.

Just after the stripper fingers enter the spaces 727 they commence to descend along the outer vertical edges of the holding arms and in the first downward movement they strike angular faces 718 of the main grippers 709 and retract those grippers; the stripper fingers then engage the upper edges of the seam end of the bag and in case the safety gripper members 736 have not been sufficiently retracted by release from the levers 1306, as previously described, they are positively retracted so that their gripping lugs 742 are out of the way within the channels of the holding arms, by the stripper fingers engaging beveled surfaces 738 of the safety grippers.

The stripper fingers 1300 are carried by arms 1339 which extend up from a cross head 1342 provided with sleeves 1345 running on rods 1348, the lower ends of which are fixed in the top piece of an oscillating frame 1351. The upper ends of the rods above the cross head are connected by a cross piece 1354. The frame 1351 is oscillated on a supporting shaft 1357 by a cam roller secured at 1360 to one of the frame uprights and engaging in a cam groove 1363 in the face of a cam body 1366 secured on shaft 49. The cross head 1342 is moved up and down on its rods 1348 by an ad-

justable link 1369 connected to the end of a lever 1372 fixed on shaft 629 previously mentioned. By this movement, once in each cycle of the machine the cross head is elevated to the position shown in Fig. 8, while the oscillating frame 1351 is in the retracted position, also shown in that figure. There is a very brief dwell of the cross-head at this position, and during this dwell the frame is rapidly oscillated inward, inserting the fingers in the apertures 727 of the holding arms and grippers, as previously described and while the oscillating frame remains in substantially the same inward position, the cross head is moved rapidly down, stripping the bag from the arms and at the same time turning it over one of the two turning heads 1303 which during the downward movement of the stripping fingers is rising between the holding arms. When the stripper fingers have moved down to a point adjacent to the lower ends of the bag holding arms the downward movement ceases and frame 1351 swings while the cross head rises until the parts are about in the position shown in Fig. 8, ready for another cycle of operations.

Turner heads and stretchers.

While in some cases a single turner head or equivalent device may be employed, it is desirable in order to move the turner head at a suitable speed in relation to the stripper fingers and to provide for conveniently driving the turner head from other parts of the machine at the desired speed, to provide two of them, which operate alternately in taking bags from successive pairs of holding arms. The turner heads are carried by a chain 1381, which runs over a large sprocket 1384 on a shaft 1387 and a smaller sprocket 1390 on a shaft 1393, these shafts being mounted in bearings in a central frame structure 1396, resting on the bed-plate and provided with right and left side plates 1399 on the inner faces of the upper portions of which are formed certain channels and cam tracks to control the movements of the turner heads. Each of the heads 1303 is located on the outer end of an arm 1402, which is secured to a plate 1405. This plate is connected to two side plates 1408. A short shaft 1411 passes through the side plates and through one of the chain rollers, taking the place of one of the chain pivot pins. The turner frame comprising the plates 1405 and 1408 with the parts carried by it is thus pivotally mounted on the chain. On the outer face of plate 1405 two bag spreading or stretching arms 1414 are pivoted at 1417. These arms have substantially straight outer faces 1420 rounded off as at 1423 adjacent to their tips and the inner faces of the arms near the tips are shouldered at 1426. The inner end faces of the arms beyond the shoulders are accommodated when the arms are converged by recesses 1429 in the sides of arm 1402. The stretcher arms are provided with cam follower pins 1432 extending through apertures 1435 in plate 1405. These pins lie in cam slots 1438 of a cam plate 1441 slidably mounted on the inner face of plate 1405 in guide-ways 1444. The cam slots are contoured to move the pins 1432 alternately, convergently and divergently as the cam plate is reciprocated, and this movement causes corresponding inward and outward movement of the outer ends of the spreading arms. One end of the cam plate is apertured at 1447 to clear the chain in the pivotal movement of the turner frame, and a portion 1450 of the cam plate extends at each side of the aperture. A gear rack 1453 is cut on each of the portions 1450 and these racks extend upwardly beyond the aperture 1447 and for convenience in forming the two racks the teeth may be cut entirely across the plate, as indicated at 1456. Secured on shaft 1411, one at each side of the chain and just within one of the side plates 1408, are rollers 1459, each of which has a toothed peripheral segment 1465, these teeth being arranged to engage the racks 1453. The shaft 1411 extends beyond the outer faces of the side plates 1408 and a roller 1468 is secured on each end of the shaft. The side plates 1408 have extensions 1474 and rollers 1477 are arranged, one at each side of the turner head frame, on studs inserted in the extensions at 1480. Other rollers 1483 are mounted on studs engaging the frame side plates at 1486. The cam tracks or roller channels in the side plates 1396 are substantially duplicated so that there is a track or channel provided at each side of the turner head frame to guide the rollers of each pair in a predetermined course. This is sufficiently understood from Figs. 8 and 60, which show one of the side plates with its channels. Channel 1489 is defined by walls 1492 and 1495. The wall 1495 is curved inward for a short distance at 1498, that is at the upper end of the long vertical stretch of channel 1489, and adjacent to this curved wall portion the inner wall 1492 is formed with an arc-shaped, approximately horizontal section 1501 joining the vertical stretch of the wall at an angle at 1504. The lower end of the vertical stretch of the channel merges with a part circular portion 1507, the center of which is approximately at the axis of the shaft 1387; and leading to this arc-shaped portion is another portion 1507 of larger curvature having an entrance at 1510. The rollers 1483 follow the channels 1489 throughout their course and where they emerge from the channel they are directed by curved wall portions 1498 onto the arc-shaped tracks 1501, and from the

left hand of those tracks, as viewed in Fig. 60, they pass through space until they re-enter the channels through the entrances 1510. Another channel 1513 is defined by walls 1516 and 1514. This has a vertical straight stretch substantially parallel to the vertical stretch of channel 1489. At the upper end of this straight stretch a rather sharp shoulder 1522 is formed on wall 1516 and the channel pursues a suitably curved course about this shoulder and into a diagonal descending stretch 1525, at the lower end of which is an inwardly directed angular stretch 1526 communicating with a short vertical stretch 1531, which merges into a part circular stretch 1538; and this communicates with the lower end of the vertical stretch of the channel, completing the channel circuit. Rollers 1477 carried by the side plate extensions 1474 run in the channels 1513. The vertical stretch of channel 1489 and the diagonal stretch 1525 of channel 1513 are in the line of ascending or descending stretches of the chain 1381. Rollers 1468, which are coincident with the pivotal axis of the turner head frame on the chain, follow the chain course, and, therefore, run in the channel stretches just referred to. Near the upper and lower end of the travel of these rollers provision is made for shifting them from one channel to the other while still pursuing their proper course of movement about the upper and lower sprockets in the following way: The rollers 1468 have considerably smaller face width than the rollers 1477 and 1483 and while the last named pairs of rollers occupy substantially the full depth of their channels the rolls 1468 occupy only the inward portions of the channels. To guide the rollers 1468 in the chain path about the upper sprocket 1390 a short arc-shaped channel 1537 is provided, which has a shallow communication with vertical stretch of channel 1489 and communicates in a similar way with the upper end of the angular stretch 1525 of channel 1513. Communicating in a similar way with the lower end of the angular stretch 1525 and leading into the curved stretch 1507 of channel 1489 is a short arc-shaped channel 1543. The rollers 1468, therefore, always follow substantially the chain course, going up through the vertical stretches of channels 1489, through the arc-shaped shallow channels 1537, down through the angular stretches 1525 of channels 1513, through the shallow arc-shaped channels 1543 and so through the arc-shaped portions 1507 into the lower ends of the vertical stretches of channels 1489. Rollers 1483 as above stated, follow the channel 1489 and in passing the entrance of arc-shaped channels 1537 cannot enter by reason of their faces extending deeper into the channel 1489 than the depth of the channels 1537. Rollers 1477 follow the course of channels 1513. Fig. 60 shows in dotted lines several successive positions of the different rollers in their channels. This combined channel and roller action is such that the turner head rising toward the bag holding arms in Fig. 8 is maintained in a position parallel to the plane of the arms so that it will run up between them, engaging against the bag bottom and pushing the bag bottom up between the arms and commencing to reverse the bag as the stripper fingers 1300 pull down the hem edge of the bag; and finally the bag is completely placed over the turner head and its arm, in right-side-out position and with the bottom corners tucked in, as and for reasons sufficiently explained in the prior patent. At about the instant that the bag is fully located on a turner head the latter commences to move toward the left in Fig. 8 without much change in its upright position and then to gradually swing in an arc outward and downward until it lies horizontally, as shown at the left in Fig. 8 and there pauses during a dwell in the movement of the chain 1381; and during the pause the bag is removed from the head by transfer mechanism, later described, and placed in the pocket of a receiving carrier.

When the turner head is moved up to receive the bag the stretcher arms 1414 are converged against the sides of the head arm and, therefore, freely enter the bag. Just after the bag is fully in place outward surfaces of rollers 1468 engage channel walls 1540, and the rollers are rotated clockwise, as viewed in Fig. 8, giving a similar movement to segmental pinions 1465, and thus the racks 1453 are moved outward in relation to the turner head frame and the cam slots 1438 separate the pins 1432 and spread the stretcher arms, as shown in Fig. 55, thus properly stretching the bag mouth. After the bag is removed at the next subsequent movement of the turner head frame, inward surfaces of the rollers 1468 engage surfaces of the roller channels and the rollers and the segmental pinions are rotated in the opposite direction, causing the stretcher arms to be again retracted.

The turner head chain 1381 is driven by another chain 1550 which passes about a sprocket 1553 on the lower turner head shaft 1387. This chain is suitably tensioned by an adjustable arm 1556 having rollers 1559 engaging opposite stretches of chain, and the lower portion of the chain passes about a sprocket 1562 on a shaft 1565. The last named shaft has a pinion 1568 engaging a much larger gear 1571 carried by a stub shaft 1574, and this gear is operatively integral with a Geneva wheel consisting of lugs 1577, separated by radial channels 1580 and provided with outward arc-shaped depressions 1583. Cooperating with this Ge-

neva wheel is Geneva driving mechanism on shaft 49 comprising a part circular disk 1586 cut away at 1589, and an arm 1592 provided with two Geneva driving pins 1595. Normally the part circular periphery of disk 1586 engages one of the arc-shaped depressions 1583 and once in each rotation of shaft 49 the Geneva wheel is unlocked by the approach of the cutaway portion 1589 and the pins 1595 then operate in two successive radial channels 1580. During the movement thus imparted to gear 1571 in each cycle of the machine the supporting chain 1381 of the turner head mechanism is driven one-half of a complete circuit about its sprockets and thus carries each turner head, as shown in Fig. 8, to the position occupied by the other one.

It is desirable to provide means in addition to the stretching arms for holding bags on the turning heads. For this purpose spring-operated clips are provided consisting of arms 1651, one for each turner head, pivoted to an outer plate 1654 of the head frame at 1657 and occupied by a spring 1660 engaging between the plate and an extension of the lever below its pivot. The upper portion of the arm has an inwardly offset straight face 1662 engaging an outward surface of the head arm 1402 and above this the clip arm has a diagonally outwardly directed end portion 1666. As the bag is moved down over the turner head its advancing edge at one side runs between the spring-actuated clip and the head arm and the clip thereupon retains the bag in position with spring-pressure. It is desirable to provide means for retracting the clip to facilitate the placing of the bag on the turner head and under the clip, and this is provided for by forming a beveled offset portion 1669 on the lever extension and this cooperates with a fixed cam plate on frame upright 1399, this cam plate being provided with beveled end members so that at the proper point in its travel the offset lever portion 1669 runs under the cam plate and the clip 1651 is opened at the proper point in its travel to permit the bag to be properly placed on the turner head.

Transfer mechanism and receiving wheel.

When the turner head carrying the bag is in delivery position, as shown at the left in Fig. 8, transfer mechanism 1591, which is in general similar to that of the prior patent, Figs. 4 and 8, grasps the bag, removes it from the head, turns it over and places it with the strung end outward in a pocket 1594 of the receiving wheel 1597. The transfer mechanism is built upon a carriage arranged to reciprocate on rails 1600 and it is moved by a lever arm 1603 carried by a shaft 1606, and the shaft is oscillated by an arm 1609 adjustably connected to a slide block 1612 moving in a slot in the forward end of lever 626, previously mentioned.

The receiving wheel rotates on a shaft 1621 fixedly supported in a frame upright 1624, and is intermittently moved a part turn corresponding to the pocket interval after a certain number of stringing operations, so that a predetermined number of bags is deposited in each pocket. Since a considerable number of bags, usually twenty-five, is desirably placed in each pocket, special mechanism is necessary to move the wheel at the relatively long separated intervals, by impulses derived from the main operating parts of the machine. The desired result is accomplished in the present invention by providing two cooperative intermittently acting driving mechanisms, as follows: A frame member connected to upright 1624 carries a shaft 1627 and on this is a sprocket 1630 driven by a chain 1633 from a sprocket 1636 on shaft 49. Shaft 1627 has a gear connection to a transverse shaft on which is a driving member 1639 of a Geneva wheel 1642 carried by a parallel shaft 1645. This shaft also carries a Geneva driving member 1647 which drives a Geneva wheel 1649; and the latter is connected to the back of the receiving wheel. The two Geneva mechanisms arranged in series as described, are designed so that after a stated number of cycles of the machine during which the receiving wheel remains stationary, say twenty-four cycles, at the twenty-fifth cycle the wheel is moved by the final Geneva mechanism a fraction of a turn equal to the pocket interval, in this case one-tenth turn, bringing a new pocket in uppermost position and carrying forward a pocket filled, in the case stated, with twenty-five completed bags.

The radial wheel segments between which the pockets 1594 are formed are provided with two parallel slots 1681, in planes transverse the wheel axis, these slots or channels extending entirely about the wheel and being cut inward to the depth of the pockets. Movable bag supporting arms 1684 are located in these slots. These arms are carried by a hub 1687 mounted on a stud 1690 extending forward from a stationary frame member, and are normally urged upward by a light spring 1693, and the upward movement of the arms is limited by a lug 1696 carried by the hub and a stationary lug 1699 carried by a frame member. As bags are successively placed in the pocket the arms 1684 are depressed and form in effect a yielding bottom for the pocket. As each bag is positioned over the pocket and upon arms 1684 by the transfer mechanism, it is pushed down into the pocket by blades 1741, which extend from shaft 1072 and have their ends properly formed to engage side portions of

the bag. These blades descend once in each cycle of the machine as the shaft 1072 is oscillated. The bags are additionally wiped down and held in position by wiping members 1750 pivotally mounted at 1753 on arms 1756 which are carried by a shaft mounted on guide hub 157. The wiping blades are yieldably held in position, as shown in Fig. 4, by springs 1759. Shaft 157 is moved one-half turn in each cycle of the machine as previously explained and comes to rest with one of the wiping members 1750 in yielding engagement with the uppermost bag in the pile which is being formed in the uppermost pocket. The periphery of the wheel is encircled by two parallel guard strips 1771 secured by stationary studs connected to frame members. These strips terminate at 1774 so as to leave one of the pockets open, that is the one which is just in advance of the bag receiving position. The bags are retained in the pockets by the guards strip until they reach the open pocket position, where they are removed, but they may be easily pulled out of the pockets at any other position when the attendant has time to remove and inspect them.

Manual control and automatic stop mechanism.

The belt shifting bar 79, which may also be identified as a starting bar, with its hand levers 85 and belt shifter, have been mentioned. The shifter bar is yieldingly urged to stop position by a spring 80, Figs. 2 and 3, compressed between a collar 83 on the bar and one of the bar supporting lugs 82. The bar is normally retained in running position by a latch tooth 86 carried by a latch arm or link 89 (Figs. 2 and 68). The latch tooth is arranged to engage a shoulder 92 provided on the bar adjacent to a recess 95. The latch link is pivoted at 98 on the upper end of an arm 101. A spring 99 urges the link upward. The latch arm is pivoted at 104 on a frame plate 107. The arm 101 has a dependent member 110 and a screw 113 passes through this member and engages a lug 116 carried by the frame plate 107, to adjustably limit the return movement of arm 101 and the latch link 89. The arm 101 and link 89 are urged to the left as viewed in Figs. 2 and 68 by spring 119 tensioned between the upper end of the arm and a fixed point on the frame at 122, Fig. 2, this spring having strength sufficient to overcome the effort of spring 80. The upper surface of latch link 89 is formed with a convex curvature at or about the point 125, this convex portion being in engagement with the under surface of the shifter bar. With the parts in running position as shown in Fig. 68, latch tooth 86 is in engagement with shoulder 92 and the pull of spring 119 holds the shifter bar back against its spring 80, and thus holds the belt on the fast pulley, as previously described. To stop the machine at any time it is unnecessary to release any positive detent, but the operator merely moves the handle 94 of either of the levers 85 to the right, as viewed in Fig. 3. The pull of spring 119 is then overcome by manual force and bar 79 is moved to the right in Fig. 68. The angular movement of arm 101 thus elevates the left hand end of the latch link 89 and the curved portion 125 of the link rocks on the under surface of the bar and this rocking movement causes the latch 86 to be withdrawn downwardly from shoulder 92 until the bar is released and moves on to stop position under the impulse of its spring 80, this movement, of course, carrying the belt onto the loose pulley, whereupon the machine stops. Evidently a similar arrangement of shifter bar and latch mechanism can be employed in connection with almost any driving mechanism and suitable controlling devices therefor. To restart the machine it is only necessary to move either handle 94 to the left in Fig. 3, whereupon the shifter bar is moved to the right, the belt is thrown back on the fast pulley and shoulder 92 is moved back sufficient for the latch to spring up into engagement with the shoulder, and the parts are then again in driving position, as shown in Fig. 68.

The automatic stopping of the machine may be accomplished in various ways by conditions arising at different stations about the machine, as previously described. In the present case the automatic stop mechanism is arranged to act in connection with the starting bar and its latch in the following manner: An electro-magnet 1801 is secured on the frame plate 107, Figs. 2 and 68, and the armature of this magnet is arranged slightly below the free end of latch link 89. The magnet circuit may be arranged in various ways but in the present instance one end of the magnet coil is grounded on the frame of the machine at 1803, Fig. 68, and the other end of the coil is connected to a conductor 1805 in which is interposed a battery 1807, which represents any suitable source of electric current. Other conductors 1809, 1811 and 1813 lead from conductor 1805 in any convenient way to the different detecting or contact mechanisms previously described. Thus, conductor 1809 leads to the feeler or detector mechanism associated with the bag feed plates, this mechanism being generally indicated at A, Fig. 68, the circuit being branched at 1815 to go to the two contact plates 391, the other plates 394 being in the present arrangement grounded, as previously described. When connection is made be-

tween either of the plates 394 and an adjacent plate 391 by one of the blades 388, the magnet circuit is closed and latch link 89 is retracted by the magnet, the starter bar is released and goes to stop position under impulse of its spring 80. The improper positioning of a bag which occasioned the stopping action is then corrected and the machine is restarted by moving one of the lever handles 94, as previously explained. Circuit branch 1811 goes to the contacts associated with the pusher mechanism, generally indicated at B, Fig. 68. The circuit is branched at 1817 and one lead goes to each of the pair of fixed contacts 892. The other contacts are grounded through the bag arms 211 when the stopping action occurs at this point, as previously explained, and the magnet circuit is then closed and operates in the same way to stop the machine. The conductor 1813 goes to the looper stop mechanism, generally designated at C, Fig. 68. The circuit is branched at 1819 and one of the branches goes to each of the fixed looper contacts 1304. The contact pins 1298 on the loopers are grounded through the frame, as previously described. When the contact is closed between either pin and its contact plate 1304, the magnet circuit is closed and operates to stop the machine in the same way.

The magnet core usually has a certain amount of residual magnetism and this tends to retain the latch link 89 against the magnet armature after an automatic stop action. To insure that the latch link will be freed from the magnet when the machine is restarted the latch link is provided with a beveled face 1825, and this is acted upon by a lug secured to the bar 79 and having a beveled face 1827. Whenever the bar is moved back to running position the beveled faces engage and the latch link is positively moved away from the magnet armature and the latch 86 is at the same time positively engaged with the shoulder 92.

Since in most cases when an automatic stopping action occurs the circuit is energized by closing of the contacts at either of the stopping stations A, B and C, and without special means to prevent it, the circuit would remain "alive" while the attendant remedies the defective condition, which would frequently cause sparks to occur at different places about the machine, it is desirable to provide means for interrupting the circuit, as soon as the stop action occurs. For this purpose spaced, insulated contacts 1830 are secured to the machine table adjacent to the starter bar and these contacts are interposed in the conductor 1805. A movable contact 1832 is secured on and insulated from the starter bar and is arranged to bridge the contacts 1830 when the bar is in running position. The circuit is thus closed, except for the breaks at the different stations A, B and C. Whenever the magnet is energized to stop the machine, as soon as the bar goes to stop position the circuit is broken between the contacts 1830 and the different contacts at the stations A, B and C are, therefore, dead until the machine is again started, and the possibility of sparking or other difficulties resulting from a live circuit are thus avoided.

The contacts 1830 are shown in an abnormal (although operative) position in Fig. 68, for the sake of clearness. Actually they are superposed and extend horizontally, as indicated in Fig. 2, and the moving contact blade 1832 is arranged horizontally to go between the contact blades 1830 after the fashion of a knife switch.

Evidently while the various parts and combinations of parts described cooperate to produce the greatly increased output and other advantages previously described, many of them are important and valuable in themselves, or in various sub-combinations, as will be understood without detailed explanation.

What I claim is:—

1. A bag stringing machine in which bags are placed on holding arms for stringing, comprising means for feeding bags in a connected series to the holding arms, an inclined feed trough located above the feeding means for directing the bags from a container to the feeding means, and a drag resting on the series of bags in the trough to apply moderate feed tension to them.

2. A bag stringing machine in which bags are placed on a holder for stringing, comprising a plate providing a bag supporting and guiding surface, a feed carriage moving to and fro to advance and place successive bags on the holder, and feed starting means comprising a hand-operated member arranged for to and fro movement in relation to said plate and a bag engaging point carried by the member.

3. A bag stringing machine in which bags are placed on holding arms for stringing, comprising a plate providing a bag supporting and guiding surface, a feed carriage moving to and fro to advance and place successive bags on the holding arms, and feed starting means comprising a hand-operated member arranged for to and fro movement in relation to said plate and a bag engaging hook carried by the member.

4. A bag stringing machine in which bags are placed on a holder for stringing, comprising a plate providing a bag supporting and guiding surface, a feed carriage moving to and fro to advance and place successive bags on the holder, grippers on the carriage, and feed starting means for engaging the hem edge of a bag and moving it down until

it is in position to be grasped by the grippers.

5. A bag stringing machine comprising a bag feed carriage, bag grippers thereon, a guide plate over which bags pass to the feed carriage, a bag stop on the plate, the plate being provided with a slot in line with the stop, a starter frame slidably mounted at the rear of the plate, a hook carried by the frame and projecting through the slot and adapted to engage the hem edge of a bag to move it to normal feed position, and a detent to retain the starter frame in inactive position.

6. A bag stringing machine comprising a bag feed carriage, bag grippers thereon, parallel guide plates over which bags pass to the feed carriage, bag stops on the plates, the plates being provided with slots in line with the stops, a handled starter frame slidably mounted at the rear of the plates, hooks carried by the frame and projecting through the slots and adapted to engage the hem edge of a bag to move it to normal feed position, and a detent to retain the starter frame in inactive position.

7. Feed mechanism for a bag stringing machine in which successive connected bags are placed on holding arms for stringing, comprising a frame, two adjacent feed plates arranged for limited movement thereon, a movable bag stop on each plate, means yieldingly resisting movement of each plate and serving to return it after displacement, and movable positive stops to prevent downward movement of the plates.

8. Feed mechanism for a bag stringing machine in which successive connected bags are placed on holding arms for stringing, comprising an upstanding frame, two adjacent feed plates arranged for substantial vertical movement thereon, a pivoted bag stop hook on each plate, means yieldingly resisting downward movement of each plate and serving to return it to elevated position after depression, movable positive stops to prevent downward movement of the plates, a feed carriage, and means by which movement of the feed carriage operates said positive stops.

9. In a bag stringing machine, bag holding mechanism to position bags for stringing, and bag feed mechanism comprising a frame, bag guide and feed plates thereon arranged for limited movement, a retractible bag stop carried by each plate, means yieldingly resisting downward movement of each plate, a positive stop to prevent downward movement of each plate, a feed carriage arranged to move vertically on the frame and having feeding grippers to engage the bag, and means by which movement of the carriage releases the bag stops and the plate stops.

10. In a bag stringing machine, bag holding mechanism to position bags for stringing, and bag feed mechanism comprising a substantially upright frame, bag guide and feed plates thereon arranged for vertical movement of limited extent, a retractable pivoted bag stop carried by each plate, means yieldingly resisting downward movement of each plate, a positive stop to prevent downward movement of each plate, a feed carriage arranged to move vertically on the frame and having feeding grippers to engage the bag and means by which movement of the carriage releases the bag stops and the plate stops.

11. In a bag stringing machine in which a connected chain of bags is moved down over guide plates and the successive bags are positioned against stops thereon and the bags are transferred successively to holding arms for stringing, a feed carriage moving to and fro between the guide plates and arms, gripper blocks mounted in the carriage for lateral movement and fixed therein against relative vertical movement, bag feed grippers and bag opening grippers carried by the blocks, means for moving the blocks laterally, and means for operating the grippers.

12. A bag stringing machine comprising a rotary member carrying a plurality of pairs of bag holders, a feed frame, bag guide plates in the frame, a feed carriage reciprocating in the frame between the guide plates and the holders, gripper blocks mounted for lateral movement in the carriage and fixed therein against relative vertical movement, the inner portions of the blocks being vertically apertured to accommodate a bag, bag feed grippers carried by the blocks, means for operating the grippers, a pair of opener arms carried by each of the blocks, one at each side of the bag aperture, opening grippers carried by each of the arms, means at each side of the carriage to operate the two opener arms at that side, means for connecting the said two operating means to move together, and means for operating the opening grippers.

13. A bag stringing machine comprising a rotary member carrying a plurality of pairs of bag holding arms, a feed frame extending substantially upward from the rotary member, bag guide plates located upwardly in the frame, a feed-carriage reciprocating on the frame between the guide plates and the holding arms, gripper blocks mounted for lateral to and fro movement in the carriage and fixed therein against relative vertical movement, the inner portions of the blocks being vertically apertured to accommodate a bag, bag feed grippers carried by the blocks, means for operating the grippers, a pair of opener arms carried by each of the blocks, one at each side of the bag

aperture, opening grippers carried by each of the arms, means at each side of the carriage to operate the two opener arms at that side, means for connecting the said two operating means to move together, means at each side of the carriage to operate the opening grippers of the pair of arms at that side of the carriage, and means connecting the two last named operating means to move together.

14. In bag feed mechanism for machines of the class described, a bag feed carriage, a bag opener arm on the carriage, a pair of bag opening gripper hooks pivotally mounted in the arm, a hook operating lever pivotally mounted in the arm and having members co-operating with the hooks, a rock shaft connected to operate the arm, and a concentric rock shaft connected to operate the lever.

15. In bag feed mechanism for machines of the class described, a bag feed carriage, a bag opener arm on the carriage, a pair of bag opening gripper hooks pivotally mounted in the arm, a hook operating lever pivotally mounted in the arm and having members co-operating with the hooks, two co-axial rock shafts, means for oscillating the rock shafts independently, a lever arm extending from one of the rock shafts and connected to the bag opener arm and another lever extending from the other rock shaft and connected to the hook operating lever.

16. In bag feed mechanism for machines of the class described, a bag feed carriage, bag opener arms on the carriage, a pair of bag opening gripper hooks pivotally mounted in each arm, a hook operating lever pivotally mounted in each arm and having members co-operating with the hooks, a rock shaft connected to oscillate the opener arms, and a concentric rock shaft connected to oscillate the hook operating levers.

17. In bag feed mechanism for machines of the class described, a bag feed carriage, two bag opener arms on the carriage, a pair of bag opening gripper hooks pivotally mounted in each arm, two hook operating levers, one pivotally mounted in each arm and each having a member co-operating with the hooks, two co-axial rock shafts, means for oscillating them independently, arms extending from one of the rock shafts and engaging the respective opener arms, an arm extending from the other rock shaft, and a cross bar thereon engaging both of the hook operating levers.

18. In a bag feed mechanism for machines of the class described, a bag feed carriage, a bag opener arm on the carriage, a pair of bag opening gripper hooks pivotally mounted in the arm, the hooks being provided with extensions, and a hook operating lever pivotally mounted in the arm and the lever being provided with an aperture substantially surrounding the pair of hooks and having offset members adjacent to the aperture to engage the hook extensions and also having members adjacent to the aperture to engage other portions of the hooks.

19. In bag feed mechanism for machines of the class described, a bag feed carriage, bag opener arms on the carriage, a pair of bag opening gripper hooks pivotally mounted in each arm, the hooks being provided with extensions, and a hook operating lever pivotally mounted in each arm and each lever being provided with an aperture substantially surrounding the pair of hooks and having offset members adjacent to the aperture to engage the hook extensions and also having members adjacent to the aperture to engage other portions of the hooks.

20. In a bag stringing machine, a rotary arm carrier, a plurality of pairs of channeled bag holding arms thereon, each arm having a longitudinally adjustable tip provided with a flange located in the channel, and means for securing the tip in adjusted position.

21. In a bag stringing machine in which bags are fed to bag holders located on a rotary carrier and the bag is strung after the carrier has advanced the holder away from the feed position, bag positioning means located at an intermediate position of the holder and comprising a pusher arranged to run under a hem edge of the bag, and means for actuating the pusher.

22. In a bag stringing machine in which bags are fed to successive pairs of bag holding arms located on a rotary carrier and the bags are strung after the carrier has advanced the arms away from the feed position, bag positioning means located at an intermediate position of the arms and comprising pushers arranged to run under the free hem edges of the same bag, and means for actuating the pushers to properly locate the bags on the arms.

23. In a bag stringing machine in which bags are fed to bag holders located on a rotary carrier and the bag is strung after the carrier has advanced the holder from the feed position, bag positioning means located at an intermediate position of the holder, comprising a pair of pushers arranged to move over upper and lower surfaces of a single bag and to engage under projecting hem edges of the bag, and means for actuating the pushers simultaneously to properly position the hem end of the bag on the holder.

24. In a bag stringing machine in which bags are fed to successive pairs of bag holding arms located on a rotary carrier and the bags are strung after the carrier has advanced the arms away from the feed position, bag positioning means located at an intermediate position of the arms and com-

prising two pairs of flexible pushers, the pushers of each pair being arranged to move over the upper and lower surfaces of the same bag and to engage under projecting hem edges of the bag, and means for actuating the pairs of pushers simultaneously to properly position the hem end of the bag on the arms.

25. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising a guide carrier arranged to move toward and from a pair of arms in stringing position, a pair of guide blocks movable on the carrier, and means for advancing the carrier and simultaneously moving the guide blocks convergently.

26. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising two guide carriers, each arranged to move toward and from a pair of arms in stringing position, a pair of guide blocks movable on each carrier, and means for advancing the carriers and simultaneously moving the guide blocks convergently.

27. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising a guide carrier arranged to move toward and from a pair of arms in stringing position, a pair of guide blocks movable on the carrier, and means for advancing the carrier and simultaneously moving the guide blocks convergently and then moving the guide blocks substantially in line with the carrier movement into engagement with the bag arms and bag.

28. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising two guide carriers, each arranged to move toward and from a pair of arms in stringing position, a pair of guide blocks movable on each carrier, and means for advancing the carriers and simultaneously moving the guide blocks convergently and then moving the guide blocks substantially in line with the carrier movement into engagement with the bag arms and bag.

29. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising a reciprocating guide block carrier, a guide block mounted for lateral movement thereon, and means for simultaneously operating the carrier and block, said means comprising a pinion mounted for rotation in the carrier, a rack bar movably mounted in the carrier and engaging the pinion, means for moving the rack bar, a stationary cam, a cam follower connected to the pinion and a member engaging the guide block and moving substantially in accordance with the movement of the cam follower.

30. In a bag stringing machine in which bags are fed upon successive pairs of holding arms and positioned for stringing by reciprocating needles, needle guide mechanism comprising a reciprocating guide block carrier, two guide blocks mounted for lateral movement thereon, and means for simultaneously operating the carrier and blocks, said means comprising pinions mounted for rotation in the carrier, rack bars movably mounted in the carrier and engaging the pinions, means for moving the rack bars, stationary cams, cam followers connected to the pinions and members engaging the guide blocks and moving substantially in accordance with the movement of the cam followers.

31. In a machine of the character described, needle guide means comprising a reciprocating carrier, a slide mounted for lateral reciprocation on the carrier, means for operating the carrier and slide, a guide block mounted to reciprocate on the slide, a yielding connection between the guide block and slide, an inward face of the guide block being contoured to engage a bag held for stringing, the inward end of the guide block also being provided with a needle guide channel.

32. In a machine of the character described, needle guide means comprising a reciprocating carrier, slides mounted for lateral reciprocation on the carrier, means for operating the carrier and slides, a guide block mounted to reciprocate on each slide, yielding connections between the guide blocks and slides, an inward face of each guide block being contoured to engage a bag held for stringing, the inward end of each guide block also being provided with a needle guide channel.

33. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, a stringing needle and needle operating mechanism, and means for indenting the bag material to facilitate entry of the needle.

34. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, a stringing needle and needle operating mechanism, a needle guide, and means for indenting the bag material to facilitate entry of the needle.

35. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, stringing needles and needle operating mechanism, and means for indenting the bag material to facilitate entry of the needles.

36. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, stringing needles and needle operating mechanism, needle guides, and means for indenting the bag material to facilitate entry of the needles.

37. In a machine of the character described, a rotary bag carrier, a plurality of bag holders on the carrier on which bags are placed and located at stringing position by movement of the carrier, a reciprocating needle carriage and a needle mounted thereon, a guide block carrier, a movable guide block thereon, means for operating the carrier and guide block, bag impressing means carried by the guide block and arranged to co-operate with the bag holder at stringing position, and means for retracting the impressing means.

38. In a machine of the character described, a rotary bag carrier, a plurality of pairs of bag holding arms on the carrier on which bags are placed and located at stringing position by movement of the carrier, the arms having rounded outer surfaces, reciprocating needle carriages and needles mounted thereon, guide block carriers and two convergently movable guide blocks on each carrier, means for operating the carriers and guide blocks, bag impressing means carried by the guide blocks and arranged to co-operate with the rounded surfaces of the bag holding arms at stringing position, and means for reciprocating the impressing means.

39. In a bag stringing machine, a holder on which a bag is positioned for stringing, a stringing needle, needle operating means, a needle guide block, means for moving the block to and from operative relation to the bag holder, a member slidably mounted in the guide block and an impressing point on the inward end of the member arranged to engage the bag material in the advance movement of the guide block and open the fabric to facilitate entry of the needle.

40. In a bag stringing machine, a holder on which a bag is positioned for stringing, stringing needles and needle operating means, needle guide blocks, means for moving the blocks to and from operating relation to the bag holder, members slidably mounted in the guide blocks and impressing points on the inward ends of the members arranged to engage the bag material in the advance movement of the guide blocks and indent the fabric to facilitate entry of the needles.

41. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a stripper adapted to co-operate with the arms to strip a bag after stringing, an oscillating frame on which the stripper is reciprocably mounted, means for oscillating the frame and means for reciprocating the stripper to move the stripper in a generally circuitous course.

42. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a pair of stripper fingers adapted to co-operate with the arms to strip a bag after stringing, a cross head carrying the fingers, an oscillating frame on which the cross head is reciprocably mounted, means for oscillating the frame, and means for reciprocating the cross head, to move the fingers in a generally circuitous course.

43. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a turner head, a turner head carrier moving in substantially a circuitous course, means for positioning the turner head substantially between the bag arms in stringing position, and moving the head upward between the arms, and means for then directing the turner head to a substantially horizontal position at a point removed from the arms for removal of the bag.

44. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a turner head carrier moving substantially in a circuitous course, two turner heads thereon, means for positioning the turner heads substantially in line with the bag arms in stringing position, and moving the heads upward between the arms, and means for then directing the turner heads to a substantially horizontal position at a point removed from the arms for removal of the bags.

45. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a turner head, a turner head carrier moving in substantially a circuitous course, means for positioning the turner head substantially between the bag arms in stringing position, and moving the head upward between the arms, means for then directing the turner head to a substantially horizontal position at a point removed from the arms for removal of the bag, bag stretching means arranged with the turner head, and means for operating the stretching means in timed relation to the movement of the head.

46. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a turner

head carrier moving substantially in a circuitous course, two turner heads thereon, means for positioning the turner heads substantially in line with the bag arms in stringing position and moving the heads upward between the arms, means for then directing the turner heads to a substantially horizontal position at a point removed from the arms for removal of the bags, bag stretching means arranged with the turner heads, and means for operating the stretching means in timed relation to the movement of the heads.

47. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means and turner head mechanism comprising a chain passing over upper and lower sprockets, a turner head frame pivotally mounted on the chain, a turner head carried by the frame and guide means carried by stationary members and by the frame respectively for directing the head in substantially vertical position during upward movement between the pair of bag arms in stringing position and then laterally away from the arms into horizontal position for bag transfer.

48. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means and turner head mechanism comprising a chain passing over upper and lower sprockets, two turner head frames pivotally mounted on the chain, a turner head carried by each frame and guide means carried by stationary members and by the frames respectively for directing the heads in substantially vertical position during upward movement between the pair of bag arms in stringing position and then laterally away from the arms into horizontal position for bag transfer.

49. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means and turner head mechanism comprising a chain passing over upper and lower sprockets, a turner head frame pivotally mounted on the chain, a turner head carried by the frame and guide means carried by stationary members and by the frame respectively for directing the head in substantially vertical position during upward movement between the pair of bag arms in stringing position and then laterally away from the arms into horizontal position for bag transfer, bag stretching arms movably mounted on the turner head frame, and means for extending the arms during the movement of the turner head from bag receiving position and for subsequently retracting the arms.

50. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means and turner head mechanism comprising a chain passing over upper and lower sprockets, two turner head frames pivotally mounted on the chain, a turner head carried by each frame and guide means carried by stationary members and by the frames respectively for directing the heads in substantially vertical position during upward movement between the pair of bag arms in stringing position and then laterally away from the arms into horizontal position for bag transfer, bag stretching arms movably mounted on each turner head frame, and means for extending the arms during the movement of the turner heads from bag receiving position and for subsequently retracting the arms.

51. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a pair of stripper fingers moving in a substantially circuitous course to strip a bag from the pair of arms in stringing position, a turner head arranged to move in a substantially circuitous course, and means for directing it in substantially vertical position upwardly between the bag arms while the stripper fingers move downward to strip the bag and turn it over the turner head.

52. A machine of the character described, comprising bag feeding means, a rotary arm carrier, a plurality of pairs of bag holding arms thereon, bag stringing means, a pair of stripper fingers moving in a substantially circuitous course to strip a bag from the pair of arms in stringing position, a turner head arranged to move in a substantially circuitous course, means for directing it in substantially vertical position upwardly between the bag arms while the stripper fingers move downward to strip the bag and turn it over the turner head, bag stretching means associated with the turner head, and means for actuating the stretching means in definite relation to the turner head movement.

53. Bag stringing mechanism comprising a bag holder on which a bag is positioned for stringing, stringing means, a turner head arranged to move in a substantially circuitous course and to engage a bag positioned by the bag holder, bag stretching means associated with the turner head, and means for actuating the stretching means during the turner head movement.

54. Bag stringing mechanism comprising a bag holder on which a bag is positioned for stringing, stringing means, a plurality of turner heads in equally spaced relation and arranged to move in a substantially circuitous course and to engage a bag posi-

tioned by the bag holder, bag stretching means associated with each turner head, and means for actuating the stretching means during the turner head movement.

55. In bag stringing mechanism, comprising bag holding arms, bag feeding means and a reciprocating needle carriage, a string feed gripper located on the carriage and comprising a pair of pivoted arms, guides directing the string between the arms, a spring resisting movement of one of the arms, a cam for moving the other arm, one of the arms having at its outer end a beveled face and the other arm having a co-operating projection.

56. In bag stringing mechanism, comprising bag holding arms, bag feeding means and reciprocating needle carriages, a string feed gripper located on each carriage, and each comprising a pair of pivoted arms, guides directing the string between the arms, a spring resisting movement of one of the arms, and a cam for moving the other arm, one of the arms having at its outer end a beveled face and the other arm having a co-operating rounded projection.

57. A machine of the class described comprising a rotary bag holder and a plurality of pairs of bag holding arms thereon, stringing mechanism including a needle, and looper mechanism comprising a looper having a main looper hook and an auxiliary string loop support.

58. In a machine of the class described comprising a rotary bag holder and a plurality of pairs of bag holding arms thereon, stringing mechanism including a needle, and looper mechanism comprising an arm, a link, and a looper pivoted in the link and having a main looper hook and an auxiliary string loop support.

59. A machine of the class described comprising a rotary bag holder and a plurality of pairs of bag holding arms thereon, stringing mechanism including a needle and looper mechanism comprising a looper having a main looper hook and an auxiliary string loop support, the loop support having a beveled surface co-operating with the needle.

60. In a machine of the class described comprising a rotary bag holder and a plurality of pairs of bag holding arms thereon, stringing mechanism including a needle and looper mechanism comprising an arm, a link and a looper pivoted in the link and having a main looper hook and an auxiliary string loop support, the loop support having a beveled surface co-operating with the needle.

61. In a machine of the class described, a needle carriage, a needle holder thereon comprising a socket and a needle clamp, a straight needle having a butt located in the socket and held by the clamp, the needle having a string channel extending from near the point to the rear end of the butt, the needle socket and clamp being arranged to provide a lateral opening corresponding with the needle channel to facilitate stringing.

62. In a machine of the class described, a needle carriage, a needle holder thereon comprising a socket, and a needle clamp, a straight needle having a butt located in the socket and held by the clamp, the needle having a string channel extending from near the point to the rear end of the butt and having a countersink in the end of the butt, the needle socket and clamp being arranged to provide a lateral opening corresponding with the needle channel to facilitate stringing.

63. The combination with bag holding mechanism and needle operating mechanism of the class described, of a needle comprising a relatively long shank having a flat side, a butt, a tapered end and a blunt point, an eye adjacent to the beginning of the taper, and an approximately central thread channel running from the eye to the butt, the lips of this channel being slightly incurved to provide a continuous string slot of somewhat restricted width.

64. The combination with bag holding mechanism and needle operating mechanism of the class described, of a needle comprising a relatively long shank having a flat side, a butt having a countersunk end, a tapered end and a blunt point, an eye adjacent to the beginning of the point taper, an approximately central thread channel running from the eye to the countersink, the lips of this channel being slightly incurved to provide a continuous string slot of somewhat restricted width, the needle being provided with a curved channel extending forward from the other end of the eye.

65. In a machine of the class described, needle operating mechanism comprising, a shaft, a needle carriage frame oscillatably mounted on the shaft, a needle carriage mounted to reciprocate on the frame, an operating lever, an adjustable eccentric providing a lever fulcrum on the base of the machine, a link having universal joint connection with the upper end of the lever and with the needle carriage, the drive shaft having a cam thereon, and a cam follower on the lever engaging the cam.

66. A machine of the class described, comprising means for feeding and supporting bags for stringing, a needle carriage and needle and string feed means associated with the needle carriage, and a string cutter for cutting the string upon approach of a knot or kink.

67. A machine of the class described, comprising means for feeding and supporting

bags for stringing, a needle carriage and needle and string feed means associated with the needle carriage, and means for automatically cutting the string upon approach of a knot or kink.

68. A machine of the class described, comprising means for feeding and supporting bags for stringing, a needle carriage and needle and string feed means associated with the needle carriage, string cutting mechanism comprising string guiding means anterior to the string feed mechanism, a movable member acted upon by a knot or kink in the string, and cutting means acting upon movement of said member to sever the string.

69. A bag stringing machine comprising means for supporting and presenting bags successively in stringing position, and means acting to automatically stop the machine upon failure of a bag to be presented in proper position at a predetermined point.

70. A bag stringing machine comprising means for supporting and presenting bags successively in stringing position, and means acting to automatically stop the machine upon failure of a bag to be presented in proper position at a plurality of predetermined points.

71. A bag stringing machine comprising means for supporting and presenting bags successively in stringing position, electrically actuated stopping means and detectors in circuit with the stopping means acting to automatically stop the machine upon failure of a bag to be presented in proper position at a plurality of predetermined points.

72. In a bag stringing machine, a bag holder on which the bag is located for stringing, means for feeding bags successively to the holder, a guide over which the bags pass to the feeding means, a feeler actuated by the bag adjacent to the guide, and means controlled by the feeler and acting in the absence of a bag at the proper position to automatically stop the machine.

73. In a bag stringing machine, a bag holder on which the bag is located for stringing, means for feeding bags successively to the holder, a guide over which the bags pass to the feeding means, a feeler actuated by the bag adjacent to the guide, an electric contact actuated by the feeler, and means in circuit with the contact and acting in the absence of a bag at the proper position to automatically stop the machine.

74. A bag stringing machine comprising driving means, stringing means, a bag holder to position successive bags for stringing, feeding means, two guide plates over which the bags pass to the feeding means, a member associated with each guide plate and engaging the passing bags, and means actuated by either of the members in the absence of a bag in proper position to interrupt the driving means and stop the machine.

75. A bag stringing machine comprising driving means, stringing means, a bag holder to position successive bags for stringing, feeding means, two guide plates over which the bags pass to the feeding means, a member associated with each guide plate and engaging the passing bags, an electric contact actuated by each of said members, and means actuated by either of the contacts in the absence of a bag in proper position to interrupt the driving means and stop the machine.

76. A bag stringing machine comprising driving means, stringing means, a bag holder to position successive bags for stringing, feeding means, two guide plates over which the bags pass to the feeding means, movable bag stops on the plates, members carried by the stops and closely overlying the passing bags, detectors co-operating with said members and retracted by properly positioned bags, and means actuated by the detectors to stop the machine upon failure of a bag to be properly presented between the guide plates and said members.

77. A bag stringing machine comprising driving means, stringing means, a bag holder to position successive bags for stringing, feeding means, two guides plates over which the bags pass to the feeding means, movable bag stops on the plates, members carried by the stops and closely overlying the passing bags, detectors co-operating with said members and retracted by properly positioned bags, and means including electric contacts actuated by the detectors and an electro-magnet in circuit with said contacts to stop the machine upon failure of a bag to be properly presented over the guide plates.

78. A bag stringing machine comprising a bag holder, means for moving the holder to stringing position, bag adjusting means located at a station anterior to the stringing position, and means associated with the adjusting means for stopping the machine in absence of a bag in proper position at the adjusting station.

79. A bag stringing machine comprising a bag holder, means for moving the holder to stringing position, bag adjusting means located at a station anterior to the stringing position, and means associated with the adjusting means for stopping the machine in absence of a bag in proper position at either of two places at the adjusting station.

80. A bag stringing machine comprising a bag holder, means for moving the holder to stringing position, bag pushers located at a station anterior to the stringing position

and arranged to act on a side portion of the bag to adjust it on the holder, and electrical contacts in circuit with the pushers and electrically actuated stop mechanism in circuit with the contacts to stop the machine in the absence of a bag in proper position on the holder.

81. A bag stringing machine comprising a bag holder, means for moving the holder to stringing position, bag pushers located at a station anterior to the stringing position and arranged to act on two side portions of the bag to adjust it on the holder, electrical contacts in circuit with the pushers and electrically actuated stop mechanism in circuit with the contacts to stop the machine in the absence of a bag in proper position at either side of the holder.

82. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, means for moving the holder to stringing position, stringing means including a looper about which the string passes in the stringing operation, and means acting upon failure of a string to be properly tensioned upon the looper to stop the machine.

83. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, means for moving the holder to stringing position, stringing means including a looper about which the string passes in the stringing operation, and electrical means acting upon failure of a string to be properly tensioned upon the looper to stop the machine.

84. In a bag stringing machine of the class described, in combination with bag feeding, positioning and stringing means, a shiftable starting member, and means yieldingly holding the starting member in running position and arranged to release when the starting member is definitely moved to stop position.

85. In a bag stringing machine of the class described, in combination with bag feeding, positioning and stringing means, a shiftable starting member, means urging the starting member to stop position, and means yieldingly holding the starting member in running position and arranged to release when the starting member is definitely moved to stop position.

86. In a bag stringing machine comprising bag feeding, positioning and stringing means, a shiftable starting member, a latch to hold the member in running position, means for releasing the latch from the shiftable member when the latter is definitely urged to stop position, and means for yieldingly retaining the latch.

87. In a bag stringing machine comprising bag feeding, positioning and stringing means, a shiftable starting member, means yieldingly urging the member to stop position, a latch to hold the member in running position, means for releasing the latch from the shiftable member when the latter is definitely urged to stop position, and means for yieldingly retaining the latch.

88. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivotal arm on which the latch is pivotally mounted, and a spring to retract the arm and yieldingly retain the latch and starting bar in running position.

89. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivotal arm on which the latch is pivotally mounted, a spring urging the latch to engagement, and a spring to retract the arm and yieldingly retain the latch and starting bar in running position.

90. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivotal arm on which the latch is pivotally mounted, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, and means yieldingly urging the starting bar to stop position.

91. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, an arm on which the latch is pivotally mounted, a spring urging the latch to engagement, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, and means yieldingly urging the starting bar to stop position.

92. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivoted arm on which the latch is pivotally mounted, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, and an electro-magnet to retract the latch.

93. In a bag stringing machine compris-

ing driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivoted arm on which the latch is pivotally mounted, a spring urging the latch to engagement, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, and an electro-magnet to retract the latch.

94. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivotal arm on which the latch is pivotally mounted, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, an electro-magnet to retract the latch, and means carried by the bar to retract the latch from the magnet.

95. In a bag stringing machine comprising driving mechanism, bag feeding, positioning and stringing means, starting and stopping mechanism comprising a starting bar having a latch shoulder, a latch to engage the shoulder and having a curved surface in rocking contact with the bar, a pivotal arm on which the latch is pivotally mounted, a spring urging the latch to engagement, a spring to retract the arm and yieldingly retain the latch and starting bar in running position, an electro-magnet to retract the latch, and means carried by the bar to retract the latch from the magnet.

96. In a bag stringing machine of the class described, bag feeding, positioning and stringing means, driving means, a shiftable member controlling the driving means, a latch retaining the shiftable member in driving position, an electro-magnet to release the latch, electric contacts located at one or more positions about the machine and controlled by operating conditions at those points to close the magnet circuit and stop the machine upon improper functioning at the respective point, and means carried by the shiftable member for freeing the latch from the magnet.

97. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, a stringing needle and needle operating mechanism, a needle guide, and means carried by the needle guide for impressing the bag material to facilitate entry of the needle.

98. A bag stringing machine comprising a bag holder on which a bag is positioned for stringing, stringing needles and needle operating mechanism, needle guides, and means carried by the needle guides for impressing the bag material to facilitate entry of the needles.

Signed at Durham in the county of Durham and State of North Carolina this seventh day of September A. D. 1921.

JOHN T. DALTON.