No. 834,756. PATENTED OCT. 30, 1906.

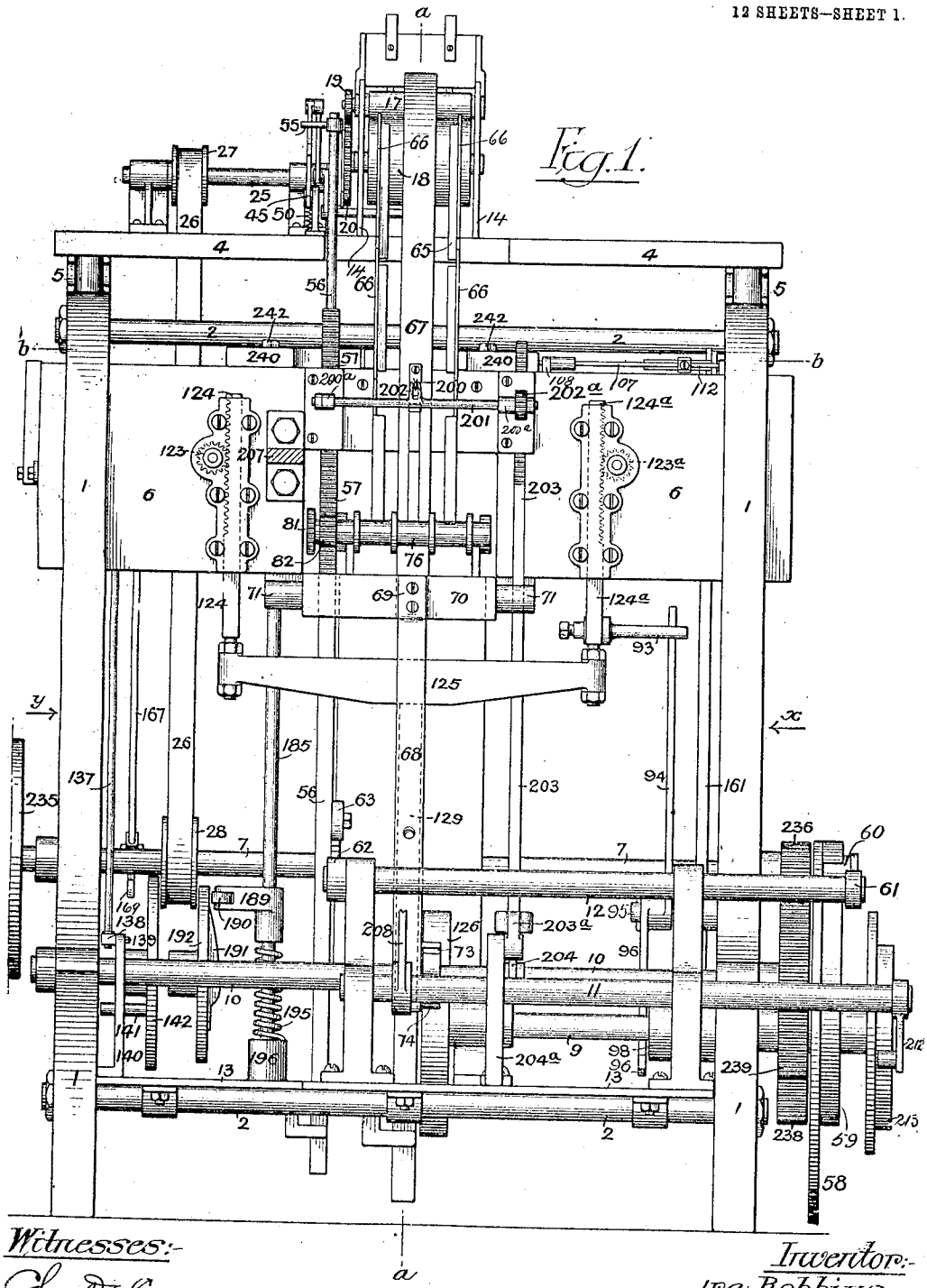
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 1.

Fig. 1.



Witnesses:-

Chas. D. Clon.

Herman E. Metius

Inventor:-

Ira Robbins.

by his Attorneys

Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

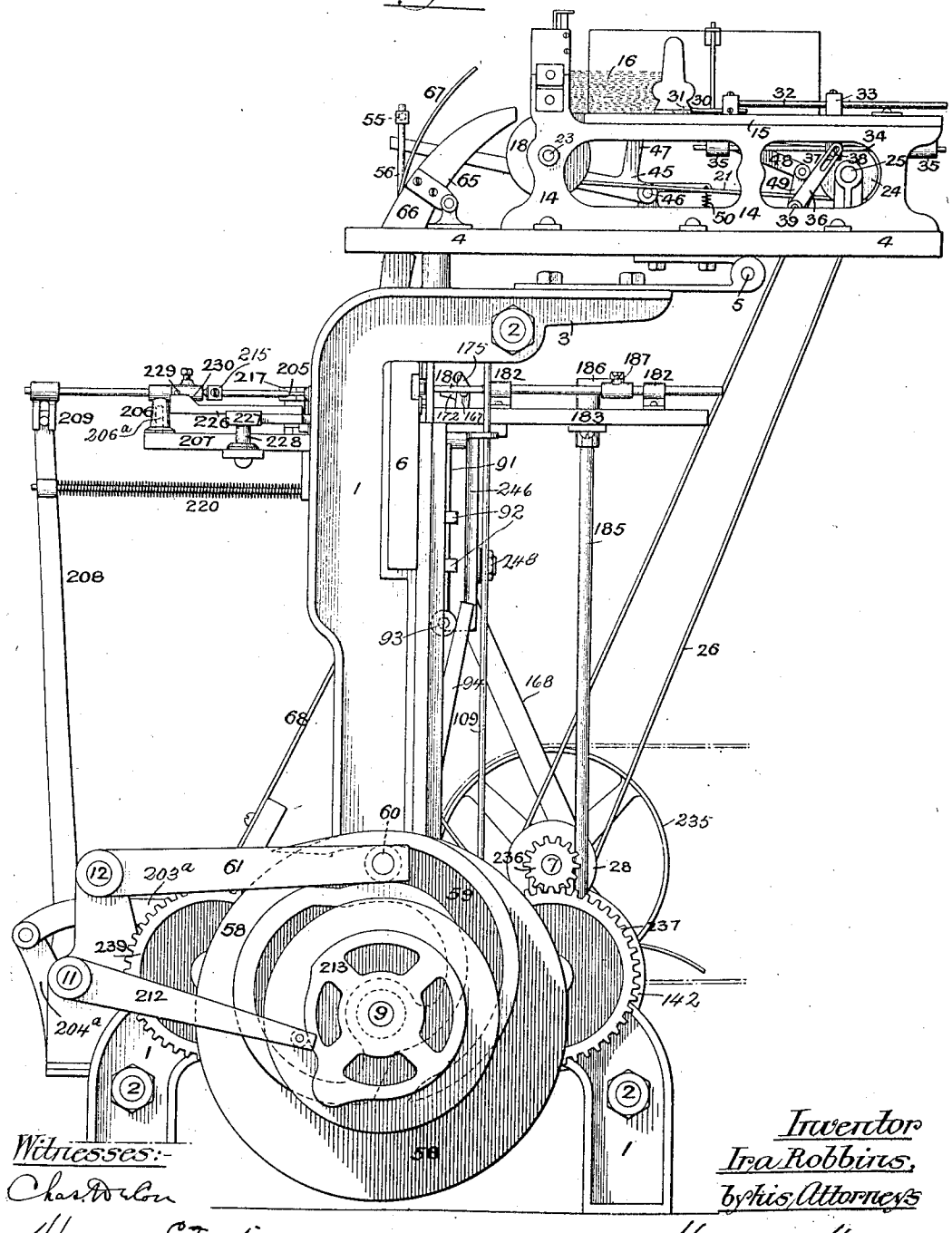
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-

Chas. Dorlon

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No. 834,756. PATENTED OCT. 30, 1906.

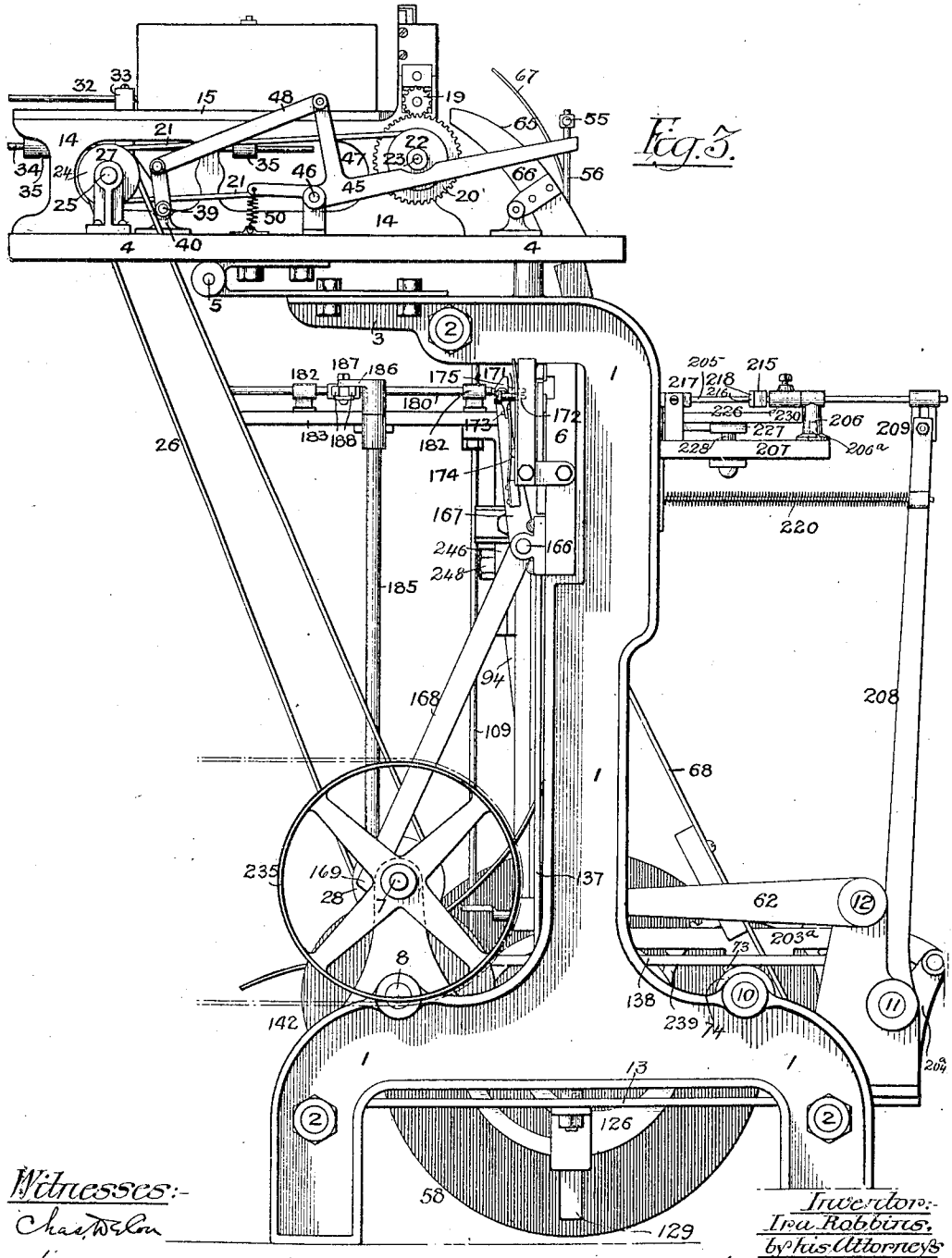
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 3.

Fig. 3.



Witnesses:-

Chas. W. Low

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Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

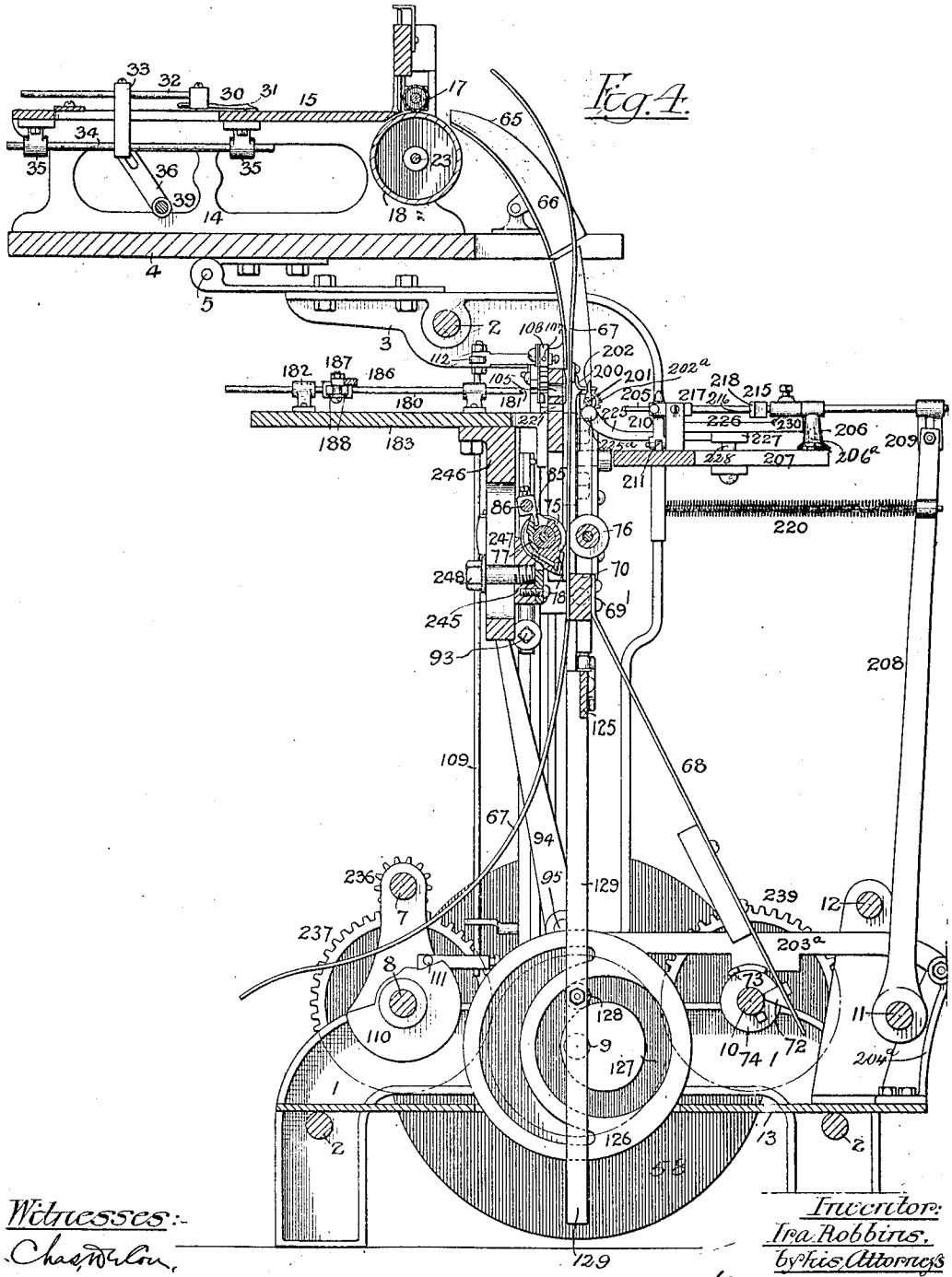
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 4.

Fig. 4.



Witnesses:-

Chas. M. Low.

Herman E. Metiers

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Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

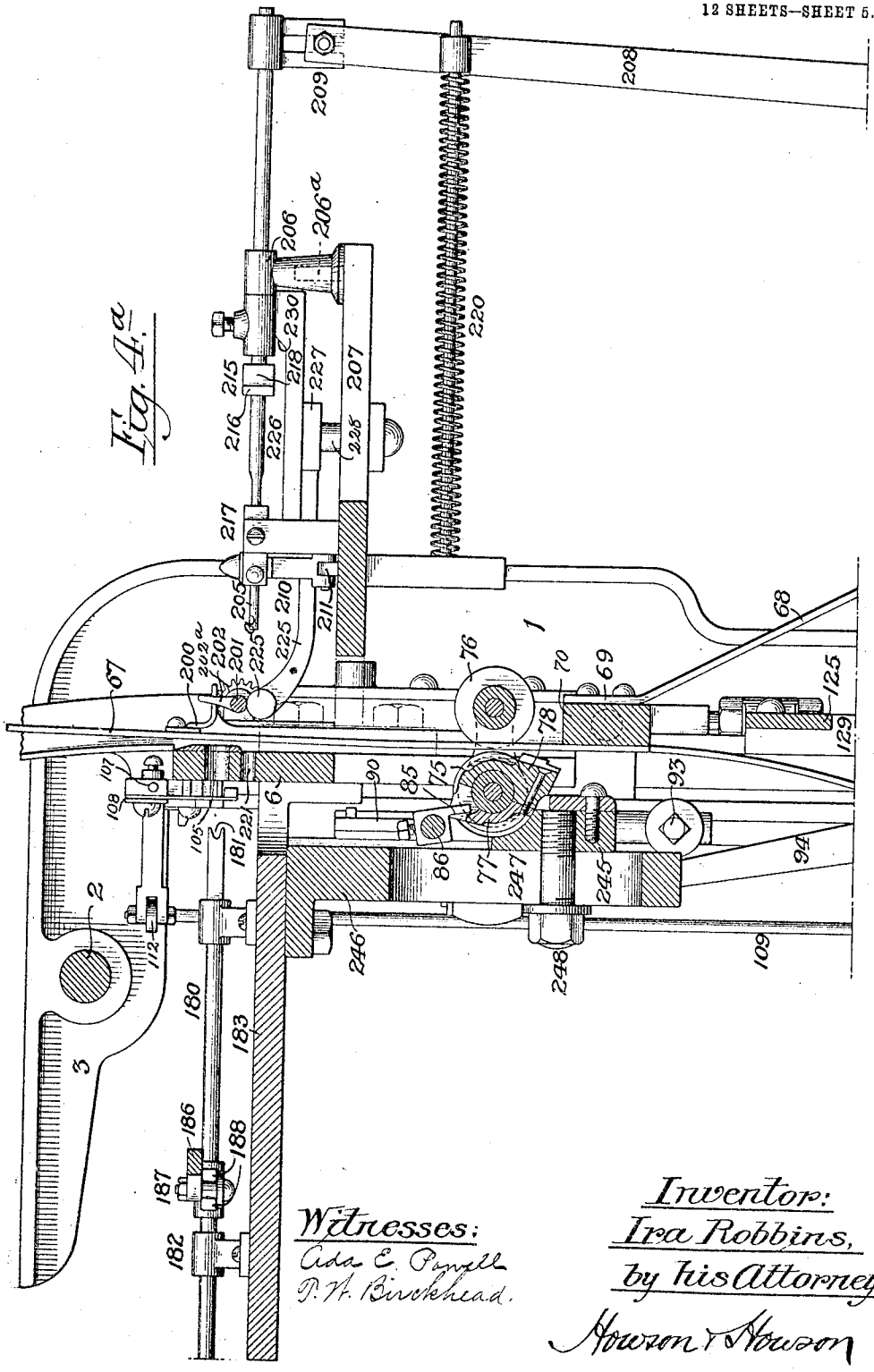
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 5.

Fig. 4a.



Witnesses:
Ada E. Powell
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Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

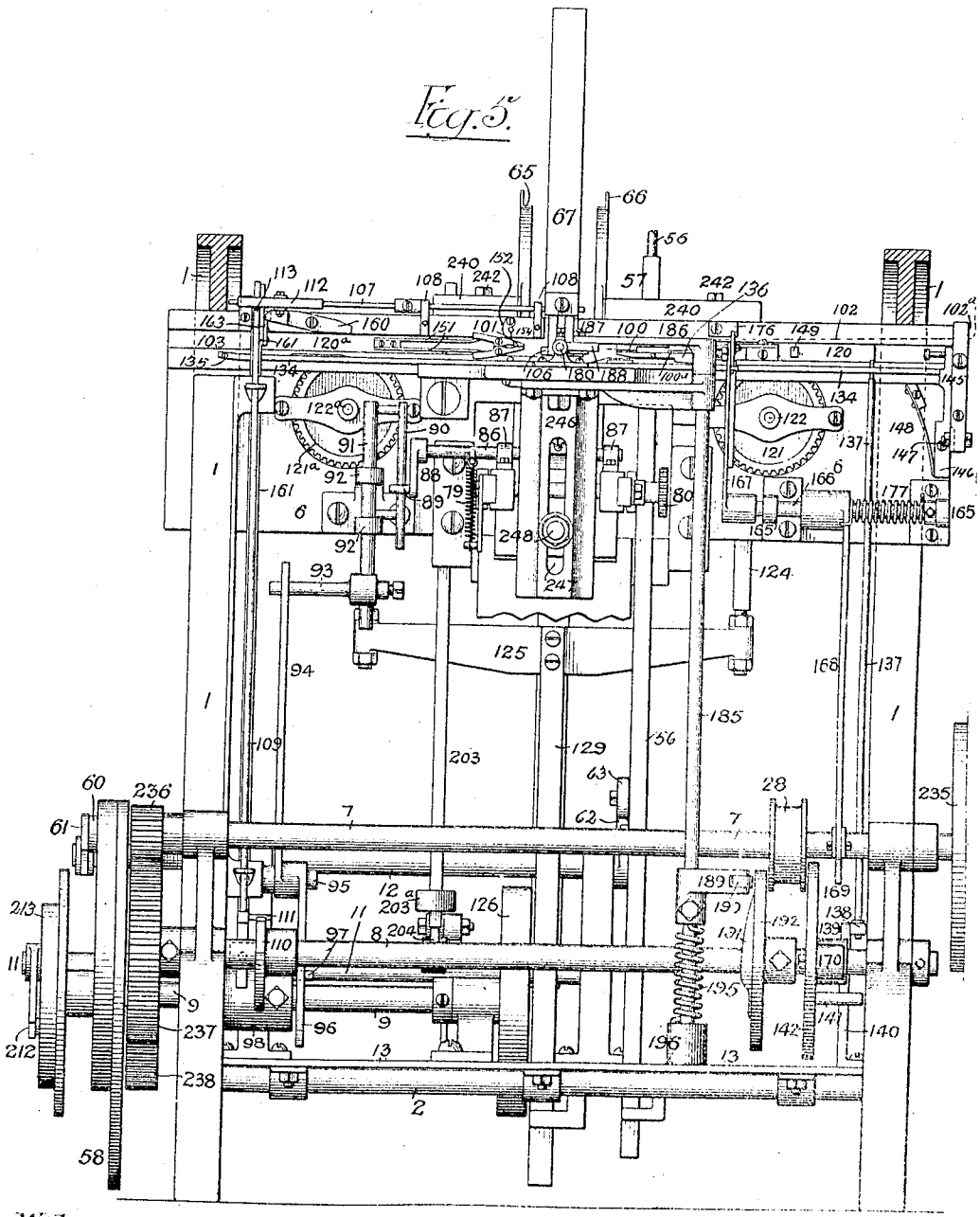
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 6.

Fig. 5.



Witnesses:-

Chas. D. Lee

Herman E. Metius

Inventor:

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by his Attorneys

Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

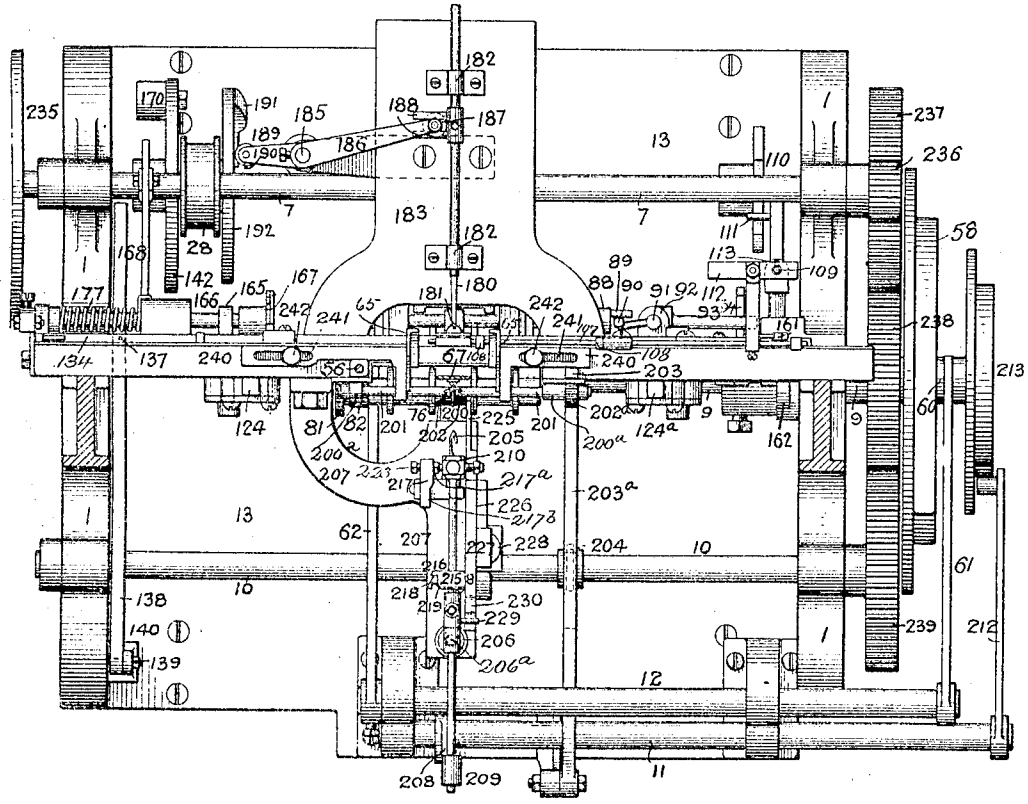
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 7.

Fig. 6.



Witnesses:-

Chas. D. Cox.

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No. 834,756. PATENTED OCT. 30, 1906.

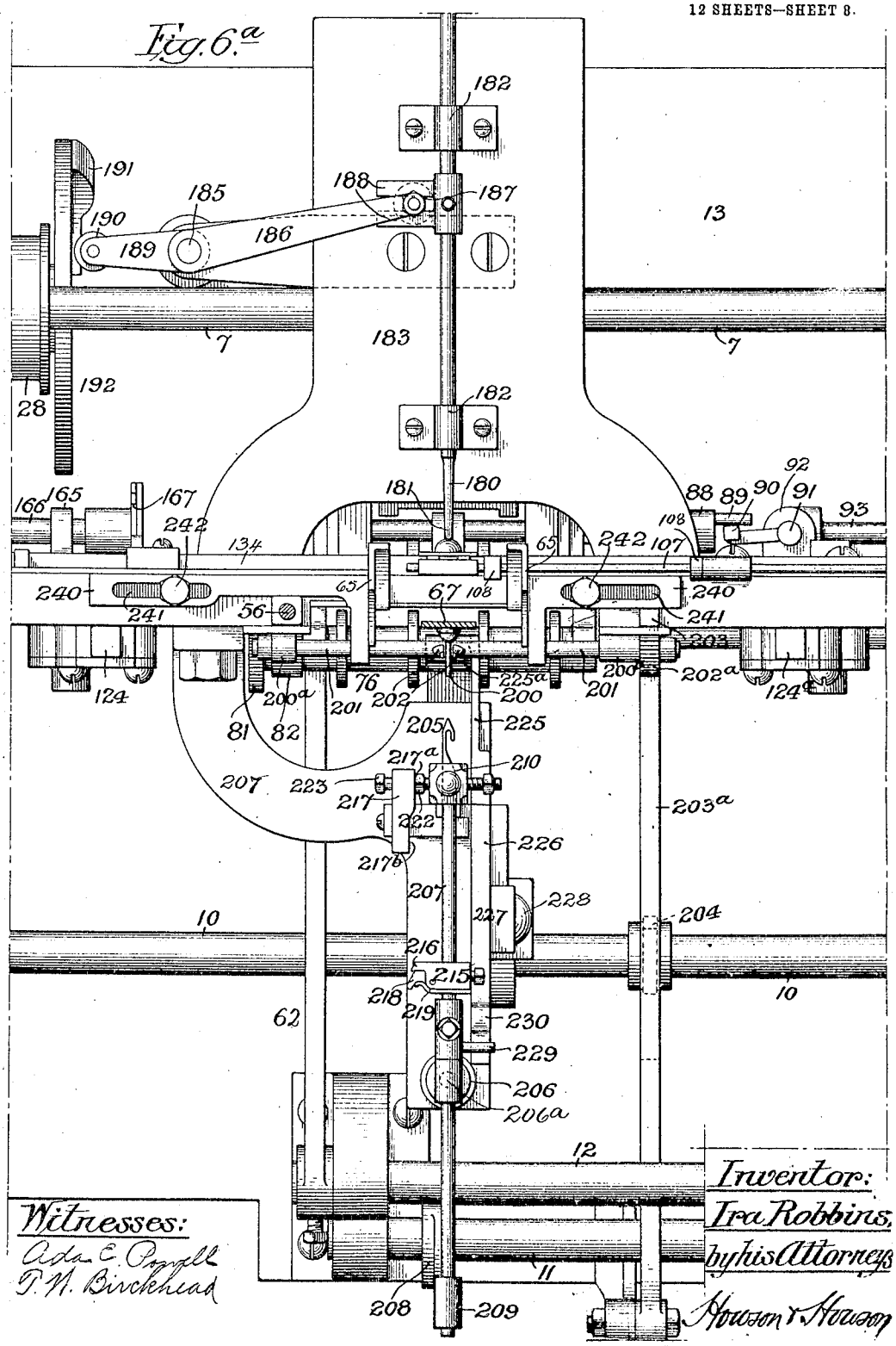
I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 8.

Fig. 6.a



Witnesses:
Ada C. Powell
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No. 834,756. PATENTED OCT. 30, 1906.

I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 9.

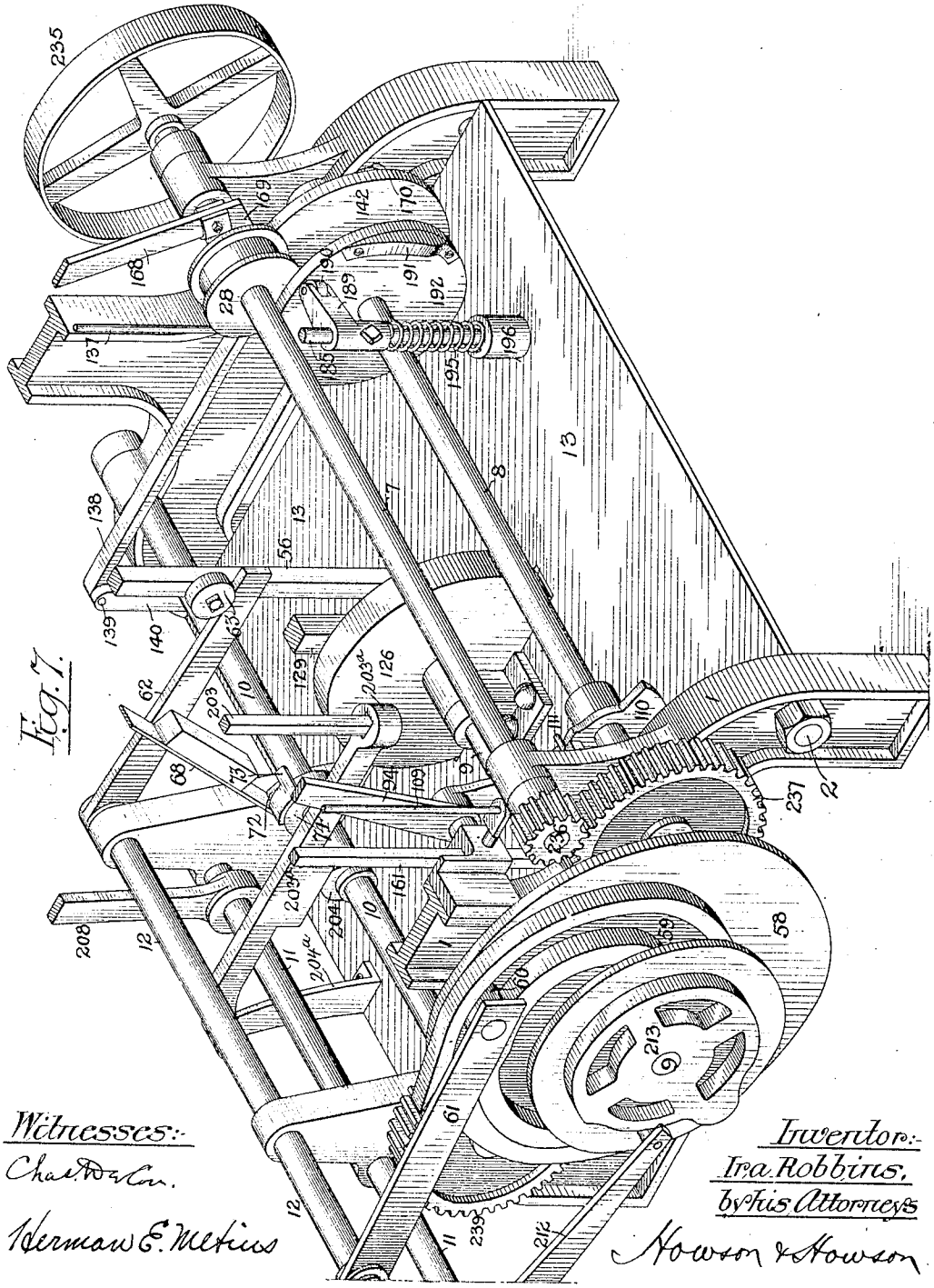


Fig. 1.

Witnesses:
Chas. Dorlon.
Herman E. Metius

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No. 834,756. PATENTED OCT. 30, 1906.

I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 10.

Fig. 8.

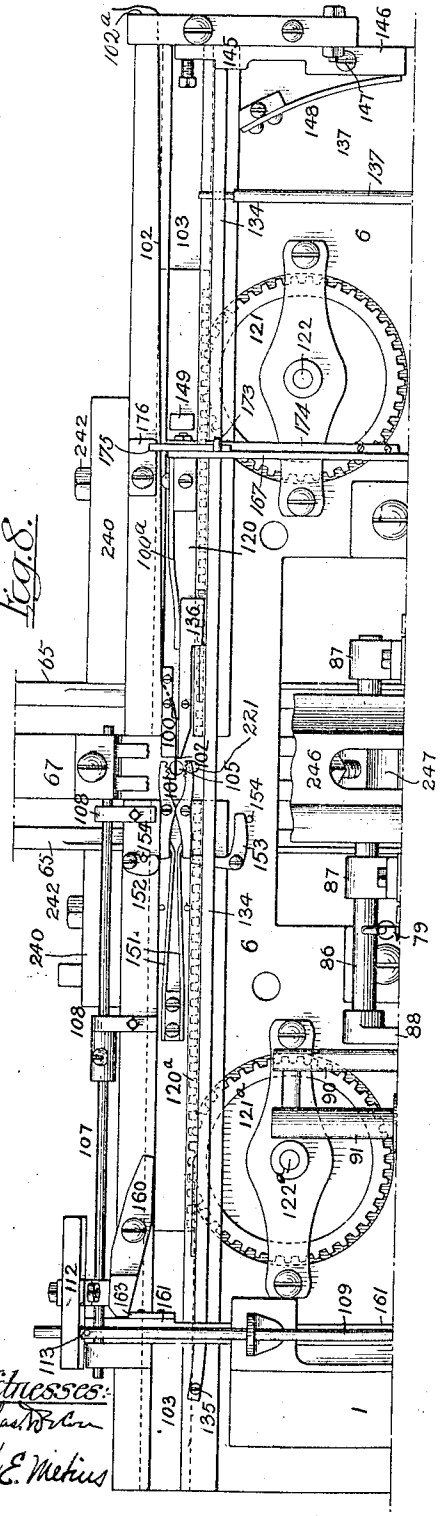
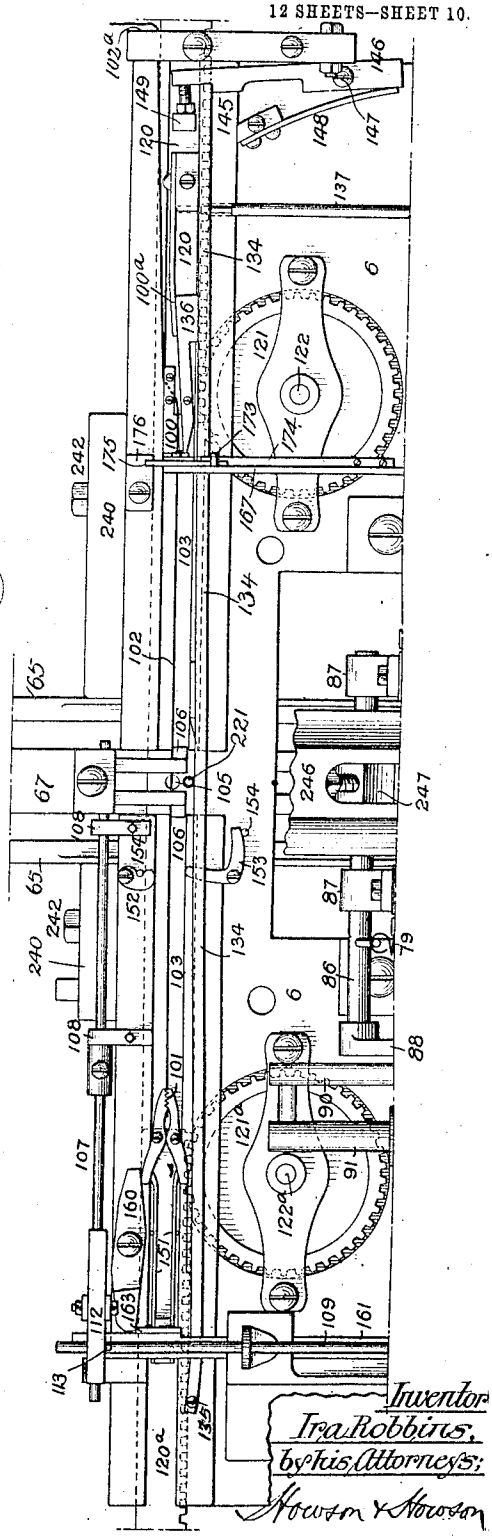


Fig. 9.



Witnesses:
Chas. F. Blum
H. E. Mellus

Inventor
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Howson & Howson

No. 834,756. PATENTED OCT. 30, 1906.

I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 11.

Fig. 10.

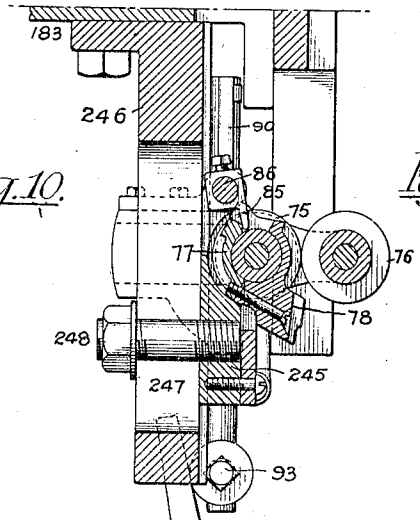


Fig. 11.

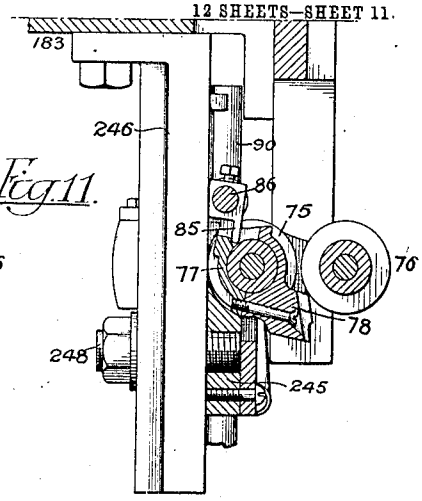
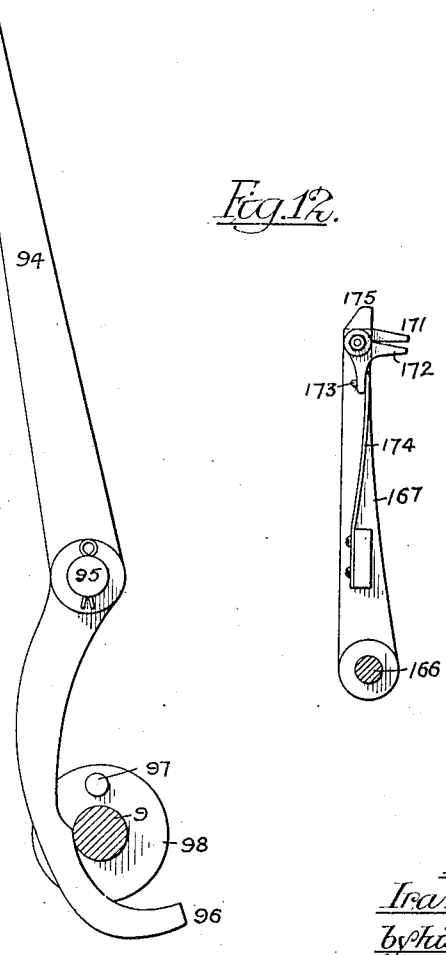


Fig. 12.



Witnesses:-
Chas. H. Lee.
Herman E. Metius

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No. 834,756. PATENTED OCT. 30, 1906.

I. ROBBINS.

TAG STRINGING MACHINE.

APPLICATION FILED APR. 2, 1903.

12 SHEETS—SHEET 12.

Fig. 13.

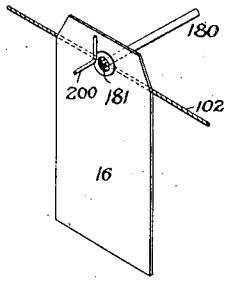


Fig. 14.

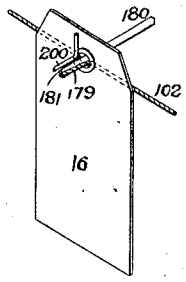
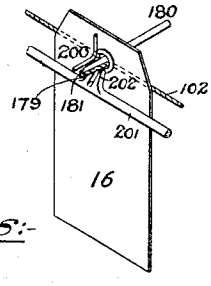


Fig. 15.



Witnesses:-

Chas. R. Ellis.

Herman E. Metius

Fig. 16.

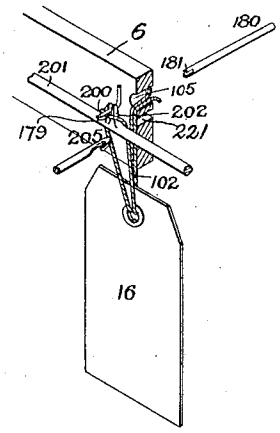


Fig. 17.

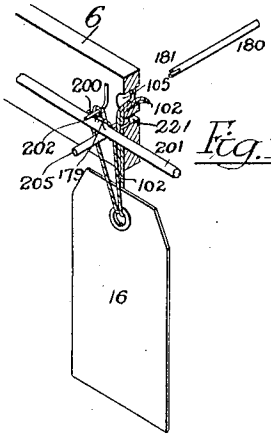
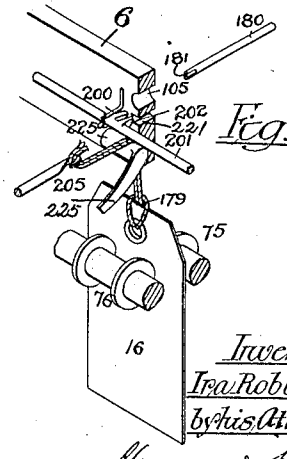


Fig. 18.



Inventor:-

Ira Robbins.

by his Attorneys

Howson & Howson

UNITED STATES PATENT OFFICE.

IRA ROBBINS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WILLIAM H. ROTH, OF PHILADELPHIA, PENNSYLVANIA.

TAG-STRINGING MACHINE.

No. 834,756. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed April 2, 1903. Serial No. 150,770.

To all whom it may concern:

Be it known that I, IRA ROBBINS, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a Tag-Stringing Machine, of which the following is a specification.

My invention consists of a new and improved machine designed for the purpose of stringing tags or other similar articles automatically.

The tags to be strung are previously provided with apertures which may be eyeleted or left plain, through which apertures the string is to be passed with the looped end first, and the free ends of said string are then passed through this loop and the latter drawn against the tag.

In my improved machine the tags are placed in a suitable receptacle, from which they are fed one at a time by suitable mechanism to a runway, from which they pass directly to the mechanism for inserting the looped string in the apertures.

My invention comprises, further, automatic means for feeding the string into position and means for severing it in proper lengths for use. Other features of my invention will be pointed out hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the machine forming the subject of my invention. Fig. 2 is a side elevation looking in the direction of the arrow *x*, Fig. 1. Fig. 3 is a side elevation looking in the direction of the arrow *y*, Fig. 1. Fig. 4 is a sectional elevation on the line *a a*, Fig. 1, looking in the same direction as Fig. 3. Fig. 4ª is an enlarged view of part of Fig. 4. Fig. 5 is a rear elevation of the lower part of the machine. Fig. 6 is a plan view of the machine, the upper part having been removed on the line *b b*, Fig. 1. Fig. 6ª is an enlarged view of part of Fig. 6. Fig. 7 is a perspective view of the lower part of the machine, showing the driving mechanism, cams, and cam-shafts. Figs. 8 and 9 are enlarged views illustrating the string-feeding mechanism forming part of my invention. Figs. 10 and 11 are enlarged sectional views of the tag-positioning means, showing the same in two positions. Fig. 12 is an enlarged view of the string-cutting knife. Figs. 13 to 18, inclusive, are diagram views in perspective, illustrating the method of passing the string through the apertures of the tags and securing such string in position.

The machine forming the subject of my invention has been designed more particularly for stringing what are known as "shipping-tags." It will be understood, however, that any kind of an apertured tag may be strung by the mechanism which I have employed in connection with this machine, it only being necessary to change the size of the feeding and operating parts without altering the design of the machine or departing from the scope of the invention.

In describing my improved machine and the operation of the same I will refer to the mechanism employed therein under several heads, which may be designated as follows: first, the selector mechanism; second, means for operating the selector mechanism; third, the runway or chute for the tags; fourth, means for positioning the tags; fifth, the string-feeding mechanism and means for operating the same; sixth, the threading-needle and means for operating the same; seventh, the looping mechanism and means for operating the same; eighth, the main driving-shaft and its connections, and, ninth, the counter-shaft and the rock-shafts.

In the accompanying drawings the machine comprises the side frames 1, which are suitably braced at 2, the upper part of said frames having projecting arms 3, to which arms a table 4 is hinged at 5.

The side frames 1 carry a cross-piece 6, upon which is mounted the mechanism for holding the tag, the means for looping the string through the same, and the means for passing the free ends of the string through said loops. The main driving-shaft is shown at 7, below which a counter-shaft 8 is arranged, such counter-shaft controlling a number of movements of the machine. In front of the main driving-shaft and the counter-shaft is a cam-shaft 9, a counter-shaft 10, and a pair of rock-shafts 11 and 12, all of which are parallel to the main driving-shaft.

My machine having been designed for the purpose of stringing tags the description naturally begins with the mechanism for engaging and delivering one tag at a time to the stringing mechanism and such engaging and delivering mechanism I have termed the "*Selector mechanism.*"—Mounted on the

table 4 at the top of the machine is a frame 14, which supports an auxiliary table 15, carrying the tags to be strung, a pile of such tags 16 being shown in dotted lines in Fig. 2. This table has at its forward end a pair of rolls 17 and 18, between which the tags are passed, which rolls are positively driven by means of the meshing gear-wheels shown at 19 and 20, such wheels receiving their movement by means of a belt 21, passing around a pulley 22, secured to the spindle 23, on which the gear-wheel 20 is mounted, such belt receiving its movement from a pulley 24 on a counter-shaft 25, which shaft is in turn driven by means of a belt 26, passing over a pulley 27 on said shaft, said belt extending from a pulley 28 on the main driving-shaft 7 of the machine. At the rear of the pile of tags I provide a longitudinally-moving finger 30, which is reciprocated back and forth to engage the tag, such finger being provided with a suitable projection 31, adapted to enter the apertures of the tags, and thereby move the same forward for entrance between the rolls 17 and 18. The moving finger is carried by a rod 32, connected, by means of a cross-piece 33, to a rod 34 beneath the table 15, and this rod 34 is adapted to slide in bearings 35, secured to the under side of said table 15. The rod 34 is actuated by means of an arm 36, slotted at 37 to engage a pin 38, carried by the cross-piece 33, and such arm is carried by a rock-shaft 39, journaled in suitable bearings 40 on the table 4. The rock-shaft is operated intermittently when it is desired to feed the tags by means of a bell-crank lever 45, pivoted at 46, such lever being depressed at regular intervals by suitable means and having an arm 47, connected to the rock-shaft 39 by means of a link 48, pivoted to an arm 49, carried at the end of said rock-shaft. As soon as a tag has been fed forward the finger 30 will be retracted by means of a spring 50, connected to the bell-crank lever 45. As at present arranged the finger 30 engages the forward wall of the aperture or hole of the tag, although it may be arranged to engage the rear of the tag or any other portion of the tag without departing from my invention. The rollers 17 and 18 are driven continuously during the intermittent movement of the feeding device.

Means for operating the selector mechanism.—The bell-crank lever 45 is engaged by a projection 55, carried by a rod 56, which rod is provided with a racked portion 57, said rod being vertically movable by means of the cam 58, the latter having a cam-groove 59, engaging a roller 60, carried by an arm 61, mounted on the end of the rock-shaft 12, the other end of said shaft carrying an arm 62, which engages an antifriction-roller 63, mounted on said rod 56. The cam 58 is mounted on the short shaft 9, and as this shaft is rotated the rod will be positively raised and lowered and at each movement will cause the engagement of the finger 30 with a tag, and the latter will be fed forward.

The runway or chute for the tags.—As soon as the tags leave the rollers 17 and 18 they drop into a guide-chute 65 and pass down the same, the latter being provided with projecting sides 66, which prevent the escape of the tag, and at the front a spring-guard 67 is employed to impart slight tension and keep the tags in proper position, this guard being extended down to the point where the tags are strung and being further continued in the form of a chute for the passage of the tags to any suitable receptacle. The guard serves the further purpose of holding the tags during the stringing operation, and for the purpose of moving said guard to engage the tags I provide the weighted arm 68, connected at 69 to a bar 70, rocking in bearings 71, to which bar the guard is attached, said weighted arm being normally held in the inoperative position. This arm is provided with a projection 72 at its lower end which is engaged by a lug 73, carried by a disk 74 on the counter-shaft 10, when said guard is to be moved into engagement with a tag.

Means for positioning the tags.—Mounted about the center of the machine are two rollers 75 and 76, (shown in enlarged views, Figs. 10 and 11,) and the engaging faces of these rollers lie midway of the chute 65. Carried by the roller 75 is a sleeve 77, which has a projection 78, said sleeve being movable on the spindle, so that the tag in passing down this chute rests first in the seat formed by this projection 78 when the latter is in the position shown in Fig. 11. The rollers are preferably provided with annular ribs, as shown, for the purpose of lightening said rollers and also in order that the projection 78 for supporting the tags may be brought into the position shown in Fig. 11. As the tags drop down they are caught by the projection 78, the rollers being apart. The projection or support 78 is fully shown in Figs. 4, 4ª, 10, and 11, and the spindle of the roller 75 is mounted in suitable bearings, one of which is enlarged to permit lateral movement of one end of said spindle and roller, so as to separate the latter from the roller 76. Such lateral movement of the roller, however, does not interfere with the operation of the pinion 80, carried by its spindle and by which it is driven, as such pinion is always in mesh with the pinion 81 of the roller 76. Movement is imparted to said rollers by a pinion 82, carried by the spindle of the roller 76 and in mesh with the rack 57 of the rod 56. To move the roller 75 away from the roller 76, (the bearings for its spindle permitting such movement,) which places said roller 75 at a slight angle with respect to the roller 76, such action also moving the projection 78 into the position shown in Fig. 11 to support the tags

dropped between the rollers, the sleeve 77 carrying such projection is engaged by a lug 85, mounted on a rock-shaft 86, journaled in bearings 85 at the back of the machine. This shaft 86 carries at one end a crank-arm 88, having a side extension 89, engaged by an arm 90, carried by a vertical rod 91, mounted in bearings 92 at the back of the machine. The rod 91 carries at its lower end a projecting arm 93, which is adjustable thereon, and this arm is in turn moved by the end 94 of a bell-crank lever pivotally mounted on a stud 95, secured to the frame 1 of the machine, the other end 96 of said bell-crank being engaged by a pin 97, carried by a hub 98, mounted on the cam-shaft 9. Upon each rotation of the shaft 9, therefore, the bell-crank lever will be moved and through the mechanism just described the projection 78 on the sleeve 77, carried by the roller 75, will be moved from the position shown in Fig. 10 to the position shown in Fig. 11, for the purpose of supporting a tag. The rocking-rod 86 is returned to its normal position, effecting the release of the sleeve and restoring the roller 75 to its place in line with the roller 76 by means of a spring 79, connected at one end to said rod 86 and at the opposite end to a fixed part of the machine.

When the parts are in the position shown in Fig. 11, the tags will be supported at the proper height to have the looped strings passed through the apertures of the same. When the rollers are in the position shown in Fig. 10, they engage the tags that have just been strung, and when the rod 56 is lowered, actuating the rollers 75 and 76, said tags will be fed through and passed into the lower part of the chute 67.

The string-feeding mechanism and means for operating the same.—This is clearly shown in the rear elevation, Fig. 5, and enlarged views, Figs. 8 and 9. 100 and 101 represent two pairs of nippers for carrying the string (shown at 102 in dotted lines) into position to be passed through the tags. The string is brought from any suitable source, enters the machine at the point 102^a, and is first engaged by the nippers 100, which are adapted to a slideway 103 at the rear of the machine, being carried back and forth in the same by mechanism shortly to be described. When starting the operation of the machine, the string is introduced to the nippers 100 by hand, and the nippers 101 engage the end of the same when it is brought to the center of the machine by said nippers 100, and the two are then returned to their extreme outward positions at the sides of the frame, leaving the string in line across the aperture 105 in the cross-piece 5, as shown in Fig. 9. The string is supported in this position by means of projections 106, which are carried by a rocking rod 107, mounted in suitable bearings 108. This rod is intended to be rocked, so as to move the projection out of the way of the nippers 101, and this rocking is accomplished by means of a rod 109, which is actuated by a cam 110, carried by the counter-shaft 8, said rod having an adjustable arm 111 to engage the cam. The rod 109 passes through a projection 112, extending from the rocking rod 107, and has a pin 113 to engage the under side of said projection 112, and when the latter is moved the string-supporting piece 106 will be held out of the way. As before noted, this projection 106 supports the string in position to be engaged by the threading-needle; but it must be moved out of the way when it is desired to bring the nippers 101 into position to engage a fresh end of the string.

The nippers are moved back and forth by the following means: Each pair of nippers is carried by a rack member 120 120^a, and engaging these rack members are the gear-wheels 121 121^a, carried by the spindles 122 122^a, suitably journaled in the frame of the machine. At the opposite ends of these spindles pinions 123 123^a are carried, and engaging these pinions are the vertically-movable rack-bars 124 124^a. These rack-bars are connected together by means of the cross-bar 125, and this cross-bar is moved up and down to cause said rack-bars to engage the pinions 123 123^a by means of the cam 126, mounted on the cam-shaft 9. This cam has a groove 127, to which a roller 128 is adapted, said roller being carried by the upright 129, to which the cross-piece 125 is attached. As this cross-piece is raised and lowered, therefore, carrying with it the two rack-bars 124 124^a, the gear-wheels 121 121^a will be rotated back and forth and will thereby move the pairs of nippers 100 and 101. The nippers 100 are normally closed, by means of the spring-arm 100^a, when moving forward and carrying the string into position to be engaged by the nippers 101, which are also moved forward; but after the string has been engaged by the said nippers 101 both sets of nippers will be retracted, and it is necessary that the nippers 100 shall be opened to permit the passage of the string through the same during the rearward movement of said nippers. This opening of the nippers is accomplished by means of the longitudinal bar 134, pivoted at 135, which bar is raised to engage a projection 136, carried at the rear of the nippers 100, and thereby open the forward end of the same, such bar 134 being raised by means of a rod 137, which is provided with a reduced end projecting through the bar 134, such reduced end forming a shoulder to engage said bar. The rod 137 is attached at its lower end to an arm 138, pivoted at 139 to a bracket 140, mounted on the plate 13, and said arm is engaged by a pin 141, carried by a face-plate 142, mounted on the counter-shaft 8.

The bar 134 is normally in the lowered position, as shown in Figs. 5, 8, and 9, and when in this position it engages a projection 145 of a lever 146, the lever being pivoted at 147 and held against the bar by a spring 148. When the rod 137 is raised, however, it is disengaged from the projection 145 and the lever swings over and locks said bar against depression. To cause it to fall again and return the bar to its normal position, a projection 149 on the rack member 120 engages the arm on said lever 146 and moves the same back, so that the bar 134 can fall clear of the projection 145 on said lever. This action takes place at the end of the rearward movement of the rack member 120, carrying the pair of nippers 100, and when these nippers close again they engage the string 102. As soon as the nippers 101 come forward they must be opened, as they are kept normally closed by the springs 151. To open them, therefore, I provide the pivoted projections 152 and 153, mounted on the slideway 103, each of which is prevented from movement in one direction by means of the stop-pins 154. The projections 152 and 153 lie in the path of the nippers 101 and engaging the rear of the same will cause the jaws to turn on their pivot and open ready to receive the end of the string, such nippers closing after passing the projections or cams 152 and 153. These projections or cams being pivoted, they do not act upon the nippers on the return stroke or when moving backward. Then the nippers 101 are retracted, pulling out the length of string desired for insertion in the tag, and as this is done the jaws of the nippers 101 must again be opened. This action is accomplished by means of the lever 160, which is operated by the rod 161 from a cam 162. Just prior to the end of the rearward movement of the nippers 101 the lever 160, which is upheld by a projection 163 on the rod 161, is allowed to fall by the downward movement of the rod, which enters a depression in the cam 162, and this movement of the lever permits the full retraction of the nippers. These nippers are opened when it is desired to insert the string in the tag by raising the rod 161 as the high portion of the cam contacts with it, and this action raises the lever 160, which acts upon the rear end of one jaw of the nippers 101, as shown in Fig. 9. As soon as the nippers 100 and 101 have been moved to their extreme outward position in the closed condition holding the string the latter is to be cut, and this is accomplished by the following means: Journaled in suitable bearings 165, carried by the cross-piece 6 of the frame, is a rock-shaft 166, carrying an upwardly-projecting arm 167 and a downwardly-projecting arm 168, which latter has a projection 169 at the lower end, engaged by a boss 170, mounted on the face-plate 142, carried by the counter-shaft 8. The arm 167 carries at its upper end the fixed blade 171 of a pair of scissors, such blade extending at right angles to the arm. This arm also carries the pivoted blade 172 of the scissors, which is normally held in the lowered or open position, as shown in Fig. 12, by means of a stop 173 and a spring 174. The arm 167 is normally held in the position shown in Fig. 3, with the scissors held away from the path of the string. When the string is to be cut, however, after the retraction of the nippers 100 the arm 167 is thrown forward by the engagement of the boss 170 with the end of the arm 168. The scissors will then embrace the string; but in order to cut it the movable blade 172 must be moved, and this is accomplished by the further movement of the arm 167, causing the engagement of the projecting end 175 of the movable blade with a lug 176, carried on the upper slideway 103. A spring 177 is coiled around the shaft 166, being attached to said shaft at one end and at the other end to a fixed part of the frame, so that it will be partly wound by the initial movement of the rock-shaft, and the tension thus created will serve to return said shaft and its parts to their normal position as soon as the boss 170 releases the end of the arm 168. The spring 174 will then return the pivoted blade of the scissors to the normal open position. This cutting of the string takes place, of course, when the nippers 100 have been retracted to engage a fresh supply of string, the cut being in advance of said nippers and after the engagement of the same with the string, so that the latter will be taut, the scissors being in such relative position to the nippers, as shown by dotted lines in Fig. 9, as to leave an end to be grasped by the nippers 101 when brought to the central position.

The threading-needle and means for operating the same.—The threading-needle is fully shown in Figs. 4 and 6 and in the perspective views, Figs. 13 to 18, inclusive. This needle (indicated at 180) is reciprocated back and forth by suitable mechanism, and when the string is held across the opening 105 and in line with the aperture in one of the tags the needle is brought forward, its notched end 181 engaging the string and carrying the loop 179 of the same through the hole in the tag. The position of the threading-needle with relation to the other parts of the machine is clearly shown in Figs. 4 and 6. This needle is mounted in suitable bearings 182 on the table 183 and is free to slide in said bearings. To move it back and forth, the following mechanism is employed: 185 represents a rod which has at the upper end an arm 186, pivotally connected at 187 to the needle 180, the needle being provided with a pair of arms 188, between which the pivotal connection works. At the lower end of this rod 185 is an arm 189, carrying at the end a

roller 190, adapted to engage a cam 191, carried by a disk 192, mounted on the counter-shaft 8. Upon every rotation of the disk, therefore, the cam 191 will engage the arm 189, rocking the rod 185, and thereby effecting the forward movement of the needle. This needle is moved positively to engage the string and force the same into the aperture of the tag, but is returned to its normal position by means of the spring 195, which spring is coiled around the lower end of the rod, one end being fixed to the arm 189, while the other end is fixed to the socket 196. The counter-shaft 8, which carries the disk 192, is driven, with the rest of the mechanism of the machine, in a manner shortly to be described. The forward movement of the needle 180 is timed to take place when the tag is held in the chute by the engagement of the movable front 67 of said chute.

The looping mechanism and means for operating the same.—Immediately above the point of outlet of the needle 180, with the string, is a hook 200, carried by the cross-piece 6, and mounted in suitable bearings 200^a, secured to the face of this cross-piece and directly below this hook, is a rock-shaft 201, having fingers 202, adapted to engage the loop 179 of the string. The rock-shaft carries a pinion 202^a, by which motion is received from a vertically-moving rack-rod 203, engaging said pinion, said rod being actuated by means of a cam 204, carried by the counter-shaft 10. The rod is supported by an arm 203^a, which alternately rises as the cam is rotated, and this arm is pivotally mounted on a bracket 204^a, suitably secured to the plate 13, carried by the lower part of the machine. These fingers 202 pass on both sides of the hook 200 when the rock-shaft is turned, as shown in Figs. 15, 16, and 17, and the loop is carried around by said fingers. These fingers cause the loop of the string to spread, permitting the entrance of the hook 205 to engage the rear ends of the same, which have been held meanwhile. The hook 205 is passed rearwardly to one side of the ends of the string, and when behind such ends the hook is given a lateral movement, which causes it to engage the string. Upon the return movement of the hook the ends of the string will be brought through the looped portion of the same held by the fingers 202. Meanwhile the tag has been caused to descend by the turning of the rollers 75 and 76, which have intermittent rotary movement, and the string ends caught by the hook and pulled through the loop are held so that the tag in its descent will pull said ends tight up against the aperture in the tag. Before the tag has descended, of course, the rock-shaft 201 has been given a reverse movement, so as to move the fingers 202 to release the loop of the string.

The hook 205 is movable in a slide-bearing 206 on the bracket 207, which is carried by the front of the machine. This hook is moved by an arm 208, connected to said hook at 209 and at its lower end secured to the rock-shaft 11. This rock-shaft is mounted in suitable bearings and carries at its opposite end an arm 212, which engages a cam 213, carried by the cam-shaft 9. This cam is shaped and timed so as to move the hook 205 into the loop of the string at the proper time to engage the free ends of the same and draw them through the loop. The forward movement of the hook 205 is straight until it passes within the loop of the string. It is then necessary to move the hook to one side in order to pass it behind and then engage the free ends of the string. To accomplish this, the hook 205 carries a projection 215, having an engaging face 216, adapted to contact with a fixed piece 217, carried by the bracket 207. This engagement causes the hook 205 to move laterally, bringing its end into engagement with the free ends of the string, and this operation is carried out as follows: The projection 215, carried by the hook-spindle, has a movable dog 218, controlled by a spring 219, and this dog and the face 216 of the projection are adapted to engage the cam-faces 217^a and 217^b of the fixed piece 217 for the purpose of changing the lateral position of the hook 205 during its to-and-fro movement. On the forward movement of the hook the engagement of the face 216 with the cam-face 217^a of the fixed piece 217 causes the lateral movement of said hook after it has entered the loop of the string, and during this movement the dog 218 rides along with the projection 215 without actively affecting the position of the hook. Upon the return movement of the hook, however, the spring will cause the dog to assume its extended position, and it will then engage the face 217^b, and as the hook is retracted along the fixed piece 217 it will be maintained in the lateral position to which it was moved upon the forward movement and will be drawn through the loop with the free ends of the string. It will be noted that this arrangement of the mechanism causes the hook to be held in the lateral position for a longer period of time during the rearward movement than during the forward movement in order that it may clear the loop with the free ends of the string. The hook is moved forward by the arm 208, carried by the rock-shaft 11, which is controlled by the cam 213, and its rearward movement is effected by the spring 220 as soon as the cam releases said rock-shaft. To accommodate the hook on its forward movement, the cross-piece 6 is provided with an aperture 221 directly below the opening 105 for the passage of the needle and string.

The bearing 206 is pivotally mounted on a vertical axis 206ª, so as to be capable of turning slightly when the hook 205 is given its lateral movement. The forward end of the hook-spindle passes through a bearing-block 210, which is hinged at 211 to the bracket 207, such block swinging on its hinge as the hook is moved laterally. The position of this block is determined by the set-screw 222, and its sidewise or lateral movement is limited by the set-screw 223. By this means the entering position of the hook may be accurately determined and fixed. As soon as the hook 205 engages the free ends of the string and starts back pulling them through the loop the tag is moved downwardly by the engaged ment of the moving rollers 75 and 76 with the same, and it becomes necessary to draw these free ends their entire length through the loop, so as to bring the latter in the tied position close against the tag. For the purpose of holding the strings after they have been pulled through the loop by the hook and while the tag is being carried away I employ an arm 225, having a side extension 225ª, which is disposed in such position that it may be raised into engagement with the rock-shaft 201, the two members thus forming a clamp to engage the free ends of the string, which are disposed between these members during the rearward movement of the hook, and impart sufficient tension thereto to draw the loop of the string taut against the tag. The arm 225 is carried by a lever 226, pivoted at 227 to a post 228, carried by the bracket 207. During the forward movement of the hook the arm 225 is in the lowered position; but on the return of said hook it is raised into engagement with the rock-shaft 201 by means of a pin 229, carried by the hook-holder, which engages a cam projection 230 on the rear end of said lever 226.

Driving mechanism for the machine.—This comprises the main driving-shaft and its connections and the counter-shafts, rock-shafts, and cam-shaft. The main driving-shaft of the machine (indicated at 7 in the accompanying drawings) carries at one end a pulley 235, from which pulley said shaft is driven and by it all the other parts of the machine. This shaft also carries the pulley 28, by means of which a portion of the tag-feeding mechanism is driven. At the opposite end of the shaft 7 is a pinion 236, meshing with a gear-wheel 237, carried by the counter-shaft 8, said gear-wheel meshing with an intermediate gear-wheel 238, carried by the cam-shaft 9, and said intermediate gear-wheel meshes with a gear-wheel 139, carried by the counter-shaft 10. Mounted on the cam-shaft 9 is the cam 126, which has a cam-path 127 formed in the face of the same, and within this cam-path a roller 128, carried by the rod 129, engages, whereby the rack-rods controlling the movement of the gear-wheels 121 121ª may be raised. The counter-shaft 8 carries the cam 110 and the disk plates 142 and 192, the former controlling the means for opening the nippers 100 and the string-cutting device, while the latter controls the movement of the threading or looping needle 180. The cam-shaft 9 carries the cam 58, which controls the movement of the rod 56 through the medium of the rock-shaft 12, said rod actuating the tag-feeding means and the cam 213, which actuates the hook 205 through the medium of the rock-shaft 11. The counter-shaft 10 carries the disk 74, having a cam-lug 73, which controls the position of the movable front 67 of the chute through the medium of the arm 68. This shaft 10 also carries the cam 204, which operates the rock-shaft 202 through the medium of the rack-rod 203 and the lever 203ª.

The entire operation of the machine is automatic, the parts acting together and the movements being synchronous, so that each operation in the movement and stringing of the tag naturally follows the previous one.

For tags of different size the chute may be widened or contracted, as desired, as the brackets 240, carrying the same, are slotted at 241 to provide for such adjustment, said brackets being retained in place by the bolts 242.

The position of the rollers 75 and 76 is also adjustable with respect to the rest of the machine should it become desirable to operate upon tags of varying sizes. The frame 245, carrying these rollers, is hung from a bracket 246, which is slotted at 247 to permit of this adjustment, said frame being held to the bracket by means of a bolt 248 passing through said slot. This bracket 246 is carried by the bracket 183. All of the other parts of the feeding and operating mechanism are adjustable, so as to accommodate such changes.

Although I have shown and described certain parts and elements as forming the machine for carrying out the object of my invention, I do not wish to be limited to the precise construction so shown and described, as it is obvious that numerous changes and modifications may be made without affecting the broad idea of the invention.

Although I have shown and described my machine as having a vertical feed for the tags, it will be understood that with but slight modifications the mechanism can be arranged to feed and string the tags in a horizontal position.

Although I have shown and described my machine as operating upon a single tag, it will be understood that a portion of the same mechanism could be extended to act upon a series of tags at a single operation, the driving mechanism being sufficient to operate several tag-feeding, string feeding and cutting, and looping devices simultaneously.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in a tag-stringing machine, of means for feeding apertured tags, means for looping strings through the apertures of the tags, a hook coacting with said means for effecting the tying of said string, and means for passing said hook through the loop, moving it laterally to engage the ends of the string and retracting it through the loop with said ends.

2. The combination in a tag-stringing machine, of means for feeding apertured tags, means for intermittently moving said tags, means for looping strings through the apertures of the tags, a hook coacting with said means for effecting the tying of said string, and means for passing said hook through the loop, moving it laterally to engage the ends of the string, and retracting it through the loop with said ends.

3. The combination in a tag-stringing machine, of means for feeding apertured tags, means for intermittently arresting the movement of said tags, means for inserting looped strings through the holes of the tags, a hook arranged to pass through said loops and engage the free ends of the string, means for moving said hook forwardly, laterally and rearwardly to draw the free ends of the string through the loop and effect the tying operation, means for retaining the ends of the string, and means for positively moving the tags after the string ends have been pulled through the loop.

4. The combination in a tag-stringing machine, of tag-feeding means, string-feeding means, means for cutting the string, means for looping said string through the eye of the tag, a hook arranged to pass through said loop and engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly to effect the tying of the string.

5. The combination in a tag-stringing machine, of means for feeding apertured tags, means for looping string through the apertures of the same, a hook arranged to pass through said loop in both directions to engage and pull the free ends of the string through the loop, means for moving said hook forwardly, laterally and rearwardly to effect the tying operation, means for retaining the ends of the string, and means for moving the tags to draw the loop taut against the same.

6. The combination in a tag-stringing machine, of means for feeding apertured tags, positioning devices for the same, means for feeding and cutting the string, means for looping and passing the string through the aperture of the tags, a hook arranged to pass through said loop and engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly to effect the tying of the string.

7. The combination in a tag-stringing machine, of tag-feeding means, positioning means for the same, string-feeding means, means for cutting said string into suitable lengths, means for looping and passing the looped end of the string through the aperture of the tags, a hook arranged to pass through said loop and engage the free ends of the string, means for moving said hook forwardly, laterally and rearwardly to effect the tying of the string, and means for imparting tension to the free ends of the string and advancing the tag whereby the loop will be drawn taut against the tag.

8. The combination in a tag-stringing machine, of means for intermittently feeding tags, positioning means for the tags, string-feeding means, means for cutting said string into sections of suitable length, means for looping and passing the looped end of the string-sections through the aperture in the tags, a hook arranged to pass through said loops and engage the free ends of the string, means for moving said hook forwardly, laterally and rearwardly to effect the tying of the string, and means for imparting tension to said free ends and advancing the tag whereby the loop will be drawn taut against the tag.

9. In a machine for stringing tags, tag-feeding mechanism, a chute leading therefrom, a roller at the lower part of said chute, a sleeve carried by said roller and having a projection to engage the tags whereby the latter may be positioned, means for looping a string through the aperture of said tags, and means for tying said string.

10. In a tag-stringing machine, tag-feeding mechanism, a chute leading therefrom, a supplemental feed-roller at the lower part of said chute, a sleeve carried by said roller and having a projection to support the tags whereby the latter may be positioned, means for looping a string through the aperture of said tags, means for tying said string, and another roller, said rollers operating intermittently to move the tags after the string-tying operation.

11. In a tag-stringing machine, tag-feeding mechanism, including a bed for the tags, a chute leading therefrom, a roller at the bottom of said chute, a sleeve carried by said roller, a projection carried thereby for positioning the tags, string feeding and cutting means, means for looping said string through the aperture of the tags, and means for tying said string.

12. In a tag-stringing machine, tag-feeding mechanism, including a bed for the tags, a chute leading therefrom, a pair of rollers at the bottom of said chute for intermittently moving the tags, one of said rollers having a sleeve, a projection for positioning the tags carried by said sleeve, string feeding and cut-

ting means, means for looping the string through the aperture of the tags, and means for tying said string.

13. In a tag-stringing machine, the combination of the tag feeding and positioning mechanism, string feeding and cutting mechanism, means for passing the looped end of the string through the aperture of the tags, means for spreading said loop, a hook arranged to pass through said loop and engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly through said loop to engage and draw the string ends through the same.

14. In a tag-stringing machine, the combination of the tag feeding and positioning mechanism, string feeding and cutting mechanism, a needle for passing the looped end of the string through the aperture of the tags, fingers to engage said loop and spread the same, a hook for passing through said loop, and means for moving said hook forwardly, laterally and rearwardly through the loop to engage and draw the string ends through the same.

15. In a tag-stringing machine, the combination of tag feeding and positioning mechanism, string-feeding mechanism comprising laterally-movable nippers, means for moving said nippers, means for cutting said string into proper lengths, means for passing the string through the aperture of the tags to form a loop, means for spreading said loop, a hook arranged to pass in the opposite direction through the loop, and means for moving said hook forwardly, laterally and rearwardly through the loop to engage and draw the string ends through the same.

16. In a tag-stringing machine, the combination of tag feeding and positioning means, string-feeding mechanism comprising laterally-movable nippers, means for moving said nippers, means for cutting said string into proper lengths, a needle adapted to pass through the hole of the tags and carry a looped end of the string, means to engage the looped end and spread the same, a hook arranged to pass through the loop, and means for moving said hook forwardly, laterally and rearwardly through the loop to engage and draw the string ends through the same.

17. In a tag-stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, a needle arranged to pass through the hole in the tags with a looped end of the string, a hook arranged to pass in the opposite direction through said loop, fingers coacting with said needle to open the loop, means for moving said hook forwardly and rearwardly to pick up and carry the free ends of the string through the loop, and cams arranged to move said hook laterally during its forward and rearward movement to cause it to engage and hold said free ends of the string.

18. In a tag-stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, a needle engaging the string and arranged to pass through the hole in the tags with a looped end of the same, fingers coacting with said needle to open the loop, a hook arranged to pass through said loop, means for moving said hook forwardly and rearwardly to pick up and carry the free ends of the string through the loop, and means for causing said hook to engage and hold the free ends of the string, said means comprising a cam to move the hook laterally during a part of its forward movement and another cam to hold it in such position during its rearward movement.

19. In a tag-stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, a needle arranged to pass a looped end of the string through the hole in the tags, fingers coacting with needle to open the loop, a hook arranged to pass through the loop and engage the free ends of the string, means for moving said hook forwardly, laterally and rearwardly through the loop to engage and draw the free ends of the string through the same, and means for advancing the tag and holding the string whereby the looped portion of the latter will be caught tightly against said tag.

20. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of sliding nippers, suitable ways for said nippers, one set of the nippers engaging the end of the string and the other set of nippers permitting the free passage of the string through the same at certain intervals, means for moving said nippers, means for opening and closing the same, means for looping the string through the apertures of the tags, and means for tying the string.

21. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of sliding nippers, suitable ways for said nippers, means for reciprocating said nippers, one set of said nippers engaging the end of the string at the termination of the inward movement of the same and the other set of nippers engaging the string at the termination of the outward movement of the same, cams for opening said nippers, springs for closing said nippers, means for looping the string through the apertures of the tags, and means for tying the string.

22. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers movable toward and from each other, means for moving said nippers, means for opening and closing the same, one of said sets of nippers being opened when the other is closed and vice versa, and means for looping and tying the string.

23. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers, racked carriers for the same, pinions adapted to engage said racks whereby the nippers may be moved, means for driving said pinions, means for opening and closing the nippers, and means for looping and tying the string.

24. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers, racked carriers for said nippers movable in slideways for the same, pinions to engage said racks whereby the nippers may be moved, smaller pinions carried by the hubs of the main pinions for moving the carriers, vertically-moving racks engaging said smaller pinions, means for opening and closing the nippers, and means for looping and tying the string.

25. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers, means for moving said nippers toward and from each other, one set of the same carrying the string during the inward movement, the string being engaged at the termination of such movement by the other set of nippers and held by the latter during its rearward movement, means for opening the first set of nippers at one end of its travel, independent means for opening the other set of nippers at both ends of its line of travel, and means for looping and tying the string.

26. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers movable toward and from each other, means for moving the nippers, means for severing the string when the nippers have been retracted, means for opening and closing the nippers, and means for looping and tying the string.

27. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers movable toward and from each other, one of said sets carrying string from a source of supply to be delivered to the other set of nippers, means for moving said nippers, means for opening and closing the nippers, means for supporting the string, and means for looping and tying the same.

28. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers movable toward and from each other and carrying the string, means for effecting the movement of said nippers, means for opening one set of said nippers at both ends of its line of travel, a movable bar for opening the other set of nippers at the inner end of its line of travel preparatory to engaging the string, a shaft, a cam carried thereby, a connection between said cam and the bar for operating the nippers, and means for looping and tying the string.

29. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers carrying the string to the point of use, means for moving said nippers, means for opening said nippers, means for severing the string, a needle to engage the string and pass it looped through the aperture of the tags, means for moving said needle into engagement with the string simultaneously with the severing of the same, means for returning said needle to its normal position after the string has been passed through the aperture of the tag, and means for tying the string.

30. The combination in a tag-stringing machine, of tag-feeding means, a chute or runway for the tags, a roll, a sleeve carried by said roll and having a projection forming a step for said tag after it passes into the runway, a guard carried by the chute to engage the tag, and means for looping and tying a string through the aperture of the same.

31. The combination in a tag-stringing machine, of tag-feeding means, a runway leading from the same, a pair of intermittently-driven rolls at the bottom of said runway, a sleeve carried by one of said rolls, and having a step or projection serving as a support for the tags, means for moving said sleeve, and means for looping and tying a string through the aperture of the tags.

32. The combination in a tag-stringing machine, of means for feeding apertured tags, means for feeding string to the same, a pair of rolls, a sleeve carried by one of said rolls and having a projection for supporting the tags, means for looping and tying said string, means for holding the free ends of the same and means for moving said rolls whereby the tags may be carried away from the stringing position and the looped string pulled taut against the end of the tag.

33. The combination in a tag-stringing machine, of means for feeding apertured tags, means for passing looped strings through the aperture of the same, a pair of rolls, a sleeve carried by one of said rolls having a projection for supporting the tags, means for separating said rolls so as to receive the tags, said means serving to partially rotate the sleeve and bring into position the projection to support the tags ready to receive the string, and means for tying said string.

34. The combination in a tag-stringing machine with means for stringing the tags, of means for feeding the tags into position to be strung, a pair of rolls, one of said rolls being laterally movable, a sleeve mounted on said roll, a projection carried thereby to engage the tags, a rocking rod adapted to en-

gage said sleeve, an arm carrying the rocking rod, a two-armed lever engaging said arm, and a cam for operating said lever.

35. The combination in a tag-stringing machine, of means for feeding apertured tags, means for looping and passing string through the same comprising a needle mounted to slide horizontally, a rock-shaft for operating said needle, means for tying the string comprising a forwardly, laterally and rearwardly movable hook passing through said loop to engage and draw the free ends of the string through the same, and means for operating said hook.

36. The combination in a tag-stringing machine, of a pair of rolls, a sleeve carried by one of said rolls for supporting the tags in position to be strung, means for feeding the string, a needle for engaging and looping said string, means for moving said needle forward gradually through the aperture of the tags, means for giving said needle a quick return after the string has been passed through the tag, and means for tying said string.

37. The combination in a tag-stringing machine, of means for feeding the tags, means for feeding string into position to be passed through the tags, a horizontally-reciprocable needle for engaging said string, a rock-shaft, an arm carried by said rock-shaft and engaging the needle, a cam, an arm carried by said rock-shaft in engagement with the cam whereby the movement of the latter will serve to move the needle in one direction, a forwardly, laterally and rearwardly movable hook for entering said loop and engaging and pulling the free ends of the string through the same, and means for operating said hook.

38. The combination in a tag-stringing machine, of means for feeding the tags into position to be strung, string-feeding means, a needle for passing said string through the aperture of the tags, means for operating said needle to form a loop, means for disengaging the looped end of the string from the needle, a hook arranged to pass through said looped end, and means for moving said hook forwardly, laterally and rearwardly through said loop to engage and draw through the free ends of the string whereby the tying operation may be effected.

39. The combination in a tag-stringing machine, of tag-feeding means, string-feeding means, a needle for passing the string through the aperture in the tags, means for operating said needle to form a loop, a rock-shaft having arms to engage the string and open the loop, a hook arranged to pass into said loop and engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly through said loop to draw the free ends of the string through the same.

40. The combination in a tag-stringing machine, of means for feeding tags into position to be strung, means for feeding string, a needle for engaging the string to pass it looped into the aperture of the tags, means for operating said needle, means for opening the looped end of the string, a horizontally-movable hook adapted to pass through said loop to engage the free ends of the string, means for moving said hook forward positively, means for giving said hook a quick return so as to pull the free ends of the string through the loop, and means for moving the hook laterally within the loop to engage and draw through the free ends of the string.

41. The combination in a tag-stringing machine, of means for feeding apertured tags, a needle adapted to pass a looped end of the string through the aperture of the tags, means for opening the loop of said string, a hook adapted to pass through said loop, a projection carried by said hook, a cam for engaging said projection whereby the hook will be moved laterally after it has been passed into said loop to engage the free ends of the string, and means for moving said hook forwardly and retracting it with said string ends.

42. The combination in a tag-stringing machine, including means for positioning apertured tags, feeding the string and passing a looped end of the latter through the aperture of the tags, of a hook adapted to pass through said loop to engage the free ends of the string, a cam, a rock-shaft, a connection between said cam and the rock-shaft, a connection between said rock-shaft and the hook for moving the same forwardly and rearwardly within the loop, and means for moving the hook laterally, such movements serving to effect the tying operation.

43. The combination in a tag-stringing machine, of means for feeding the tags, means for feeding and positioning the string, means for looping and passing said string through the tags, a hook arranged to pass into said loop, means for moving said hook forwardly, laterally and rearwardly to pull the free ends of the string through the same, a pair of scissors for cutting said string, a pivoted arm carrying said scissors, a cam for moving said scissors into operative position and causing them to close on the thread, and a spring for returning said scissors to the open position.

44. The combination in a tag-stringing machine, of a chute or runway having a movable front, means for feeding tags through the same, means for intermittently moving said tags, the latter being held between such movements by said movable front, and means for looping and tying the string.

45. The combination in a tag-stringing machine, of a chute or runway having a mov-

able front, means for feeding the tags through the same, said tags being arrested in their movement by the movable front of the chute, means for actuating said chute-front, and means for looping and tying the string.

46. The combination in a tag-stringing machine, of a chute or runway having a movable front for intermittently arresting the movement of the tags, means for feeding tags through the same, a pivotal support for said front, a weighted arm for moving said chute-front, a cam for acting upon said weighted arm, and means for looping and tying the string.

47. The combination in a tag-stringing machine, of means for feeding the tags, means for intermittently arresting the movement of said tags, means for feeding string into position with respect to the tags, a needle for pushing said string into the aperture of the tags, a rocking rod connected to said needle, means for operating said rod so as to cause the needle to engage and pass the string through the aperture, a hook arranged to pass through the loop to engage and draw the free ends of the string through the same, and means for imparting a forward, lateral and rearward movement to said hook.

48. The combination in a tag-stringing machine, of means for feeding a tag, means for intermittently arresting the movement of said tag, means for feeding string into position to be passed through the aperture of the tag, a needle for engaging said string, a rocking rod operatively connected to said needle, a cam for moving said rod so as to push the needle through the tag, a spring for moving said rod to retract the needle, a hook having a forward, lateral and rearward movement arranged to pass through the loop and engage and draw the free ends of the string through the same and means for operating said hook.

49. The combination in a tag-stringing machine, of means for feeding tags, means for intermittently arresting the movement of the same, means for feeding string into position to be passed through the hole in the tags, a horizontally-movable needle for engaging said string, a rock rod or shaft, an arm carried by said shaft and operatively connected to said needle, a cam, an arm carried by said shaft and in engagement with said cam whereby the needle with the string may be passed through the aperture of the tags, a torsional spring for moving said rock-shaft so as to retract the needle, a hook arranged to pass into said loop so as to engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly through said loop to effect the tying of the string.

50. The combination in a tag-stringing machine, of means for feeding a tag, means for feeding string into position to be passed through the aperture of the same, a needle for engaging said string, said needle forming a loop in the same, means for advancing and retracting the needle, a hook for entering the loop as the needle is retracted, and means for moving said hook forwardly, laterally and rearwardly to engage and draw the free ends of the string through the loop.

51. The combination in a tag-stringing machine, of means for feeding tags, means for engaging said tags to move them intermittently, means for feeding string into position to be passed through the aperture in the tags, a needle for engaging said string, said needle forming a loop in the string, means for moving the needle to and fro, means for engaging the loop as the needle is retracted, a hook arranged to pass through said loop, and means for moving said hook forwardly, laterally and rearwardly to engage and draw the free ends of the string through the loop.

52. The combination in a tag-stringing machine, of means for feeding apertured tags, means for feeding string thereto comprising nippers movable toward and from each other, one set of such nippers carrying the string when moving toward the other, and the other set carrying the string when moving away from the first-named set, means for moving said nippers, means for opening the first set at the inner end of its travel, and means for opening the other set of nippers at both ends of its travel.

53. The combination in a tag-stringing machine, of means for feeding apertured tags, means for feeding the string comprising two sets of nippers movable toward and from each other, rack-bars carrying said nippers, gear-wheels actuating said rack-bars, pinions carried by the gear-wheels, rack-rods for moving said pinions, a cam for moving said rack-rods, means for opening and closing the nippers, and means for looping and tying the string.

54. The combination in a tag-stringing machine, of means for feeding apertured tags, means for feeding the string into position to be passed into the tag comprising two sets of sliding nippers to engage the same, means for moving said nippers, means for keeping said nippers in the closed position when moving in one direction, means for opening one set of nippers when moving in the opposite direction comprising a pivoted bar adapted to engage the under side of said nippers, means for operating said bar, means for opening and closing the other set of nippers to carry and release the string, and means for looping and tying the same.

55. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of sliding nippers to engage said string, means for moving said nippers, means for keeping said nippers in the closed position when moving in one direction, means for opening one

set of nippers when moving in the opposite direction comprising a pivoted bar engaging the under side of said nippers, a rod for raising said bar, a cam for acting on the rod, a trigger for holding the bar in the raised position, means for releasing the bar upon the return movement of the nippers so that they may close upon a fresh portion of the string, means for opening and closing the other set of nippers to carry and release the string, and means for looping and tying the same.

56. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising a pair of sliding nippers carrying the string from the source of supply, a pair of nippers for carrying it away from the first pair as the latter are retracted, means for opening and closing said nippers to receive and carry the string, means for moving said nippers, a cam for opening the second set of nippers when they reach the limit of their rearward movement, a rod for setting said cam, a driven shaft, a cam on said shaft for actuating said rod, and means for looping and tying the string.

57. In a tag-stringing machine, mechanism for feeding apertured tags, means for feeding string into position to be passed through the tag-apertures, a needle for engaging said string, a rock-shaft, a pair of arms carried by said rock-shaft for engaging the loop made by the needle, a pinion on said rock-shaft, a rack-rod engaging said pinion, a cam for actuating said rack-rod, a hook for entering the loop of the string, and means for giving said hook a forward, lateral and rearward movement whereby it may engage the free ends of the string and draw them through the loop.

58. In a tag-stringing machine, mechanism for feeding apertured tags, means for feeding string into position to be passed into the aperture of the tags, a needle for engaging the string, means for passing the needle through the aperture and forming a loop, means for removing said loop from the needle, a hook adapted to pass through the loop and engage the free ends of the string, means for moving said hook into and out of the loop, a fixed projection adjacent to the moving hook, a lug carried by said hook and engaging said projection whereby the hook is moved laterally, and a pivoted member carried by said lug and serving to hold the hook on its return movement in the position to which it has been moved.

59. In a tag-stringing machine, the combination of tag feeding and positioning mechanism, string feeding and cutting mechanism, means for passing a looped end of the string through the aperture of the tags, a hook for passing through said loop and engaging the free ends of the string, means coacting with said hook to move the same forwardly, laterally and rearwardly and pass the string ends through the loop, means for holding the free ends of the string so that the loop will be drawn against the tag as it is moved away, said means being operated by the return movement of the hook and means for moving said tag.

60. In a tag-stringing machine, the combination of tag feeding and positioning mechanism, string feeding and cutting mechanism, a needle for passing a looped end of the string through the aperture of the tags, means for moving said needle a hook passing through said loop to engage the free ends of the string, and means for moving said hook forwardly, laterally and rearwardly to draw said free ends through the loop.

61. In a tag-stringing machine, the combination of tag feeding and positioning mechanism, string-feeding mechanism, means for cutting said string into proper lengths, means for holding the string, a needle adapted to pass through the hole of the tag and push a looped end of the string through the same, means for operating said needle, means for engaging said looped end, a hook arranged to pass through said loop, and means for moving said hook forwardly, laterally and rearwardly to engage the free ends of the string and draw them through the loop.

62. In a tag stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, means for holding the string, a needle adapted to pass through the hole in the tags and carry a looped end of the string, means for operating said needle, a hook arranged to pass in the opposite direction through said loop to engage the free ends of the string, means coacting with said hook to open the loop, means for moving said hook forwardly and rearwardly, and cams for moving said hook laterally so as to engage the free ends of the string and draw them through the loop.

63. In a tag-stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, means for holding the string, a needle engaging the string and arranged to enter the hole in the tags and carry a looped end of the string, means for operating the needle, means coacting with said needle to open the loop, a hook passing through said loop to engage the free ends of the string, means for moving the hook forwardly, laterally and rearwardly to engage the free ends of the string and draw them through the loop to effect the tying operation, and means for advancing the tag during such operation.

64. In a tag-stringing machine, the combination of tag feeding and positioning means, string feeding and cutting means, mear for holding the string, a needle arranged to pass through the hole in the tags and

carry a looped end of said string into the same, means for operating the needle, means coacting with said needle to open the loop, a hook arranged to pass through the loop, means for moving said hook forwardly, laterally and rearwardly to engage the free ends of the string and draw them through the loop to effect the tying operation, rollers to advance the tag during this operation, and means for holding the string as the tag is moved away whereby said string will be caught tightly against the tag.

65. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of engaging means for said string movable toward and from each other, independent means for operating said string-engaging means, one set of such engaging means holding the end of the string and the other set of engaging means permitting the free passage of the string through the same in its movement away from the other, and means for looping and tying the string.

66. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of engaging means movable toward and from each other, independent means for operating said string-engaging means, means for reciprocating said engaging means, one set engaging the string at the termination of the inward movement of the same and the other set engaging the string at the termination of the outward movement of the same, and means for looping and tying the string.

67. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers, ways in which said nippers are slidably mounted, means for moving said nippers back and forth, means for closing said nippers, means mounted along the ways for opening the nippers at predetermined intervals, and means for looping and tying the string.

68. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers, carriers for said nippers ways in which said nippers are slidably mounted, means for moving said carriers back and forth, means for keeping both sets of nippers normally closed, means mounted along the ways for the carriers for opening said sets of nippers at predetermined intervals, and means for looping and tying the string.

69. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers, means for moving said nippers toward each other, one set of the same carrying the string, means for moving the nippers away from each other, the string being engaged by the second set of nippers just prior to such movement, means for keeping said nippers normally closed, means for opening the nippers comprising cams arranged at both ends of travel of one set of the same and a bar engaging the other set as it is retracted from the inner end of its line of travel, and means for looping and tying the string.

70. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding mechanism comprising two sets of nippers carrying the string to the position of use, means for operating said nippers, means for supporting the string, means for severing the string, a needle to engage the string and pass it looped through the aperture of the tags, means for moving said needle simultaneously with the severing of the string, and means for tying the string.

71. The combination in a tag-stringing machine, of means for feeding apertured tags, string-feeding means comprising two sets of nippers carrying the string to the position of use, cutting mechanism for severing the string, means for operating said cutting mechanism, a needle to engage the string and pass it looped through the aperture of the tags, means for moving said needle into engagement with the string simultaneously with the severing of the same, means for engaging the loop thus formed, means for automatically returning said needle to its normal position after the string has been passed into the aperture of a tag, a hook arranged to pass through said loop, and means for moving said hook forwardly, laterally and rearwardly to effect the tying of the string.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRA ROBBINS.

Witnesses:
MURRAY C. BOYER,
JAMES C. URAYER.