Nov. 17, 1953 E. E. WEST 2,659,328

TUBULAR BAG MACHINE

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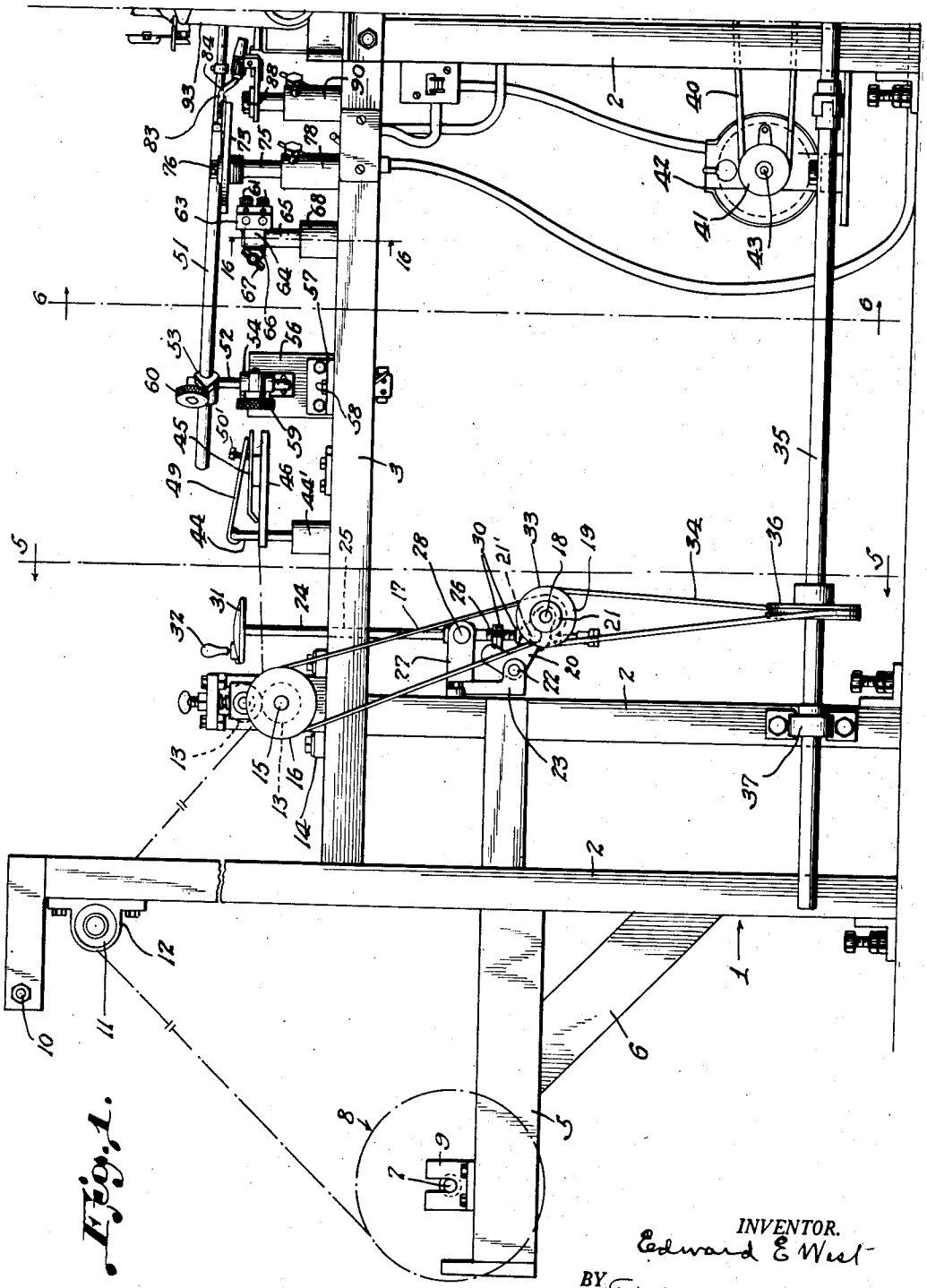


Fig. 1.

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TUBULAR BAG MACHINE

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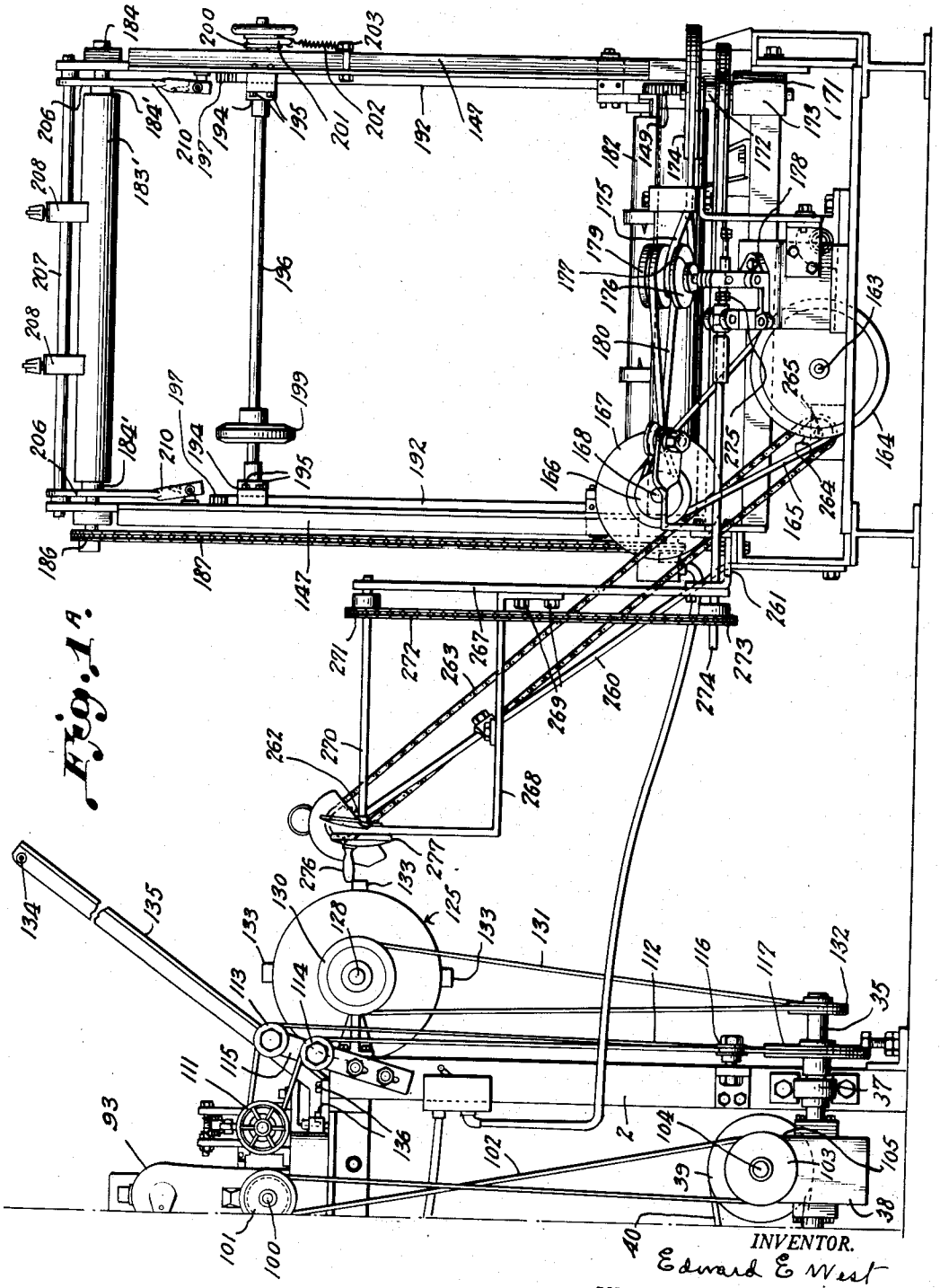


Fig. 1A.

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TUBULAR BAG MACHINE

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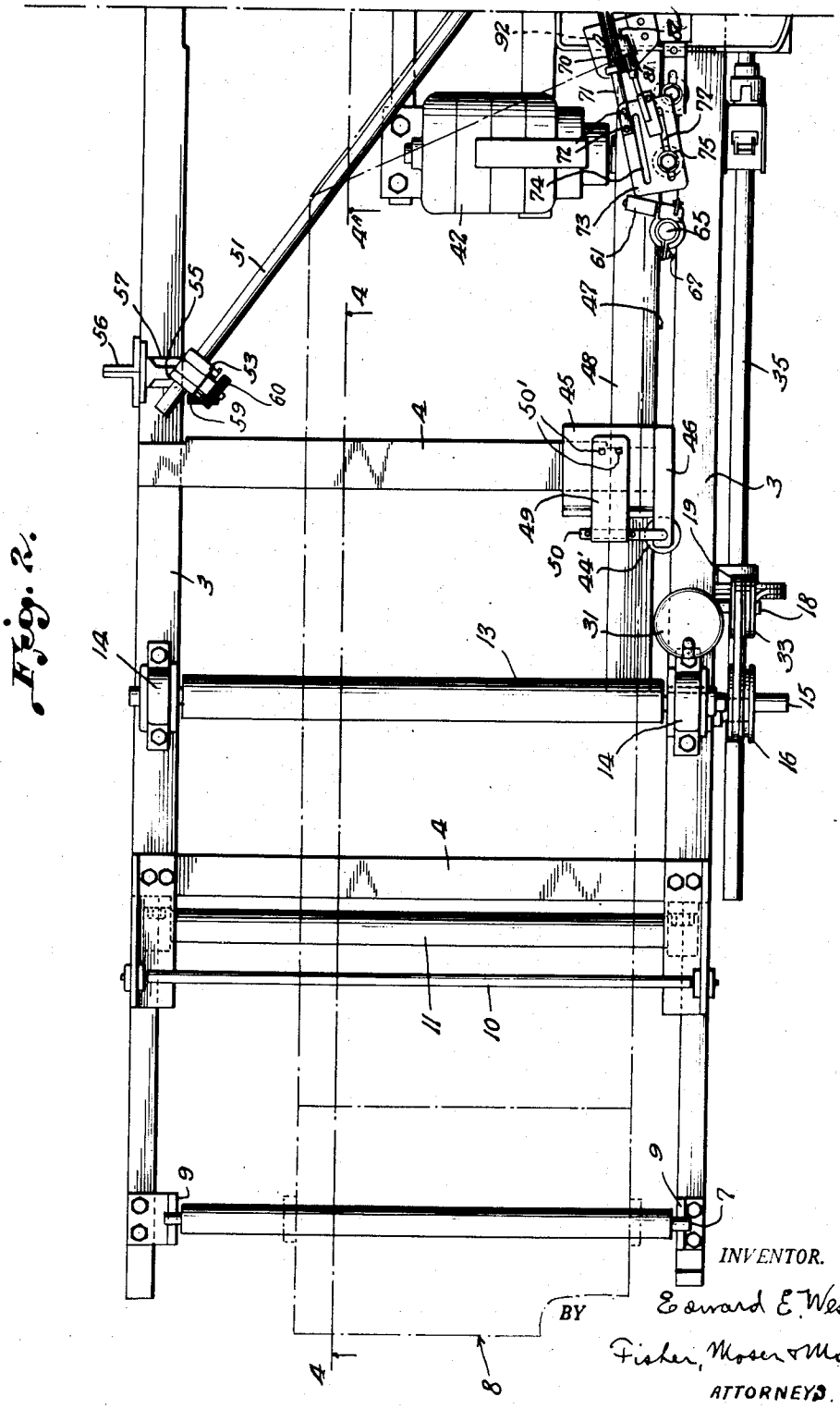


Fig. 2.

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TUBULAR BAG MACHINE

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Fig. 2B.

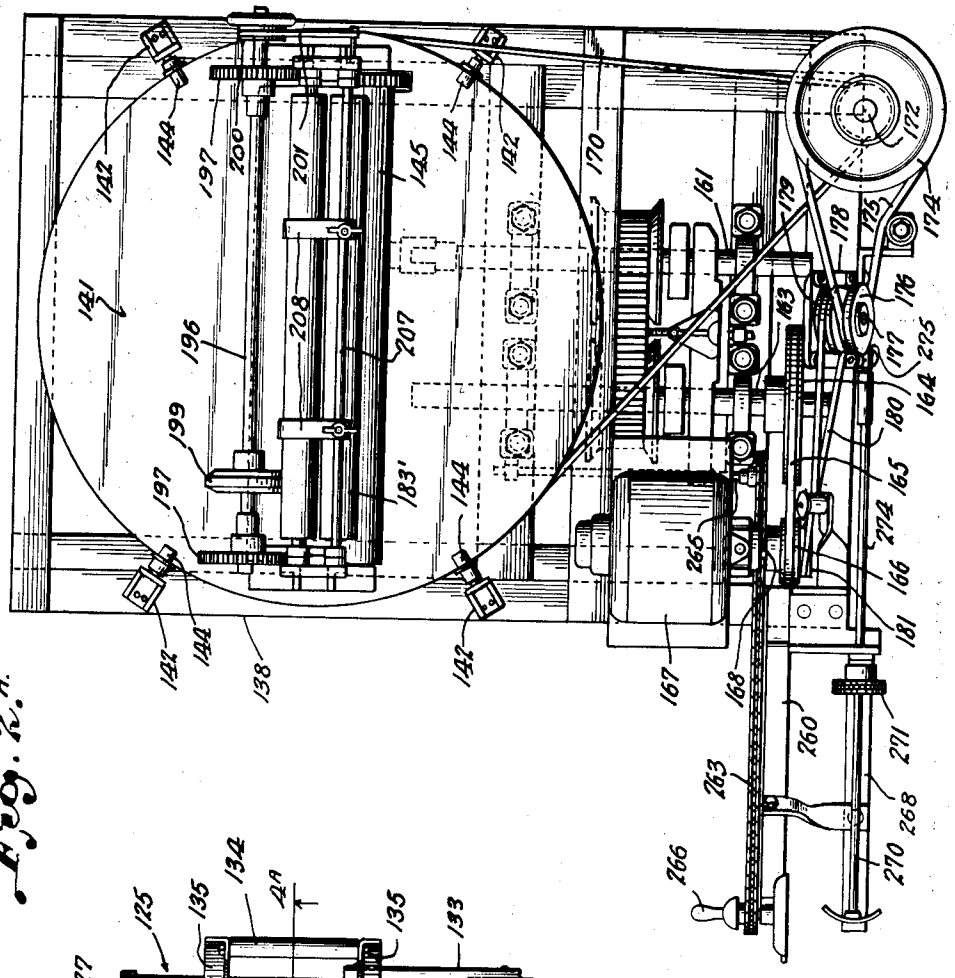
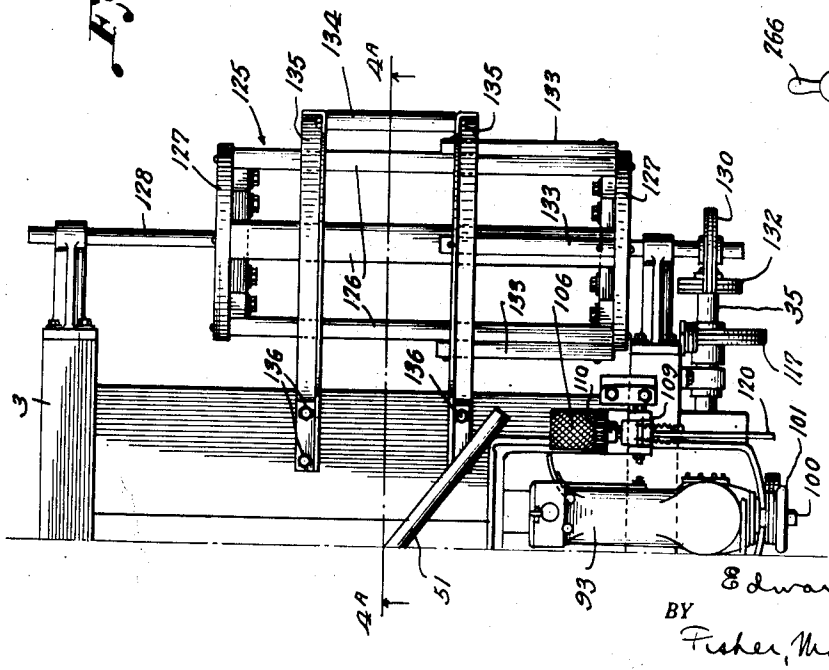



Fig. 2A.



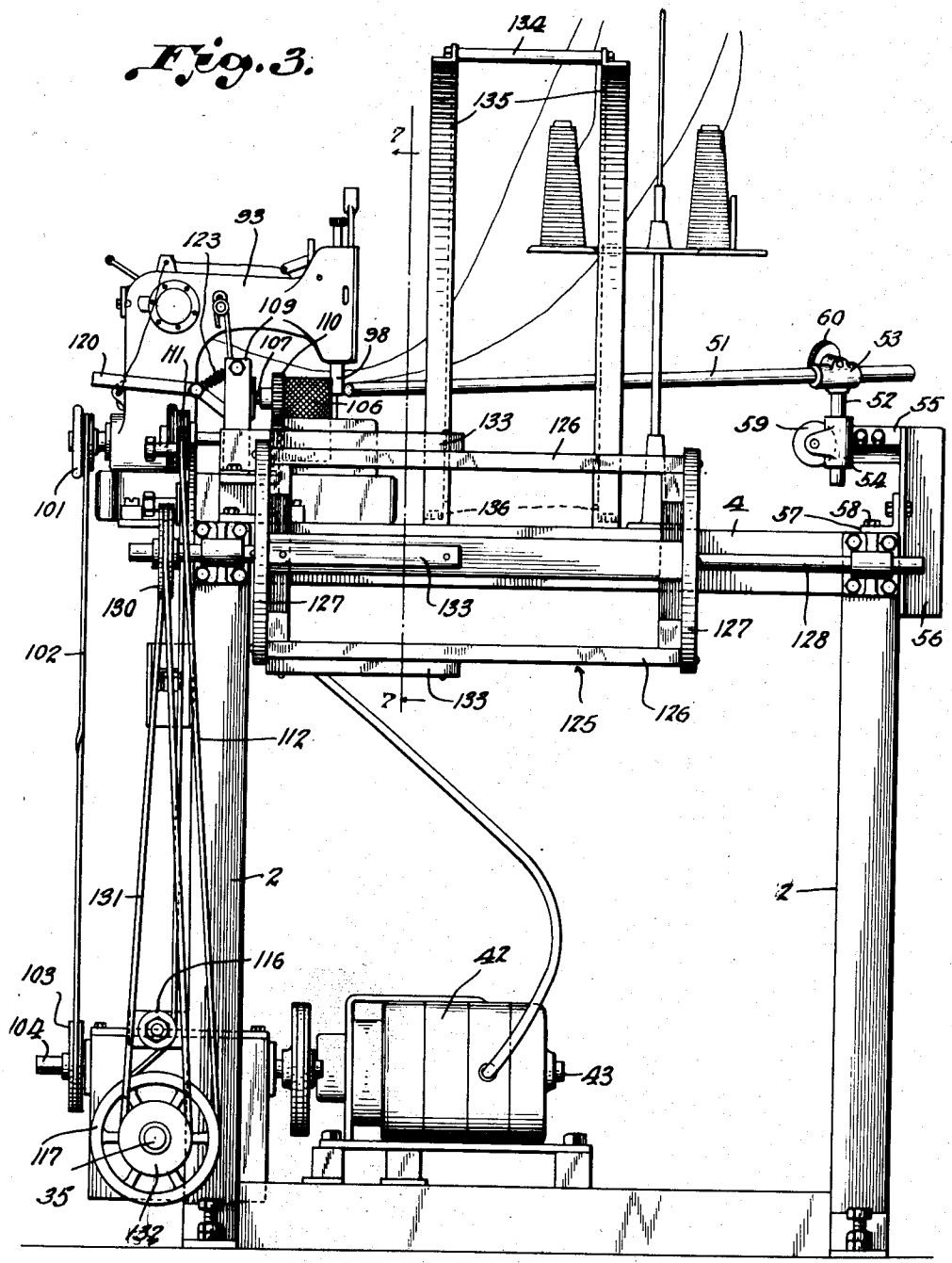

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TUBULAR BAG MACHINE

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Fig. 3.




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Fig. 4.

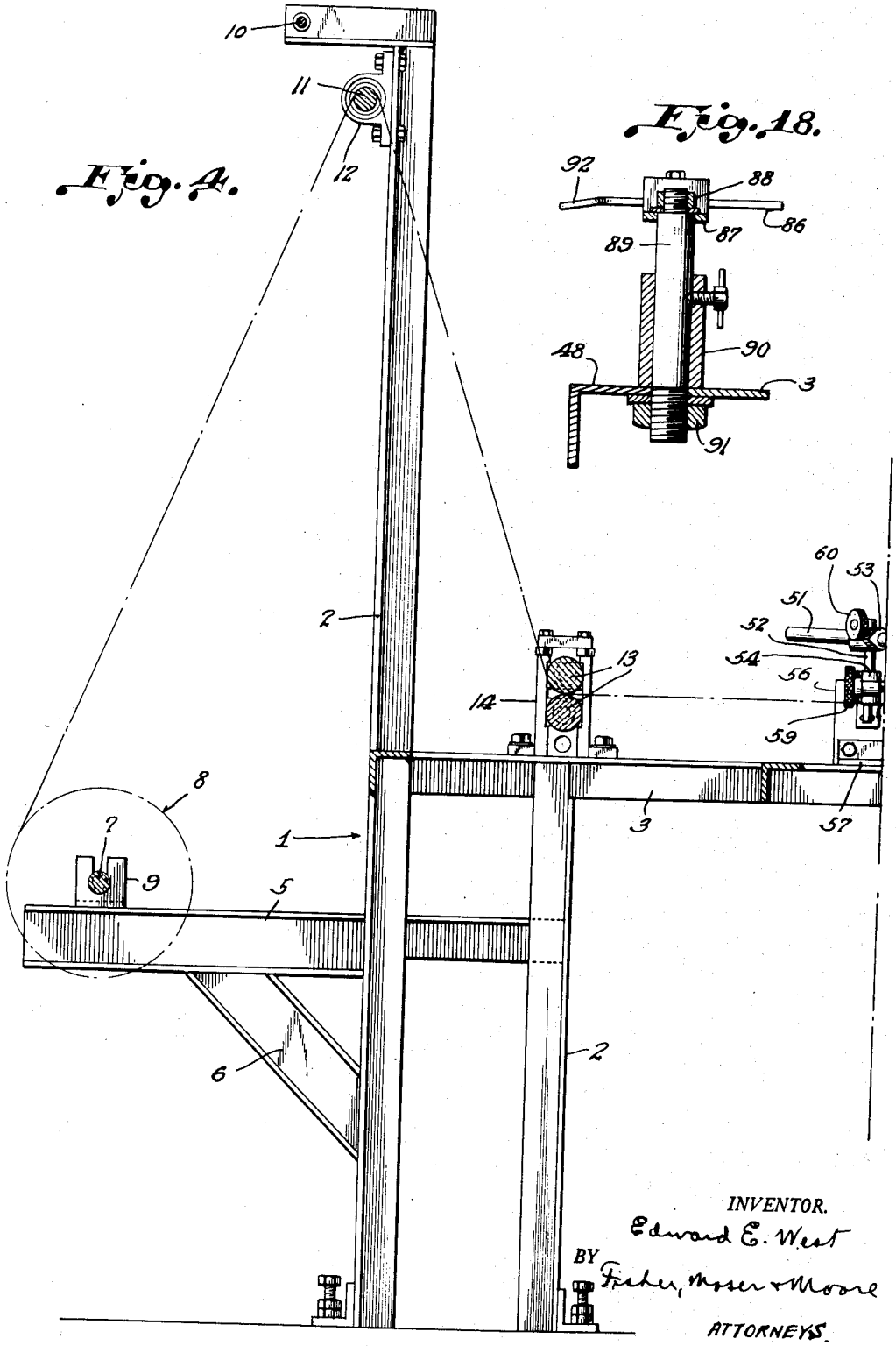



Fig. 18.



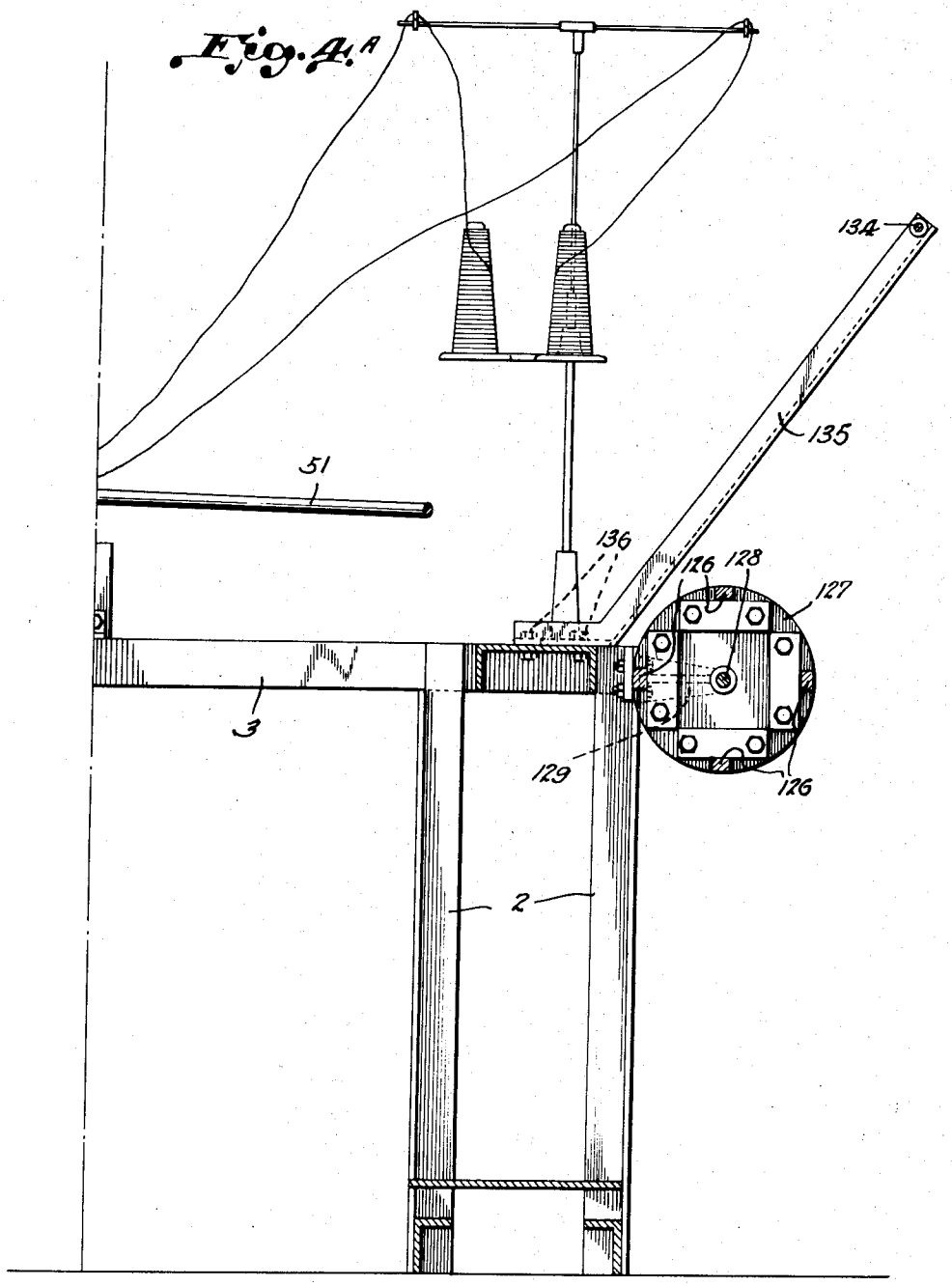

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Fig. 4A




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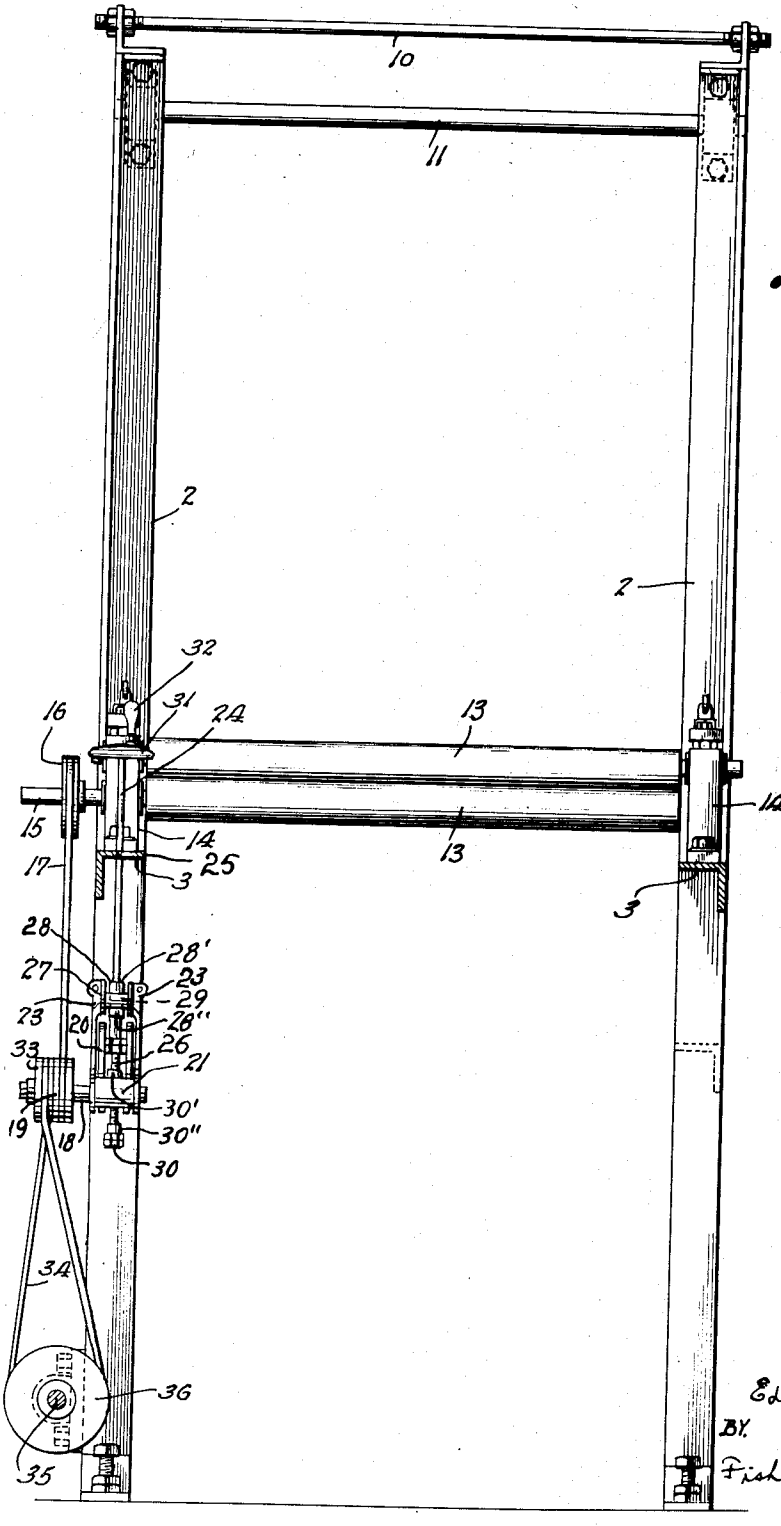



Fig. 5.

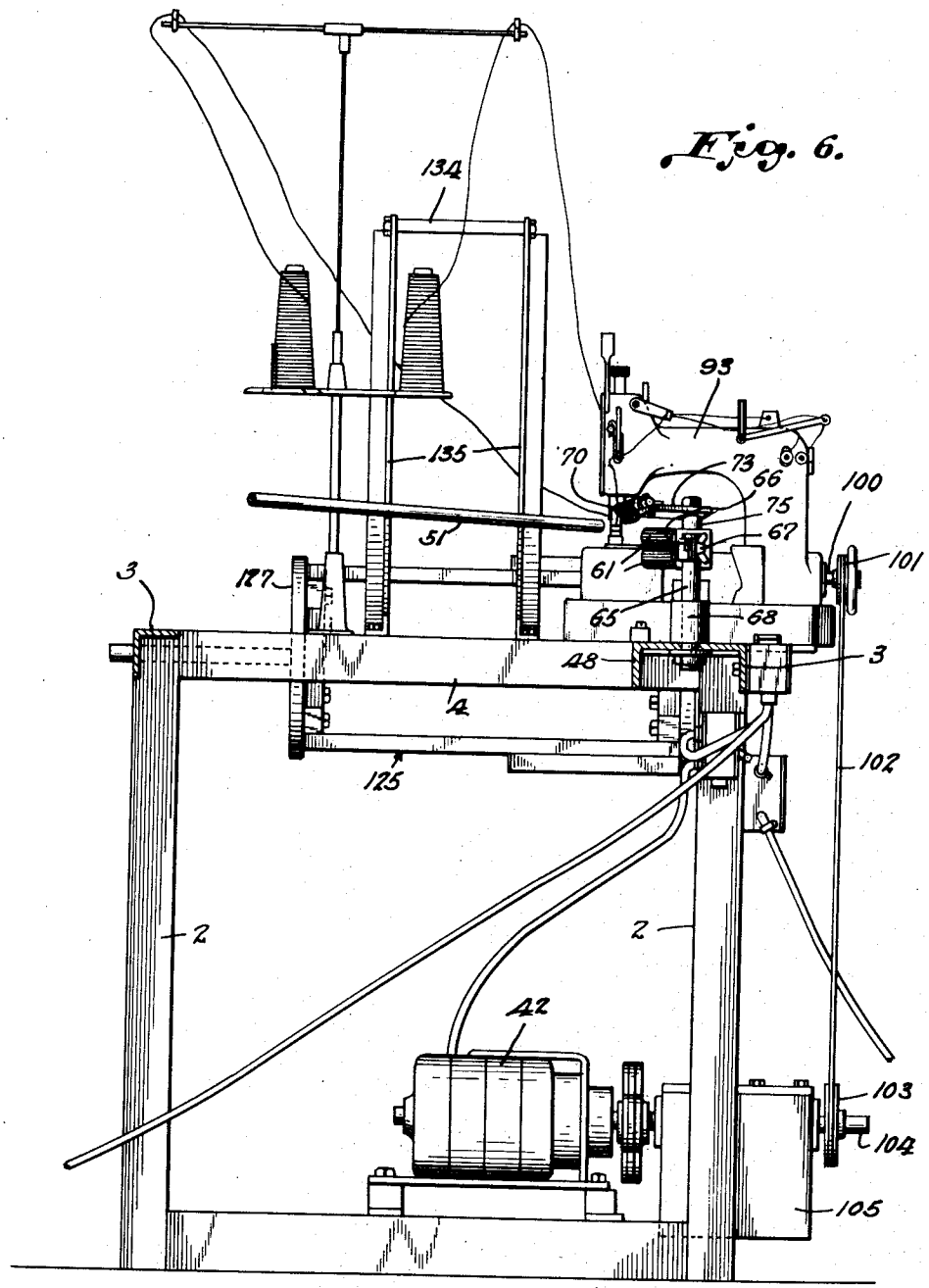
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Fig. 6.




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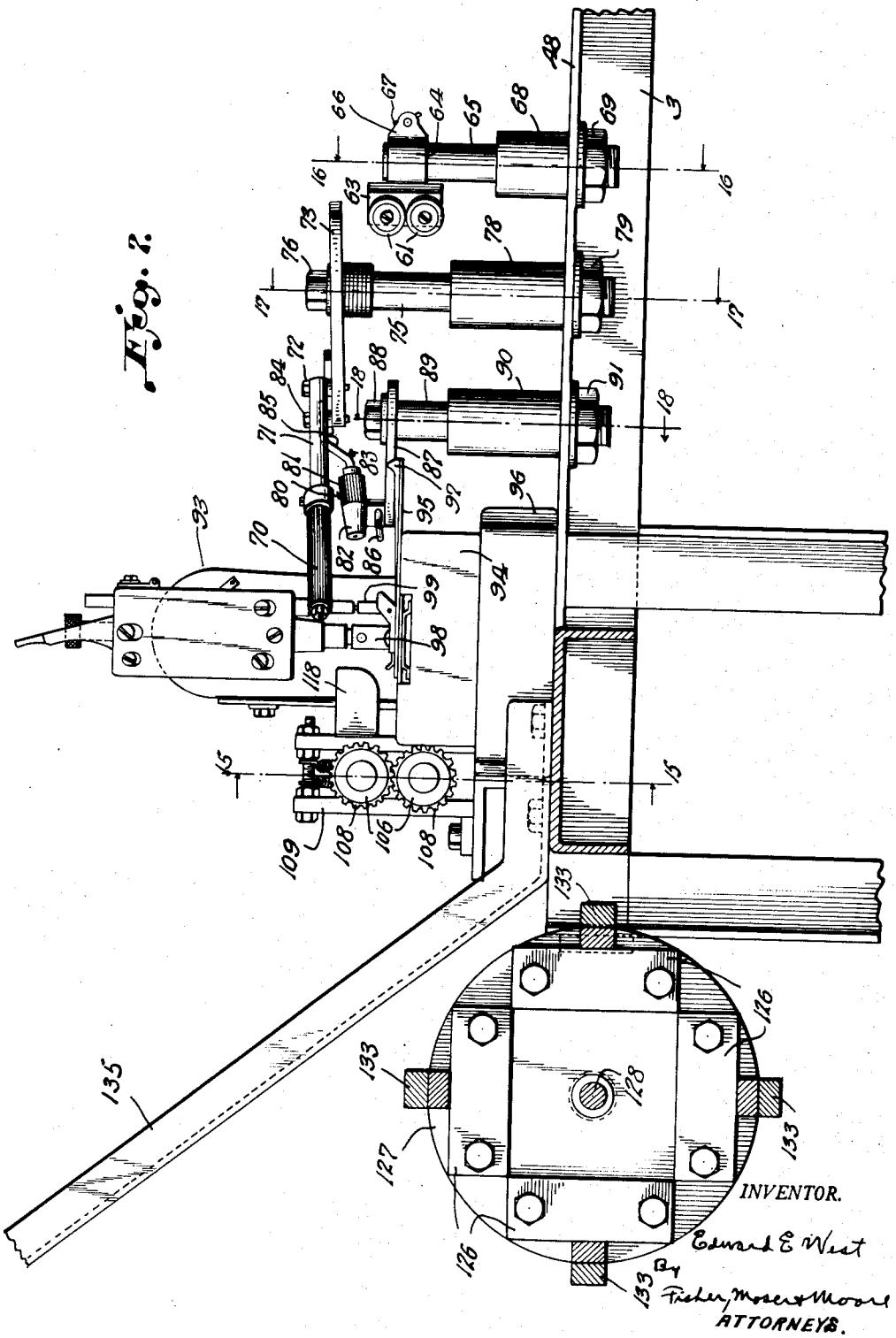
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TUBULAR BAG MACHINE

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Fig. 2.




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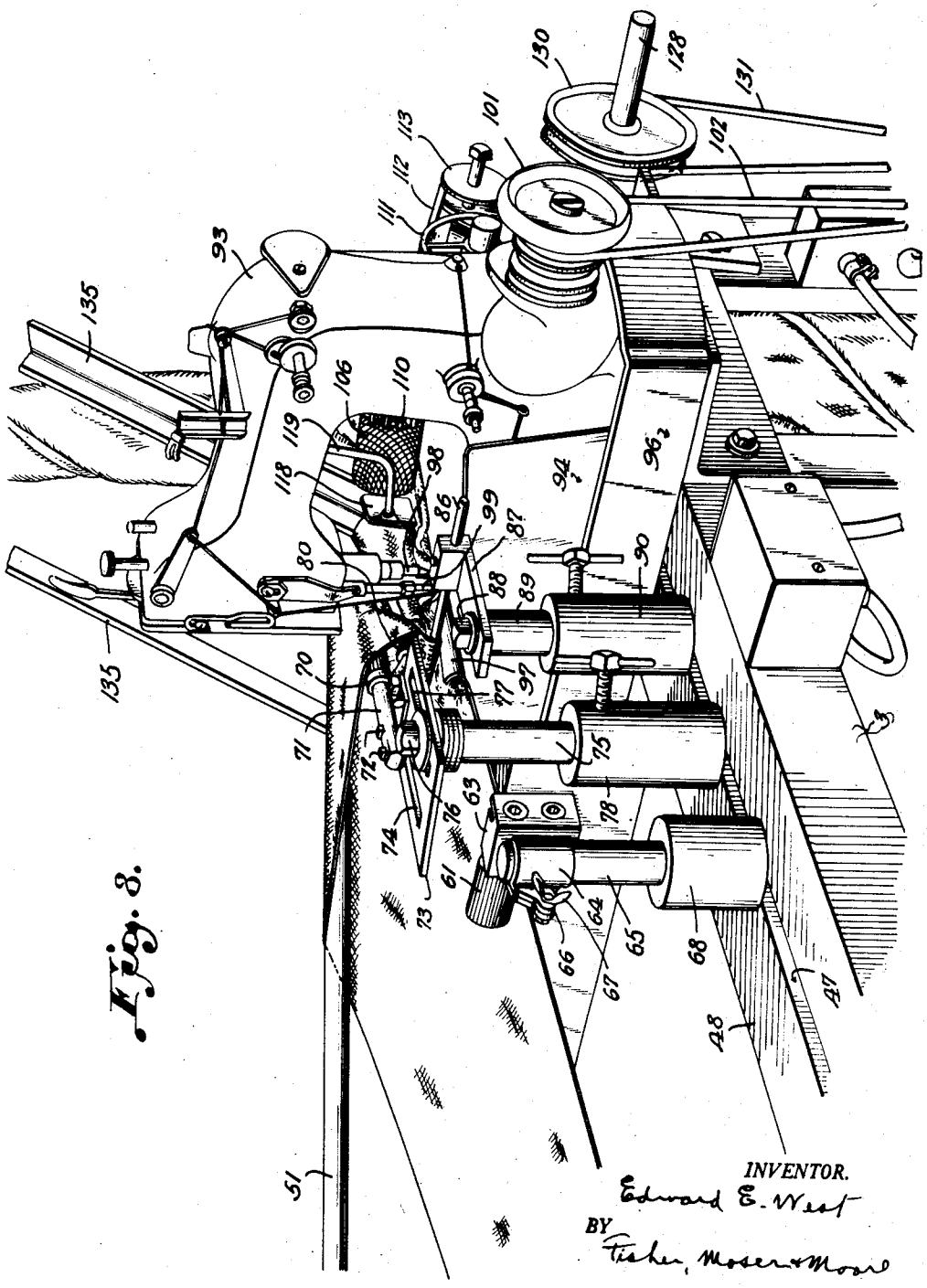



Fig. 8.

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TUBULAR BAG MACHINE

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Fig. 9.

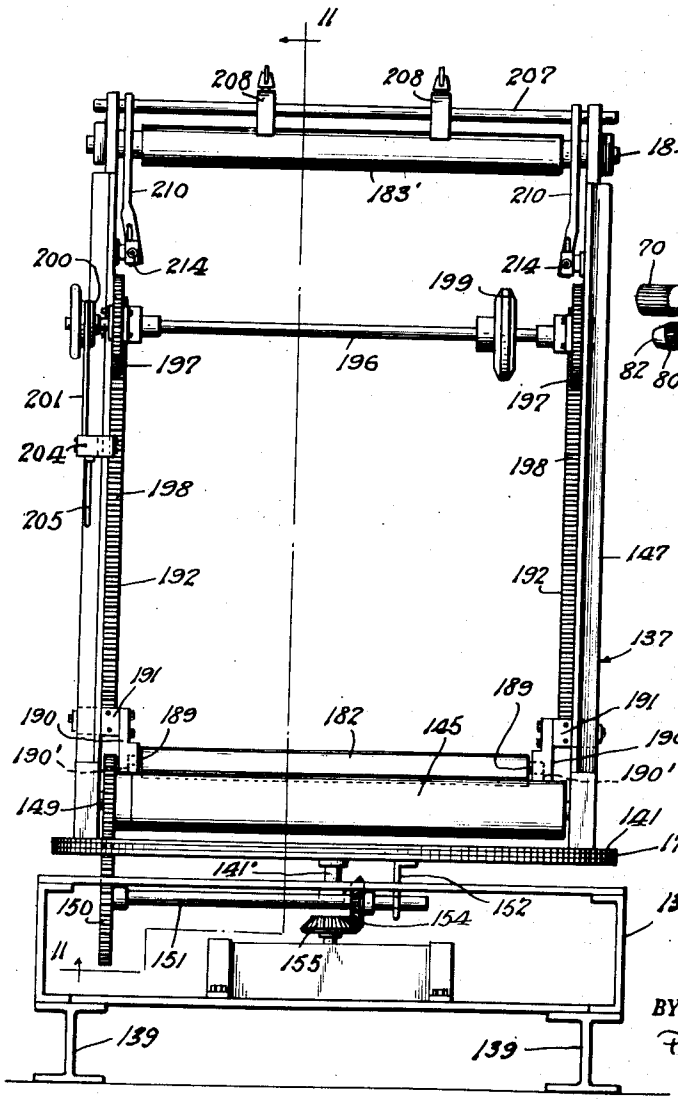



Fig. 16.

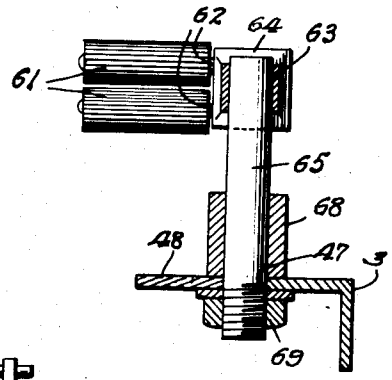
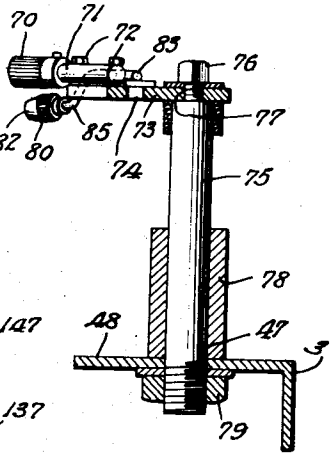



Fig. 17.




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Fig. 15.

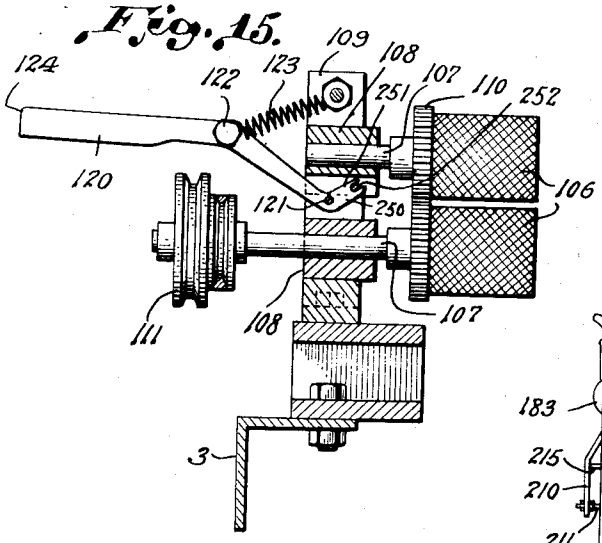
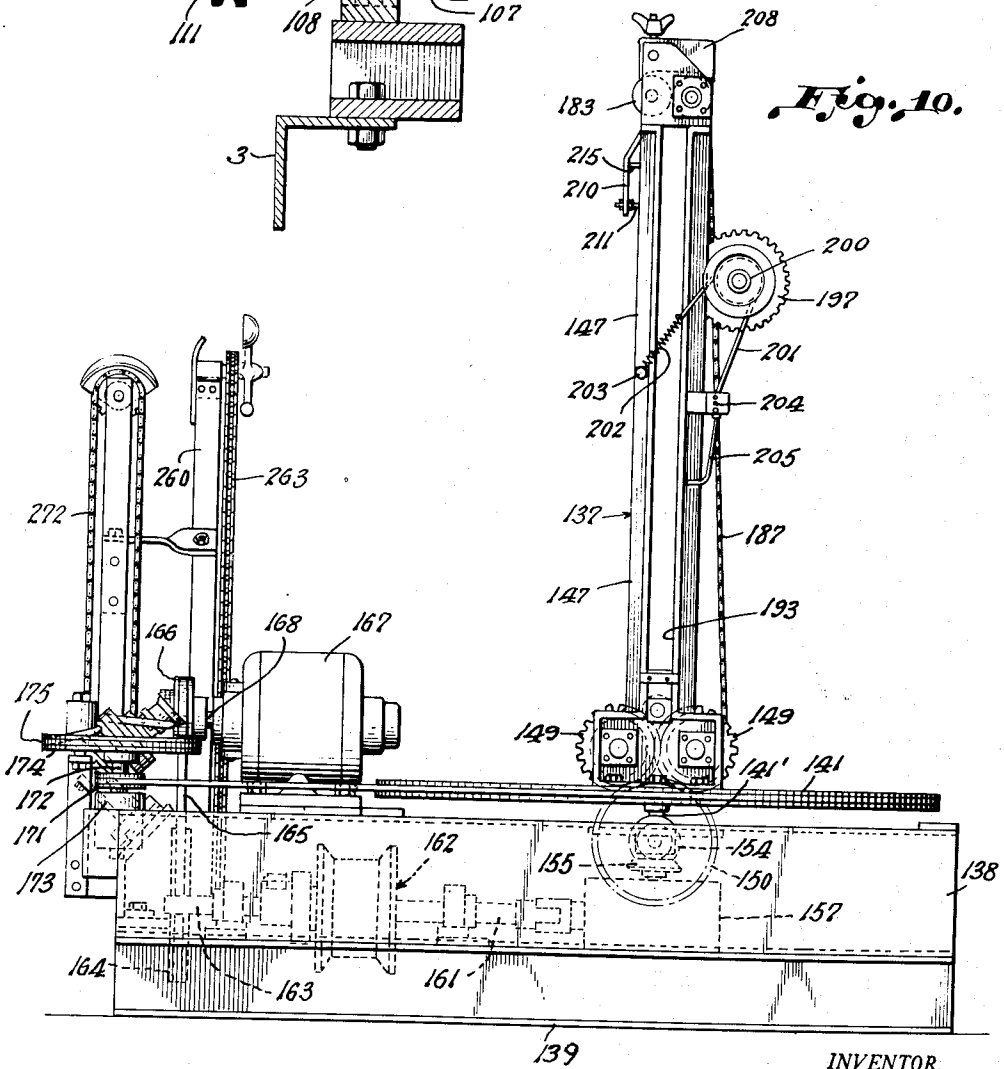



Fig. 10.




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Fig. 11.

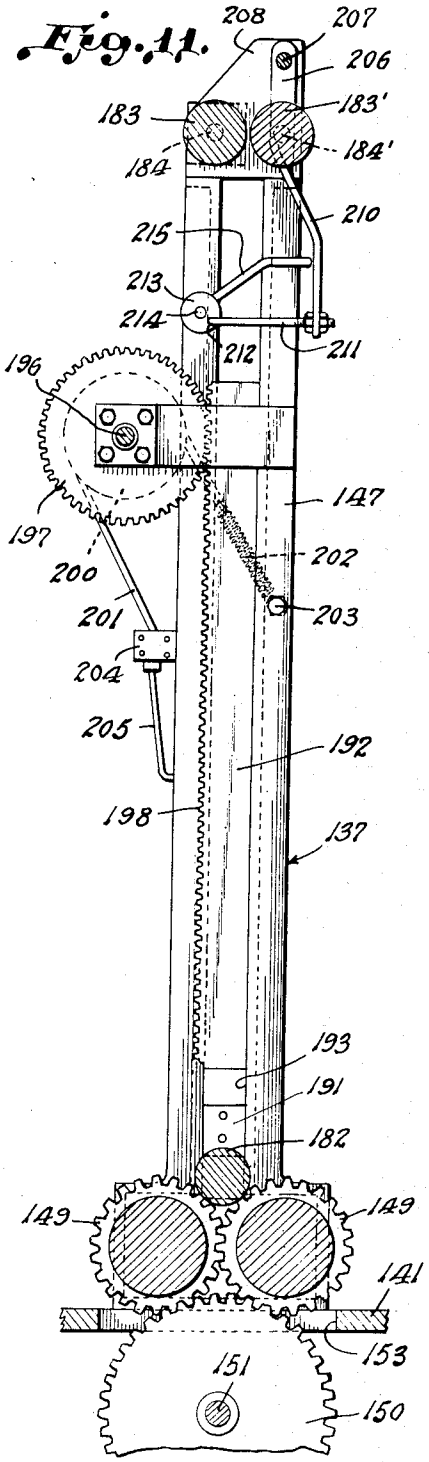
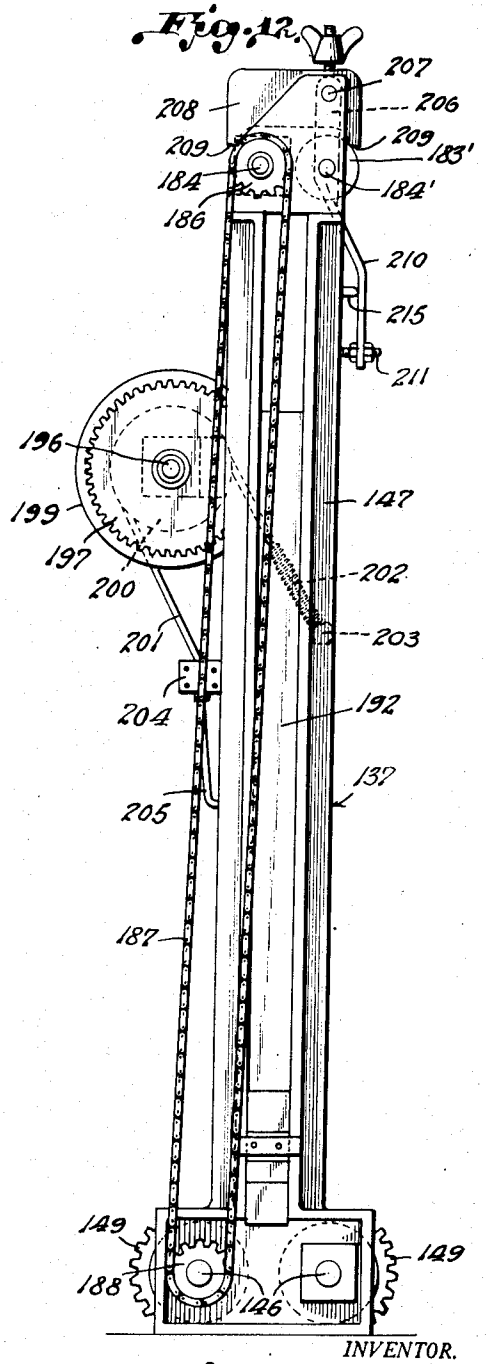



Fig. 12.



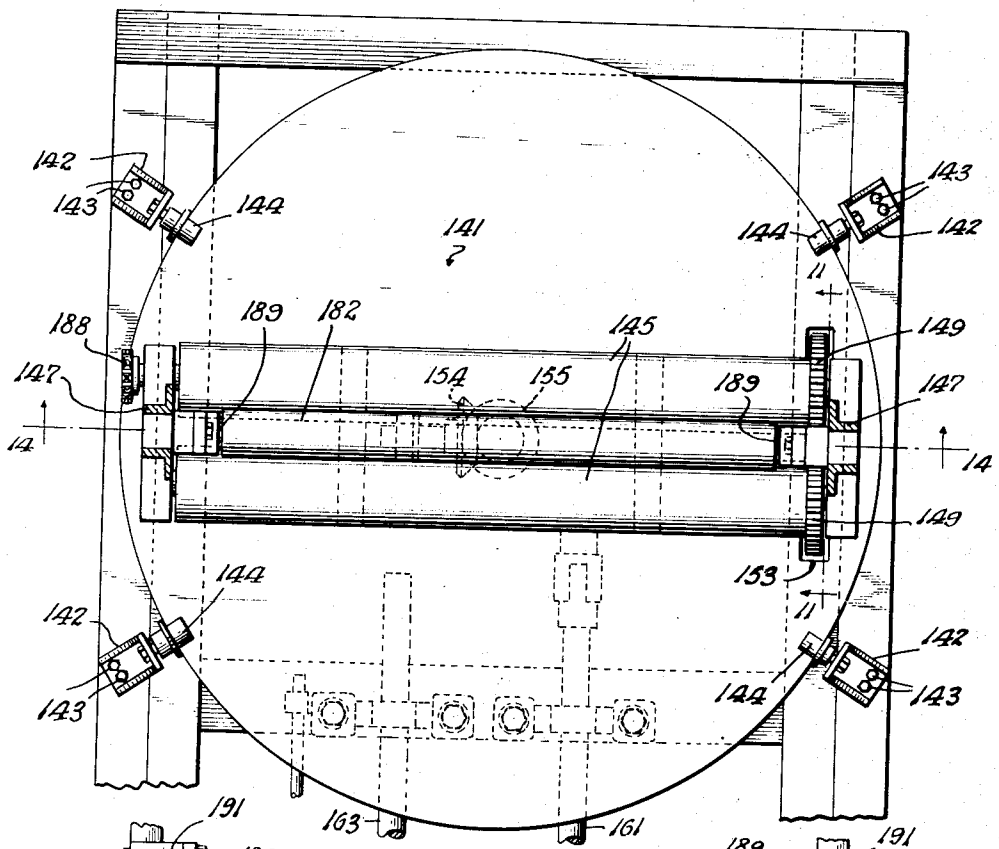

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Fig. 13.




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# UNITED STATES PATENT OFFICE

2,659,328

## TUBULAR BAG MACHINE

Edward E. West, Richmond, Va.

Application March 29, 1949, Serial No. 84,111

10 Claims. (Cl. 112—63)

1

This invention relates to an improved apparatus for forming tubes.

The principal object of the present invention is the provision of an improved apparatus for forming tubes from a continuous strip of material by securing the strip together on the bias, which apparatus constitutes an improvement over the tubular bag making machine disclosed in my Patent No. 2,340,290, issued February 1, 1944.

Another object is the provision of an apparatus for forming tubes wherein novel means is provided for supporting and feeding a continuous strip of material so that the marginal edges thereof are overlapped and secured together on the bias.

Another object is to provide a tube forming apparatus having novel adjustable means for forming the strip into various sizes of tubes and aligning the marginal edges of the strip so that they are secured together on the bias.

A further object is the provision of means for aligning the formed hem or overlapped marginal edges of the tube to assure of the same being properly and uniformly stitched together.

A still further object is to provide novel adjustable means for pulling the travelling web of cloth laterally and guiding one edge thereof so that the hems are properly and uniformly formed.

Still another object is the provision of readily adjustable means for adjusting the pull on the web of cloth and controlling the pull on the slack side thereof to permit of the stretchable cloth being properly controlled.

Another object is the provision of a novel dorfing drum which engages with the stitched tube and imparts an undulating movement thereto to assure of the tube being moved away from the sewing mechanism.

A further object is to provide an adjustable turntable associated and coordinated with the main portion of the machine for untwisting and winding the formed cloth tube.

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

Figure 1 is a side elevation of the cloth feeding, supporting, folding and guiding portions of the machine;

Figure 1A is a side elevation of the tube stitching mechanism and turntable for untwisting and winding the formed tube;

Figure 2 is a partial plan view of the cloth feeding, supporting, folding and guiding portion of the machine;

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Figure 2A is a partial plan view of the tube stitching mechanism and the dorfing drum;

Figure 2B is a plan view of the turntable for untwisting and winding the formed tube;

Figure 3 is an end view of the tube forming and stitching portion of the machine;

Figure 4 is a section on the line 4—4 of Figure 2 showing the cloth feeding end of the machine;

Figure 4A is a section on the line 4A—4A of Figures 2 and 2A showing the cloth folding member, tube waving drum, and tube guiding member;

Figure 5 is a section on the line 5—5 of Figure 1 showing the cloth guiding member and feeding rollers;

Figure 6 is a section on the line 6—6 of Figure 1;

Figure 7 is a section on the line 7—7 of Figure 3;

Figure 8 is a perspective view of the various means for pulling the cloth, folding the web, controlling the marginal edges, stitching the hemmed portion and pulling the tube;

Figure 9 is an end view of the turntable;

Figure 10 is a side elevation of the turntable and driving means therefor;

Figure 11 is a section on the line 11—11 of Figure 9;

Figure 12 is a side elevation of the turntable standards and associating winding mechanism;

Figure 13 is a plan view of the turntable;

Figure 14 is a section on the line 14—14 of Figure 13;

Figure 15 is a front view of the cloth hem pulling rollers;

Figure 16 is a front view of the side edge pulling and forming rollers;

Figure 17 is a front view of the rollers for respectively supporting the cloth and adjusting the edge thereof;

Figure 18 is a front view of the forming rod for bringing the selvaged edges of the cloth together before stitching.

Referring more particularly to the drawings, wherein similar reference characters designate like parts throughout the several views, the numeral 1 designates generally a main frame, of metal or other suitable material, comprising a series of pairs of spaced vertical standards or uprights 2 having longitudinally extending side top frame members 3 and cross frame members 4 suitably secured to the upper ends thereof. A pair of spaced horizontally disposed cloth roll supporting arms 5 are suitably secured to one pair of uprights 2 at the forward end of the machine, at a point between the lower end thereof

and the top frame members 3, which arms 5 are additionally supported by a pair of spaced struts 6. The projecting ends of a shaft 7, carrying a cloth supply roll 8, are journalled in slotted bearings 9 mounted on the arms 5 to permit of a web of cloth being delivered through the machine, as hereinafter described.

The upper ends of the end uprights 2 project upwardly above the top frame members and are suitably connected together by a spacer bar or the like 10. An idler roll 11, journalled in bearing brackets 12, connected adjacent the upper ends of the end uprights 2, permits of the web of cloth 8 passing thereover during the travel thereof and has a tendency to smooth the same. A pair of transversely extending driven feeding rollers 13 are journalled in vertical bearing brackets 14, mounted on the side top frame members 3 adjacent the forward end of the machine. The rollers 13 are disposed one above the other and engage with each other, and one end of the lower roller shaft 15 carries a pulley 16 driven by a belt 17 which travels over a second driven pulley 19, carried by a transverse stub shaft 18 journalled in a bearing 21 formed on the lower end of a substantially L-shaped arm 20. The arm 20 is pivotally connected, as at 22, to a substantially L-shaped bracket 23 suitably connected to the upright 2.

Adjustment of the pulley 19 is effected to regulate the tension of the belt 17 by means of a vertical rod 24 (Figures 1 and 5) which extends downwardly through an opening 25 in one of the side frame members 3. The lower end of the rod 24 extends through a threaded bore 29 in a block 28, supported between two spaced horizontally disposed arms 27 of the L-shaped bracket 23. Bushings 28' and 28'' arranged on either side of the block 28 permit of the rod being rotated therein, for a purpose to be hereinafter described. A threaded portion 26 on the lower end of the rod 24 extends through a block 21' carried by one leg of the L-shaped arm 20. Stop nuts 30 on the lower extremity of the rod 24 and collars 30' and 30'', sleeved on the rod above and below the block 21', enable the rod to move the L-shaped arm 20 about its pivot 22. Thus, an upstanding crank 32, formed on a disc 31 mounted on the upper end of the vertical rod 24, may be manually rotated in the appropriate directions, which causes the arm 20 and pulley 19 to be raised or lowered. This adjustment results in the belt 17 being either slackened or tightened which, in turn controls the speed with which the pulley 16 rotates. The pulley 19 is driven by a second pulley 33 on stub shaft 18 in turn driven by a belt 34 which travels over a pulley 36 carried by a main longitudinal driven shaft 35 journalled in bearings 37 mounted on the frame uprights 2. The shaft 35 is driven by gearing, not shown, in a gear box 38 mounted on the frame, which gearing drives a pulley 39 in turn drivingly connected by a belt 40 with a pulley 41 on a shaft 43 of an electric motor 42, of conventional construction. When the pulley 16 is driven, as just described, the lower feeding roller 13 is rotated in a clockwise direction, viewing Figure 1, which causes the upper roller 13 to be rotated in an opposing or counterclockwise direction so that the rollers engage with and pull the web of cloth therebetween. If will, of course, be understood that the aforementioned adjustment of the L-shaped arm 20 and pulley 19 also moves the pulley 33 to regulate the tension of the belt 34. In other words, both belts 17 and 34 are simultaneously slackened or tightened, through the adjustment of the arm 20, to control the speed of pulley 16. To assist in this feeding of the cloth, the upper roller 13 may have a strip or strips, not shown, suitably applied thereto for frictionally engaging the cloth, or the rollers may be knurled or fluted.



As the cloth is fed by the feeding rollers 13 and 14, the right hand marginal edge of the strip, viewing Figure 1, is caused to pass over a smoothing plate 45 carried by a forwardly extending arm 46 mounted on a vertical rod or post 44. The latter is sleeved through an enlarged cylindrical collar 44' the lower end of which spans or overlaps a gap or slot 47 formed between the horizontal portions or flanges of one top side angle frame member 3 and a second angle frame member 48 which is attached to the cross top frame members 4 by welding or the like, the members 3 and 48 being separated or spaced apart, as best shown in Figure 8 for this purpose of providing the slot or gap 47. The threaded lower end of the rod or post 44 extends through the slot 47 and receives a nut, neither the threads nor nut being shown, so that the post 44 may be clamped in stationary position relative to the frame members 3 and 48 but may upon loosening of the nut, be moved lengthwise in the slot 47 for adjustment purposes. The upper end of the rod or post 44 is formed with a lateral integral extension or arm 50 on which a flat plate 49 is sleeved and supported to project forwardly and downwardly so that the forward end thereof rests on the smoothing plate 45. A pair of screws 50' mounted in the end of the plate 49 are adapted to rest at their lower ends on the plate 45 (see Fig. 2). Thus, when the cloth web is run through the machine one side marginal edge thereof will pass over the smoothing plate 45. Plate 49 is hinged on L-shaped arm 44 so that it can swing freely above the plate 45. Screws 50' are for mounting a yardage counter, not shown, the wheels of which run on the web to give an accurate account of the amount of goods run through the machine. Plate 49 is hinged so that the yardage counter will pass with its own weight against the web.

After passing through the feeding rollers 13 and having its right hand marginal edge smoothed, as just described, the cloth is directed under and thence upwardly over an angularly disposed horizontal bar 51, as best shown in Figures 1, 2, 3 and 8. One end of the bar extends through a collar 53 on the upper end of a vertical post 52 projecting through a bushing 54 carried by a laterally extending arm 55 on a vertical bracket 56. A flange 57 secured to the bracket 56 is secured to the side top frame member 3 by a bolt or the like 58 so that the bracket is rigidly supported on the frame. The horizontal bar 51 normally extends forwardly and laterally across the frame at an angle of approximately forty-five (45) degrees relative to the longitudinal axis thereof, and the free or unsupported forward end thereof normally terminates at a point ahead of a sewing mechanism to be presently described. The angle of the bar 51 may be adjusted by manually swinging the bar bodily about the axis of the vertical post 52 and bushing 54, after a clamping screw 59, mounted on the bushing 54, is rotated to loosen its clamping action on the post 52. When so loosened, the post 52 may be rotated in its bushing, in an obvious manner, so that the bar 51 can be manually swung in the desired direction. The vertical post 52 may also

be elevated or lowered in the bushing 54. Thus, the bar can be set at an angle either greater or less than forty-five (45) degrees so that the diameter of the cloth tube formed thereby may be made smaller or larger. If it is arranged at an angle less than forty-five (45) degrees the tube will be smaller, and if it is set at an angle over forty-five (45) degrees the tube will be larger. It will also be noted that the bar 51 may be readily removed from the collar 53 on the post 52 by sliding the same therethrough after loosening a clamping screw 60 in the collar 53. By virtue of the approximate 45° angle of the bar 51, relative to the machine frame, the continuously moving strip of cloth in passing under and over the bar is thence directed transversely of the frame, at an angle, after which the cloth is acted upon by cloth supporting and forming devices, presently to be described, which cause the left selvage of the cloth to overlie the right hand marginal edge or in proper position for the edges of the cloth being stitched or otherwise secured together on the bias, as also hereinafter described.

During the travel of the continuously moving strip of cloth under and over the angle bar 51, the right hand marginal edge of the cloth is passed between a pair of fluted horizontally disposed adjusting or pinch rollers 61 (best shown in Figures 7, 8 and 16). The rollers 61 are mounted on shafts 62 (see Fig. 16) journalled in a bearing block 63 which is adjustably connected to a post 65 by a bracket 64. Extended ears 66 on the bracket are retained together by any suitable means such as a bolt and wing nut 67 so that the bracket may be loosened to permit of vertical and angular adjustment of the rollers 61. As shown in Figures 2, 7 and 8, the rollers 61 extend laterally and slightly forwardly at an angle so that the fluted faces of the rollers frictionally engage the upper and lower surfaces of the travelling web of cloth and exert a slight lateral pull thereon so that the marginal edge of the cloth is guided and the width thereof is controlled preparatory to formation of the latter into a tube. It will be understood that the width of the marginal edge of the cloth may be varied by adjusting the rollers 61 relative to the vertical axis of the supporting post 65 to vary the amount of pull which the rollers exert on the cloth. The post 65 is sleeved within an enlarged cylindrical collar 68 the lower end of which overlaps or spans the gap or slot 47 between the side frame members 3 and 48 and the end of the post 65 extends through the slot 47 and is clamped therein by a nut or the like 69 (Figures 7 and 16) which, upon loosening, permits of the post 65 and rollers 61 being moved longitudinally of the frame for further adjustment purposes.

As the continuously moving web of cloth passes under and over the angle bar 51, the left hand marginal edge portion is passed over an elongated fluted cylindrical cloth supporting roller 70 journalled on a rod 71 suitably connected by bolts or the like 72 in a slot 74 in a horizontal plate 73 supported on the upper end of a post 75. A nut or the like 76 serves to clamp the plate 73 to the post, and the latter extends through a second slot 77 in the plate so that, by loosening the nut 76, the plate may be longitudinally adjusted relative to the post. An enlarged cylindrical collar 78, having the post 75 projecting therethrough, overlaps the slot 47 so that the post extends through the slot and is clamped therein by a nut 79 on the lower end of the post (Figure 17) which, upon loosening, permits of the post 75 and plate



73 being moved longitudinally of the frame for adjustment. The post 75 is spaced forwardly of the adjusting roller supporting post 65. The web of cloth is thence directed downwardly over a second cylindrical cloth supporting roller 80 which is circumferentially fluted, as at 81, and is formed with a tapered outer end 82. Roller 80 is journalled on one end of a rod 83 the other end of which is attached to the forward end of the plate 73 by a bolt or the like 84. The rod 83 is bent downwardly and laterally, as at 85 (see Figures 7 and 17), so that the roller 80 slopes at a slight angle below the horizontal and slightly at an angle toward the roller 70. Thus, the roller 80 is spaced below and offset from the roller 70 and the relative positions of the two rollers 70 and 80 are such that the web of cloth passes over the top of the roller 70 and thence downwardly over and under the downwardly slanting roller 80, after which the cloth passes over and under a laterally extending horizontal tube forming rod 86. By reference to Figure 7, it will be seen that the plate 73 and supporting rollers 70 and 80 are above the plane of the adjusting rollers 61.

The tube forming rod 86 (Figures 7, 8 and 18) is carried by the outer end of a forwardly extending horizontal bracket 87 connected by a bolt or the like 88 to the upper end of a post 89. The inner end of the rod 86 is also bent slightly forwardly, as at 92 (see Figures 2 and 18). Sleeved on the post 89 is an enlarged cylindrical collar 90 which overlaps and supports the post 89 in the slot 47, and the lower end of the post is clamped in the slot by a nut or the like 91 (Figure 7). The post 89 is spaced forwardly from the cloth roller supporting post 75 and may be adjusted relative thereto by loosening the nut 91. As the tube forming rod 86 extends laterally of and below the cloth supporting rollers 70 and 80, the continuously moving web of cloth is directed rearwardly over and thence forwardly under or around the forming rod 86 so that the left hand marginal edge or selvage of the cloth web is caused to be arranged above and in overlapping relationship with the right hand marginal edge thereof, as best illustrated in Figure 8, preparatory to being stitched or otherwise connected to form the web into a tube, as hereinafter described.

The right hand marginal edge of the cloth web passes over a flat horizontal hem guiding plate 95 suitably mounted on the base plate 94 of a conventional sewing machine 93, the base plate 94 of which is suitably supported on a flat bed plate 96 on the main machine frame. The hem guiding plate 95 is formed with an upwardly and inwardly bent side portion 97. As the plate 95 is arranged beneath and spaced from the forming rod 86 and associated cloth supporting rods 70 and 80, it will be seen that the right hand marginal edge of the cloth engages with the inner face of the bent side portion 97 and is caused to be aligned with the overlapping left hand selvage thereof in position to their being stitched or otherwise connected together. The sewing machine 93 is so mounted on the main machine frame that it extends transversely thereof or at substantially right angles to the direction of travel of the web of cloth. As the usual presser foot 98 and reciprocating needle 99, only portions of which are shown in Figures 7 and 8, are arranged below the supporting rollers 70—80 and adjacent the bent end 92 of the forming rod 86, it follows that the overlapped marginal edges of

the cloth strip are caused to pass under the presser foot 98 and to be stitched together by the threaded needle 99 to form the cloth into a tube. It will be understood that, while a means for stitching the marginal edges of the strip together has been shown and described, the same may be otherwise connected together by pasting, cementing or the like. In the present machine, the main shaft 100 of the sewing machine is provided with a pulley 101 on one end thereof which is drivingly connected by a belt or the like 102 with a pulley 103 on a stub shaft 104 of a gear box 105 (Figures 1A, 3 and 6) arranged on the base of the frame. As the shaft 104 is drivingly connected by gears, not shown, with the main longitudinal driven shaft 35, it will be understood that, during operation of the machine, the sewing machine will also be actuated in timed relation therewith.

After the cloth web has been formed and stitched or otherwise formed into a tube, it is necessary to pull the same away from the forming and sewing mechanism so that the tube may pass through the remaining portion of the machine. This operation is effected by a pair of horizontally disposed fluted or knurled pull rollers 106 (best shown in Figure 15), carried by shafts 107 journalled in bearings 108 on a vertical bracket 109 on the top of the main frame. The rollers 106 are geared together by gears 110, and the shaft 107 of the lower roller projects through its bearing and carries a pulley 111. A belt or the like 112 rides on the pulley 111 and over idler pulleys 113 and 114, journalled in a vertical bracket 115 (Figure 1A) mounted on the frame, and a third idler pulley 116, journalled in the base portion of the main frame, and thence over a pulley 117 adjacent the outer end of the main longitudinal driven shaft 35. Thus, the lower roller 106 is rotated in a clockwise direction, viewing Figure 8, which rotates the upper roller 106 in an opposing or counter-clockwise direction which causes the roughened surfaces thereof to frictionally engage the upper and lower surfaces of the cloth tube and to pull the same forwardly through the machine. During this movement of the cloth tube, a vertically disposed flat guide plate 118 (Figures 7 and 8), carried on a rod 119 depending from the sewing machine 93, engages the formed and twisted tube forwardly of the stitching mechanism and prevents the same from becoming entangled therein. In order to facilitate the initial entry of the cloth tube between the rollers 106, the bearing 108 for the upper pulling roll shaft 107 is mounted on its supporting bracket 109 for limited vertical movement. A lever 120 (Figures 3 and 15) fulcrumed adjacent its lower end on a pin 121 arranged in the bracket 109 and the lower end of the lever is bent upwardly as at 250, and has a fork 251 which engages a pin 252 on the upper bearing block 108. The lever 120 is connected intermediate its ends, as at 122, by a spring 123 to the upper end of the bracket. By moving the outer end 124 of the lever downwardly against the tension of spring 123, it will be noted that the upper roller 106 will be moved away from the lower roller.

Due to the fact that the travelling web of cloth is folded over the angularly disposed bar 51, so that the overlapped marginal edges are stitched together on the bias, a twist is imparted to the tube which it is desirable to remove before being wound into a tube for future use, as presently described. To supplement the operation of the pull rollers 106 to assure of the tube being uniformly removed and pulled from the sewing mechanism, additional means in the form of a horizontally disposed dorfing drum 125 is provided. The dorfing drum embodies a series of flat bars or strips 126 secured at their ends to discs 127 and extending therearound in spaced apart relation to form a hollow skeleton form. The drum 125 is mounted for rotational movement on a shaft 128 extending therethrough and journalled in brackets 129 attached to the forward end of the main machine frame at the upper end thereof, so that the drum extends transversely of the main frame in the path of travel of the cloth tube. As the various devices for feeding, folding, forming and sewing are arranged at one side of the machine, the twisted tube of cloth is caused to engage with and pass over the dorfing drum adjacent one end thereof. The dorfing drum is preferably constructed of wood or similar material because of its lightness and the fact that during the frictional engagement of the cloth therewith it will not be subjected to as much wear, as would be the case if the drum was formed of metal. A pulley 130 mounted on one end of the drum shaft 128 is drivingly connected by a belt or the like 131 with a pulley 132 mounted on the end of the main longitudinal driven shaft 35 so that the drum is rotated in a clockwise direction, viewing Figure 1A. After the cloth tube is engaged by the pull rollers 106 the same passes over one end of the dorfing drum whereby the spaced bars 126 thereof successively engage the cloth and impart a waving or undulating movement thereto which assures of the cloth being shaken or otherwise moved away from the sewing mechanism and the end of the angle bar 51. As shown in Figures 1A and 3, the movement of the cloth caused by the dorfing drum may be accentuated by increasing the height of the drum bars 126 by suitably mounting relatively short strips 133 on top of the bars 126 at one end thereof.

After passing over the rotating dorfing drum 125, the cloth tube drops downwardly of the main frame. In order to remove the previously described twist from the tube, the latter is then drawn upwardly over a horizontal bar 134 supported in the upper ends of a pair of spaced upwardly and outwardly extending bracket arms 135 which are bolted or otherwise attached at their lower ends, as at 136, to the top of the main frame. The tube of cloth is drawn up further over an idle spool mounted in a suitable frame, neither of which is shown, suspended from the ceiling of a room. The tube, after passing over the spool, is drawn or pulled downwardly by mechanism mounted upon a vertically disposed rotating turntable 137 whereby the twist is removed therefrom and the cloth tube is rewound upon a reel for future use.

The turntable 137, best illustrated in Figures 2A and 9 to 14, consists of a substantially rectangular frame or base 138 mounted on a pair of I beam members 139. A cross member 140 has the depending shaft 141' of a relatively flat, circular, turntable carriage plate 141 journalled therein so that the plate 141 may be rotated, as hereinafter described, relative to its base 138. The plate 141 is additionally supported by a series of approximately four spaced brackets 142 mounted, as at 143, on the top of the base 138 and each of which is provided with a pair of spaced idler rollers 144 which respectively engage the top and bottom faces of an act as a bearing sur-

face for the flat, circular, turntable carriage plate 141.

Extending transversely of the turntable carriage plate 141 are a pair of horizontally disposed, parallel, rewinding rollers 145 which are rotatably mounted by stub shafts 146 in the lower ends of a pair of vertical standards 147, bolted or otherwise secured, as at 148, to the turntable plate 141. A pair of gears 149, on one end of the rollers 145, are in mesh with each other and one of the gears 149 is in mesh with a gear 150 mounted on the end of a horizontal shaft 151 journalled in brackets 152 on the underside of the circular plate 141, a slot 153 being provided in the plate through which the gear 150 extends. The shaft 151 is rotated by means of a bevel gear 154 thereon which meshes with a bevel gear 155 on the upper end of a vertical stub shaft 156 journalled in a gear box 157 supported by a cross piece 158 mounted on the base members 139. Mounted on the lower end of shaft 156 is a gear 159 (Figure 13) which meshes with and is driven by a worm 160 on the outer end of a longitudinal drive shaft 161 of a Reeves variable speed control unit 162, of conventional construction and suitably mounted in the turntable frame 138. The other shaft 163 of the unit 162 is provided with a pulley 164 which is drivingly connected by a belt or the like 165 with a pulley 166 on the shaft 168 of an electric motor 167 suitably mounted on the turntable base 138. As shown in Figure 14, the annulus of the turntable plate 141 is grooved, as at 169, to accommodate a drive belt or the like 170 which is driven by a pulley 171 on a vertical shaft 172 journalled in a bearing 173 (Figure 1A) on the turntable base 138. A second pulley 174 on the upper end of the shaft 172 is drivingly connected by a belt or the like 175 with a pulley 176 on a shaft 177 journalled in a bracket 178 suitably connected on the base 138. A second pulley 179 on bracket shaft 177 is drivingly connected by a belt or the like 180 with a second pulley 181 on the end of motor shaft 168. By virtue of the drive just described, it will be understood that the circular turntable carriage plate 141 is rotated in counter-clockwise direction, viewing Figures 2A and 13, and the rewinding rollers 145, upon which a winding reel or core 182 is freely supported, are rotated in opposing directions, that is, counter-clockwise and clockwise, for a purpose to be presently described.

The stub shafts 184 of one of a pair of horizontally disposed, slightly spaced, parallel rollers 183 and 183' are journalled in suitable openings in the upper ends of vertical standards 147. The stub shafts 184' of the other roller 183' are journalled in downwardly depending arms 206 fixedly secured to a horizontally disposed shaft 207 journalled in suitable openings in the upper ends of the vertical standards 147. Two spaced substantially U-shaped guide members 208 are sleeved on the shaft 207 and the spaced lower ends 209 thereof ride on the top faces of the rollers 183 and 183'. One of the shafts 184 projects through the standard 147 and carries a sprocket 186 which is drivingly connected by a chain or the like 187 with a sprocket 188 on one of the rewinding roller stub shafts 146. Thus, the roller 183 is rotated in a clockwise direction (Figure 12) so that the other roller 183' in frictionally engaging the cloth tube is rotated in an opposing or counter-clockwise direction and the tube is pulled or drawn downwardly therebetween, in an obvious manner, to deliver the same to the winding reel or core. During its downward travel, the cloth will pass between and be guided by the guide members 208 on the shaft 207. The roller 183' may be adjusted relative to its companion roller 183 to facilitate the initial entry of the cloth tube therebetween by means of depending levers 210 (best shown in Figure 11) on the arms 206 carried by the shaft 207 which are pivotally connected to the ends of rods 211 in turn pivotally connected off center, as at 212, to collars 213 journalled on studs 214 in the sides of the vertical standards 147. Handles 215, mounted on the collars 213 and extending upwardly and outwardly therefrom, may be manually moved upwardly or downwardly to control the position of the roller 183' with respect to the roller 183, in an obvious manner.

The winding reel 182 rests upon and is freely supported by the pair of horizontal bottom rewinding rollers 145, and the extended ends of the reel shafts 189 are journalled in slots 190' in bearings 190 mounted on blocks 191 suitably connected to the lower ends of a pair of vertical rack bars 192. The blocks 191 are slidably arranged in longitudinal slots 193 in the vertical turntable standards 147, and the upper ends of the rack bars 192 are held in position relative to the standards 147 by means of brackets 194 connected, as at 195, to the standards. A horizontal cross shaft 196 is journalled in the brackets 194, below the pair of feed rollers 183 and 183', and gears 197 on the ends of the shaft 196 engage with the teeth 198 of the rack bars 192.

Also mounted on the other end of the cross shaft 196 is a brake drum 200 having a brake band 201 thereon. One end of the band 201 is connected by a coil spring 202 to a pin 203 mounted in and at one side of one of the vertical standards 147 and the other end thereof is connected to the other side of the same standard by means of a bracket 204. This last mentioned end of the band 201 passes freely over or through the bracket 204 and is pivotally connected to a handle or lever 205, so that the operator can, by actuation of the handle in a clockwise direction, viewing Figures 11 and 12, draw the brake band 201 tightly against and slow down the rotation of the brake drum 200, as the cloth tube is being wound on the reel 182, any means, not shown, being employed to lock the handle after any desired adjustment of the band. During the vertical movement of the rack bars 192 the same engage the gears 197 on the shaft 196 and the latter rotate against the braking action of the brake band and drum, which holds the lower end of the rack bars against the winding reel shafts so that the winding reel is retained in engagement with the bottom rewinding rollers 145. This causes the tube of cloth to be pressed against and to be wound tightly around the reel 182.

During the winding of the cloth tube on the winding reel 182 the latter will ride upwardly in the turntable standards until the desired amount of cloth has been wound thereround. At such time, if the cloth supply has not been exhausted, the cloth tube is suitably severed at a point below the rollers 183 and 183' so that the reel 182 may be removed from the turntable. To facilitate the removal of the winding reel shafts, shaft 189 from the slots 190' in the rack bearing 190, the shaft 196 may be further rotated by a hand wheel 199 mounted thereon, so that the racks 192 are elevated and the bearing slots 190' are moved out of engagement with the reel stub shafts 189. This permits of the cloth reel being lifted out of the turntable, in an obvious manner.

Although the turntable mechanism has been

shown and described as being arranged apart from the main part of the machine, it is to be understood that this has been done to facilitate the description and illustration thereof. Thus, the turntable mechanism may be mounted and arranged on a part of the main machine frame so as to form a composite part thereof. In any event, it is to be understood that the turntable is a necessary and component part of the entire machine and the manner in which it is arranged or supported is immaterial. It will also be understood that, while the turntable mechanism is shown and described as being operated by a separate motor, this mechanism will generally be coupled with and driven by the main motor **42** so that the latter will constitute the source of power for the entire cloth tube forming, twisting and winding apparatus.

As the angle folding bar **51** may be adjusted to cause the machine to produce tubes of varying diameters formed in the machine according to requirements, it is also necessary to vary the speed of rotation of the turntable carriage and the rewinding rollers so that the cloth tube will be untwisted and wound upon the reel accordingly and in timed relation with the balance of the machine. For example, if the angle of the angle bar **51** is made greater than forty-five (45) degrees, it follows that a tube of smaller diameter will be formed and a smaller twist will be imparted thereto. Thus, the speed of rotation of the turntable carriage will be decreased. However, as the cloth will then move through the machine at a faster rate of speed, the speed of rotation of the rewinding rollers on the turntable carriage must be correspondingly increased so that the cloth tube will be wound on the reel. On the other hand, if the angle of the angle bar **51** is made less than forty-five (45) degrees, a larger diameter tube will result and a greater or more pronounced twist will be imparted to the tube. In such a case, the speed of travel of the cloth through the machine will be decreased which will require the speed of rotation of the turntable carriage to be correspondingly increased. In which event, the rewinding rollers must also be decreased in speed. Any suitable control means may be provided for regulating the speed of the variable speed control unit and associated means for rotating the turntable carriage for varying the speed of rotation of the rewinding rollers and turntable carriage. One such type of control means is shown in part in Figures 1A, 2A and 10, wherein an upwardly and an angularly extending arm **260** is suitably connected at its lower end to a bracket **261** on the turntable frame. A sprocket **262** journalled in the upper end of the arm **260** is drivingly connected by a chain or the like **263** with a sprocket **264** on a shaft **265** connected with the Reeves variable speed control unit **162**. The sprocket **262** may be rotated by a handle **266** to actuate the shaft **265** which in turn varies the speed of the speed control unit **162** to vary the speed of rotation of the rewinding rollers **145** in any suitable manner, not shown. Also connected to the turntable machine bracket **261** is an upstanding arm **267** having an L-shaped arm **268** bolted thereto, as at **269**. A shaft **270**, journalled in the upper ends of the arms **267** and **268** carries a sprocket **271** which is drivingly connected by a chain or the like **272** with a sprocket **273** formed on a transverse shaft **274** journalled in the turntable machine frame. The shaft **274** is suitably connected, as at **275**, with the pulley shaft **177**, so that, when the shaft **270** is rotated by a crank **276** on a disk **277** on one end thereof, the electric motor drive belt **180** and turntable drive belt **175** may be respectively slackened or tightened, to either increase or decrease the speed of the turntable pulley **174**, in a well known manner. As the specific speed control unit is not important to the turntable mechanism, it is not deemed necessary to illustrate or describe the same in more detail.

It is to be understood that various changes and improvements may be made in the apparatus, herein described and illustrated, without departing from the scope and spirit of the appended claims.

Having thus described my invention what I claim is:

1. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, means on said frame for pulling one side edge of the strip, means for continuously feeding the strip of material from the source of supply to said guiding and pulling means, an adjustable angularly disposed means mounted on said frame and extending at an angle with respect to said guiding and pulling means for directing said moving strip substantially diagonally relative to the longitudinal axis of the apparatus, strip supporting and edge adjusting means mounted on said frame adjacent one end of and being angularly disposed relative to said angularly disposed means, and a tube forming means mounted on said frame and associated with said supporting and edge adjusting means whereby the marginal edges of the diagonally directed strip are brought together on the bias, and means on said frame for connecting the marginal edges to form said strip into a spirally wound continuous tube.

2. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, a pair of parallel rollers mounted on said frame at one side and extending substantially at right angles relative to the frame, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member adjustably mounted at one end to the frame and extending transversely of and at an angle to said frame for directing said moving strip substantially diagonally of the frame, a cloth supporting means mounted on said frame, an edge supporting means mounted on said frame adjacent said cloth supporting means, and a tube forming rod mounted on said frame adjacent said cloth supporting and edge supporting means for directing one marginal edge of the strip above the other marginal edge thereof, and means on said frame for connecting the marginal edges to form said strip into a continuous tube.

3. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, a pair of parallel rollers mounted on said frame at one side and extending substantially at right angles to the frame, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member having one end adjustably mounted at one side of the frame and extending transversely of and at an angle to said frame for directing said moving strip substantially diagonally of the frame, a cloth supporting means mounted on said

frame adjacent one side thereof, an edge supporting means mounted on said frame adjacent one side thereof, and a tube forming rod mounted on said frame adjacent said cloth supporting and edge supporting means for directing one marginal edge of the strip above the other marginal edge thereof, and means on said frame for connecting the marginal edges to form said strip into a continuous tube.

4. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, a pair of parallel rollers mounted on said frame at one side and extending substantially at right angles to the frame, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member having one end adjustably mounted at one side of the frame and extending transversely of and at an angle to said frame for directing said moving strip substantially diagonally of the frame, supporting means on said frame adjacent one side thereof, a cloth supporting roller carried by said supporting means for supporting said strip of cloth, an edge supporting means associated with said supporting means and a tube forming rod mounted on said frame adjacent said cloth supporting roller and said edge supporting means for directing one marginal edge of the strip above the other marginal edge thereof, and means on said frame for connecting the marginal edges to form said strip into a continuous tube.

5. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, a pair of parallel rollers mounted on said frame at one side and extending substantially at right angles to the frame, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member having one end adjustably mounted at one side of the frame and extending transversely of and at an angle to said frame for directing said moving strip substantially diagonally of the frame, supporting means on said frame adjacent one side thereof, a cloth supporting roller carried by said supporting means for supporting said strip of cloth, an edge supporting means carried by said supporting means and a tube forming rod mounted on and spaced above said frame adjacent said cloth supporting roller and said edge supporting means for directing one marginal edge of the strip above the other marginal edge thereof, and sewing means on said frame for connecting the marginal edges to form said strip into a continuous tube.

6. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, rollers mounted on said frame for guiding and pulling one side edge of the strip, means for continuously feeding the strip of material from the source of supply through said rollers, means on said frame for engaging and smoothing said continuously moving strip of material, an angularly disposed means mounted on said frame and extending at an angle with respect to said rollers for directing said moving strip substantially diagonally, and a tube forming means mounted on said frame whereby the marginal edges of the diagonally directed strip are caused to be brought together, sewing means on said frame for stitching the marginal edges together to form said strip into a continuous tube, and power means adjacent said sewing means for engaging with and pulling the formed cloth tube therefrom and means on said frame for imparting a waving movement to the cloth tube to assure of the tube being freed from the sewing means.

7. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply, a supporting frame, rollers mounted on said frame for guiding and pulling one side edge of the strip, means for continuously feeding the strip of material from the source of supply through said rollers, a plate at one side of said machine over which said strip passes and means on said plate for smoothing one side of the strip, an angularly disposed member mounted on said frame and extending at an angle with respect to said rollers for directing said moving strip substantially diagonally, a tube forming rod mounted on said frame adjacent one end of said member, and rollers on said frame associated with said rod and member for directing said diagonally extending strip over and under said rod whereby one marginal edge of the strip is arranged above the other marginal edge thereof, and sewing means on said frame associated with said forming rod and member for stitching the marginal edges of the strip together on the bias to form a continuous tube.

8. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, rollers mounted on said frame for guiding and pulling one side edge of said strip, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member mounted on said frame and extending at an angle with respect to said rollers for directing said moving strip substantially diagonally, and a laterally extending tube forming rod mounted on said frame adjacent one end of said member whereby the marginal edges of the diagonally directed strip are brought together on the bias, sewing means on said frame adjacent said member and forming rod for stitching the marginal edges together to form a continuous tube, rollers mounted on said frame adjacent said sewing means for pulling the tube therefrom, a cylindrical drum mounted on said frame for engaging the tube, means for rotating said drum for imparting a waving movement to the tube to assure of the tube being freed from the sewing means.

9. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, rollers mounted on said frame for guiding and pulling one side edge of said strip, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member mounted on said frame and extending at an angle with respect to said rollers for directing said moving strip substantially diagonally, and a laterally extending tube forming rod mounted on said frame adjacent one end of said member whereby the marginal edges of the diagonally directed strip are brought together on the bias, sewing means on said frame adjacent said member and forming rod for stitching the marginal edges together to form a continuous twisted tube, rollers mounted on said frame adjacent said sewing means for pulling the tube therefrom, a cylindrical drum mounted on one end of said frame for engaging the tube, means for rotating said drum for imparting a waving movement to the tube to as-

sure of the tube being freed from the sewing means, means for removing the twist formed in said tube, and means for winding the untwisted tube into a uniform tubular roll, all of said means operating in timed sequence.

10. An apparatus for forming tubes from a continuously moving strip of material from a source of material supply comprising a supporting frame, a pair of rollers mounted on said frame for guiding and pulling one side edge of said strip, means for continuously feeding the strip of material from the source of supply through said rollers, an angularly disposed member adjustably mounted at one end on said frame and extending parallel to and diagonally of the frame for directing said moving strip diagonally of the frame, a tube forming rod mounted on and extending laterally of the frame, spaced cloth supporting rollers on said frame adjacent one end of said member and extending substantially longitudinally of the frame above said forming rod for directing said diagonally extending strip over and under said rod whereby one marginal edge of the strip is arranged above the other marginal edge thereof, sewing means on said frame adjacent said member and supporting rollers and rod for stitching the marginal edges of the strip together on the bias to form a continuous tube having a twist therein, means for moving said twisted tube from said sewing means, means for removing the twist formed in the tube, and means for winding the untwisted tube into a uniform roll, all of said means operating in timed sequence.

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